

CONSTRUCTION OF BIG DAMS IN NORTH EAST INDIA: A CRITICAL STUDY

**A thesis submitted in part fulfillment of the requirements for the
degree of Doctor of Philosophy in Law**

Submitted By:

Mayashree Gharphalia

Under the Supervision of Dr. Diptimoni Boruah

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ABSTRACT

The Government of India proposes to construct mega dams in North East India. This is done because North East India has been identified as the future power house of the country and it has the potential of addressing the power crisis faced by the country in the present era.

Northeast India, consists of the seven sister states of Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and plus Sikkim. It is known for its biological and cultural diversity. The unique Brahmaputra and Barak river systems add to the magnificent beauty of this region. The eight states are collectively referred together as the „Northeast“. The region is a mosaic of substantial diversity both historically and in contemporary times. This region represents an important part of the Indo-Myanmar biodiversity hotspot and is home to important wildlife species. Himalaya and Indo-Burma are among the 34 global biodiversity hotspots recognized currently. The area is not amply documented and it seems that it has been an area of diminished concern.

North East India is a region of high level of endemism. The region shelters diversity of indigenous communities, with a substantial portion of the population dependent on natural resource based livelihoods. This diversity of communities comes with unique socio-cultural, agro-ecological and land-holding systems.

The Central Electricity Authority (CEA) in the year 2001 did a preliminary ranking study of the hydroelectric potential of various river basins in the country. The Brahmaputra basin was identified as a basin having the highest potential for hydropower. The push for large hydropower projects in the Northeast is primarily a process driven by the Central government till the gradual liberalisation of hydropower policies allowed states to invite private players.

There are issues associated with construction of mega dams in the region. Among a host of impacts, that dams would cause, the chief among them are: North East's fragile ecosystem that is rich in biodiversity shall be threatened by the proposed dams. These eco systems have been protected by indigenous communities for generations. The

downstream floodplains will be adversely affected by these dams. Additionally, if the dams were to be brought to fruition, many similar projects would erupt throughout the region.

The dams' utility and efficiency shall be hindered due to the extensive floods caused by the Brahmaputra during monsoon. Another factor is that the northeastern part of India is seismically active and has high possibilities of earthquakes. Therefore it can be argued that the Brahmaputra basin is a dangerous place to invest in dams. An earthquake could have severe impacts for the many people downstream. Finally, the regional farmers are heavily concerned about the soil erosion new dams would cause. It has been observed that dams wreak havoc on downstream floodplains. Soil erosion would destroy the habitat for indigenous wildlife as well as farms.

The research work focuses on issues associated with five major dams in North East. The dams are the Lower Subansiri, the Ranganadi, the Gumti, the Pagladia and the Tipaimukh. A common issue observed in all these cases is that prior informed consent has not been taken from the Project affected people and also the rehabilitation and resettlement schemes are inadequate. The environment impact assessment report, which is an important document in commissioning the dams seems to be a farce. The downstream impact of the dams has often been a neglected part in the common discourse of the dams. This has also been overlooked. When dams trap alluvial and sediments, it impacts the downstream region and the farmers. The North East falls in the fifth most active seismic zones of the world. Therefore, the construction of large number of dams to fulfill the development agenda of the state is not a desirable idea.

The World Commission of Dams was established in the year 1997 in a workshop in Switzerland, hosted by the World Bank and World Conservation Union. It was attended by diverse group of stake holders ranging from electricity companies to protest groups against dams. The strategic priorities of Dams and Development Report of the Commission are

- Gaining Public Acceptance
- Comprehensive Options Assessment
- Addressing Existing Dams
- Sustaining Rivers and Livelihoods

- Recognising Entitlements and Sharing Benefits
- Ensuring Compliance
- Sharing Rivers for Peace Development and Security

These good governance practices will act as the foundation and will have significance for the future global policy-making efforts.

Another important theme that finds a place in this investigation is how the state responds to the issue of development induced displacement. In the present neo liberal era, countries are moving towards a new model of development based on “developmentalism”. Unfortunately, in many regions of the developing world including North East India, this development has been forced to confront a wide variety of losses. Developmental projects like dams cause forcible displacement of people and there are no policies or guidelines for relief and rehabilitation for displaced people and attempt by the governments to formulate such policies have been feeble. The government has desired the diluting the rehabilitation and resettlement clause and asking the states to do away with the most essential provisions such as „prior informed consent“, „social impact assessment etc in their land acquisition acts. Against this backdrop this investigation will critically examine the inter relation between land acquisition, development and displacement. The present research also tries to consider the impact of land acquisition on displaced people and identifies loopholes in the existing legal framework.

Researcher has identified the legitimacy of dam construction under International Law as another thematic head of the .The third chapter of the research enterprise examines the international legitimacy of unilateral dam development in an international watercourse from the perspective of international water law. The thesis, explores how legal norms and principles can contribute to transboundary water cooperation. It investigates how equitable and reasonable utilization, as required by the United Nations Watercourse Convention, could be reached and whether current activities are in conformity with international norms. Based on this analysis and in the light of international customary law, the article questions the compatibility of unilateral control and capture of water resources

In this context, the present investigation concludes in the proposition that mega dams while recognised as important indicators of modern development, have proven to cause

long term ecological degradation and invariably displace human habitations. In the region of North East, the ecology is identified as delicate in nature, unique to the region and has higher potential risks if the balance is disturbed. The construction of large dams in the region thus poses a higher risk to both the delicately balanced unique ecology of the region as well as displacing people and their livelihoods



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CERTIFICATE

This is to certify that this thesis entitled “**Construction of Big Dams in North- East India: A Critical Study**”, presented by Mrs Mayashree Gharphalia, LL.M, Net ,for the award of degree of Doctor of Philosophy in Law to the National Law University and Judicial Academy, Assam is the result of her original investigation undertaken under my personal guidance and supervision.

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Date :

(Dr. Diptimoni Boruah)

Associate Professor

National Law University and Judicial Academy, Assam

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Mayashree Gharphalia

ABBREVIATIONS

AASU	All Assam Students Union
ABSU	All Bodo Students Union
ADB	Asian Development Bank
AJYCP	Asom Jatiyatabadi Yuba Chatra Parishad
AKIC	Amritsar Kolkata Industrial Corridor
ATMA	Appropriate Technology Mission Assam
BDR	Bangladesh Rifles
BJP	Bharatiya Janata Party
BMEC	Bengaluru Mumbai Economic Corridor
BSUP	Basic Services to Urban Poor
BTC	Bodoland Territorial Council
CAG	Comptroller and Auditor General
CBD	Convention on Bio Diversity
CBIC	Chennai Bengaluru Industrial Corridor
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
COPE	Committee on Peoples and Environment
CPR	Common Property Resources
CRPD	Convention on the Rights of Persons with Disabilities
DID	Development Induced Displacement
DMIC	Delhi Mumbai Industrial Corridor
DoNER	Development of North Eastern Region

ECEC	East Coast Economic Corridor
EIA	Environment Impact Assessment
FAC	Forest Advisory Committee
FPIC	Free Prior Informed Consent
FRL	Full Reservoir Level
GDP	Gross Domestic Product
GHG	Green House Gases
GLOFs	Glacial Lake Outburst Floods
GOI	Government of India
GW	Giga Wat
GWWD	Grand Western Water Diversion
Ha	Hectors
HEP	Hydro Electricity Project
ICESCR	International Covenant on Economic Social and Cultural Rights
ICJ	International Court of Justice
ICOLD	International Commission on Large Dams
IEA	International Energy Agency
IHSDP	Integrated Housing and Slum Development Programme
ILA	International Law Association
IPCC	Inter Governmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
IWRM	Integrated Water Resource Management

JNNURM	Jawaharlal Nehru National Urban Renewal Mission
KM	Kilometres
KMSS	Krishak Mukti Sangram Samiti
LAA	Land Acquisition Act
LDOFS	Landslide Dam Outburst Floods
MFF	Multi Tranche Financing Facility
MP	Madhya Pradesh
MOEF	Ministry of Environment and Forest
MOU	Memorandum of Understanding
MW	Mega Wat
NBWL	National Board of Wildlife
NDA	National Democratic Alliance
NEAA	National Environmental Appellate Authority
NEAMA	National Environmental Appraisal and Monitoring Authority
NEC	North Eastern Council
NEEPCO	North Eastern Electric Power Corporation Limited
NEI	North East India
NMP	National Manufacturing Policy
NER	North Eastern Region
NEWRA	North East Water Resources Authority
NGO	Non Governmental Organisation
NGT	National Green Tribunal

NHPC	National Hydro Power Corporation
NRRP	National Rehabilitation and Resettlement Policy
NTDRC	National Tipaimukh Dam Resistance Committee
PA	Protected Area
PAF	Project Affected Family
PIL	Public Interest Litigation
PPP	Public Private Partnership
R and R	Rehabilitation and Resettlement
Ro R	Run of the River
RFCTLARR	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act
RHEP	Ranganadi Hydro Electricity Project
SC	Scheduled Caste
SDP	Spatial and Development Plans
SIA	Social Impact Assessment
SNWD	South North Water Diversion
SPS	Safeguard Policy Statement
ST	Scheduled Tribe
UDHR	United Nation's Declaration of Human Rights
UIG	Urban Infrastructure Governance
UIDSSMT	Urban Infrastructure Development Scheme for Small and Medium Town
UN	United Nations

UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Program
UNDRIP	United Nations Declaration on the Rights of the Indigenous People
UNFCCC	United Nations Framework Convention on Climate Change
UPA	United Progressive Alliance
US	United States
USFS	Unclassified State Forests
USSR	United States of Soviet Russia
WCD	World Commission on Dams
WECD	World Commission on Environment and Development

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Appendix 1: Report on Downstream Impact Study of the Ongoing Subansiri Lower Hydroelectric Power Project at Gerukamukh of National Hydroelectric Power Corporation Limited

Appendix 2: RTI Information Details

CHAPTER I
INTRODUCTION

SYNOPSIS

- **PRELUDE**
- **BACKGROUND**
- **RESEARCH PROBLEM**
- **OBJECTIVES**
- **RESEARCH QUESTIONS**
- **HYPOTHESIS**
- **RESEARCH METHODOLOGY**
- **LITERATURE SURVEY**
- **RESEARCH GAP**
- **CHAPTER SUMMARY**

1.1 Prelude

The North Eastern Region (NER) of India has a great potential of untapped hydropower. The Government of India proposes to construct mega dams (herein after big dams) in the region to harness such potential. The key reason for such a proposal is that it would address the power crisis that the country is facing in the present times and north east has a vast potential of hydropower to meet the crisis.¹ The North East is a frontier region geographically located approximately in between Bhutan and Bangladesh.² The region has been politically and culturally sensitive and volatile, with numerous sub-national and ethnic conflicts occurring over the decades since independence.³ The causal factors are many and complex. Historical identity formations and animosities, resource crunch and livelihood challenges leading to ethnic conflict and perceptions of outsiders versus sons of the soil, and historically entrenched visions of autonomy and sovereignty have added to the sensitiveness.⁴ These challenges got further intensified with the rise of an enormous tea industry in the region which resulted in migration of tea labourers into the region from various parts of the mainland India such as West Bengal, Chota Nagpur Plateau, and Jharkhand, causing intensification of insider-outsider imagination. The region accounts for seven major National Parks that are home to rich flora and fauna.⁵

Besides being rich in natural biodiversity, the North –East is also one of the most seismically sensitive zones of India. The entire region is marked as seismic zone 5, which scientists identify as the highest risk laden zone and highly prone to the occurring of intense earth quakes.⁶ Construction of big dams will cause massive destruction of the region in terms of the rights of the people and the ecology of the region.

¹ Neeraj Vagholikar, *Dams and Environmental Governance in North East India*, DAMMING NORTH EASTINDIA(July,8,2019,10AM).

http://trpervis.nic.in/test/doc_files/Dams_and_Environmental_Governance_in_NE_India.pdf

² India's northeast comprises of seven States known as —Seven Sisters!/: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. Apart from these seven states, Sikkim was incorporated as its eighth State in 2002.

³ These movements seek various forms of political autonomy, and some others even pursue secessionist movements.

⁴ The Bodo Movement, secessionist movement of the United Liberation Front of Assam etc.

⁵ Sumit Chakravarty, et al, *North East India, The Geographical Gateway of India's Phytodiversity*, 8,IF,702,702(2012).

⁶ *Supra note 1.*

1.2 Background

In the recent years there have been proposals to construct hydroelectric dams across the seven states of North East and the state of Sikkim under the aegis of the Government of India .Such a decision of the government has triggered the debates on dams and development in the region. While the official accounts of government inform about the possibility of generating clean power and greater harvesting of water resources for development, there are evidences that focus on the potential risk factors and the need to assess them in a comprehensive way before proceeding with the construction of such projects. Even when there are many identified benefits of development projects such as dams, there is enough evidence, learnt from the experience with similar projects in parts of mainland India that highlight issues such as the need for comprehensive ecological and environmental risk impact assessment. There is a need for plan of action for their mitigation, there is the issue of cultural diversity and comprehensive planning of rehabilitation and resettlement of the project affected people and more generally the need for human rights impact assessment. Besides these concerns, the North East presents the specific risk factors of the seismic vulnerability and that of loss of indigenous cultures.

Such kind of development that the government has conceived may have tremendous effect on the human rights‘ of the people. The idea of developmentalism‘ is behind such pursuits by the Indian state. Premised on the idea that the productive structure of a nation may be improved with the help of active economic policy, this concept is based on a notion that some economic activities are more conducive to growth and generalised welfare than others.⁷ However such kind of development is not a convenient approach because it is no longer an obvious ambition in the light of ecological problems, at a time of revaluing local culture and cultural diversity.⁸

The region of North East India accounts for less than 8 percent of the country’s total geographical area and less than 4 percent of India’s total population.⁹ It measures about

⁷ Erik S Reinert, *Developmentalism*, Working paper on Technology Governance and Economic Dynamics no 34.

⁸ Developmentalism emphasizes the intervention of the state in the development of a nation. It stems largely from post-World War II aid projects targeting the underdevelopment of newly decolonized states. Developmentalism has been criticized for having a linear view of progress and for neglecting deeply rooted power inequities in the world system that are the root of underdevelopment and dependency.

⁹ SUBIR BHAUMIK, TROUBLED PERIPHERY, CRISIS OF INDIA’S NORTH EAST,1(2009).

2.6 lakh square kilometers with a population of around 39 million.¹⁰ It is a land of rich cultural heritage and bio-diversity. The region accounts for nearly 475 ethnic groups, about 200 tribal groups divided further into numerous communities.¹¹ It is a part of the Indo Burma Biodiversity Hotspot region which is ranked sixth among 34¹² biodiversity hotspot¹³ regions of the world. Among various other implications, the issue with large dams in north east India is that with the setting up of such dams, the slightest tremor of earthquake may collapse the dams and an extremely active geodynamic condition of the terrain in Arunachal Pradesh, may cause the entire land to be washed away by flood. Most importantly, Majuli, the largest riverine island in the world and Kaziranga National Park in Assam will be washed away. Such a catastrophe may endanger species in the Himalaya and Indo Burma bio diversity region, the two out of 34 global biodiversity regions in the world. Embankment breaching may intensify flood hazard. Secondly, the region is a hub of rich diversity of indigenous communities and a substantial portion of population depends on natural resources based livelihoods and this diversity is characterised by a unique socio cultural, agro ecological and landholding systems. Setting up of large dams may debar the communities of their

¹⁰ *Ibid.*

¹¹ *Supra note 9.*

¹² **Africa**

1. Eastern Afro-Montane 2. The Guinean forests of Western Africa 3. Horn of Africa 4. Madagascar and the Indian Ocean Islands 5. Maputo land, Podoland, Albany hotspot 6. Succulent Karoo 7. East Malanesian islands 8. South Africa's Cape floristic hotspot 9. Coastal forests of Eastern Africa.

Asia and Australia

1. Himalayan hotspot 2. The Eastern Himalayas 3. Japan biodiversity hotspot 4. Mountains of South-West China 5. New Caledonia 6. New Zealand biodiversity hotspot 7. Philippine biodiversity hotspot 8. Western Sunda (Indonesia, Malas and Brunei) 9. Wallace (Eastern Indonesia) 10. The Western Ghats of India and Islands of Sri Lanka 11. Polynesia and Micronesian Islands Complex including Hawaii 12. South-Western Australia.

North and Central America

1. California Floristic Province 2. Caribbean islands hotspot 3. Modrean pine-oak wood lands of the USA and Mexico border 4. The Mesoamerican forests.

South America

1. Brazil's Cerrado 2. Chilean winter rainfall (Valdivian) Forests 3. Tumbes-Choco-Magdalena 4. Tropical Andes 5. Atlantic forest.

Europe and Central Asia

1. Caucasus region 2. Iran-Anatolia region 3. The Mediterranean basin and its Eastern Coastal region.

¹³ Biodiversity hotspots are defined as regions —where exceptional concentrations of endemic species are undergoing an exceptional loss of habitat.

source of livelihood which is a violation of their right to a dignified life. The Environment Impact Assessment Report, a critical document that aids decision making by the government ignores this aspect. Thirdly a dominant argument in commissioning such mega projects is that the displacement that will occur as a result of such projects will be smaller as compared to that in the other parts of the country and therefore it is right to establish such projects in the region but the reality is that since major parts of North -East is hilly, permanent cultivation is almost impossible and therefore such projects should be established considering the context of the region in terms of demography, vegetation and land use practices. The next issue with large dams is that lower riparian will be adversely affected with the collapse of dams in case of an earthquake, an issue which is often neglected in popular discourse on impact of dams. Then again the electricity that is to be produced will be meant for use everywhere else through the process of Power Evacuation by a public sector enterprise except North-East because as per the Indian State North East's own electricity requirements are modest as compared to the rest of India. Now, one may ask as to how such consequences are an issue.

The big dams are a major source of conflict in the region. The issues involved with dam construction in the region are articulated within the framework of environmental governance in this research. This is because the Central Government through its Ministry of Environment and Forests (MoEF) currently governs the decision making process. The environmental and social impacts should be to be addressed in a comprehensive manner. The environment impact assessment for dams in the region has not been carried out in a desirable manner. The region is a hotspot for many wildlife species. Two out of 34 biodiversity hotspot regions cover North East Region. The current environmental impact assessment reports neglects this aspect. As far a social impact is concerned many indigenous communities that depend on the rivers for livelihoods will be debarred of their livelihoods. A neglected issue in the popular discourse on dams is the downstream impact. When a dam traps the flow of the river, it also traps sediments and other nutrients that fertilize the downstream plains. This is yet another impact of dam which often stands neglected. In case of Subansiri, the 116 metre high dam would submerge 3,436 ha. of forests. The Tipaimukh hydropower project is anticipated to submerge 275.50 sq km of land surface in the state. As far as the Pagladia hydropower project is concerned in a design of 23 kilometres long and 26 meters high

the dam will be constructed along with a reservoir to retain 446 million cubic meters of water which would submerge 38 villages.

The environmental and human rights impact of such developmental project equally needs attention and this research is an attempt to highlight the same.

The research enterprise has an introductory chapter that provides a prelude to the subject under study. The research then proceeds to give a general introduction to the proposal of dam construction in the region and provides a pen picture of hydropower potential of the region. In the third chapter, the legitimacy of dam building under international law has been identified as the third thematic head of the research. The fourth chapter provides case studies on five important dams of the region. The fifth chapter articulates the impact of dams from an environmental perspective. The Sixth chapter analyses the response of the state in preserving the human right to rehabilitation and resettlement of the project affected people. The researcher identifies 5 dams as case study in chapter number four of the research. They are: The Lower Subansiri, the Ranganadi, the Gumti, the Pagladia and the Tipaimukh. A brief account of their profile and anticipated affects are narrated below.

1) The Lower Subansiri Dam: Officially known as Subansiri Lower Hydroelectric Project the Lower Sowansiri Dam has been given green light by the National Green Tribunal. The dam is under construction and is located in the Gerukamukh village in Dhemaji District of Assam and Lower Subansiri District on the border of Assam and Arunachal Pradesh states.¹⁴ The dam will be the largest hydroelectric project in India if constructed as planned. The anticipated effects of the construction ranges from environmental impacts to ecosystem damage and loss of land. 47 km of the Subansiri river and around 40 sq km land mass of Himalayan Subtropical pine forests, Himalayan broadleaf forest parts of the tally Valley Wildlife Sanctuary will be submerged by the construction. An elephant corridor and some subsistence agriculture fields are also at stake. According to official data 38 families will be displaced if the dam is completed.

2) The Ranganadi Dam: Ranganadi dam is a run off the river dam. It has a Full Reservoir Level (FRL)¹⁵ of EL 567.00m.¹⁶ Run-of-river hydroelectricity (ROR) or *run-*

¹⁴ Available at <https://shodhganga.inflibnet.ac.in/bitstream/10603/98510/3/ch1.pdf>(August 1, 2019, 10:04 AM)

¹⁵ This is the highest reservoir level that can be maintained without spillway discharge or without passing water downstream through sluice ways.

of-the-*river* hydroelectricity is a type of hydroelectric generation plant whereby little or no water storage is provided. A part of the North Eastern Council (NEC) initially, this scheme and was to be implemented by the North Eastern Electric Power Corporation (NEEPCO). It was in the year 2002 the 68 m high dam with a capacity of 405 MW was commissioned in Lower Subansiri district. According to the NEEPCO the project will store water up to a level of 567 m and the reservoir will not be able to retain the water if flooding occurs.¹⁷ 3 units of this dam will be operated by a maximum of 160 cumecs¹⁸ of water. A tailrace channel will divert the water to the Dikrong River from the power house. The excess water will be released to the downstream of the Ranganadi River in a controlled manner.

3) The Gumti Dam: Gumti Hydroelectric Power Project is erected near Tirthamukh in the South Tripura District of Tripura. Commissioned in the year 1976, this power project was approved with an installed capacity of 15 MW.¹⁹ Gumti River is the basin of the power plant. The type of project is small, since its capacity is less than 25 MW and the type of power plant is Dam on river having reservoir. The hydroelectric project status is operational. The power project is erected in the Eastern Hydroelectric Region of the country.²⁰ The water source for the power project is from Gumti River.²¹

The Tripura State Government is the owner of the project and Tripura State Electricity Corporation Limited is the operator of the power plant.²² Tripura and the neighbouring states are the beneficiaries of the power plant. The construction of power plant is completed in 1984 and soon it started its operations. Vertical Shaft Francis²³ is used as power plant. The total installed capacity of the plant is 15 MW having three units. All of the three units are commissioned.

4) The Pagladia Dam: The Pagladia dam is proposed to be built near Thalkuchi village in Nalbari district of Assam.²⁴ It is one among the dams sanctioned in the North Eastern India. The anticipated site where this dam will be built is about is 26 kms north of

¹⁶ Available at https://shodhganga.inflibnet.ac.in/bitstream/10603/103457/12/12_chapter%203.pdf (August 1, 2019, 10:50 AM).

¹⁷ *Ibid.*

¹⁸ Unit of rate of flow of water, a cubic metre per second.

¹⁹ Available at <https://swapdial.com/public/knowledge-contents/industrial-data/gumti-hydroelectric-power-project/> (August 1, 2019, 11 AM).

²⁰ *Ibid.*

²¹ *Ibid.*

²² *Ibid.*

²³ A kind of hydropower turbine of a dam.

²⁴ Gita Bharali, *Pagladia Dam Project in Assam, :A Case Study*, Conference on Redressing Inequalities of Displacement by Development: Dams and Mines, 2004.

Nalbari town in the Nalbari district of Assam, near the Indo- Bhutan International Boarder.²⁵ Inhabited by both tribal and non-tribal community the area houses 90 percent of Bodo people and 10 percent are from the non-tribal community. This area is a strong hold of the All Bodo Students Association (ABSU). It is under the jurisdiction of the Boroland Territorial Council (BTC).The risk associated with the dam construction is that the Pagladia Dam will threaten their livelihood, socio-political practices, which are integrated and deeply-rooted to their ancestral lands. 38 villages will be submerged and beneficiaries of rehabilitation will be mostly non-tribals on the southern bank of Pagladia. According to the rehabilitation package proposed by the Brahmaputra board 18,473 people from 3271 families will be resettled but the actual number is much higher than that.²⁶

5) The Tipaimukh Dam: The Tipaimukh Dam is proposed embankment dam on the river Barak in Manipur state of India.²⁷ The purpose of the dam is flood control and production of hydroelectricity. In addition to the environmental impact, the Meitei People also have to be relocated.²⁸ Experts say that massive dam will disrupt the seasonal rhythm of the river and have an adverse effect on downstream agriculture and fisheries. Another environmental factor is the Tipaimukh Area lies in a seismically volatile reason of the planet.

The sixth chapter pertains to the human right to rehabilitation and resettlement of the displaced and analyses how the state has been responding to the issue of development induced displacement in the region.

The dams which are being pursued are proposed or will be constructed in a seismically volatile region. North East India falls in the fifth most seismic zone of the world. Also building of such dams goes against Electricity Act 2003 which provides that any developmental project should be environmentally benign. Section 36 of the Biodiversity Act, 2002 provides that before construction of any project the project affected people must be consulted.

²⁵ *Ibid* .

²⁶ *Ibid* .

²⁷ M.Assaduzaman,Md Mosahiur Rahman,*Impacts of Tipaimukh Dam on Down Stream region in Bangladesh: A Study on Probable EIA*,13 JSF,1,5,(2015).

²⁸ *Ibid* .

1.3 Research Problem

While dams continue as symbols of development and progress, there are hidden questions of ecological damage and human vulnerabilities. Therefore, development pursued through construction of big dams is not a convenient approach for development in North-East region as it may invite natural catastrophe and adversely affect the rights of the people, ecology, and socio cultural diversity of the region. The ongoing efforts to harness the vast hydropower potential through a series of dams have 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.

1.4 Objectives

The research has the following objectives

1. To analyse the need for construction of big dams in the region of North- East India
2. To analyse the impact of big dams, which are being currently pursued in the North-East India.
3. To understand the hydropower scenario of North- East India.
4. To evaluate the state of five big dams in the region.
5. To analyse the legitimacy of dam building under international law
6. To examine the human right to resettlement and rehabilitation and the approach of the government in responding to the people displaced due to construction of big dams.

The study aims to pursue this goal in the light of existing debates on dams and development at the national and global level and the specific empirical, political and ecological context of the North East to explore if a more holistic approach to development can be adopted.

1.5 Research Questions

1. What is the impact of large dams, which are being currently pursued in the North-East India?
2. What is the state of hydropower in the North- East region of India?
3. How do we assess the legitimacy of dam construction under international law?
4. What has been the state of five dams in North East India and what is the common thread that runs through all these dams?
5. What has been the response of the state in preserving the human right to resettlement and rehabilitation of the affected people?

1.6 Hypotheses

Big dams, while recognised as important indicators of modern development, have proven to cause long-term ecological degradation and invariably displace human habitations. In the region of the North-Eastern states, the ecology is identified as delicate in nature, unique to the region and has higher potential risks if the balance is disturbed. The construction of big dams in the region thus poses a higher risk to both the delicately balanced unique ecology of the region as well as displacing people and their livelihoods

1.7 Research Methodology

The researcher has employed qualitative method of research for the present investigation. Qualitative research is concerned with developing explanation of social phenomena which helps us to understand the world around us and why things are the way they are. It is concerned with the social aspects of the world thereby seeking to explore answers as to why people behave the way they do, how opinions and attitudes are formed, how people are affected by the events that go on around them, why and how cultures have developed, the difference between social groups etc. It is about confronting abstract with the concrete.

In order to aggregate an overall understanding of dams in North East, the researcher has used the report on downstream impact study of the ongoing Subansiri Lower Hydroelectric Power Project at Gerukamukh of the National Hydroelectric Power Corporation Limited Compiled by the expert Group on the dam. The researcher has further taken help of RTI filed to compile information on the theme under study.

Various books, newspapers, reports, relevant legislations and web sources have been consulted for the study.

The researcher has used extensively, information from North Eastern Social Research Centre, Library of National Law University Assam, Library of Gauhati University and Library of National Law University Delhi. Case study method have been employed compose one of the chapters for the present study.

The researcher emphasises on case study because it is descriptive and inductive owing to its characteristic of in depth study of an event or action and employment of multiple methods to interrogate it. Case study is therefore descriptive and heuristic. Heuristic means it seeks to provide an understanding of an issue. Bluebook 19th edition has been used for citation in the thesis.

A methodological challenge for the study will be to map and analyse the ethos of life and culture of peoples of the north east that often is indicated as the source of its unique character.

1.8 Literature Survey

1.R. Srivatsan, History of Development Thought A Critical Anthology, 2012

This book is a collection of papers excerpts written revolving round the subject of development. The book is an attempt to map the different ways of conceptualising and theorising development in the past 50 years. Development thought emerged as the governing principle of the First World global hegemony in the new world order marked by the end of the Second World War and the beginnings of decolonization. Six decades later in our present geopolitical conjecture marked by globalisation and neoliberal resurgence History of Development Thought revisits the major stands in the development debate from the 1950s to the early twenty first century.

2. Jan Nederveen Pieterse, Development Theory, 2010

The researcher has used this book extensively in writing about dams and development. The book under review represents the author's engagement with development studies over many years. Chapter I is the substantive introduction to the book .It problematises development knowledge and offers a stock major trends on development thought. Chapter 2 focuses on deep legacies of Euro centrism in developmentalism .Chapter 3 addresses the zigzag character of development thinking and its inconsistencies over

time. Chapter 4 revisits the political economy approach by way of Samir Amin's work Chapter 5 takes up various ways in which culture has been incorporated into development discourse and policy. Chapter 6 subjects alternative development claims to a critical treatment, Chapter 7 is critique of post development arguments. Chapter 8 argues for extending the human development approach to social development. Chapter 9 is a methodological reflection; it takes arguments on Eurocentrism in chapter 2 further and argues for critical holism as the Tao of development

Chapter 2 of the book has been used immensely in the investigation to say why development is no more an obvious aim today and how it is a Euro American concept.

3. Sandhya Goswami, Troubled Diversity, The Political Process in North East India, 2015

This book is edited by Sandya Goswami and is a collection of papers written by different authors. The book deals with the political context of the region of North East India. Running into the history of how the region was formed, the book deals with several issues that makes the region cut off from the mainland India and how it can be integrated. There is a chapter named the Nexus between Development and Diversity: A case study of the Pagladia Dam Project written by Barnalee Choudhury, which has been used by the researcher. The author says that the term -development is multifaceted and regarded as an important vehicle of progress for every society. She narrates how development became the main motive of the war torn nations to catch up with the western world. Dams have been a sign of development. As far as dams in Assam and in the larger context of the Northeast India is concerned she says that it has severely affected the tribal and the indigenous communities of the region are dependent on the traditional natural resource based livelihood.

4. P. Nayak, Growth and Human Development in North East India, 2014

This book is a collection of articles written by different authors. The Chapter—Socio political transition, growth trends and development Attainment in The North East in the Post Independence Period written by M.P Bezbaruah reviews the development experience of the region in the context of its political administrative transformation in the post independence period. He points out that development experience of the region has been mixed and uneven. While there are periods of high growth for individual states the region as a whole has been increasingly lagging behind the country in terms of per

capita income .He argues for enhancement of the rate of economic growth in the region based on its inherent strength and endowed resource base. If the author means that the rate of growth should be based on the natural resources then it can be critiqued from the perspective of the fact that development is no more an obvious aim in the light of a time of revaluing the local culture and resources. In a chapter titled —Politics of Human Development contributed by Apurba Kumar Baruah brings out the politics involved in the issues concerning human development. Citing the example of poverty he explains that in contemporary development theory poverty has been basically reduced to an issue of measurement and the issue of the mechanism of its generation is often overlooked.

5. Mc Duie Ra Duncan, Civil Society, Democratisation and Search for Human Security

The book under review examines the relationship between civil society and human security in the Indian state of Meghalaya, part of the region known as Northeast India. Civil society has been revived over the last two decades and is now one of the key concepts in development, politics, and international aid. The concept has gained particular significance as part of attempts to analyse and instigate grassroots democratisation through widespread political participation. This is seen as enabling a broader range of issues to be politicised and made a part of political agendas at the local, national, and global levels. However there are few studies that examine the constraints on civil society at the local level, even in contexts where civil society may appear to be active and vibrant. Those studies that do exist tend to focus on the constraints coming from the state, overlooking the constraints that come from within civil society itself. In the chapter titled Constructing Environmental Insecurity: The Politics of Degradation and Identity the author asserts that the links between tribal people and environmental sustainability are very strong in Indian environmentalism and among civil society actors. As Meghalaya is a tribal majority state and tribal people control the distribution and use of land, the egalitarian assumptions about tribal societies and their sustainable use of the environment are central to the way environmental degradation in Meghalaya is constructed in the rest of India. The lack of knowledge about Meghalaya, its people, and the Northeast region in general compounds such perceptions. As Sinha argues, there have been calls across India to take control of environmental resources, especially forests, away from the state and give it back to communities

6.K.R Dikshit, Jutta K.Dikshit, North East India, Land People ,Economy, 2014

The book opens with a chapter titled North-East India through the Ages. Similarly, to provide a background to the part on the People', a chapter entitled Early Colonisation is given as a prelude to enable the readers to appreciate the enormous variety in nomenclature and the present distribution of different groups. The book begins with the region's historical antecedents and the changes the region has experienced through the ages, in the opening chapter, North-East India through the Ages'. This chapter proves immense help to the researcher in understanding the North East as a region

7. Partha J Das, A Compendium of Case Studies: A Welcome Initiative, (Review of Water Conflicts in North East India), 2013

This compendium has been published by the Forum for policy Dialogue on Water Conflicts in India. Documenting water related conflicts has been the chief work of this forum. The forum has published 63 case studies from India. In this compendium on North East India, case studies from the region have been articulated. Being the first document of its kind, issues related to environmental concerns have been analysed in this compendium. This compendium analyses issues of annual flood in the Assam valley, the unprecedented rise in hydropower construction in Arunachal Pradesh, the threat of water diversion and dam building by China in the upstream of Brahmaputra, shortage drinking water in towns and hill areas etc. A compendium of 18 case studies, it covers different water related issues in the region. The rationale for this compendium has been brought to the fore by three chapters and a note by the editors. 18 case studies have been included out of which nine case studies deal with hydropower development and the rest of the nine studies other debatable issues related with water in the region. Dr. A.C. Bhagbati, a renowned social anthropologist from northeast expressed concerns for the implications of dam construction in the region in the chapter titled Damming of rivers and Anthropological Research: An Introductory Note'. In this chapter he expresses the concern that no anthropological research was carried out while planning development of the country and the impact of dams on the inhabitants remained only a technical question in the planning process of which nothing has changed even after these many years of independence.

Seismic Survey for OIL in the Brahmaputra River Basin: Scientific Understanding and People's Perceptions is a case study that deals with how natural resource extraction in the region has affected the water resources and how substandard

technologies used for seismic surveys and oil exploration have resulted in negative impacts as well as contestations in Assam. The Barak River: Conflict around the impending Oil Extraction in Manipur is another case study that talks about the potentiality of oil extraction in Manipur to worsen the conflicts in the region around the Barak river from its source in Manipur through Assam and up to Bangladesh

Partha J .Das writes the Water Quality in Assam: Challenges, Discontent and Conflict‘ and Conflicts over Drinking Water .The case study Jiadhal River Catchment: Conflicts over Embankments‘ .The focus of these case studies are the issue of frequent changes in the water course of Jiadhal river .The case study aptly and succinctly reflects upon the unpredictable nature of the rivers in the region. It asserts that embankments can do no good to protect‘the people from the fury of the river.

Riverbank Erosion in Rohmorla: Impact, Conflict and Peoples’Struggle is a case study by by Sidharth Kumar Lahiri that focuses on the worst erosion affected area of Assam, Rohmorla (in Dibrugarh district in upper Assam)

Two case studies The Kurichu Project in Bhutan: Transboundary Hydropower Projects and Downstream Impacts and Uncharted Waters: Navigating the Downstream Debate on China’s Water Policy‘ chart out how the transboundary nature of rivers in the northeast adds to the complexities of water conflicts in the region. The bursting of the Tsatichu landslide dammed lake in Bhutan led to flash floods that submerged parts of the Barpeta and Nalbari districts in downstream Assam by the Beki and Manas Rivers.

The latter case study by Nimmi Kurien, discusses the politics of the plan of China to build dams on the river Brahmaputra and divert its water which has a bearing on the water dynamics of northeast. Indicating that in order to establish the first user rights, India has neglected the ecological concerns and have planned to build mega dams in the Siang, Lohit and Subansiri rivers.

The issue of hydropower dams in the northeast has been divided into 9 case studies pertaining to Sikkim, Manipur, Arunachal Pradesh and Assam. The electricity that would be produced here is meant to be used everywhere else in the country but North East because as per the state, the energy requirement of North East India is low in comparison with the rest of the country. It can be observed that these case studies bring to light similar issues or instances leading to a larger critique of the hydropower development programme in the region although these case studies are located in

different states. Tipaimukh High Dam on the Barak River¹¹ written by R.K Ranjan states that construction of the Tipaimukh dam will lead to permanent displacement and loss of livelihoods of indigenous communities, mostly belonging to the Zeliangrong and Hmar people. Originally planned for flood control this hydropower dam has several issues ranging from geological and seismic factors, to the hydro dynamics of the dam itself.

Sikkim has been taken as yet another case study pertaining to the issue of dam construction in the region in the compendium. The case study titled Hydropower Projects on the Teesta River: Movements against Mega Dams in Sikkim¹² by Tseten Lepcha discusses the impact of hydropower projects on the livelihoods, ecosystem, cultural identity, religion, and political rights of the people and demographic changes due to influx of outsiders for dam construction.

Arunachal Pradesh has been identified as state having the highest hydropower potential in the North East India. Four case studies pertaining to the hydropower development in Arunachal Pradesh and show the extent of damage which the construction of dams will do to the society, environment, economy and culture of the state. The case study, titled The Dibang Multipurpose Project: Resistance of the Idu Mishmi¹³ by Raju Mimi focuses on the Dibang Multipurpose project. There are two major issues related to this hydropower project Firstly, the displacement that is going to occur as a result of the dam construction is considered to be negligible in face of the supposed economic viability of the project. Secondly due to huge influx of outside labourers for dam construction, there may be demographic imbalance of the Idu Mishmi¹⁴ of demographic Dibang valley. Two case studies on the Demwe Lower Hydro-Electric Project which is the lower most project of the 11 projects in the Lohit river basin and will be constructed near ParshuramKund, culturally significant site. Girin Chetia writes the chapter titled Damming the Lohit: Claims and Counter Claims¹⁵ to bring home the point that comprehensive cumulative impact assessment study has not been conducted for the construction of dams on the river basin.

The chapter Demwe Lower Hydroelectric Project in Lohit River Basin: Green Clearances Bypass Ecological and Socio-Cultural Concerns¹⁶ written by NeerajVaghlikar analyses this project from the perspective of environmental governance. He opines that commissioning of the said dam violates various

environmental and wildlife related laws in the country. There has been no public hearing held for this project.

The Lower Siang Hydropower Project has been studied by Arjing Perting who focuses on the proposed 2700 MW Lower Siang HEP one of the series of projects proposed in the Siang Basin. The project has been opposed by Adi Student Union (AdiSU), Siang People's Forum and Forum for Siang Dialogue on the grounds of issues similar to the ones discussed in the context of the other projects above.

The Kopili Hydro-Electric Project: Downstream People Rise in Struggle' is the case study presents the issue of floods in the downstream in 2004 due to the release of excess of water from the said project.

The case study State Water Policy of Assam 2007: Conflict over Commercialising Water by Chandan Kumar shows that there are anomalies in the draft State Water Policy 2007 and in preparation of it not much civil society participation was allowed.

N.G. Mahanta in his chapter Water Conflicts in Northeast India: The Need for a Multi-track Mechanism focuses on the approach to be adhered to in order to engage with water conflicts in the north-eastern region. Whose River is it, anyway? by Sanjib Baruah focuses particularly on the Lower Subansiri project. It also discusses most of the issues which have been addressed by various case studies in the compendium. This study highlights that the government wants to massively intervene in hydropower generation through hydropower generation in the North East India. The Government of India aims to add 400 hydropower dams with a total capacity of 107,000 MW by 2025 - 2026. Out of this, according to CEA estimates Northeast India could generate as much as 58,971 MW of hydropower. This compendium has important information regarding water conflict issues in the North East region.

8. Monirul Hussain, Interrogating Development: State, Displacement and Popular Resistance in North East India, 1900

Monirul Hussain in this book has documented development induced displacement of population in the region in the post-colonial period. Despite state-sponsored development initiatives, the North East still remains highly underdeveloped and politically disturbed. Various development projects initiated by the state led to massive displacement of population within the region, which has virtually gone unnoticed. The author has made use of extensive empirical data to document this massive displacement.

A significant shift in the politics of the region has been the emergence of popular resistance outside the conventional party system, based on new political cleavages is strengthening the democratic consciousness of the people.

9. Manju Menon, A Dossier of Large Dams For Hydropower In Northeast India, 2005

The environmental and social impacts of the hydropower projects, unfavourable and disproportionate cost-benefit ratios, have been drawn out in this volume. Reflections on impacts of conservation offsets such as compensatory afforestation have been done. This work is the result of project reports and communication between ministries, departments and experts.

10. Hanna Werner, The Politics of Dams: Developmental Perspectives and Social Critique in Modern India, 2015

Construction of large dams has been rampant in post-Independence developmental politics in India. Tracing the ideological foundation of dam-building in India this volume explains the opposition dam building faces and if there is an alternative to dam building.

It combines a historical analysis of the politics of dam and grounds the reflections on the language of resistance. The methodology employed is ethnography of the north Indian Tehri dispute about hydropower projects on the Ganges.

Modernity and development is the theoretical framework of the volume. The broader intellectual and political underpinnings are crucial in order to rethink the different layers of critique with regard to such projects.

11. Social Institute New Delhi, The Dam and the Nation: Displacement and Resettlement in the Narmada Valley, 2002

The researcher has used this book extensively in understanding the issue of Resettlement and Rehabilitation with all its political antecedents in the Narmada Valley

12. Jean Dreze, Displacement and Resettlement: Ecological and Political Issues in the Narmada Valley Conflict, 1997

This volume investigates the problem of displacement and resettlement in the Narmada valley in all its aspects. Empirical evidence has been used for putting forward the

resettlement scenario in the valley. Issues relating to development –induced displacement have been highlighted through the method of case study.

13. Thounaojam Somokanta, Large Dams in India, The Missing Dimension of Science, Technology and Society (STS), 2018

This book fills the existing lacuna in research in Science, Technology and Society (STS) through a review of existing studies of large dams in India, and analysing a case study of the proposed Tipaimukh dam project in Manipur, India. It reveals the strong connections between risk, technology, politics and environmentalism in the context of the Tipaimukh dam.

14. Pranab Bardhan, The Political Economy of Development in India, 1998

Bardhan examines the political and social constraints on Indian development. In the newly added epilogue Bardhan comments on the process of liberalization in the 1990 s and examines the feasibility of the exercise in the light of ground realities.

15. Kate Baylis, et.al The Political Economy of Development: The World Bank, Neoliberalism and Development Research, 2011

This book helps understand the evolution and thinking of the World Bank in development practices. The Political Economy of Development provides tools for gaining this understanding and applies them across a range of topics. The research, practice and scholarship of development are always set against the backdrop of the World Bank, whose formidable presence shapes both development practice and thinking. This book brings together academics that specialise in different subject areas of development and reviews their findings in the context of the World Bank as knowledge bank, policy-maker and financial institution. The volume offers a compelling contribution to our understanding of development studies and of development itself

16. Julie K. Maldonado, Challenging the Prevailing Paradigm of Displacement and Resettlement, 2018

A critical problem on the international development agenda is Development-caused forced displacement and resettlement (DFDR) .The frequency of forced displacements is rapidly increasing, while there are inadequate poor and misleading reporting from the side of the government. This book analyzes widespread impoverishment outcomes, risks to human rights, and other adverse impacts of displacement; it

documents under-compensation of expropriated people, critiques cost externalization on re settlers, and points a laser light on the absence of protective, robust, and binding legal frameworks in the overwhelming majority of developing countries. The book suggests and proposes constructive solutions to improve quality respect human rights. It also advocates for the reparation of bad legacies left behind by failed resettlement. It brings together prominent scholars and practitioners from several countries who argue that states, development agencies, and private sector corporations which trigger displacements must adopt a "resettlement with development" paradigm. The book's co-authors do research into legal, economic, financial, policy, and pragmatic operational recommendations.

17. M.H Fulekar, Environment and Sustainable Development, 2014

Mankind is facing many challenges of improving the quality of air, water, soil and the environment and maintaining the ecological balance in the present era. A major global concern in the present era is environmental pollution, accentuated by modern growth of industrialization, urbanization, modern agricultural development and energy generation. This has also lead to the indiscriminate exploitation of natural resources for fulfilling human desires and needs, thus contributing to the disturbing of the ecological.

This book contemplates that human beings, in the truest sense, are the product of their environment. Arguably, it can be said that the man-environment relationship indicates pollution and deterioration of the environment have a social origin. The modern technological advancements has produced contaminants in the form of chemical, chemical processes processes/operations and other pollutants which are above the self-cleaning capacity of the environment. Deterioration of the environment from the various sources is a threat to human lives. The impact of the pollutants on the environment will be significant when the accumulated pollutants load will exceed the carrying capacity of the receiving environment.

Sustainable development envisages the use of natural resources, such as forests, land, water and fisheries, in a sustainable manner without causing changes in our natural world. The Rio de Janeiro-Earth Summit, held in Brazil in 1992, focused on sustainable development to encourage respect and concern for the use of natural resources in a sustainable manner for the protection of the environment.

18. K.R Shanmugam, Environment and Development: Essays in Honour of Dr U. Sankar, 2016

This book discusses valuing environmental degradation, green economic growth, trade environment linkage, climate change, health outcome efficiency and public works programmes.

19. Sarah Bracking, Valuing Development, Environment and Conservation Creating Values that Matter, 2020

Policy-makers and infrastructural project developers are increasingly and carefully trying to assign economic values to things such as ecologies, the atmosphere, even human lives. Previously these values were kept outside the purview of economic systems. This book explores the complex interdependencies, contradictions and trade-offs that can take place between economic values and the social, environmental, political and ethical systems that inform non-monetary valuation processes.

The book outlines the valuation, their components, calculative technologies, and outcomes in different social, ecological and conservation domains by using rich empirical methods and tools. The book gives reasons for why economic calculation and technocratic institutions dominate in actual practice and also highlights on the ingenuity of human and non-human agencies can combine and frustrate the dominant economic models.

The tension between dominant model that emphasises technical and universalising criteria on one hand , valuation practice in specific local contexts on the other hand is nicely depicted in the book .

20. Flavia Rocha Loures, The UN Watercourses Convention in Force, Strengthening International Law For Transboundary Water Management, 2013

In 1997, majority of States in the UN General Assembly voted for the adoption of the UN Water Courses Convention.²⁹ It is a global overarching framework governing the rights and duties of States sharing freshwater systems. There are 263 shared watersheds in the world, which drain the territories of 145 countries and accounts for more than forty percent of the Earth's land surface. Therefore effective interstate cooperation and management of water courses in line with international legal instruments is a topic of crucial importance, especially in the context of the current global water crisis.

²⁹ United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses.

The role and relevance of the UN Watercourses Convention is being assessed in this book. It describes and evaluates its entry into force as a key component of transboundary water governance.

Before, it can enter into force, the Convention requires further contracting States to approve it. The drafting and negotiation of the Convention and its relationship to other multilateral environmental agreements has been described in this book. There are case studies to assess the role of the Convention at various levels: regional (European Union, East Africa, West Africa, Central Asia, Central America and South America), river basin (e.g. the Mekong and Congo) and national (e.g. Ethiopia and Mexico). The book in its conclusion proposes how future implementation of the convention will strengthen international cooperation in the management of water resources, and hence promote biodiversity conservation as well as sustainable and equitable use.

21. Kanchan Chopra, Development and Environment Policy in India, 2017

This book examines the nuances of the relationship between development and environmental conservation policy in India over the last three decades. Keeping India as the base or the focal point, the study extends to an analysis of global aspects and other developing countries as and when the situation demands. The crux of the book is that development always has to take environmental issues into consideration.

Articles:

1. Neeraj Vagholikar, Dams and Environmental Governance in North East India

In this article the author explains the impact of dam building in north east India. This has been done within the framework of environmental governance because currently governance framework in the country pertaining to environment and ecology is lead by the Ministry of Environment and Forests (MoEF) of the Central Government of India. The article stresses on the point that comprehensive environmental and social impacts assessment must be carried on in a comprehensive way to assess the viability of the projects. Environmental clearance is a mandatory process which the large hydroelectric projects need to pass through. The environmental clearance procedures are administered by the MoEF, to evaluate the viability of the hydroelectric projects on environmental and social grounds. Public consultations are mandatory so that people can render informed consent for such projects for grant or rejection of clearance.

Projects could also require other clearances, based on their specific locations. For example forest clearance from the MoEF and the Standing Committee of the National Board of Wildlife(NBWL) is required if a developmental project such as dam is to be constructed inside or within a 10 km range of wildlife protected areas.

2. Mmhonlumo Kikon, Dams in India's North-East: Putting a Mega Diversity region in a Hotspot

This article describes the impact of dam building in North-East India and the author in this article says that the decisions on viability of the dam and future dam projects in the region must be founded on affirmative answers for questions such as: Whether the people been given a chance to express their informed consent and participate in the development process at local and regional levels? Is there an alternative to water and energy resource development? Have the authorities raised beyond the technocratic questions and the social and environmental factors been given the importance in assessing options? If there is a lack of basin wide understanding of the ecology of the rivers then a knowledge regime can be the way forward to help holistic development. If the answers to these pertinent questions are found to be assertive, only then persual of large hydropower projects is a conducive idea for a context like North East India.

1.9 Research Gap

A Knowledge gap in most of the studies relating to dams and development is that the international legal framework pertaining to dams and water management of international watercourses finds no articulation. This research enterprise attempts to throw light on this important aspect. There is dearth of information on the legal perspective of the issue of dam construction. Therefore this research enterprise attempts to articulate on the environmental, international and human rights aspects within the ambit of legal perspective.

CHAPTER SUMMARY

- This chapter articulates the prelude to the research undertaken by the researcher which gives a pen picture of the issue of dams and development in North East India.
- It explains the background of the problem as to why the government of India plans to build big dams in the region.
- The research problem has been highlighted as the human and ecological issues associated with such plan.
- The objectives have been highlighted as to what are the aims that this research seeks to fulfill.
- In order to fulfill the objectives, the research questions have been framed to seek answers to various questions raised in the research.
- Hypothesis has been framed. It is the assumption or the proposition that the research aims to test.
- The research methodology has been highlighted as qualitative.
- A robust survey of literature has been done to inquire on the previous works on the topic.
- The research gap that this research aims to solve is the lack of legal perspective on the topic in the previous works.

CHAPTER II
CONSTRUCTION OF BIG DAMS IN NORTH EAST
INDIA AND ITS HYDROPOWER PROSPECTS

SYNOPSIS

- **INTRODUCTION**
- **THE REGION OF NORTH EAST INDIA**
- **GEOGRAPHY OF NORTH EAST INDIA**
- **CURRENT SCENARIO OF HYDROPOWER IN NORTH EAST INDIA**
- **FACTS ON NORTH EAST HYDROPOWER**
- **BENEFITS OF HYDROPOWER**
- **BENDING RULES ON HYDROPOWER AND DAMS**
- **POLITICAL ECONOMY OF HYDROPOWER**
- **PEOPLE AND POLITICS ON HYDROPOWER IN NORTH EAST INDIA**
- **ISSUES IN HYDROPOWER HARNESSING IN NORTHEAST INDIA
ACCORDING TO THE STANDING COMMITTEE ON ENERGY**
- **INCOMPREHENSIVENESS OF THE SCE REPORT**
- **CONCLUSION**
- **CHAPTER SUMMARY**

2.1 Introduction

The Government of India has projected North- East India as India's future powerhouse'.³⁰ The hydroelectric projects that are planned in this region have the potentiality to change and alter the river scape of the region.³¹ Big dams are emerging as a key cause of conflict in the region. The region has witnessed many dam-related conflicts in the past. For example, because of the Kaptai dam, built in the Chittagong Hill Tracts during the 1960s, the traditional homelands of the Hajong and Chakma communities were submerged. Not only this, they were forced to migrate into other parts of Northeast India.³² Construction of big dams has led to clashes and conflicts between the local communities and the refugees in Arunachal Pradesh. Arable land in the Raima Valley were submerged because of the construction of the Gumti dam in Tripura in the 1970s. Local tribal population were displaced that caused considerable unrest in the valley.³³ In Manipur the Loktak dam project commissioned in the 1980s affected the wetland ecology of the Loktak Lake endangering the habitat of the endangered Sangai (the brow-antlered deer). This was coupled with loss of livelihoods of local people in the region.³⁴ The impending loss of home, land and livelihood due to the Tipaimukh Project in Manipur and Pagladiya project in Assam has been a serious cause of concern for the people. More recently Assam and Arunachal Pradesh have witnessed major conflicts because of lack of individual and cumulative impact assessment of over 100 dams planned in the upstream of Arunachal Pradesh. Dam induced floods due to the Ranganadi hydro electric projects have resulted in devastation in Assam and Arunachal Pradesh. There has been stiff opposition against the construction of Subansiri hydroelectric project on the Assam Arunachal Pradesh border from affected people, activists and civil society. Major debates centering on the downstream impacts of the dams have been triggered by these factors. Meanwhile, the Lepchas and the Idu Mishmis in uplands of Sikkim and Arunachal are concerned about

³⁰ Manju Menon, et,al, *Large dams in North East ,A Bright Future?*(Aug 29,2019.10 PM), file:///C:/Users/hp/Downloads/LargeDamsinNEIndia-AbrightfutureEcologistAsia%20(11).pdf.

³¹ *Ibid* .

³² Aranyak ,et. al, *Damming North East India - Juggernaut of Hydropower Projects Threatens Social and Environmental Security of Region*,(Aug29,2019,11PM) <https://www.indiawaterportal.org/articles/damming-north-east-india-juggernaut-hydropower-projects-threatens-social-and-environmental>.

³³ *Ibid* .

³⁴ *Ibid*.

the hydro projects planned in their homelands.³⁵ Arguably, the big dams seem like the largest development intervention in the region that is ecologically, seismically and culturally sensitive.

It is necessary to articulate upon the context of the research work. The physical profile of the region along with a succinct discussion on the hydropower scenario is provided in this chapter which serves as a context for the problem undertaken to study.

2.2 The Region of North-East India

The eight states of North-East India are Assam, Arunachal Pradesh, Meghalaya, Manipur, Nagaland, Mizoram, Tripura and Sikkim. This region exhibits unique biological and cultural diversity coupled with striking land holding systems.³⁶ The Brahmaputra and Barak river systems add to the diversity and uniqueness of the region. Though the seven states including Sikkim are known as the North East, there is great measure of diversity within the region in terms of political and socio economic issues. The region is rich in biodiversity and is a home of elephant, rhino, wild water buffalo, pygmy hog and Gangetic river dolphin.³⁷ The Himalaya, Indo-Burma, and Western Ghats and Sri Lanka, the three out of 34 biodiversity hotspots cover parts of India. The first two are found in North East India. 8% of the country's geographical area is found in North East India. As estimated by the international criteria, the region houses 21% of Important Bird Areas within India. North East is an area of diminished concern and is still poorly documented. Biologists have discovered new species of animals in the region in the recent years. In addition to smaller life forms, biologists have discovered large mammals such as primates. This is an indication of the unexplored and pristine nature of the region. The northeast also has a high level of endemism (plant and animal species found nowhere else).

The Brahmaputra is the one of world's largest river. The river Brahmaputra originates in the Tibet and falls in the Bay of Bengal.³⁸ From its origin to its outfall, it measures 2897 km.³⁹ It flows for 1625 km in Tibet, 918 km in India and 354 km in Bangladesh.⁴⁰ The river's catchment area⁴¹ is 580,000 sq km which measures 293,000 Sq. km in Tibet,

³⁵ *Ibid.*

³⁶ Pranab Kumar Das, *North East, The Power House of India: Prospects and Problems*, 18, JHSS, 36, 36, 2013.

³⁷ *Ibid.*

³⁸ Available at The Brahmaputra River , https://shodhganga.inflibnet.ac.in/bitstream/10603/69957/9/09_chapter%204.pdf (Aug 20, 2020, 4 PM)

³⁹ *Ibid.*

⁴⁰ *Ibid.*

⁴¹ A catchment of a river is the area of a land where rain water is collected. It is often bounded by hills

.This rain water feeds the river when the water flows over the landscape, it finds its way into streams and down into the soil. In times of low rainfall some of this water stays underground and continues to slowly feed the river .Every inch of land on the Earth forms part of a catchment.

240,000 Sq. Km in India and Bhutan and 47,000 Sq. km in Bangladesh.⁴² It is known in different names in different places. In Tibet it is known as *Tsangpo*, in China it is known as *Yarlungzangbo*, *Jamuna* in Bangladesh, on entering India it takes the name of Brahmaputra. More precisely the river on entering India and after girdling round *Namcha Barwa*⁴³ peak of the Himalayas, the river is known as *Siang* in its upper reaches and the *Dihang* in its lower reaches near *Along* and *Pasighat* of Arunachal Pradesh. After *Pasighat* of Arunachal Pradesh and near *Sadiya* of Assam as the river is joined by two other Trans-Himalayan rivers, the *Dibang* and the *Luhit*, it is known as the Brahmaputra. Steamers and boats can navigate in its channel at an average altitude of 3,650m above mean sea level for a length of upto 640 Km. This feature makes this waterway one of the most remarkable waterways of the world. There are different schools of thoughts regarding the source of Brahmaputra, till the late nineteenth century. In the later part of the nineteenth century Swedish explorer Sven Hedin⁴⁴ conclusively said that the mountain *Tamchok-Kabab* which stands on the east of *Langchen Kabab* is the source of the Brahmaputra River. The previous impression that the river originates in the *Manas Sarovar*⁴⁵ lake is an erroneous one. The source of this river is at an altitude of 5,300m, about 63 Km south east of *Manas Sarovar* lake in south west Tibet. The Brahmaputra belongs to the family of south flowing rivers of the Himalaya, namely, Huang Ho⁴⁶, Yangtze-Kiang⁴⁷ and Mekong.⁴⁸ These rivers share most of the characteristics with the Brahmaputra. Many tributaries merge in the infant stage of their outlet from near the Mayum-La pass (5,150m) and Marnayak-La pass (5,303m). The Brahmaputra is separated from the Manas Sarowar Lake by these passes. Two other Indian rivers Indus⁴⁹ and Sutlej⁵⁰ have their source here.

⁴²*Supra note 5.*

⁴³It is a mountain in the Tibetan Himalaya. The traditional definition of the Himalaya extending from the Indus River to the Brahmaputra would make it the eastern anchor of the entire mountain chain, and it is the highest peak of its own section as well as Earth's easternmost peak over 7,600 metres (24,900 ft).

⁴⁴ Swedish explorer who led through a series of expeditions through Central Asia that resulted in important archaeological and geographical findings.

⁴⁵High altitude fresh water lake fed by the Kailash Glacier

⁴⁶The Yellow River or Huang Ho is the second-longest river in China, after the Yangtze River, and the sixth-longest river system in the world at the estimated length of 5,464 km.

⁴⁷The Yangtze or Yangzi is the longest river in Asia, the third-longest in the world and the longest in the world to flow entirely within one country.

⁴⁸The Mekong, or Mekong River, is a trans-boundary river in East Asia and Southeast Asia. It is the world's twelfth longest river and the seventh longest in Asia.

⁴⁹The Indus River (also called the Sindhū) is one of the longest rivers in Asia. It flows through China (western Tibet), India (Ladakh) and Pakistan.

The Barak River that originates in Manipur is the other major river in Northeast India. The upper catchment area of the river falls in the north, north western, western and south western portion of the state of Manipur. The middle course of the river flows through the plains of Cachar in southern Assam, while the lower, deltaic course falls in Bangladesh. The Brahmaputra and the Barak, both the river systems can be called the lifeline of the region and the local communities. The local communities depend on fishing and agriculture fed by the rivers in their respective flood plains.

The region is a mosaic of diversity of indigenous communities that adds to the uniqueness of the region. A substantial portion of the population depends on livelihoods that are natural resource-based. Indicators like unique, agro-ecological, socio-cultural, and land-holding systems mark the diversity of communities. Massive demographic and economic changes were brought by the influx of workers for tea and other business in the later part of the 19th century. In 1875, the British established the inner line⁵⁰ - a demarcation between the plains and the mountains so that there is no conflict or clashes between the hills and the plains population. This scheme of the government and the geographic moderation of the region kept Arunachal Pradesh away from upheavals, unlike in Assam where massive stretches of land were converted into privately owned tea gardens.

Struggles for political autonomy and the associated armed conflicts have added to the socio-political complexities of the region in the present times. The Constitution of India has tried to accommodate the unique demands of the region by establishing an administrative system that is different from the rest of the country. Different degrees of autonomy and self management of natural resources has been devised for the indigenous communities by the Sixth Schedule of the Constitution of India. In spite of such arrangements, they are debarred from taking part in the decision making process related to developmental projects.

2.3 Geography of North East India

2.3.1 Location

The location of North- East India is between 25°7′ N and 28°23′ N latitude, 89 °46′ E and 97°25′ E longitude. It is situated to the south of Himalaya. North East India has a

⁵⁰Longest of the five rivers that flow through the historic crossroads region of Punjab in northern India and Pakistan.

total area of 26.22 million hectares whereas the total area of India accounts 329 million hectares⁵¹. There are total eight states in North-East. They are Assam, Meghalaya, Arunachal Pradesh, Nagaland, Tripura, Manipur, Mizoram and Sikkim.⁵² In the north and north east, this region shares international borders with China and Bhutan.⁵³ Bangladesh and Myanmar surrounds the region on the south and south- east. Assam and Tripura are plain states while the rest of the states can be called almost mountainous.⁵⁴ Popularly known as the Chicken's Neck, the Siliguri Corridor a narrow land passage connects the western part of the region to the eastern part of the country. This land is between Nepal and Bangladesh

2.3.2 Physiographic Features

The Northeast region can be physiographically categorized into the Eastern Himalayas, Northeast Hills (Patkai-Naga Hills and Lushai Hills), Plateau of Meghalaya and the Brahmaputra-Barak Valley Plains

PHYSIOGRAPHIC REGION	ADMINISTRATIVE AREA
Eastern Himalaya	Sikkim And Arunachal Pradesh
North East Hill(Patkai Naga Hills And Lushai Hills	Manipur ,Mizoram And Nagaland
Plateau of Meghalaya	Entire State Of Meghalaya
Brahmaputra And Barak Valley Plains	Assam And Tripura

2.3.3 Geological Features

The North-East and the adjoining region make a complex geological province. The east-west Eastern Himalaya and the north south Patkai, Naga, Manipur, Chin, Arakan, and Yoma hill ranges (of Indo-Burmese origin) converges to make up the region. Collision and subsequent subduction between the land masses of India and Eurasia formed these tertiary mobile belts.⁵⁵ The northwest trending diorite-granodiorite⁵⁶ complex of the

⁵¹ Available at <http://databank.nedfi.com/content/north-east-india>(Aug 30,2019,10 PM).

⁵² T.RAATAN,HISTORY ,RELIGION AND CULTURE OF NORTH EAST INDIA,9(2006).

⁵³ *Ibid.*

⁵⁴ *Ibid.*

⁵⁵ The largest continental area on earth, comprising all of Europe and Asia.

⁵⁶ Often found in volcanic arcs, Granodiorite is an intrusive rock, intermediate in composition between diorite and granite. Although often similar in appearance to diorite or granite, it has a higher quartz content than diorite, and a higher mafic mineral content than granite.

Mishmi massif truncates the two belts to the North-East.⁵⁷ The Archaean-Proterozoic cratonic lies in the core of these mutually orthogonally disposed mobile belts.⁵⁸ Elements of the Meghalaya plateau and the Mikir Hills, cover the southern margin of the Meghalaya plateau.⁵⁹ The Shillong (Meghalaya) massif is the oldest in north-eastern promontory of the Indian shield, which occupies a crucial tectonic position between the Himalaya in the north and the Indo-Burmese arc to the east. This massif is the only landmass that existed in the region before the break up of Gondwanaland. The plateau consists of high-grade gneissic complex, overlain by mildly deformed Proterozoic intracratonic⁶⁰. A narrow passage of foothill land in North Bengal measuring 33 km in width on eastern side and 20 km on the western side connects the region to the main land India. Called the Siliguri Corridor or Chicken's neck this passage is often disrupted due to heavy rains and floods.⁶¹ The whole North Eastern Region is covered by Brahmaputra-Barak river system. The three parts that spread over the whole region is Assam valley (Brahmaputra), Purbanchal and Meghalaya Mikir (Bodo) regions.⁶² The total area of Assam valley is 58,274 sq.km., which is 720 km. long and 80 km. wide.⁶³ The valley is split by Eastern Himalayas, Patkai Naga Hills and Garo, Khasi and Mikir Hills.

The Assam Valley Consists of the districts such as, Sibsagar, Darrang, Nowgong, Kamrup, Goalpara, Dibrugarh and Lakhimpur, and they are important from an administrative point of view. Purvanchal region measures 94, 800 sq.km and comprises Manipur, Nagaland, Tripura, Arunachal Pradesh and Mizo Hills and Cachar. It has Bangladesh at south-west, Myanmar at southeast and China at north-west.⁶⁴ The third part of the region which is Meghalaya Mikir, starts at Dhansiri at the east and ends at Singimari at the west. It measures 400 km. long and 40 km. wide covering an area of 35,291 sq.km. The state of Meghalaya, a part of North Cachar Hill districts of Assam and a part of Karbi Anglong makes up this area. The region of North East from the

⁵⁷ A compact group of mountains .

⁵⁸ Archaean cratons are the stable remnants of Earth's early continental lithosphere, and their structure, composition and survival over geological time make them unique features of the Earth's surface.

⁵⁹ Nandy, D.R. and Dasgupta, Sujit (1991): *Seism tectonic Domains of North-eastern India and Adjacent Areas. In Geology and Geodynamic Evolution of the Himalayan Collision Zone, Part 2*, 18 PCE.

⁶⁰ A kind of mineral.

⁶¹ Jovsankar Hazarika, *Geo-politics of Northeast India: A Strategic Study* (Sep 25,2019,10PM), <https://shodhganga.inflibnet.ac.in/handle/10603/68458>.

⁶² CHANDRIKA SING, NORTH EAST INDIA: POLITICS AND INSURGENCY,14.

⁶³ V. K.Nayar, *Crossing the Frontiers of Conflict in The North East and Jammu and Kashmir :From Real Politik to Ideal Politik*. (Delhi, 2005), p.3.

⁶⁴ *Id* p14.

physiographic point of view is divided into three major groups. North eastern frontier mountainous range is the first group; second is south-eastern hill ranges and the third part consists of Assam plateau, Assam valley and Cachar plains.

2.4 Current Scenario of Hydro Power in North -East India

As per the International Energy Agency (IEA), net installed capacity of hydro electricity globally is 999 GW. Ten countries accounts for 66% of the total hydropower capacity. India ranks seventh in the list of these countries in terms of using hydro sources in total domestic electricity generation, where as our neighbour country China has the highest rank.

The North- East India has the potential of about 58,971 MW of hydropower i.e. almost 40% of the country's total hydro potential. Coupled with hydropower the region has abundant resource of coal, oil and gas for thermal power generation. In spite of such huge potential the region ranks lowest in the country in terms of per capita energy consumption. This is mainly due to inhospitable climatic conditions, remote location and inaccessibility of geographical locations etc. ultimately leading to lesser industrialisation. The NE Region is blessed with huge hydro potential of about 58,971MW, out of which 1,727 MW (about 2.92%) has so far been harnessed as on 1st July, 2020. Additional 2300 MW of hydro power are under construction. The balance of about 93.17% is yet to be exploited. Contribution of NEEPCO in the hydro installed capacity of NER is 1,225 MW i.e. about 70.93%.⁶⁵

2.5 Facts on North- East Hydropower

The total hydroelectric power potential of the Northeast is 50,382 MW which means it comes to about 40% of the total assessed hydropower potential of the country.⁶⁶ Assam has a potential of 674 MW. Arunachal Pradesh has a potential of 50,328 MW, while Manipur has a potential of 1784 MW. 2394 MW is the total hydropower potential of Meghalaya. Mizoram has a potential of 2196 MW, Nagaland has a potential of 1574 MW. Sikkim, 4286 MW, Tripura, 21 MW. These figures may vary depending on the update by state governments. For example, it is estimated that Arunachal Pradesh now has a potential of 57,000 MW. The revised figures for the full Northeast region are

⁶⁵ Available at www.neepco.co.in (Nov 30,2020,10 PM).

⁶⁶ Central Electricity Authority data from report of Inter-Ministerial Group on NE Hydro.

estimated to 170 hydropower projects which will produce electricity of a total capacity of 70,000 MW.⁶⁷

Large hydropower projects (above 25 MW) already in operation in Northeast are Sikkim: Rangit III, Teesta V in Sikkim.⁶⁸ In Assam, the dams are the Kopili, Khangdong, Lower Borpani (Karbi Langpi). Manipur has the Loktak hydropower project.⁶⁹ Meghalaya has Umiam Umtru IV, Kyrdamkulai, Umiam Stage I . In Arunachal Pradesh, Ranganadi Stage I is in operation. Nagaland has the Doyang dam.

11 projects with total installed capacity of 1686 MW are under construction in North East India Large hydropower under construction in North East India are Chujachen, Teesta III, Teesta VI, Rangit IV, Jorethang Loop in Sikkim, Kameng, Lower Subansiri, and Pare are in Arunachal Pradesh.⁷⁰ Meghalaya has the Myndtu, New Umtru. 10 projects with total installed capacity of 4891 MW are at various stages of clearance.

2.6 Benefits of Hydropower

The different benefits of hydropower are described below

Pollution Free Source of Energy: Hydropower is a clean source of energy because unlike coal or natural gas it utilizes water to generate electricity. It does not create air pollution or create any toxic by-products.⁷¹

Reliable Source of Energy: It can transform from minimum power to maximum output speedily and foreseeable, therefore hydropower can meet changing demands.⁷²

Renewable Source of Energy: Owing to its dependence on water cycle driven by sun, hydropower becomes a renewable source of energy. It is by harnessing the natural energy of flowing and falling water that hydropower is produced.⁷³

⁶⁷ Supra 1

⁶⁸ *Ibid* .

⁶⁹ *Ibid* .

⁷⁰ *Ibid* .

⁷¹ Bureau of Reclamation, Power Resources Office, Hydroelectric Power as cited in India to have Potentials For Renewable sources of Energy,(Sep 25 ,2019,2 PM), <https://engmag.in/today-india-has-one-of-the-highest-potentials-for-the-effective-use-of-renewable-energy-resources/>.

⁷² National Association of Hydropower as cited in Hydroelectric Power as cited in India to have Potentials For Renewable sources of Energy,(Sep 25 ,2019,2 PM), <https://engmag.in/today-india-has-one-of-the-highest-potentials-for-the-effective-use-of-renewable-energy-resources/>.

⁷³ Bureau of Reclamation, Power Resources Office as cited in Hydroelectric Power as cited in India to have Potentials For Renewable sources of Energy,(Sep 25 ,2019,2 PM), <https://engmag.in/today-india-has-one-of-the-highest-potentials-for-the-effective-use-of-renewable-energy-resources/>.

Efficient Source of Energy: Today's hydropower proves to be more efficient than any other form of generation. This is because more than 90 percent of available energy can be converted into electricity by the turbines.⁷⁴

Flexible Source of Energy: In response to changes in electrical demand hydropower output can be changed quickly. There can be control of the flow of water. Hydropower is generally available as needed because the flow of water can be controlled through the turbines to produce electricity on demand.⁷⁵

Domestic and Secure Source of Energy: Hydropower is produced from water in domestic rivers. Therefore hydropower is not subject to disruptions from foreign suppliers. It is free of issues associated with other fuel sources such as cost fluctuations, and transportation issues.⁷⁶

Cost effective Source of Energy: Hydropower generation has low operating costs. It has a long power plant life compared with other large scale power-generating options. The power plant life can be extended economically and it can remain in service for many years, once the initial investment is made. Typically after a service of for 40 to 50 years, the operating life of the hydropower plant gets doubled.⁷⁷

Stored Energy Source: The reservoir stores a large amount of energy which can be used in the future because hydropower is generated by water which is stored or ponded in a reservoir behind a dam.

2.7 Bending Rules on Hydropower and Dams

The World Commission on Dams provides for guidelines for construction of mega hydro projects. The bending rules on hydropower and dams under the rubric of the WCD include arguments in favour of significant and all inclusive estimation of water

⁷⁴ National Association of Hydropower as cited in Hydroelectric Power as cited in India to have Potentials For Renewable sources of Energy,(Sep 25 ,2019,2 PM), <https://engmag.in/today-india-has-one-of-the-highest-potentials-for-the-effective-use-of-renewable-energy-resources/>.

⁷⁵ Bureau of Reclamation, Power Resources Office, Hydroelectric Power as cited in Hydroelectric Power as cited in India to have Potentials For Renewable sources of Energy,(Sep 25 ,2019,2 PM), <https://engmag.in/today-india-has-one-of-the-highest-potentials-for-the-effective-use-of-renewable-energy-resources/>.

⁷⁶ National Association of Hydropower Hydroelectric Power as cited in India to have Potentials For Renewable sources of Energy,(Sep 25 ,2019,2 PM), <https://engmag.in/today-india-has-one-of-the-highest-potentials-for-the-effective-use-of-renewable-energy-resources/>.

⁷⁷ International Hydropower Association, Hydropower and the Worlds Energy Future Hydroelectric Power as cited in India to have Potentials For Renewable sources of Energy,(Sep 25 ,2019,2 PM), <https://engmag.in/today-india-has-one-of-the-highest-potentials-for-the-effective-use-of-renewable-energy-resources/>.

and energy needs. Alternatives for meeting these needs are assessed in the instrument of World Commission on Dams. Project developers, both public and private are held legally accountable to negotiated agreements with affected communities. This document provides that free, prior and informed consent of indigenous communities has to be obtained before construction of a hydropower project. As per the instrument, people must have full access to information regarding the dam. Feasibility studies, sensitivity analysis of the dam and potential cost of the project together with time overruns and shortfalls in production have to be conducted. Participative monitoring at the design stage and adaptability of the dams, together with management procedures has to be followed through project lifetime.⁷⁸

2.8 Political Economy of Hydropower

There are three stand points that may be identified in the context of the debate surrounding big dams in India. They are: first, one section of the people stand at the receiving end and have to pay huge social costs, while the other avails large premiums and benefits, second, the environment has to be protected at all cost, third, big dams are not a bane ,but the environment and social implications have to be addressed.⁷⁹

The report of the World Commission on Dams (WCD) states the regime of hydropower is replete with inequalities and inequity. The poorer sections of the society including the vulnerable groups like the tribal's and women are discriminated against and excluded from the share of benefits of big dams. There has been a shift in perspectives on large dams. Since 1970s the construction of new dams has fallen down. This is because it is too expensive to maintain dams that no longer serve their purpose. There for there is an increased tendency towards restoration of rivers and decommissioning of dams.

There has been grossly unequal distribution of costs and benefits of dams across people and mitigating such consequences is one of the focuses of environmental justice. In the hydropower regime the urban centres largely gain from the energy production, while the people of North-East India, are made to bear the social and environmental implications of these mega hydel projects.

The effect of dams ranges from loss of livelihood to downstream impacts and influx of labour. Big dams require large tracts of land and land acquisition for such dams results

⁷⁸ *Supra* 30.

⁷⁹ Satyajit K .Singh,*Evaluating Large dams in India*,25 EPW,(1990).

in large scale displacement. Displacement injures the community and common natural resources of the communities. Groups like the Lepcha and Idu Mishimi will be affected due to displacement and loss of livelihood. Projects like the Lower Subansiri have the potential of submerging arable land to the extent of 70 km upstream. Because permanent cultivation is not possible in the hilly terrain, jhum or shifting cultivation which is one of the main occupations and source of food security of the people will be grossly affected. The jhum cycle will be shortened due to increased pressure on the land. The submergence of land will affect the Common property resources of the people.

The culture and ethnic tradition of the people will also be affected due to construction of big dams. For example, people are sceptical about the construction of the Tipaimukh dam in Manipur where the Zeliangrong Nagas inhabit. With the construction of the dam they will lose half of their sacred places and hills.

Big hydel projects require both skilled and unskilled labourers. Influx of labour from outside territories and their prolonged presence in an area may alter and impact the demography of that area. Proponent of big dams often project employment generation as on the ancillary benefits that crop up from such projects but in reality local people are hardly employed in such enterprises.

The downstream impact of dams is often neglected in the popular discourse of dams. When a dam is constructed, it will block the water flow to the downstream areas. When water is stored in the upstream, it will mean less water during the dry season and flood during the monsoon season. This will result in changes in wetland ecology in the flood plains, loss of fisheries. In addition to this, the agriculture of the riverine islands will be impacted negatively.

As estimated by the World Commission on Dams, around 40 to 80 million people in the world have been displaced by large dams. Added to such displacement, their constructions have, submerged or waterlogged large tracts of land worldwide. The distributional effects of dams are ignored by economic and technocratic evaluations because the affected people are often the politically and economically disadvantaged.

45,000 big dams constructed worldwide have obstructed nearly half of the world's rivers.⁸⁰ Advocates and proponents of big dam emphasize the role of large dams in irrigation, and hydropower for domestic or industrial use etc. Roughly 3,600 cubic kilometres of water has been stored by dam reservoirs. They have generated 19 percent of the world's electricity supply. 30 to 40 percent of land has been irrigated by them worldwide.⁸¹

Opponents of big dam are of the opinion that loss of agricultural and forest land, water logging and increased salinity are the major risk associated with construction of big dams. The World Bank which is the single largest source of funds for building of big dams in its policy stance, reflects on the tension between total productivity benefits and the social costs of big dams. In the mid 1980s due to the criticisms by the Non Governmental Organisations and civil society, the World Bank reduced its funding to big dams. However, recently, it has increased its funding towards construction of big dams with the argument that the rationale for the dam rests on proper use of revenues for poverty reduction and environmental management.⁸²

In the coming two decades India's power demand is forecasted to rise by 350 percent.⁸³ Such a surge would require that the country triples its power generation capacity.⁸⁴ India's energy strategy accords a significant place to hydropower. Until recently, the engineering projects needed to tap the hydropower of the fast moving rivers of the Eastern Himalayas was not feasible because of the poor communication infrastructure of the North-East Region. But the explicit development oriented protests in the region has changed the situation, thereby bringing changes in improved roads, railways tracks, and bridges.

Northeast India is a seismically active zone. The hydrological and morphological features of rivers are greatly impacted by earth quakes in the region. History is replete

⁸⁰ Esther Duflo et.al, *Dams*, 122, *The Quarterly Journal of Economics*, 601, 601, (2007).

⁸¹ *Ibid*.

⁸² The World Bank supports the hydropower capacity of the country. The Bank has also been requested to support its power sector agencies to help them attain international standards. The aim of the World Bank is to assist the government to enhance its hydropower potential in a sustainable manner ensuring financial, economical, and technical soundness coupled with meeting social practices. The Bank has engaged in hydropower in India since the late 1950s. The Sardar Sarovar project on the river Narmada, Nathpa Jhakri and Koyna IV projects which were completed in 2002 and 1998 respectively, have benefited from the World Bank.

⁸³ Sanjiv Baruah, *Hydropower Mega Dams and Politics of Risk*, 47 *EPW* (2012).

⁸⁴ The World Bank, *Development and Growth in Northeast India: The Natural Resources, Water, and Environment Nexus Strategy Report No. 36397*, 2007, pp. 55-56.

with evidences of catastrophic earthquakes that include the 8.7 earthquake of 1950, that caused massive landslides and blocked the flow of the Subansiri, Dibang and Dihing rivers. Catastrophic flood was caused when the trapped water burst through in cascades. Major hydropower projects are planned in these rivers today. The memories of the earthquake that took place in the 1950 are still in the collective memory of the people and therefore big dams in the valley evoke a sense of danger in the minds of the people.

The political economy of big dams in North East India is quite simple. As per the Government of India, the energy requirement of North East is modest. It uses less than one percent of the country's total energy in industry while the per capita consumption estimates a third of the country's national average. The hydropower that is supposed to be produced is meant to be used everywhere else except North East. The project planning talks about a method called 'power evacuation', through which the electricity that is produced will be transmitted to the national power grid.

Therefore, the first and the foremost implication of the hydropower planning in the region is that the region is witnessing late capitalism in the role of a natural resource supplier to augment economic development in other places. But the inhabitants of the region will have to bear the costs of such perusal of large infrastructural projects. People's faith has been shaken and this anxiety proves to be a potent social force against the big dams planned by the Government of India.

Hydropower production depends on the fuel of moving water. So the basic fuel that drives hydropower is available to the owners free of cost. Once the hydropower plant is built, unlike the huge initial investments, the operational costs are minimal. Hydropower can also be exported to foreign countries. Although environmentalists opine that owing to the low carbon source of energy hydropower may be attractive, yet it reeks of unsustainability if it is large scale.

Big dams under construction or commissioned in Arunachal Pradesh and other North Eastern states will destroy the aquatic health of the rivers and potentially harm the livelihood of the communities that depend on the aquatic bodies like rivers. The negative impacts of dams will be pervading North East India as thousands of people depend on the water bodies for their livelihood. Flood plain agriculture depends very much on the river sediments of flood water.

The hydropower projects currently pursued are different from the earlier river valley projects. The multipurpose river valley projects in the mid-20th century, was run by the spirit of decolonization itself. This spirit emphasized on transforming fluvial powers into national assets.⁸⁵ Those projects were meant to develop the river basins in terms of flood control, navigation and irrigation. Until recently, the entire policy stance on rivers in North East India was about mitigation of flood.

In 1972 the Brahmaputra Board was constituted. Its primary mandate was flood mitigation. Investigations that were carried out on dams especially in the Brahmaputra Basin .But none of the plans saw the light of the day because of lack of resources. In the present times all these plans have been changed to single purpose dams meant to produce hydropower that will be sold for huge premiums by private and public sector companies.⁸⁶

Protests against the 2000 MW Lower Subansiri dam under construction in Gerukamukh village in the Dhemaji district of Assam started in the 2000s on grounds of faulty clearances under environment, forest and wildlife laws of the country. The dam site is rich in wildlife and biodiversity. Serious flaws were pointed out in the clearances. It was alleged that the Environment Impact Assessment report and other reports crucial in gaining project clearance undermined the potential adverse impact on biodiversity. The resistance was lead by the All Assam Students Union(AASU) and the *Krishak Mukti Sangram Samity* focussing on the issues of dam safety and the downstream impacts.

2.9 People and Politics on Hydropower in North -East India

There is an apprehension among a large section of people about the possible detrimental role of the capital produced from hydropower plants. Civil society is of the opinion that the tea-plantation and capital produced from them could hardly generate enough economic space or employment for the engagement and participation of local people. Besides making the tea industry inaccessible for the local people, it has also, locked off huge land resources out of their reach. It seems that the same is being now done with the water of the region. The compelling argument being made is that the capital invested in the multiple mega hydropower projects is another attempt to push off

⁸⁵ *Supra note 83.*

⁸⁶ Only the 3000 MW Dibang project is multi-purpose having a flood moderation component.

the resources from the region to feed the rest of the country as it is perceived that region itself has a small power demand. The youth from North East India has played an active role in their protest and the argument on their part is that development and economic progress that destroys the cultural and natural heritage of the region is not desirable. The *Krishak Mukti Sangram Samiti*, concludes that the dams debate in the region cannot be cribbed, confined or restricted to the technical issues involved in the dam alone. Larger questions of rights over natural resources exist and these have to be answered convincingly. These resources are being handed over to power developers thereby transforming the flow of rivers dramatically.

The proponents of hydropower in the region have painted a seemingly optimistic picture and a win- win situation for the region. The language is couched in ostensible win-win scenarios: like it will secure energy for the rapidly developing national economy; accelerate development in hitherto backward‘ but hydro potent areas; and generate clean‘ energy. Such an argument takes the discourse away from the earlier dam-related critiques. In such a case there is de politicization of the environmental or the water governance of the region and the entire scheme of governance is transferred to power developers or the state backed private entities.

2.10 Issues in Hydropower harnessing in northeast India according to the Standing Committee on Energy.⁸⁷

The Government of India has shown interest in exploring the hydropower potential of the North- East since 1990s because it is supposed to be cleaner and more sustainable than the traditional kind of energy. The first state in North East to come under the hydropower regime is Sikkim, followed by the state of Arunachal Pradesh. Numerous memoranda of understanding were signed by both the states with private and public power developers. On January 4, 2019, the Standing Committee on Energy (SCE) presented the –43rd Report on Hydropower|| in the Lok Sabha .Emphasising on the significance of hydropower in India, and the challenges faced by it in the country in March 2019, hydropower projects with installed capacity of more than 25 MW was declared as –renewable energy, .The report also specially focused on exploiting the full potential of hydropower in the pristine regions of the country. The North-East has been an unexplored region as far as hydropower harnessing is concerned. In the context of

⁸⁷ Jaya Takur, *Exploring the Hydropower Potential of India's North East* ,(Dec 14 ,2020,6 AM), https://www.orfonline.org/wp-content/uploads/2020/03/ORF_Issue_Brief_341_Hydro-Northeast.pdf.

the recommendations of the report, it is important to analyse the issues involved in time overrun of the hydropower projects which are discussed as follows

2.10.1. Issues of Fund Constraints⁸⁸

The SCE's 2019 report, says that an average cost of 8 crore per MW is needed for coal based power plants, while for hydroelectric projects, it is INR 10 crore. Thus, from an initial-cost perspective, hydropower projects appear to be less lucrative for developers. 70:30 is the debt equity ratio for a typical hydro station. 30 percent resources is obtained, either from the developers own resources or from public private enterprises. The remaining 70 percent equity is availed from, bonds, scheduled commercial banks and other financial institutions. The availability of domestic loans is not an issue for projects developed by Public Sector Undertakings claims the report. However, lenders of their own accord may stop financing any project for reasons such as unsatisfactory progress of the project or the inability of promoters to deploy requisite equity. This has the potentiality to turn into a vicious cycle.

Recommendation No. 6 of the SCE report urges approaching bankers to give loans to developers for long term which is for 20 or more years. It recommends that assistance from international agencies should be availed at cheaper rates for hydropower projects.

2.10.2 Lack of Clearance⁸⁹

As per the SCE report, the delays in environmental and forest clearances are one of the major reasons for apprehensions in the hydel project industry. At present, clearances for infrastructure projects are to be obtained from the Ministry of Environment and Forest (MoEF), the Expert Appraisal Committee (EAC), the Forest Advisory Committee (FAC), and the National Board of Wildlife (NBWL). According to project developers as well as the Ministry of Power, the process is time-consuming and cumbersome. Establishment of special cell to address the hydropower projects has been recommended under recommendation No. 4 of the SCE report. In light of the implications of construction of big dams fast-tracking the clearance process is not a desired approach. Basin based studies before planning a project has been recommended under recommendation No. 5. Such a step can help make EIAs more comprehensive. The

⁸⁸ *Ibid* .

⁸⁹ *Supra note 79*.

ecological costs of a project can be identified and thereby help people render informed decisions during the clearance process.

2.10.3 Geological Issues⁹⁰

As far as geological issues are concerned, the seismicity North-East India is a crucial factor that must be taken into account. The region is one of the six most seismically active regions of the world. Between 1953 and 1992 the region experienced as many as 21 earthquakes. Each one was more than 6.5 on the Richter scale. The project reports lack sufficient details and transparency in the aspect of susceptibility to seismic activities. Slope failure, is a chief cause of delay for ongoing projects The SCE report labels such activities as geological surprises. The analysis in the report is a result of certain projects case studies of Manu Dam, Kopili Dam, Teesta-III and Umiam and Umling Dam of Tripura, Assam, Sikkim and Meghalaya respectively.

2.10.4 Issues in Land Acquisition⁹¹

A regional government structure has been suggested by the SCE's report to facilitate and foster transparency in the land acquisition, resettlement and rehabilitation processes. But since a long time, this process has been plagued by improper identification of stakeholders and lack of their involvement in the decision making process. People's protests in the form of the anti dam movement in the region has been triggered by issues of displacement of people and inadequate resettlement and rehabilitation of the same by large Multipurpose River Valley Projects (MRVP). This also hinders the land-acquisition process. The WCD report of 2000 under the ambit of -Rights and Risk framework prioritises equity, sustainability, efficiency, participatory decision making, and accountability. Importance has been given to stakeholder dialogue at all stages of development. The National Rehabilitation and Resettlement Policy (2007), and the Right to Fair Compensation and Transparency in Land Acquisition and Rehabilitation and Resettlement Act (2013) have been devised as policies to address the issues. Rehabilitation and resettlement is a state subject. In this light, state and local authorities' cooperation is needed for the effective implementation of the said legislation. Non-availability of record of land and ownership coupled with issue of multiple claimants etc make land acquisition more difficult.

⁹⁰ *Ibid* .

⁹¹ *Ibid*.

The foremost consideration in any development of dams must be the village and individual household identification that are likely to be affected by the project. For example, different EIA reports for Tipaimukh Project mentions different numbers of affected individuals and villages. Anti dam movement is fuelled by such lapses. Prior informed consent of the stakeholders is lacking in the process. For example, only those who had the documents and could officially prove their displacement were allowed to attend the public hearing for Tipaimukh dam in Manipur on November 2006. People without any official land documents were denied entry. Moreover, people could not understand the technical terms and the nitty gritty of the projects as the documents were not translated into local dialects. It is alleged that the authorities were clearly biased in their judgements. The Adi and Galo tribes affected by the Siang project in Arunachal Pradesh argue that –their right to free, prior and informed consent⁹² is being violated in the process of commissioning of dams in their homeland.⁹² The SCE report fails to include a clear methodology for making the land transfer and rehabilitation process more transparent.

2.11 Incomprehensiveness of the SCE Report⁹³

The SCE Report has not articulated other issues related to the sustainability of the dam projects. These issues are not exclusive to North East alone. The report lacks comprehensiveness and the issues that are not covered in the report are discussed below:

2.11.1 Sediment Management⁹⁴

The Brahmaputra-Ganges and Meghna basin is the carrier of largest amount of sediment in the world. In projects such as run-of-the-river projects, sediment management forms an important process. Any engineering obstruction created on the river is impacted by production of sediment in any river system significantly. The life expectancy of hydropower projects may be adversely affected by sediment accumulation in the reservoir. If it is not properly managed, the cost- and carbon-efficiency of hydropower projects may be impacted over time. Proper database of the sediment load of the river along with a management process during the planning period must precede any construction of dams on north eastern rivers.

⁹² As enshrined by the UN Declaration on the Rights of Indigenous Peoples.

⁹³ *Ibid.*

⁹⁴ *Ibid.*

2.11.2 Management of Transboundary Rivers⁹⁵

The rivers on which dams will be constructed are international water courses and they flow through more than one country. The repercussions of developing and constructing big dams in transboundary river basins must be adequately articulated in the SCE's report. For example, India, China, Nepal, Bhutan and Bangladesh, share the Ganga Brahmaputra Meghna Basin and Bangladesh is the lower riparian to India. India, China and Pakistan, share the Indus Basin and Pakistan is the lower riparian to India. A basin-based authority is lacking in place for many of these rivers. A concrete law that addresses the concerns of nations on transboundary rivers is lacking in place and therefore placing international law as the base, the report ought to include the issue of management of transboundary rivers.

In the case of north eastern states, the majority of the projects are being built on rivers that are shared between India, Bangladesh and China. When projects are developed by India which is the upstream country, it creates water centric tensions in the lower riparian. This is also coupled with ecological distress in the lower riparian country. For example if the Tipaimukh dam is built, it may result in water scarcity in lower riparian Bangladesh, for which there has been active resistance in the country and abroad. To address the issues pertaining to water and river management a –Joint River Commission^{ll} has also been established

Construction of big dams on transboundary rivers can affect the ecology and economy of the downstream states. Such a development can be seen as a prelude to hydro problems in South Asia in future in the absence of proper management mechanism. A proper management mechanism under the JRC can handle bilateral issues by taking a holistic approach. This also needs the support and help of the basin authorities in order to foster a regime of cooperation among the countries sharing a common river.

2.12 Conclusion

Climate crisis in developing countries like India, calls for a move away from fossil fuels. In lieu of fossil fuels nation must depend on eco-friendly sources of energy. However the role of hydropower projects cannot be ruled out but such should be planned or installed only after a comprehensive and proper impact assessment.

⁹⁵ *Ibid.*

Traditional Environment Impact Assessment is a must. In addition to that, comprehensive studies regarding possible geological issues that might arise during the project are a need of the hour. Rehabilitation and the resettlement of the potential displaces must be carried out in a fair manner and people should be given an opportunity to take part in the decision making process. Fast tracking the clearance process has been the focus of the 43rd Report on Hydropower. However, while doing so, the Government of India must be conscious of the possible damages that can be inflicted on the ecosystem.

CHAPTER SUMMARY

- This chapter starts with an introduction that highlights on the government's plan to built big dams in the region of North- East India.
- It gives a pen picture of the region through highlighting the geography, the physiography, and the climatic features etc which are relevant for the present study.
- The current scenario of hydropower is articulated in the chapter.
- Certain facts are cited in this chapter relating to the hydropower in North -East India
- The benefits of hydropower are articulated in this chapter.
- The political economy of hydropower is explained in the chapter
- A pen picture of the people and civil societies' response to the government's plan to harness the hydropower potential of the region is provided in the chapter.
- The status of hydropower according to the Standing Committee on Energy is explained in this chapter.

CHAPTER III

**LEGITIMACY OF DAM BUILDING UNDER
INTERNATIONAL LAW AND INDIAN APPROACH
TOWARDS INTERNATIONAL WATER LAW**

SYNOPSIS

- **INTRODUCTION**
- **TECHNICAL ASPECTS OF A BIG DAM**
- **WORLD COMMISSION ON DAMS**
- **THE CHANGING CONTEXT OF WATER AND DEVELOPMENT**
- **BIG DAMS AND ITS REVIEW BY WCD**
- **PERFORMANCE OF BIG DAMS**
- **DECISIONMAKING, PLANNING AND INSTITUTIONAL ARRANGEMENTS**
- **CORE VALUES OF DECISION MAKING**
- **RIGHTS RISK AND NEGOTIATED OUTCOMES**
- **LEGITIMACY OF DAM BUILDING UNDER INTERNATIONAL LAW**
- **INDIAN APPROACH TOWARDS INTERNATIONAL WATER LAW**
- **CONTROVERSIES SURROUNDING THE MANAGEMENT OF THE RIVER BRAHMAPUTRA**
- **CURRENT SITUATION**
- **CONCLUSION**
- **CHAPTER SUMMARY**

3.1 Introduction

Dams that will be built on the rivers of North- East India are international water courses and the sharing of international water courses is one of the key challenges for the 21st century.⁹⁶ Lack of a holistic cooperative legal framework for most of the world's 263 transboundary river basins is a cause of concern of the global community. This part of the research will assess the legitimacy of dam building in an international water course and articulate on the Indian approach to international water law. Before that it is necessary to browse through the technical aspects of a big dam.

3.2 Technical aspects of a Big Dam

The technical aspects of a big dam including its meaning and purpose are described below:

3.2.1 Meaning of a Big Dam

According to the International Commission on Large Dams (ICOLD)⁹⁷, a dam is an artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material, for the purpose of storage or control of water'. There may be various sizes of dams ranging from small dams which are built for storing water for farms to large dams which store water for large urban centres or for producing electricity⁹⁸. As defined by the International Commission on Large dams, a big dam is a dam which is⁹⁹:

- a) More than 15 metres in height measured from the lowest point of the general foundations to the crest of the dam,
- b) More than 10 metres in height measured as provided above and they have at least one of the following characteristics:
 - i. The crest is not less than 500 metres in length

⁹⁶ Mohsen Nagheebby et.al, *The Legitimacy of Dam Development in International Watercourses: A Case Study of the Harirud River Basin*, Transnational Environmental Law, 2, 2 (2019).

⁹⁷ The International Commission on Large Dams, or ICOLD, is an international non-governmental organization. It is dedicated to the sharing of professional information and knowledge of the design, construction, maintenance, and impact of large dams. Founded in 1928 the commission has its central office in Paris, France. It consists of 100 member national committees which have a total membership of about 10,000 individuals.

⁹⁸ Available at www.icold-cigb.net/GB/dams/definition_of_a_large_dam.asp (Nov 5 2019 10 PM).

⁹⁹ *Ibid*.

- ii. The reservoir formed by the dam has a capacity of 1 million cubic metres of water or more.
- iii. The dam has a capacity to discharge 2000 cubic metres of water or more per second.
- iv. The design of the dam is unusual.

3.2.2 Necessity of Dams

Dams were built in the ancient times for water supply or irrigation. With the development of civilization, needs increased and there was greater need for irrigation, flood control, sediment control and energy. Therefore dams are constructed for a specific purpose such as flood control, irrigation, hydropower etc. Multipurpose dams are very important for a nation as there are both domestic and economic benefits attached to it.¹⁰⁰

Water being the most important resource after land and air, the demand for water has increased manifold in today's world. During the past three centuries, the amount of water withdrawn from freshwater resources has increased by a factor of 35, world population by a factor of 8. With the present world population of 5.6 billion still growing at a rate of about 90 million per year, and with their legitimate expectations of higher standards of living, global water demand is expected to rise by a further 2-3 percent annually in the decades ahead.¹⁰¹ Because of high consumption in rich countries, the many ways of conserving and recycling may more or less suffice to curb further growth in supply.¹⁰² In other regions water availability is critical to development above the unsatisfactory level or the demand owing to population growth. In these regions, the role of dams and reservoirs cannot be ignored.

Variations in season and climate impede the efficient use of river runoff that causes floods and draughts. Dams serve the purpose of mitigating and preventing floods and also stores water during surplus and release it during scarcity.

3.2.3 Purpose of Dams

1. Irrigation: At present in India around 277 million hectares of land which accounts for about 18 percent are arable. It is responsible for around 40 percent of crop output

¹⁰⁰ *Ibid.*

¹⁰¹ *Ibid.*

¹⁰² *Ibid.*

and employs about 30 percent of population spread across rural areas. With population growth being expected irrigation must be increased for production of food. It is estimated that about 80 percent of additional food production by the year 2025 will need to come from irrigated land. This will require more reservoir projects.

2. Hydropower: Hydropower plants range from several hundred kilowatts to several hundred megawatts. Only a few in the world has the capacity of 10,000 megawatts to supply electricity to millions of people in the world. Hydropower plants in the whole world have a capacity of 675000 megawatts that produces over 2.3 trillion kilowatt-hours of electricity each year supplying 24 percent of world's electricity. In some countries hydropower is the source of entire electricity. In 1998, the hydroelectric plants of Norway and the Democratic Republic of the Congo (formerly Zaire) provided 99 percent of each country's power; and hydroelectric plants in Brazil provided 91 percent of total used electricity. Electricity generated from dams is the by far the most renewable energy source. More than 90 percent of the world's renewable electricity comes from dams.

3. Domestic and Industrial Use: Water is very essential for our civilization. Rain water falling on earth ends up as runoff and only 2 percent of it replenishes the groundwater. Dams which are properly constructed and planned serve the essential purpose of preserving this rain water for purposes of water supply.

4. Inland Navigation: Natural river conditions, such as changes in the flow rate and river level, ice and changing river channels due to erosion and sedimentation, create major problems and obstacles for inland navigation. The advantages of inland navigation, however, when compared with highway and rail are the large load carrying capacity of each barge, the ability to handle cargo with large-dimensions and fuel savings. Enhanced inland navigation is a result of comprehensive basin planning and development utilizing dams, locks and reservoirs which are regulated to provide a vital role in realizing regional and national economic benefits. In addition to the economic benefits, a river that has been developed with dams and reservoirs for navigation may also provide additional benefits of flood control, reduced erosion, stabilized groundwater levels throughout the system and recreation.

5. Flood Control: Dams and reservoirs can be effectively used to regulate river levels and flooding downstream of the dam by temporarily storing the flood volume and

releasing it later. The most effective method of flood control is accomplished by an integrated water management plan for regulating the storage and discharges of each of the main dams located in a river basin. Each dam is operated by a specific water control plan for routing floods through the basin without damage. This means lowering of the reservoir level to create more storage before the rainy season. This strategy eliminates flooding. The number of dams and their water control management plans are established by comprehensive planning for economic development and with public involvement. Flood control is a significant purpose for many of the existing dams and continues as a main purpose for some of the major dams of the world currently under construction. Let us now look at the World Commission on Dams and its recommendations.

3.3 World Commission on Dams

Overwhelmingly complex and fundamentally simple the global debate about large dams has pervaded infrastructure development law. The debate is complex as the issues go beyond and are something more than the mere technicalities such as the design, construction, and operation of dams themselves.¹⁰³ The debate of dams encompasses a large number of issues ranging from social to political choices which serve as a catalyst to the human aspiration to progress. When we hear the word Dams' the first thing that must be remembered is that they alter rivers.¹⁰⁴ They also alter the use of natural resources, which entails distributing the benefits meant for the local riparian to beneficiaries at national level. Issues of justice, governance, equity and power make the core of the debates of dams. The dams' debate is simple because of few easily understood principles based on calculations, facts and figures and economic statistics. These would make the decision making process around water and energy easy apart from responding to the controversy surrounding dams. Principles are not different but they are the same principles based on human rights, development, and sustainability. And these are the principles that are the prelude to the establishment of the World Commission on Dams (WCD). The report of WCD was published in the year 2000. It provides guidelines for decisions on water and energy resources development. The Commission, the WCD stakeholder's forum, individual experts and affected people did rigorous intellectual exercise and reflection for more than two years on every possible

¹⁰³ Deborah Moore, *The World Commission on Dams + 10: Revisiting the Large Dam Controversy* 3, WA, 1, 4, (2010).

¹⁰⁴ *Ibid.*

aspect of the dams debate to bring forth this document. It communicates each and everything important to the entire spectrum of dams debate consisting of affected people, the commission itself and the expert groups on water and energy resources¹⁰⁵

Before proceeding it is relevant to summarise the following points pertaining to the dam debate:

- Significant contributions to human development and progress have been made by dams and the benefits derived from them cannot be neglected.
- It has often resulted in lack of equity in the distribution of benefits. Especially when the benefits are relocated to people in the national region rather than the riparian people and this calls for questioning the value of dams.
- A resolution can be attained by taking into account the rights of the affected people and all the stake holders who bear the risks involved in the resource development regime.
- Outcomes can be negotiated in such a way that unfavourable projects are eliminated in the early stage

The issue of dams and development must be looked from a different perspective. One must rise above the engineering formulas as it is a simplistic way of looking into the debate. Such an approach will ensure that

- the social, economic and environment dimensions of development are integrated;
- transparency and certainty for all the stakeholders is kept intact and
- confidence level among the nations to meet their future water and energy needs is enhanced.

The report of WCD is a milestone in the evolution of dams as an indicator of development and progress.¹⁰⁶ In reality the dams debate is a debate about the very meaning, purpose and ways for achieving development and progress.¹⁰⁷ The Commission through its Global Review of the performance of dams presents an integrated assessment of when, how and why dams succeed or fail in meeting

¹⁰⁵ Aviva Imhof, *Citizen's guide to the World Commission on Dams*(Nov 3 2019 10 PM), <https://www.irn.org/files/wcd/wcdguide.pdf>.

¹⁰⁶ World Commission on Dams, *Dams & Development: A new framework for decision-making – overview*(Nov 4 2019 10 PM) <https://pubs.iied.org/pdfs/9126IIED.pdf>.

¹⁰⁷ *Ibid.*

development objectives. This provides the rationale for a fundamental shift in options assessment and in the planning and project cycles for water and energy resources development. The framework for decision-making is encapsulates five core values .They are sustainability, equity, accountability efficiency, participatory decision-making and accountability. It proposes:

- Identification of all legitimate stake holders in negotiating development choices and agreements based on a rights-and-risks approach.
- emphasizing seven strategic priorities and corresponding policy principles for water and energy resources development like, total options assessment, addressing the condition of the existing dams, sustaining river ecology and livelihood of the people dependent on rivers, gaining public acceptance, recognition of entitlement holder, guarantee compliance, and sharing rivers for peace, development and security at an international level ; and
- criteria and guidelines for good practice related to the strategic priorities, ranging from life-cycle and environmental flow assessments to impoverishment risk analysis and integrity pacts.

The rationale and recommendations of the Commission offer such scope for progress because a single perspective cannot offer a vantage point to development on its own. It ensures that the decision on energy and water development is taken after a comprehensive analysis by integrating the environmental, social and economic dimensions of development. Transparency and certainty for all involved thus is enhanced through such an approach. Added to this, a level of confidence in the ability of nations and communities to meet their future water and energy needs is also reinforced in a holistic manner.

3.4 The Changing Context of Water and Development

The key points on the dams debate is not confined to dams alone. Rather it is a debate about options for water and energy development. They are related directly to the issue of management of freshwater resources which appears to be one of the greatest challenges facing the world in the current scenario. Human induced water withdrawals from lakes, rivers and ground aquifers have been well documented. It is estimated that a total of 3,800 cubic kilometres of annual freshwater is withdrawn today which is

twice as much as 50 years ago.¹⁰⁸ Conflicts on territorial stake, access to water etc have unfolded scenario that affects relations:¹⁰⁹

- within and between nations;
- between rural and urban populations;
- between upstream and downstream interests;
- between agricultural, industrial, and domestic sectors; and
- between human needs and the requirements of a healthy environment.

The challenge in such a scenario is not to mobilize so as to compete successfully, but to balance competing interests. The challenge is to use water resources in such a way that meets the needs of people and economic as well as environmental needs. In the global development agenda, issues relating to the supplying water to the burgeoning population, depleting groundwater resources and declining water quality top the list. But this should not hinder the nations from choosing the path of cooperation.

Mega dams emerged as one of the main catalysts of management of water resources during the twentieth century. More than 45,000 large dams have played important role in domestic use, food and energy production and flood control. These are the few areas in which people have used water resources. According to current data, irrigated land worldwide which accounts to thirty to forty percent relies on dams and that dams generate nineteen percent of world electricity. During 1930- 1970, dam construction was rampant throughout the world as nations were embarking upon massive economic change and the construction of large dams was viewed as a way to development and economic progress. During the 1970s an era when social engineering and development agenda were at its peak, two to three big dams were commissioned each day somewhere in the world. The justification for such developments is that it justifies the enormous investments made. Apart from that, secondary and peripheral benefits that big dams brought were food security employment, electrification, and the expansion of physical and social infrastructure such as roads .Slowly, issues pertaining to the cost of large dams began to emerge coupled with its impact on people, ecology and river basins it emerged as a serious public concern. Initially the focus was on the local impacts of specific dams. Slowly it transcended to the global arena. According to the global

¹⁰⁸ The Report of the World Commission on Dams Executive Summary.

¹⁰⁹ *Ibid.*

estimates some 40-80 million people were displaced by dams while sixty percent of the world's rivers' ecology has been affected by dams and diversions of the river water. This changing scenario was a prelude to the establishment of the World Commission on Dams. It was established in February 1998. The commission began its work in May of the same year after dialogue and negotiation between different stakeholders. There were initially twelve members reflecting the perspectives of regional diversity, expertise, and stakeholder. Created as an independent body in the WCD each member acted in individual capacity. The objectives of the Commission were:

- to review the development and effectiveness of large dams and assess alternatives for water resources and energy development; and
- to enhance and develop yardstick that is internationally acceptable, standards and norms that help the planning, design, appraisal, construction, operation, monitoring, and decommissioning of dams.

3.5 Big Dams and its Review by the WCD

The Commission reviewed the experience with large dams especially in India and China. Its knowledge base also consisted of a briefing paper for Russia and the Newly Independent States that were created after its disintegration.¹²⁵ Existing dams were cross check surveyed,¹⁷ papers were thematically reviewed, public was consulted and more than 900 submissions were made to the Commission.¹¹⁰ This comprehensive and enormous exercise provided the basis of social, economic, environmental, technical and financial performance assessment of the large dams. This evaluation was based on the arguments given by the dam supporters that form the basis of their approval. It studied a broad spectrum of dams giving attention to particular dams as to why and how they have failed in particular places.

3.6 Performance of Big Dams

The knowledge base discovered that many large dams have failed in technical, financial, and economic performance and this is coupled with violation of rights of poor people, indigenous peoples, and other vulnerable groups and also results in ecological and social hazards. It also concluded that there has not been any substantive evaluation of dams and has been very narrow in scope. In its assessment it also found that a high

¹¹⁰ *Ibid.*

degree of variability is displayed by big dams in delivering predicted water and electricity services. This falls short of the estimated physical and economic targets while some other dams continue generating benefits after thirty to forty years. The following points are pertinent:

- Schedule delays and significant cost overruns have characterised big dams performance.
- Irrigation services to be given by big dams have almost failed and have been less profitable than estimated.
- The notion that large dams generate adequate amount of electricity is erroneous. Sometimes they tend to perform below a target that is expected.
- Rivers, aquatic ecosystems and watersheds are extensively impacted leading to irreversible loss of species and ecosystems.
- Lack of attention and participation leads to limited success in countering the ecosystem impacts of large dams.
- Lethargic attitude on the part of the government for implementation of resettlement and rehabilitation for the displaced have ushered in stiff resistance against big dams worldwide.
- Added to this, the disoriented approach and neglect for the downstream impact on livelihoods have led to the impoverishment and suffering of millions who depend on riverine ecology.
- The true profitability of the large hydel project schemes remains elusive as there has been faulty estimation of the environmental and social costs of large dams.

The most important point perhaps is that people who usually bear the cost of displacement due to large dams are not the actual beneficiaries of the services like water or electricity. In the light of the human rights and sustainable development slogans in the present era and given the fact that large inequities exist in the distribution of these costs and benefits, a balance sheet approach is seen as unacceptable.

3.7 Decision-Making, Planning, and Institutional Arrangements

The decision to build a dam is influenced by many variables. These considerations go beyond immediate technicalities. Large dams often served as a focal point for the interests and aspirations of politicians, centralized government agencies, international

aid donors and the dam-building industry. Such an approach also does not consider the alternatives available. The WCD Global Review documents identified that there has been a frequent failure to involve the affected people in the decision making process. Factors like corruption have further added to distortion of decision-making.

Even in the 1990s social and environmental impacts were outside the considerations for dam building. In the last two decades the conflicts surrounding dams and resistance against them have increased due to the social and environmental impacts. Not only this, failure of the financing agencies to abide by statutory and internal guidelines have accelerated the conflict over large dams.

3.8 Core Values for Decision-Making

As stated in a forgoing paragraph the Commission grouped the core values that informed its understanding of these issues under five principal headings:

- equity,
- efficiency,
- participatory decision-making,
- sustainability, and
- accountability.

These five issues are more than simply issues. They form the philosophy of the entire report. They form the test that must be applied to all decisions concerning dams and development. The debate of dams and development is all about the purpose, meaning and pathways for gaining development. Arguably all decisions concerning water and energy management should be in tandem with the emerging global commitment to sustainable development. It must align itself with the clarion call of the Universal Declaration of Human Rights(UDHR) of 1948and related covenants and conventions thereafter. These later resolutions include the more progressive documents like the Declaration on the Right to Development adopted by the UN General Assembly in 1986, and the Rio Principles agreed to at the UN Conference on Environment and Development in 1992.

3.9 Rights, Risks, and Negotiated Outcomes

In case of large scale development interventions such as dams, balancing of competing needs and entitlements is the most important factor in understanding the conflicts

associated. The approach of the commission is founded on assessing risk and recognising rights in planning and commissioning of dam like infrastructure. In such an approach the commission applies these core values to the water and energy resource management strategy. The Commission develops an approach that offers a means to apply these core values to decision- making about water and energy resource management. The Commission has viewed the controversies surrounding dams within a broader normative framework within which the Commission has developed seven strategic priorities as stated above and are discussed below:

1. Gaining Public Acceptance

Key decisions regarding dam construction must be accepted by the public. Equitable and sustainable energy and water resources development need public acceptance. Acceptance and legitimacy of decisions of government for dam construction requires addressing and recognizing rights, together with guaranteeing the entitlements particularly of indigenous and tribal peoples, women, and other vulnerable groups. Decisions must be mandatorily based on process that enables informed consent and participation by the affected people. In case the project affects the rights of the tribal and indigenous people, then the free, prior and informed consent should be taken.

2. Comprehensive Options Assessment

Options and alternatives to dams must be explored through comprehensive assessment. The entire radius of policy available to people and dam developers must be made known to them so that the selection of alternatives is based comprehensive and participatory assessment. Institutional and technical options should be judged on the basis of social and environmental factors that continue through all stages of planning, project development, and operations.

3. Addressing Existing Dams

Environmental mitigation and restoration process should be strengthened, social issues must be addressed and benefits from existing dams should be optimised. Dams and the context in which they operate do not remain static. The mutations are triggered by change in water use priorities, alterations in the river basin, other technological developments. Regulations pertaining to technology and environmental policy transform benefits and impacts. Management and operation practices of the dams must

adapt continuously to changing circumstances of the project's life and the surrounding context of people and environment and must address the social issues.

4. Sustaining Rivers and Livelihoods

Watersheds, rivers and aquatic ecosystems projected as the biological engines of the planet also serve as livelihoods of local communities. Building a dam transforms landscapes and creates risks of irreversible impacts. In order to foster equitable human development and subsequent welfare of all species it is necessary that we restore the eco systems at river basins level. Good site selection and project design should be prioritised to avoid adverse impacts. Environmental flows can be tailored so that it can help maintain downstream ecosystems and the lives of communities that depend on them can be preserved.

5. Recognizing Entitlements and Sharing Benefits

Negotiation and planning with the affected people to recognise improve livelihoods and quality of life, ought to be the priority of the state. The rehabilitation and resettlement are the fundamental commitments of the state and the developer.

6. Ensuring Compliance

Commitments for the planning, implementation and operation of dams should be prioritised and met by the governments, developers, regulators and operators. This will help enhance and ensure public trust and confidence. Negotiated agreement should be project specific and adherence to international applicable regulations, criteria, and guidelines, should be ensured at all critical stages in project forethought and execution. Incentives and mechanisms that are mutually reinforcing are of utmost importance for environmental, technical and social measures. If such incentives are coupled with an appropriate mix of regulatory and non-regulatory measures, it can go a long way in ensuring effectiveness. It must be mentioned here that flexibility is needed to accommodate changing circumstances.

7. Sharing of Rivers for Peace, Development, and Security

Administration and management of transboundary rivers has been a contentious issue between many countries. Diversion of water on transboundary rivers has given rise to considerable tension between countries and within countries. Constructive cooperation

is the prerequisite for specific interventions for diverting water. Management of natural resources is often made the subject of agreement among nations in order to foster and promote a discourse of mutual interest for regional cooperation and peaceful coexistence. In the present times, there has been a change and an enormous shift in focus from the technocratic approach of allocating a finite resource to the sharing of rivers and their associated benefits by riparian territories can be witnessed at an international arena. This approach is further ossified by external financing agencies that support the principles of good faith equity and conscience between riparian states.

The divisive conflicts need to be remedied and discarded with if nations are to achieve equitable and sustainable outcomes. Future decisions on water and energy management between states depend upon the need to reflect and integrate the strategic priorities and their associated policy principles in the planning and project cycles.

3.10 Legitimacy of Dam Building under International Law

3.10.1. Assessing Legitimacy

It is necessary to assess not only the legality but the legitimacy of building dam on an international watercourse.¹¹¹ Legality generally implies compliance with applicable law and rules. Legitimacy however involves the application of just fair and justified actions.¹¹² In this section, the researcher elaborates on the international rules applicable to dam building on a transboundary river.

International treaty law on water is limited to the International Convention on the Law of the Non-navigational Uses of International Watercourses 1997. But this convention fails to provide more than a framework for further cooperation. In this research enterprise, international water law is considered as customary rules and principles to guide water conflict resolution. Thus, here, the 1997 UNWC, considered to be customary law, is used as the basis for the legal framework. Also it should be noted that not all watercourse states are party to these conventions. The landscape of international water law is broader than the UNWC. International environmental law regimes, such as those under the 1971 Convention on Wetlands of International Importance especially

¹¹¹ *Supra note 96.*

¹¹² *Ibid.*

as Waterfowl Habitat (Ramsar Convention)¹¹³ and the 1992 Convention on Biological Diversity (CBD), are undoubtedly of importance as well for new infrastructure projects on international watercourses. Moreover, the concept of legitimacy unavoidably requires broader scrutiny than merely analyzing sources of international water or environmental law and human rights law, since concepts of distributive justice and equity also play a role in assessing legitimacy.

3.10.2 Principle of Sovereignty

The starting point to assess the legitimacy of developing a dam on a shared watercourse is the principle of sovereignty. Sovereignty is a key reference point for international water utilization.¹¹⁴ This suggests that a state has sovereignty over its natural resources as well as the right of development of those resources. But the sovereign right to exploit natural resources should not affect other states harmfully. International law has an accepted principle, which is recognized by the International Court of Justice (ICJ) and tribunals in several cases. In the case of the *Lake Lanoux Arbitration*¹¹⁵, it was held that states have the sovereign right to utilize their natural resources.¹¹⁶ Therefore, it can be justified to unilaterally damming a shared watercourse through the sovereign right of that particular state with absolute territorial sovereignty. However, this sovereignty of states is not absolute but conditional. The scope of its application is limited to specific circumstances.¹¹⁷ The ICJ in the *Gabčíkovo-Nagymaros*¹¹⁸ case held that the right of a

¹¹³ The Convention on Wetlands of International Importance is the first modern treaty between nations aimed at conserving natural resources. The signing of the Convention on Wetlands took place in 1971 at the small Iranian town of Ramsar. Since then, the Convention on Wetlands has been known as the Ramsar Convention. The Ramsar Convention's aims to halt the worldwide loss of wetlands and to conserve, through wise use and management, international cooperation, policy making, capacity building and technology transfer.

¹¹⁴ Farnum, R.L., et al. *Hydro-Hegemons and International Water Law*, *Routledge Handbook of Water Law and Policy*, 297–310 (2017).

¹¹⁵ *Lake Lanoux Arbitration (France v. Spain)*, Arbitral Tribunal, 16 Nov. 1957, (1957) 12 *Reports of International Arbitral Awards*, p. 281. Lake Lanoux is situated in southern France near the border of Spain. The lake is fed by several streams that originate in France. Water from the lake joins the river Carol before crossing into Spain. In the 1950s France took a decision to divert the water of Lake Lanoux to generate hydroelectricity. Spain believed that such a step would violate its water rights under a treaty signed in 1866. The arbitral tribunal issued an award in 1957, rejecting Spain's arguments as France promised not to alter the volume of water from the lake. The tribunal did not foresee an injury to the interests of Spain. It also observed that standing and flowing waters are subjected to the sovereignty of the states where they are located.

¹¹⁶ *Ibid.*

¹¹⁷ Y. Tyagi, *Permanent Sovereignty over Natural Resources*, 4 *Cambridge Journal of International & Comparative Law*, 588–615 (2015).

¹¹⁸ In the year 1977, Hungary and Czechoslovakia signed a Treaty for the construction of dams and other projects along the Danube River that bordered both nations. Czechoslovakia dammed the river in its

sovereign state unilaterally to build a dam on a shared watercourse completely within its territory is still subject to particular limitations. Firstly the riparian state has the duty not to cause significant transboundary damage and, secondly, it has the duty to respect the equitable and reasonable utilization of a shared watercourse.¹¹⁹ Premised on this principle, a riparian state will have the right to build a dam on a shared watercourse but such a right is limited. States must adhere to other international obligations. This reasoning signifies that limited territorial sovereignty is now the accepted theory for the utilization of shared watercourses in international law.

Moreover, water as natural resource is different from other resource because humans depend on water. Therefore this research enterprise focuses on at-best limited but not absolute sovereignty over a shared watercourse.¹²⁰ Therefore it can be said that the state of origin will have the basic right to utilize the shared watercourse, but this utilization must comply with the international obligations of the state of origin.¹²¹ This balanced approach is reflected precisely in the concept of equitable and reasonable utilization of the watercourse.¹²²

3.10.3. The 1997 UN Watercourses Convention

Under Article 38 of the statute of the International Court of Justice(ICJ) ,the sources of International Law are elaborated. They are international conventions, international customary law and the general principles of law recognised by civilised nations. Premised on these sources, it is pertinent to ask the question as to which obligations under International law govern the construction of dam particularly for example in the case of India and China as there is no formal treaty between both the states. As a result the UNWC can potentially play the role.¹²³ Since neither of the states has acceded to the

territory when Hungary stopped working on the project. No amount of negotiation could resolve the matter. Hungary terminated the Treaty based on the fact that the damming of the river had been agreed only on the ground of a joint operation and sharing of benefits associated with the project, to which Czechoslovakia had unlawfully unilaterally assumed control of a shared resource.

¹¹⁹ McCaffrey, S, *The Contribution of the UN Convention on the Law of the Non-Navigational Uses of International Watercourses* IInternational Journal of Global Environmental Issues, 250–63(2001).

¹²⁰J. Dellapenna, *Treaties as Instruments for Managing Internationally Shared Water Resources: Restricted Sovereignty vs. Community of Property*, 1 Case Western Reserve Journal of International Law, 27–56(1994).

¹²¹ N.SCHRIJVER, SOVEREIGNTY OVER NATURAL RESOURCES: BALANCING RIGHTS AND DUTIES ,231–52(1997).

¹²²L. Chiussi, , *United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses*, in Fitzmaurice, M., Tanzi, A. & Papantoniou, A. (eds), *Multilateral Environmental Treaties*, (2017).

¹²³ P.PEEL, PRINCIPLES OF INTERNATIONAL ENVIRONMENTAL LAW, 310–12(2012).

convention, the UNWC is not formally binding in this case. The convention can make a positive contribution in strengthening transboundary water cooperation; therefore the emphasis of this dissertation is placed on the UNWC. The UNWC provides for the substantive and procedural norms of customary international law, under the principle of equitable and reasonable utilization.¹²⁴ Two ingredients are the grand essentials for the formation of customary international law. They are: *Opinio Juris*¹²⁵ and State practice. The UNWC was adopted by the UN General Assembly after extensive work and preparation by the International Law Commission that plays an important role in the identification of customary law.

The substantive and procedural norms that the UNWC contains are completely interrelated. Equitable and reasonable utilization, the no harm principle and the general obligation to cooperate are the substantive norms. Procedural guidelines stress on the how the states must implement their substantive norms. Obligation to exchange data, to provide information concerning planned measures and further consultation on the potential effects of such planned measures are the procedural norms. They are binding on all states as they form the corpus of International Law. The *Gabcikovo-Nagymaros* (Hungary v Slovakia)¹²⁶ case and the *Pulp Mills* (Argentina v Uruguay)¹²⁷ case support this observation. Certain states practices demonstrate the global influence of the UNWC. For example the Southern African Development Community Revised Protocol on Shared Watercourses¹²⁸, The Nile Basin Cooperative Framework Agreement.¹²⁹

¹²⁴F.R Loures et.al, *The Authority and Function of the UN Watercourses Convention*, in Loures, F.R. & Rieu-Clarke, A. (eds), *The UN Watercourses Convention in Force: Strengthening International Law for Transboundary Water Management* (2013), 49–66(2013).

¹²⁵ An opinion of law or necessity.

¹²⁶ *Gabčíkovo-Nagymaros Project (Hungary v. Slovakia)*, Judgment (Merits), 25 Sept. 1977, *ICJ Reports* (1997), p. 7.

¹²⁷ *Pulp Mills on the River Uruguay (Argentina v. Uruguay)*, Judgment, 20 Apr. 2010, *ICJ Reports* (2010), p. 14. The International Court of Justice made several important observations with respect to environmental impact assessments' status in international law. The Court held that undertaking an environmental impact assessment where there is a risk that the proposed industrial activity may have a significant adverse impact in a transboundary context, in particular, on a shared resource has become an important part of international law in the present times. (para.204). Considering that an EIA should be conducted prior to the implementation of the project. (para.205), the Court held that the content and scope of EIAs had not yet been defined by either general international law or by the Statute. Therefore, the Court considered that each State should determine EIAs' content in its domestic legislation.

¹²⁸ Available at <https://www.sadc.int/documents-publications/show/1975>. (Sep 20, 2019, 10 PM).

¹²⁹ Available at http://www.internationalwaterlaw.org/documents/regionaldocs/Nile_River_Basin_Cooperative_Framework_2010.pdf (Sep 20, 2019, 10 PM).

The world order in the contemporary times is grounded on consent and self interest. States have a conservative approach towards international commitments. They prefer far more flexible framework agreements.¹³⁰The UNWC provides for a more acceptable framework of general duties and rights. Therefore this document must be adopted as a global instrument in order to address the principles of international customary law which are discussed in details hereunder.

3.10.4 The Equitable and Reasonable Utilization Principle

Several doctrines and principles have been adopted by the states in utilizing the shared water resources. Four theoretical principles including territorial sovereignty, equitable utilization, territorial integrity and common management are there for allocating resources for water courses. Among these doctrines, the doctrine of equitable utilization is a principle of customary international law.¹³¹ This doctrine simply provides that the substantial interests of all the riparian states must be reconciled and taken care of.

One of the fundamental principles of international law is the principle of equitable and reasonable utilization. It involves a decision making strategy in which various aspects of utilization of watercourses must be examined. The ICJ decision of the *Gabčíkovo-Nagymaros*, a conflict between Hungary and Slovakia concerning a dam expressly declared the principle of equitable and reasonable utilization as a principle of customary international law.¹³²This principle has been also articulated in Article 5 of the UNWC and Article 2 of the Berlin Rules, 2004.¹³³ Hence, unless otherwise agreed by riparian states, such states are obliged to use shared watercourses in an equitable and reasonable manner.¹³⁴

Here, one may ask the question as to how such equitable and reasonable utilization should be defined and agreed by the riparian states. It may be difficult to determine whether a shared watercourse is used equitably and reasonably used in the absence of joint management of shared watercourse. Article 6 UNWC lists a non-exhaustive

¹³⁰D.ARMSTRONG, et.al, INTERNATIONAL LAW AND INTERNATIONAL RELATIONS, 288, (2012)

¹³¹ It is reflected in the UNWC and Draft Articles on Transboundary Aquifers.

¹³² *Gabčíkovo-Nagymaros (Hungary v. Slovakia)*.

¹³³ The Berlin Rules on Water Resources were approved by the Water Resources Law Committee of the International Law Association (ILA) in 2004. These Rules set out customary international law relating to freshwater resources: ILA, Report of the 71st Conference 3, (2004) 71 ILA 337, 385.

¹³⁴J.W Dellapenna, , *The Customary International Law of Transboundary Fresh Waters* (2001) 1(3-4).

number of factors that should be considered in evaluating equitable and reasonable utilization. They are population dependence, the availability of alternatives, and the effects of the shared water utilization. Therefore there is the need of riparian states, utilizing the shared water by considering these factors and by taking into account the interests of other riparian states as well as the ecosystem of the shared watercourse. Balancing of diversity of state interests could still be a challenge in the absence of any political intent to apply these factors would be onerous. Therefore, some authors express concern about the practical application of these factors.¹³⁵ Another challenge is that different riparian states have different evaluation of these factors which may also lead to disagreement among riparian states. For example some authors may suggest that equitable utilization should be determined with reference to fairness and norms of distributive justice.¹³⁶ Arguably if such a stand is resorted to, such evaluations of fairness and distributive justice in the context of water allocation should not be rendered without *particular* attention being paid to the special needs of the least developed states. In this connection, one may argue that distributional equity requires richer states to provide assistance to poorer states in order to enable them to utilize shared watercourses in a more efficient manner.¹³⁷

Therefore it can be said that implementation of procedural obligations is of utmost importance if one is to go by the rationale of evaluation of equitable and reasonable utilization. Only through an effective implementation of procedural obligations could substantive obligations be fully evaluated and complied with by the riparian states.

3.10.5 The No Harm Principle

The principle of no harm has been widely cited in number of cases of the ICJ and articulated in several international and regional legal instruments.¹³⁸ It is cited in the *Trail Smelter Arbitration*,¹³⁹ the *Corfu Channel*,¹⁴⁰ the *Nuclear Tests*,¹⁴¹ and

¹³⁵ For a discussion of different perspectives on defining ‘justice’ and ‘equity’, see also M. Zeitoun, et al., *Transboundary Water Justice: A Combined Reading of Literature on Critical Transboundary Water Interaction and “Justice”, for Analysis and Diplomacy* 16 *Water Policy*, 174–93 (2014).

¹³⁶ O. McIntyre, *Utilization of Shared International Freshwater Resources: The Meaning and Role of “Equity” in International Water Law* 38 *Water International*, 112–29 (2013).

¹³⁷ *Ibid.*, pp. 126–8:

¹³⁸ J. Albers, *Responsibility and Liability in the Context of Transboundary Movements of Hazardous Wastes by Sea: Existing Rules and the 1999 Liability Protocol to the Basel Convention*, 152 (2014).

¹³⁹ *Trail Smelter Arbitration (United States v. Canada)*, Trail Smelter Arbitral Tribunal, 16 Apr. 1938, 3 *Reports of International Arbitral Awards*, p. 1905, at 1911–37. The Tail Smelter was located in British

the *Pulp Mills* cases. It is also reflected in Principle 21 of the Stockholm Declaration¹⁴² and Principle 2 of the Rio Declaration,¹⁴³ the ILC Draft Articles on Prevention of Transboundary Harm from Hazardous Activities 2001,¹⁴⁴ Article 7 UNWC, and many other international instruments.

Let us take the example, of the *Lake Lanoux Arbitration (France v. Spain)*. In this case French plan to divert water from Lake Lanoux to generate hydro-electric energy was brought to the arbitral tribunal where Spain argued that it would violate its water rights under a series of treaties. Rejecting Spain's arguments the arbitral tribunal held that the French plan would not alter the volume of water entering Spain. The tribunal reached at this conclusion by relying on the French promise to return water to Spain.

The no-harm principle as a customary rule of international law and is binding upon states. Article 3 of the ILC Draft Articles of 2001 expresses that the state of origin shall take all appropriate measures to prevent significant transboundary harm or at any event to minimize the risk thereof. Similarly, but more limited in coverage, Article 7 UNWC requires watercourse states to take all appropriate steps in order to prevent causing significant harm to other watercourse states in utilizing an international watercourse in their territories.

In general, this principle limits the scope of the sovereign rights of states. The sovereign right of a state to exploit its own resources has restriction. It has to ensure that that the activities within its jurisdiction or control do not cause damage to the environment of

Columbia since 1906. It was owned and operated by a Canadian corporation. The sulfur dioxide emitted from the Trail Smelter resulted in the damage of the state of Washington between 1925 and 1937. This led to the United States suit against the Canada with an injunction against further air pollution by Trail Smelter.

¹⁴⁰ *Corfu Channel Case (United Kingdom v. Albania)*, Judgment (Merits), 9 Apr. 1949, *ICJ Reports* (1949), p. 4, at 43. The explosion of mines in the Albanian waters resulted in the death of a British naval personnel. It was on this basis that the United Kingdom claimed that Albania was internationally responsible for damages.

¹⁴¹ *Nuclear Tests Case (Australia v. France)*, Judgment, 20 Dec. 1974, *ICJ Reports* (1974), p. 253; *Nuclear Tests Case (New Zealand v. France)*, Judgment, 20 Dec. 1974 *ICJ Reports* (1974), p. 457. In the South Pacific, a series of nuclear tests was completed by France which made Australia and New Zealand to apply to the I.C.J. demanding that France stops testing immediately. Before the award by the court, France announced that it had completed the test and did not plan any further test. So France moved for the dismissal of the application.

¹⁴² Available at <http://www.un-documents.net/aconf48-14r1.pdf>. (Sep 25, 2019, 10 PM).

¹⁴³ Available at <https://www.un.org/documents/ga/conf151/aconf15126-3.htm>. (Sep 25, 2019, 10 PM).

¹⁴⁴ Adopted by the ILC at its 53rd session in 2001, and submitted to the UN General Assembly as a part of the Commission's report covering the work of that session (UN Doc. A/56/10). The report, which also contains commentaries on the draft articles, appears in 2001(II) *Yearbook of the International Law Commission*, Part Two.

other states or of areas beyond the limits of national jurisdiction. This principle also implies that the state in which any activity is planned (the state of origin) should take all appropriate measures to prevent causing *significant* transboundary damage beyond its territory or control.

It is pertinent to understand the meaning transboundary damage. Any adverse impact that results from activities carried out in one country which cause significant damage in the territory of another country is a transboundary damage. There are four ingredients to constitute transboundary damage:

(i) there must be a human cause of transboundary damage; (ii) significant adverse impacts has to result from such damage; (iii) there must be a causal link between activities carried out in the territory of, or under the control of, one country and harm incurred in the territory of another state; and (iv) there must be transboundary movement of such harmful impact.¹⁴⁵ If the case establishes a transboundary damage on the part of one state the principle places a due diligence obligation upon the state of origin to take all *appropriate* measures. This raises the question as to what kind of measures are considered appropriate? States have the discretion and authority to decide which measures should be taken and which activities should be governed by preventive measures. Furthermore, if developmental activities over a river by a state reflect the criteria of the equitable and reasonable utilization principle, it arguably meets the no-harm principle. Similar to the principle of equitable and reasonable utilization, the no-harm principle can be interpreted from the vantage point of substantive and a procedural lens. The substantive aspects of the principle deal with the *threshold* of transboundary damage as to how much of a damage is transboundary damage. The procedural dimension of no harm is the specific obligations with which states should comply to prevent transboundary damage. The substantive and procedural implications of the no-harm principle, however, have been developed in different instruments.

As per Article 7 UNWC, a riparian state must prevent the causing of *significant* harm to other riparian state. Therefore, it can be said that the threshold that is used for qualifying transboundary damage is significance: the obligation of watercourse states is limited

¹⁴⁵ H.XUE, TRANSBOUNDARY DAMAGE IN INTERNATIONAL LAW, 4–10, (2003).

to the duty not to cause *significant* transboundary harm.¹⁴⁶ The ILC Draft Articles of 2001 also provides for the same threshold. But neither UNWC nor the ILC draft articles indicates of the activities coming within the scope of the defined threshold. Only the ILC indicates that it includes activities which are not prohibited under international law. Hence, though Article 7 of the UNWC says that the utilization of a shared watercourse is not prohibited under international law, it could still be considered unlawful and beyond the legitimate rights of each of the riparian states in case it leads to constant transboundary damage to other riparian states.

However, there may be an instance in which the utilization of shared watercourses could be considered lawful but leads to transboundary damage. Answering this question, McIntyre links the no-harm principle with the principle of equitable utilization and further argues that the significant harm could be prohibited only at a stage when factors that are relevant to the application of the principle of equitable utilization are taken into account. Many of these factors are environmental in nature. Therefore environmental impacts of using a shared watercourse must be taken into account while evaluating these factors. Added to this, the notion of sustainability implies that the interests of all communities related to the shared watercourse, as well as environmental factors, should be given priority in using that watercourse. Hence, McIntyre concludes that preventing transboundary damage to a large extent is included within the determination of a reasonable and equitable regime.¹⁴⁷

Some other authors say that no-harm principle in customary international law should be given primacy over the equitable and reasonable utilization principle. Others maintain that the equitable and reasonable utilization principle should be given priority over the no-harm principle.¹⁴⁸ In order to avoid transboundary damage states are under an obligation to take into account the other provisions set out in the UNWC. A slight harm to the other riparian states is inevitable when the country of origin develops a shared watercourse. Therefore, it is also inevitable that using a shared watercourse an upstream state will cause some degree of harm to a downstream state. In the light of recent developments in international law, arguably the no-harm and equitable and reasonable

¹⁴⁶ *Ibid.*

¹⁴⁷ *Ibid.*

¹⁴⁸ S.M.A. Salman, *The World Bank Policy for Projects on International Waterways: An Historical and Legal Analysis* 96(2009).

utilization principles should be interpreted in combination with other international norms such as sustainable development. Therefore, it can be argued that the equitable and reasonable utilization principle is flexible enough to imply an additional obligation not to cause *significant* harm. The UNWC must be interpreted in a manner that avoids difficulties over the interpretation of the principle of equitable and reasonable utilization and the principle of no significant harm. This can be resolved only by giving priority to the former principle while giving the latter special status

3.10.6 The obligation to Cooperate

Another prominent principle is the duty to cooperate which is generally accepted as customary international law and is reflected in several regional and international instruments.¹⁴⁹ An autonomous requirement of customary international law is the duty of notification. It is usually of conventional arrangements and is equally important for an effective implementation of both the principle of equitable and reasonable utilization and the duty to prevent significant transboundary harm.¹⁵⁰ Article 8 UNWC articulates this duty. Sovereign equality, territorial integrity, mutual benefit and good faith are the basis on which the riparian states should cooperate by the virtue of this provision so that maximum utilization and adequate protection of an international watercourse can be obtained. Without clear procedural obligations implementation of the substantive obligations may prove otiose. Article 4 of the ILC Draft Articles on the Prevention of Transboundary Harm requires the states concerned to cooperate in good faith in preventing significant transboundary harm or minimizing the risk thereof.

In general watercourses states have a duty to cooperate over the utilization and management of shared watercourses. But the legal implications of this duty remain somewhat ambiguous. By definition the cooperation principle is somewhat an abstract rule and the specific obligations of states concerned should be clearly expressed. According to Article 9 UNWC, riparian states are under a duty to regularly exchange data and information on the condition of the watercourse. This can be considered one of the specific obligations of states under the general obligation to cooperate. Thus, there are several other specific obligations within the ambit of General

¹⁴⁹ C. LEB, CO-OPERATION IN THE LAW OF TRANSBOUNDARY WATER RESOURCES, 80–2(2013).

¹⁵⁰ *Ibid.*

obligation to Cooperate. These specific obligations are well set out in Part III UNWC. And these specific obligations clearly fit within the general duty to cooperate. According to part III, states are under an obligation to exchange information, consult and negotiate with each other on the planned measures which may have a significant adverse effect on other watercourse states. Article 24 UNWC provides watercourse states to enter into consultations concerning the management of the international watercourse, at the request of any of them. Management' is defined in Article 24 as: (a) planning the sustainable development of an international watercourse and providing for the implementation of any plans adopted; and (b) otherwise promoting the rational and optimal utilization, protection, and control of the watercourse. Hence, it seems that such consultation is wider than that concerning planned measures and includes a wider scope, such as the establishment of a joint management mechanism for utilization of the shared watercourse.

A broader approach has been adopted in ILC Draft Articles on the Prevention of Transboundary Harm. Article 6 provides that the origin country should require prior authorisation for any act within its jurisdiction that has the potentiality to cause significant transboundary harm. Article 7 provides that such an evaluation of harm must be done by a comprehensive EIA. Article 9 requires that the state of origin to provide states likely to be affected with timely notification of the assessment. Then again, if any of the states concerned requests, in order to prevent any transboundary, there must be consultation within a reasonable time frame. The aim of such consultation as per Article 9(2) the ILC is to reach an equitable balance of interests. It provides that states should employ best efforts' to comply with information requests from other watercourse states. Article 10 further determines the factors related to an equitable balance of interests.

Even if consultation failed to produce an agreed solution to an issue, the ILC expects the state of origin to take into account of the interests of a state likely to be affected. Conducting a (transboundary) EIA can ensure a meaningful implementation of the duty to notify other watercourse states. Therefore, the principles of international law require a state of origin to conduct an EIA which considers the interests of states likely to be affected. This is reflected in the 2010 judgment of the ICJ in *Pulp Mills* as customary international law. Hence, there is no doubt that conducting an EIA which considers the

interests of the state likely to be affected and its local community is a specific obligation required by international law.

But it must be noted that, the effective implementation of both the equitable and reasonable utilization principle and the no-harm principle heavily relies upon procedural requirements. Thus, procedural principles, avoid disputes and strengthen cooperation over international watercourses, and also support the substantive principles.

3.10.7 Subsidiary Sources

The above account relating to legitimacy of dam construction over a shared water course makes it clear that when a state builds a dam which may have negative impacts on the downstream state(s), the state of origin is required to meet various obligations which are part of the corpus of international law and are binding upon all states. Apart from analysing this issue in the light of international water law the, international obligations could be further analyzed from three perspectives: (i) international environmental law, (ii) human rights, and (iii) equity concerns. The Ramsar Convention,¹⁵¹ provides that parties should implement their planning to promote the conservation of wetlands and, as far as possible, the wise use of wetlands in their territory. Arguably riparian states should take specific action to protect the ecosystem of a shared watercourse. Any change in the ecological character of the shared watercourse due to technological developments must be communicated to the other riparian states. Transboundary water damage may be assessed in the light of other sources of international environmental law, such as the 1992 CBD. The assessment does not merely relate to the damage caused by inequitable water use *per se*, but extends to broader secondary impacts concerning environmental issues, which are also covered in the Stockholm Declaration,¹⁵² and the Rio Declaration.

The construction of a dam in an international watercourse violates human rights. It could lead to the displacement of particular (often vulnerable) groups. Indigenous water rights may be violated without adequately considering the rights of the indigenous people.¹⁵³ Construction of a dam by an upstream state could guarantee drinking water for

¹⁵¹ Available at <https://www.ramsar.org> (Sep 30, 2019, 11 PM).

¹⁵² On the 1972 Stockholm UN Conference on the Human Environment.

¹⁵³ M. Jackson et al *Protecting Indigenous Values in Water Management: A Challenge to Conventional Environmental Flow Assessments* (2011) 14 *Ecosystems*, 1232–48 (2011).

its people but at the same time it could reduce the water supply for downstream users. Any act of a riparian state which restricts people's access to fresh water is inequitable. Therefore, the right to water should be respected, irrespective of the position of the state involved, in proportion to the actual needs of riparian states.¹⁵⁴ Both the international community and authoritative human rights bodies increasingly recognize a human right to water. Under Articles 11 and 12 of the International Covenant on Economic, Social and Cultural Rights (ICESCR) of 1966, the right to water is recognised as legally binding. General Comment 15 of the UN Committee on Economic, Social and Cultural Rights, 2002 which monitors the implementation of the ICESCR provides that the human right to water is indispensable for leading a life in human dignity. It is a prerequisite for the realization of other human rights'.

Finally, the concept of equity as a principle has found a place in international law through the devises of state practice and international tribunal awards. In the context of transboundary shared watercourses, equity could have three functions and they are: (i) to assess the equitable share of riparian states; (ii) to ensure that all relevant circumstances and stakeholders are taken into consideration; and (iii) to determine the governing law and its application.¹⁵⁵ It is necessary to invoke other principles such as that of common but differentiated responsibility of states. It is, however, important to recognize that the assessment of the legitimacy of dam construction necessarily involves more than merely an analysis of international water law.

The research deals with dams and development question in the North East India. Therefore it is pertinent to understand the Indian approach towards International Water Law and articulate briefly on the tension between India and China as an example to further throw light on the potentiality of International law principles to devise a solution on dispute relating to transboundary water body exploitation.

3.11 Indian Approach towards International Water Law

India had abstained from voting on the UN Watercourses Convention on the ground that the draft was not adequate to foster consensus among countries. It was argued by India that the draft might fail to promote wider acceptability owing to lack of balance to accommodate different interests.

-Articles 3¹⁵⁶, 5¹⁵⁷, 32¹⁵⁸ and 33¹⁵⁹ were the provisions that were not sanctioned by the Indian Government. India's delegate made the following observations:

¹⁵⁴ T.S. BULTO, THE EXTRATERRITORIAL APPLICATION OF THE HUMAN RIGHT TO WATER IN AFRICA, 194(2014).

¹⁵⁵ R. HIGGINS, PROBLEMS AND PROCESS: INTERNATIONAL LAW AND HOW WE USE IT 220(1994).

¹⁵⁶ 1. In the absence of an agreement to the contrary, nothing in the present Convention shall affect the rights or obligations of a watercourse State arising from agreements in force for it on the date on which it

became a party to the present Convention. 2. Notwithstanding the provisions of paragraph 1, parties to agreements referred to in paragraph 1 may, where necessary, consider harmonizing such agreements with the basic principles of the present Convention. 3. Watercourse States may enter into one or more agreements, hereinafter referred to as —watercourse agreements, which apply and adjust the provisions of the present Convention to the characteristics and uses of a particular international watercourse or part thereof. 4. Where a watercourse agreement is concluded between two or more watercourse States, it shall define the waters to which it applies. Such an agreement may be entered into with respect to an entire international watercourse or any part thereof or a particular project, programme or use except insofar as the agreement adversely affects, to a significant extent, the use by one or more other watercourse States of the waters of the watercourse, without their express consent. 5. Where a watercourse State considers that adjustment and application of the provisions of the present Convention is required because of the characteristics and uses of a particular international watercourse, watercourse States shall consult with a view to negotiating in good faith for the purpose of concluding a watercourse agreement or agreements. 6. Where some but not all watercourse States to a particular international watercourse are parties to an agreement, nothing in such agreement shall affect the rights or obligations under the present Convention of watercourse States that are not parties to such an agreement.

¹⁵⁷ 1. Watercourse States shall in their respective territories utilize an international watercourse in an equitable and reasonable manner. In particular, an international watercourse shall be used and developed by watercourse States with a view to attaining optimal and sustainable utilization thereof and benefits therefrom, taking into account the interests of the watercourse States concerned, consistent with adequate protection of the watercourse. 2. Watercourse States shall participate in the use, development and protection of an international watercourse in an equitable and reasonable manner. Such participation includes both the right to utilize the watercourse and the duty to cooperate in the protection and development thereof, as provided in the present Convention.

¹⁵⁸ Unless the watercourse States concerned have agreed otherwise for the protection of the interests of persons, natural or juridical, who have suffered or are under a serious threat of suffering significant transboundary harm as a result of activities related to an international watercourse, a watercourse State shall not discriminate on the basis of nationality or residence or place where the injury occurred, in granting to such persons, in accordance with its legal system, access to judicial or other procedures, or a right to claim compensation or other relief in respect of significant harm caused by such activities carried on in its territory.

¹⁵⁹ 1. In the event of a dispute between two or more parties concerning the interpretation or application of the present Convention, the parties concerned shall, in the absence of an applicable 13 agreement between them, seek a settlement of the dispute by peaceful means in accordance with the following provisions. 2. If the parties concerned cannot reach agreement by negotiation requested by one of them, they may jointly seek the good offices of, or request mediation or conciliation by, a third party, or make use, as appropriate, of any joint watercourse institutions that may have been established by them or agree to submit the dispute to arbitration or to the International Court of Justice. 3. Subject to the operation of paragraph 10, if after six months from the time of the request for negotiations referred to in paragraph 2, the parties concerned have not been able to settle their dispute through negotiation or any other means referred to in paragraph 2, the dispute shall be submitted, at the request of any of the parties to the dispute, to impartial fact-finding in accordance with paragraphs 4 to 9, unless the parties otherwise agree.

4. A Fact-finding Commission shall be established, composed of one member nominated by each party concerned and in addition a member not having the nationality of any of the parties concerned chosen by the nominated members who shall serve as Chairman. 5. If the members nominated by the parties are unable to agree on a Chairman within three months of the request for the establishment of the Commission, any party concerned may request the Secretary-General of the United Nations to appoint the Chairman who shall not have the nationality of any of the parties to the dispute or of any riparian State of the watercourse concerned. If one of the parties fails to nominate a member within three months of the initial request pursuant to paragraph 3, any other party concerned may request the Secretary-General of the United Nations to appoint a person who shall not have the nationality of any of the parties to the dispute or of any riparian State of the watercourse concerned. The person so appointed shall constitute a single-member Commission. 6. The Commission shall determine its own procedure. 7. The parties concerned have the obligation to provide the Commission with such information as it may require and, on request, to permit the Commission to have access to their respective territory and to inspect any facilities, plant, equipment, construction or natural feature relevant for the purpose of its inquiry. 8. The Commission shall adopt its report by a majority vote, unless it is a single-member Commission, and shall submit that report to the parties concerned setting forth its findings and the reasons therefor and such

1. Article 3 failed to articulate the principles of freedom autonomy and rights in favour of the states to sign treaties on international watercourses without any constrain from the convention and

2. Article 5 was unclear and ambiguous. Words like sustainable utilization were left undefined. India's reservation on the core principles like the reasonable and equitable utilization shows that India is not apprehensive regarding the spirits of these articles but the potential interpretations of the terms.

3.11.1 The Governing Rule

India has denied the theory of absolute sovereignty theory as it has very little significance in modern international water management. India has specifically abstained from Article 5 and 7 of the Convention. Because India is a downstream riparian, for example to China, it will not accept the principle of reasonable and equitable utilization either.¹⁶⁰ But the importance of this principle cannot be negated as a part of the customary international law.¹⁶¹ Scholars from China and India believe that the governing rule is the prior utilization theory. Based on this theory both the countries believe that they have a better say on the river water because of historical rights. However such an approach will lead to competition between both the countries on dam construction thereby resulting in adverse social and environmental implications and less utilization of the river.¹⁶² Although when the construction of a hydropower project is complete, it is often inequitable to require the states to restore the status quo before the construction, and it is unlikely to confer absolute water rights on the state.¹⁶³ The governing rule in this case is the reasonable and equitable utilization. Therefore the states may have to mitigate the consequences of dam building by paying compensation.

recommendations as it deems appropriate for an equitable solution of the dispute, which the parties concerned shall consider in good faith. 9. The expenses of the Commission shall be borne equally by the parties concerned. 10. When ratifying, accepting, approving or acceding to the present Convention, or at any time thereafter, a party which is not a regional economic integration organization may declare in a written instrument submitted to the depositary that, in respect of any dispute not resolved in accordance with paragraph 2, it recognizes as compulsory ipso facto, and without special agreement in relation to any party accepting the same obligation: (a) Submission of the dispute to the International Court of Justice; and/or (b) Arbitration by an arbitral tribunal established and operating, unless the parties to the dispute otherwise agreed, in accordance with the procedure laid down in the annex to the present Convention. A party which is a regional economic integration organization may make a declaration with like effect in relation to arbitration in accordance with subparagraph (b).

¹⁶⁰ Hongzhou Zang, *Sino-India water disputes: the coming water wars?* 3 WIRE WATER. 155, 160 (2016).

¹⁶¹ *Ibid.*

¹⁶² *Supra note* 160 at 240.

¹⁶³ *Ibid.*

3.12 Controversies Surrounding the Management of the River Brahmaputra

As far as relation between China and India is concerned, controversies relating to the management of the river Brahmaputra or the Yarlungzangbu are three fold. It must be remembered that the Brahmaputra is an international water course. Therefore, firstly, China's construction of the Zangmu dam on the river without informing the lower riparian states, secondly China's plan to divert the water of the river Brahmaputra and India's lower Subansiri project's potential effect over territorial disputes have the potential of creating much tensions in the coming future. The following sections discuss the application of customary international law to these controversies.

3.12.1 The Zangmu Dam Controversy

China has approximately, 22000 large scale dams¹⁶⁴. The Zangmu dam is a series of six run of river dams located in the autonomous region of Tibet.¹⁶⁵ It is a series of six run of river dams. Run of river dams means the dams is not used to store water, rather the water flows through a series of turbines following the river's natural flow in order to generate electricity¹⁶⁶ the controversy is that China started building the dam without sharing any information with India and Bangladesh which has raised concerns in both the countries. China claims that this would not affect the downstream countries as it is only a run of the river project and would not result in reduction of flow to the downstream countries. Yet another claim of China is that not building a dams on the river Brahmaputra means not using the river to its maximum potential; Then again since the natural run off of the river in the Chinese part is only limited, Indian concerns on the planning of the dams is unnecessary. Yet China cannot be released of its international obligations. While preparing the statement on run off the context of both the countries are not taken into consideration. It seems that both the countries have been compared without comparing the effects of different uses, and does not take into account the impact on timing of the natural flows.¹⁶⁷ It must be remembered that China has a share to only a small portion of the natural runoff the river, yet such runoff may be crucial to downstream countries irrigation in dry season.

¹⁶⁴Stephanie,MSmith,*The Damming of Nature: How China is Expanding Its Dam Infrastructure and Potential Negative Downstream Effects on Fisheries of the Yaluzangbu-Brahmaputra River*,9 GOLDEN GATE UNIVERSITY ENVIRONMENTAL LAW JOURNAL269,270(2016).

¹⁶⁵*Ibid*

¹⁶⁶Sudha Ramachandran, *Water Wars: China, India, and the Great Dam Rush*, THE DIPLOMAT , <http://thediplomat.com/2015/04/water-wars-china-india-and-the-great-dam-rush/> (Feb. 20, 2019.10 PM)

¹⁶⁷ *Supra note 160* at 242

It is the procedural aspects of the Zangmu Dam project that concerns the downstream countries. What India expects is that there must be a comprehensive bilateral treaty to handle the water sharing and management issue relating to the Brahmaputra or the Yarlungzangbu. India does not claim that notification of planned measures is a rule of customary international law. What concerns India is that there is no mechanism between both the countries for notification of planned measures and information sharing. The Chinese state has given green light to other hydropower dams in the Chinese part of the River Brahmaputra besides the Zangmu project. The authorities maintain that all the projects are run of the river project and therefore require no storage of water and as such will not hamper the rivers natural flow into the North- East India. Despite such assurance, there are enough reasons to generate apprehensions in India's North-East and in Bangladesh, where the Brahmaputra is an unquestionable lifeline and forms core ingredient of the cultural life here. Chinese dam construction and the planning of the other dams violates the rules of customary international law. Considering the limited runoff the river in China and run of the river nature of the dam the principle of reasonable and equitable utilization is probably taken care of, but the failure to share information with the downstream countries violate the customary rule of notification for planned measures.

3.12.2 China's Water Diversion Project

3.12.2.1 Not Involving the Brahmaputra River

In India media has been highlighting that China has been embarking on a water diverting project from the upper reach of the Brahmaputra to the highly populated northern part of the country¹⁶⁸. China has implemented part of its South North Water Transfer Project. The project comprises the Eastern Scheme, the Central Scheme and the Western Scheme.¹⁶⁹ Even if the project is implemented fully, it is unlikely to affect the Brahmaputra. Environmental impact of the Eastern Route and the Central Route is likely to be relatively minor¹⁷⁰. Therefore these schemes have been implemented.¹⁷¹ The western route is the most controversial one owing to its several disjoint segments. It is

¹⁶⁸ Ashok Swain, *China's Water Diversion Is Not Responsible For Brahmaputra River Turning Black*, OUTLOOK, (March 31 2018, 10 PM) <https://www.outlookindia.com> > Website > International

¹⁶⁹ Supra 160 at 243

¹⁷⁰ Darrin Magee, *Moving the River? China's South-North Water Transfer Project*, ENGINEERING EARTH, 1499, 1508-89 (2011).

¹⁷¹ *Ibid.*

technically difficult and the most economically infeasible. This route would traverse ecologically and culturally diverse areas of western China thereby posing serious risk to species, environment and human habitat. The government has increased its investment in The western route, consisting of several disjoint segments, is the most controversial, most technically difficult, and (currently, at least) the most economically infeasible of the three routes. The list of complications is short but significant. First, the route would traverse ecologically and culturally diverse areas of western China, potentially posing unwarranted risks in terms of species loss and challenges to human

3.12.2.2 National River Linking Project of India.

In midst of all speculations regarding Chinese water diversion from the upper reaches of river Brahmaputra ,its own National River Linking Project has been criticised from many quarters. The National River Linking Project of India envisages the transfer water from water _surplus area to water deficit area through inters basin water transfer projects.¹⁷² The project has caused much anger and protest in Bangladesh. The contention on the part of Bangladesh is that diversion of water from Brahmaputra and Ganges which provide 85% of the country's fresh water flow in the dry season, would result into an ecological disaster.¹⁷³The components of River Linking Projects have been split into three parts: 1.Northern Himalayan Rivers interlink component., 2.A southern peninsular component, 3.An intra-State rivers linking component. India has designed its own river linking project when China has no intention of diverting water from the Brahmaputra as of now. Thus in the future China too can claim that it is also equitable and reasonable utilization for China to transfer its national waters.

3.12.2.3 The Lower Subansiri Dam Controversy

The 2000 MW Lower Subansiri hydroelectric power Project, proposed to come up at Gerukamukh of Assam Arunachal border is the first large hydroelectric project to be constructed in the Subansiri river basin,the location of which is claimed by both India and China. The 1914 border delimitation agreement between the British and the Tibet without the sanction of the Tsing central government can be said to be the prelude to this conflict. In 1962 a war broke out between China and India known as Indo Sino war.

¹⁷²Upali Amarasinghe, *The National River Linking Project of India Some Contentious Issues*, 16 WATER POLICY RESEARCH HIGHLIGHT, 1,3 (2012).

¹⁷³ Dharmendra Mehta, Naveen ,K, Mehta , *Interlinking of Rivers in India :Issues and Challenges*, 19 GEO ECO MARINA, 137,140(2013).

In the war Chinese came out victorious but withdrew its troops from the territory. Thus the dispute remained unresolved and the territory was kept under the dominion of India. Since then government of both the states have been trying to find a solution to the dispute but only a little progress has been made. Now, the Subansiri Dam is located at this disputed territory of India China border. India's plan to build the dam without notification of planned measures may alert China of its territorial claim because the building of dam may epitomise India's claim over the disputed territory. China is interested in giving notification of planned measures to the downstream countries. Customary international law says that notification applies not only to the upstream countries but also to the any riparian commissioning any big developmental project like that of dams. Given the fact that there is hydropower potential in the Great Bend of the Brahmaputra located in the disputed territory controlled by India, China may want prior notification of planned measures from India so to reach a mutual understanding on the issue of dam building and understand the status of the disputed territory.

3.13 Current Situation

3.13.1 Information Sharing at Governmental Level

There exists a pact between the two countries on sharing of hydrological data during the monsoon season. According to the MoU signed in October 2013 between China and India, both the countries will be entitled to discuss every issue of mutual interest pertaining to Trans border Rivers.¹⁷⁴The Memorandum addresses sharing of hydrological data between both the countries but does not establish a bilateral mechanism. Yet it provides for a good framework for trans-border river cooperation. Sharing of hydrological information, is a way to cooperate without compromising on information considered sensitive by both the parties.

3.13.2 The Dhaka Declaration on Water Security

The Dhaka Declaration on Water Security discussed the future cooperation among countries that made up the Himalayan River Basin in 2010.¹⁷⁵ 25 distinguished water experts from India, Bangladesh, China and Nepal, participated in the workshop.¹⁷⁶ The

¹⁷⁴Wasbir Hussain, IndianadChina: An Assessment of October 2013 Agreements MoU on the Brahmaputra River, www.ipcs.org/comm_select.php?articleNo=4149 (April 1 2018).

¹⁷⁵BIPPS and Strategic Foresight Group, *Dhaka Declaration on Water Security*, www.bipss.org.bd/index.php?...id...dhaka-declaration-on-water-security... (April 1, 2019, 10 PM).

¹⁷⁶*Ibid.*

workshop recognised the importance of water security of the Himalayan River Basin. While acknowledging the significance of a collaborative approach to data sharing, the declaration emphasized on joint research projects and serious consequences of climate change. The declaration also underscored the need to save the interests of the lower riparian especially.¹⁷⁷

The management of water of River Brahmaputra needs a mechanism. Any mechanism to administer the water of river Brahmaputra should be based on the core principles of customary international law namely equitable and reasonable utilization, prevention of significant harm, notification of planned measures and other complementary measures like information sharing¹⁷⁸. The MoU signed in 2013 recognised that transboundary rivers are an important asset to the development of all riparians.¹⁷⁹ Both countries agreed to enhance trust and communication and China agreed to share more hydrological information to India during the monsoon period. This information sharing must improve further if Indian apprehension over Chinese activity on the Brahmaputra is to be reduced.¹⁸⁰ An all basin mechanism that is multilateral cooperation between the three riparian can go a long way in this. Even if China claims that it will not antagonise India, conflict may still result in if either country believes that it is under threat from the other. Previous tendencies of the Chinese unwillingness to share hydrological information on dams created such fear in India. Mutual goodwill and joint research projects in the region can foster strong bilateral bonds. Efficient water management policies will help reduce the future food and water crisis in both the countries. Water must be taken as a scarce and strategic resource and a holistic approach towards its management may prevent future water wars. Soft power should be used for negotiation to avoid destabilising the region. China must change its strategy from –responsive diplomacy to –preventive diplomacy, where it must be responsible for proactively engaging with riparians so as to prevent disputes.¹⁸¹

The Brahmaputra is the least utilized Himalayan River. It holds strategic position for the economic development of all its riparians. An all basin treaty mechanism is the need of the hour to enhance mutual trust and communication between all the riparians .This

¹⁷⁷ *Ibid.*

¹⁷⁸ Supra 160 at p.248.

¹⁷⁹ Medeleine Lovelle, *Co-Operation and the Brahmaputra ,China and India Water Sharing*, (Apr 2, 2018, 10 PM) www.futuredirections.org.au › Topic › Global Food and Water Crises.

¹⁸⁰ *Ibid.*

¹⁸¹ *Ibid.*

mechanism should be based on the core principle of reasonable and equitable utilization, prevention of significant harm and sharing of information of planned measures. Then again, the seismic fragility of the region requires a holistic approach towards the management of the river so that no riparian state is harmed. An all basin mechanism has become important so that the states reconcile their national water policies, and all the riparians get the benefit of flood control and finance without encroaching upon territorial issues that are sensitive.

3.14 Conclusion

Assessing the legitimacy of dam construction according to international law requires the incorporation of a wide variety of factors. Focusing exclusively on international water law, it can be held that the legitimacy of such construction depends not only on states' compliance with substantive norms such as equitable utilization and the no-harm principle, but equally on their procedural duty to cooperate, as well as the duty to notify. More particularly, the latter obligation is of crucial importance as it can facilitate a culture of communication among co-riparian states by providing a shared language, common understandings and several starting points for structured interstate discussions. Moreover, since the adoption of the UNWC, the concept of integrated water resources management has been developed, which implies the necessity to address the legitimacy of dam construction not merely by focusing simply on one dam, but by looking at water management in an integrated manner. A final assessment of legitimacy might even go beyond water and environmental law to include an analysis of human rights aspects and equity considerations. Thus, a holistic analysis of the legitimacy of dam construction entails a complicated exercise that includes all relevant dimensions in the river basin in question.

CHAPTER SUMMARY

- The chapter starts with the introduction that gives a general introduction to the theme under study.
- It articulates on the technical aspects of a dam as to what is a big dam.
- It provides an explanation as to what is the World Commission on Dams.
- The changing context of water and development is discussed in the chapter which tells why water is becoming a source of conflict in the present times.
- Performance of Big dams as per review by the WCD is explained
- The core values that make up the basis of review by WCD are discussed
- The chapter's most important part is the legitimacy of dam building under international law that articulates on the different theories and principles that guide dam building on an international water course
- The United Nations Convention on International Water Course is the most important international water law instrument that governs dam building in an international river

CHAPTER IV

DAM CONSTRUCTION IN NORTHEAST INDIA:

CASE STUDIES

SYNOPSIS

- **INTRODUCTION**
- **THE MODERNISATION THEORY**
- **THE LOWER SUBANSIRI DAM**
- **THE RANGANADI DAM**
- **THE GUMTI DAM**
- **THE PAGLADIA DAM**
- **THE TIPAIMUKH DAM**
- **CONCLUSION**
- **CHAPTER SUMMARY**

4.1 Introduction

The period after the Second World War has witnessed the advent of a massive and unprecedented project of social engineering in Third World countries. This process was variously termed as industrialization, modernization, or development. This labelling was justified on basis of a supposed superiority of Western economic and political institutions and of Western values over non Western ones. In the history of development studies, modernization theory holds an important position as a theory to change the rest of the world in lines with western development.¹⁸² The way modernization theory suggests for development and modernity proved to be controversial soon after its development as a theory. This is because, the linear progress of the nation often resulted in the violation of the rights of the people or destruction of the ecology. This part of the research will advance the idea that even though modernization as an idea is still relevant, the basic notions and objections attached to the modernization approach are highly debatable. To explore these issues, this part of the research shall attempt to highlight the issues involved in five big dams in North-East India through the prism of modernization controversy and conclude that modernization achieved through dams is not a conducive idea for a context like North- East India. A common thread runs through the five dams under study. It has been seen that resistance against these dams is lead by the poorer strata of the society and therefore it is called the Environmentalism of the Poor.

4.2 The Modernization Theory

One of the orientations to the term modernization‘ conceives it as a process of social change. Another orientation considers modernization not only as a change but also as a response to change. Samuel Huntington in 1968 asserted that modernization is a multidimensional process that includes transformation of human views and activities. Halpern¹⁸³ in 1966 defined modernization as a response to change and this definition focuses on the capacity of institutions to manage those changes effectively. Combining these two views into one, Eisenstadt¹⁸⁴ in 1966 argued that modernization as a process of change and at the same time he stresses on the capacity of institutions to control or

¹⁸² Available at https://www.academia.edu/8374391/Modernization_Theory_A_Critical_Analysis(Aug 25 2019 10 PM).

¹⁸³ Manfred Halpern, a modernisation theorist.

¹⁸⁴ A sociologist, who stressed on the interplay between cultural and structural process of change. Researched broadly on change, modernities and civilizations.

adjust to changes. Similarly, the American economic historian Rostow in 1960 presented a model, considered as the blueprint for modernization approach, signposting development as series of stages such as underdevelopment, transition and modernity. These definitions of modernization imply that, in order to be modern like the west, traditional countries must go through these stages of development. Therefore a society where the association of productions and standard of living was akin to western countries such as America was considered modern or modernised. Conversely, considering the Chinese modernization that includes family bondage, tradition, rural life and culture, Li in 2009 argued that scholars have reached consensus that modernization is a functional change of traditional societal arrangement. Therefore, modernization is a process of changing societies from pre-modern (traditional, pastoral and agricultural) to modern (industrialized, secular and urban). Having considered the meaning of the term modernization', the context of modernization theory now needs to be taken into account.

As said in the foregoing chapters the theory emerged when development became an urgent issue after the Second World War where economic and political realities were slowly beginning to change. The world was divided into two blocks-capitalist and socialist, making a cold war situation. Self determination was the slogan and new countries were emerging from the decolonization of western colonies. The new economies focussed on development and it became an urgent issue of priority. Specifically, modernization theory is the historical outcome of three main events in the post second world war period. First is the rise of America as a super power to challenge the growth of the global communist movement. The second event is the development of a worldwide communist movement led by Russia and later on China and the third is the decolonization of western colonies in Asia and Africa.¹⁸⁵

Tipps¹⁸⁶ in 1973, in order to add on to the above contextual discussion, perfectly argued that modernization theory developed as a response of the American political leaders and scholars to the post second world war period context. The Rostow model of economic development, as cited above, is a suitable example of what Tipps call the response of the American scholars. This model of modernization makes it clear that the implicit purpose of modernization theory is to develop the emerging countries and slid them

¹⁸⁵ *Supra note 182*

¹⁸⁶ D.C Tipps, a modernisation theorist.

towards the capitalist block. But it must be remembered that the context in which the theory was developed is particularly suitable to that culture, not necessarily suitable for others. Modernization theory developed in a context and this contextual emergence of the theory gave birth to doubts of the objectivity of modernization approach. For example, the theory has been criticised of being ethnocentric. This question of ethnocentrism becomes apparent when a leading proponent of modernization theory, Eisenstadt explicitly explains modernisation as a process of societal change towards western model of development. Challengers of modernization theory such as Li in 2009 argued that there are some societies that rise from the leaving of previous social arrangement, not from the replacement with a so-called western model. He said that China's development is the glaring example of this view and goes on to explain that China's modernization includes traditions such as family bondage, rural life and culture, ethnic interpersonal connections while these were completely absent in the western oriented modernization theory.

It is, therefore, proved that modernization is something different from westernization as in the case of China's modernization. Much of the debate around modernization theory is based on its conceptualization that development is a linear process with a preset ultimate aim. The only expected goals of the pre modern societies were the contemporary development icons of the modern world. Max Weber, presented his renowned theory of variables that implies if pre-modern countries want to be modern, they must follow the countries that are already modern. But it must be reiterated that human history is a complex one rather than being linear. Therefore, modernization theory leads to a one size-fits-all' approach failing to take into consideration the context of the western society in which it developed and that of the pre-modern countries. This notion of linearity of modernization theory is completely unable to explain the non-linear human development phenomenon of the world.

In a world where human development is considered as an integral part of development said Amartya Sen in 1999, countries such as Greenland opted out of the European Union and similarly Iran enacted laws against freedom of speech. There is no guideline to deal with such nonlinear aspects of human development in the theory and, therefore, the modernization approach fails to succinctly explain the notion of linearity of modernization. The theory must consider that different countries have different notions and standards towards good and bad and therefore a one sided definition of what

modernity or modernization entails, neglects the other aspects of human development. Similarly, the theory completely overlooks some crucial issues of humanitarian aspects making the approach problematic. For example, while issues such as equal income distribution, public health and environmental concerns are important considerations for development as asserted by Dreze and Sen, they are completely missing in the theory. Interestingly, the exclusion of these issues makes countries appear more modern than they are supposed to be since modernity does not consider equality and other issues but considers only the average national income. Environmental aspects are included in the ecological modernization school of thought but evidence is not seen to combine them in the modernization approach. As these are mostly the twenty first century issues, it is probably a threat to the theory's relevance today. Beside the notion of linearity being problematic, the dichotomization of modernity and tradition offers serious critiques for the modernization approach. According to most of the modernization theorists western countries are perfectly modern while undermining non-western societies as traditional and unchanged by contrast. Such an orientation of modernization holds the idea that non western countries are substandard even though they share the same living standards (such as Japan) as western countries (such as the United States). This core assumption of the theory is disproved when it was argued that traditional elements can be considered as part of modernisation as in the case of China's development. Therefore, the fact that modernity and tradition are linked and sometimes interdependent is overlooked by modernization approach. It can be argued therefore that the consequences of this limited view of the theory become apparent if applied to most of the Asian and African countries. Modernization theory fails to explain the situation of those countries though the emergence of these countries contributed to the development of the theory. The final point of why the modernization approach is controversial is that the term modernization itself is ambiguous. Modernization, as Tipps in 1973 correctly notes, is a term simply superimposed with industrialization, adding nothing to it. He then goes on to argue that as the term has been used simply as synonym for some pre existing precise variables such as industrialization, it deserves no functionality to perform as a theoretical framework and therefore modernization as a theory of development is questionable.

It can be further explained that because of the ambiguous use of the term, it lost its originality in precision and as a consequence, is difficult to disprove. In contrast to the

above limitations of the theory, the idea of modernity is yet relevant for practical reasons. But how to achieve this modernity is a matter to really think about. Since society will always be changing, existing theories will be unable to rationalise these changes. Modernization theory came in a particular context to explain how industrialization, secularity and the nation state were relevant to changes and development. But in the course of time while societies still require modernity, modernization approach is reasonably unable to tell how to achieve this modernity. Therefore, alternative modernity should be thought of for the betterment of the world as a whole.

Contemporary writers generally legitimise their actions on grounds, namely the need for and the desirability of transferring modern western technology to Third World countries in order to bring about increases in per capita output (particularly in the high-productivity industrial sector), or the expanded provision of "basic needs" (i.e., formal education, modern health facilities, piped water supply, and so forth) . Structural changes such as state building speed up such transfer and the inculcation of a particular set of development-enhancing "modern" values and habits among the people of traditional societies. The early days of this project were characterised by an unquestionable confidence in the ability of social scientists to help the people of Third World countries banish their inherited problems and construct a new social reality from scratch. Today there is a crisis in modernisation theory. Hardly a book or journal on development issues comes out which does not express disappointment, disillusionment or dissatisfaction with the ability of what Ashis Nandy¹⁸⁷ has called a 'secular theory of salvation,' to live up to its promise to expand human freedoms.

Many factors have contributed to the emerging crisis. The most obvious one is the extremely uneven record of development: of the persistence of poverty amid increasing affluence, of the increase in unemployment despite expanding production, and, in general, of the failure in ameliorating the condition of people in the poorest countries of Africa and Asia. A second reason is the increasing association of modernization and development with ecological disasters: the devastation of tropical rain-forests and mountain watersheds, the deleterious (and unanticipated) ecological consequences of large dams and large irrigation systems, the loss of subsistence agricultural land to desertification in Africa and to water logging and salinity in Asia, and the high energy-

¹⁸⁷ An Indian political psychologist, social theorist and critic.

requirement and vulnerability of modern technologies. Another contributory factor is a similarly increasing association of development with higher levels of conflicts and tensions in much of the Third World, in almost all parts where the developmental project has been under way for a significant period of time, where such conflicts as wars, civil unrest, civic and ethnic violence, political repression and urban crime appear to have increased tremendously. Responsibility must also be placed at the door of a fourth consideration namely the onset of a period of confusion, muddled groping and search for new paradigms in Economics as well as Political Science, the two mother disciplines of development theory". Notwithstanding the importance of each of the above, however, it seems that the single most important reason for the spreading disillusionment is a 'loss of hope' as Mary Kaldor once put it, an erosion of the myth that development can create a just and humane society. This erosion has also permitted the increase in popularity and self-assurance of non-Western (and often anti-Western) social, cultural and political movements in Third World countries. Some of the above reasons can be summarised here.

- 1) First, there is growing recognition that it is not possible, given the earth's resources, for the entire planet to be able to emulate the consumption pattern of Western countries.
- 2) Second, tremendous unanticipated social and political problems accompanying development have raised the concern that, even if it were possible to 'become like the West,' attempts to do so in the shortest possible time could be socially harmful.
- 3) Third, growing familiarity of Third World citizens with the mode of existence in the West has created serious reservations about the desirability of following this line of development. These reservations have surfaced in the West as well, and have no doubt helped to reinforce those in the Third World.
- 4) Fourth, escalation of the irrational arms race between the two superpowers and the accompanying intensification of belligerent rhetoric, despite widespread popular resistance, have created doubts about the ability of the rational model to even ensure the survival of the species.

As a result of these and other factors, the two dominant Western models of progress have relinquished their hold over the imagination of Third World intellectuals, and a shift towards indigenous values has become more legitimate. In this essay we take the resulting crisis in modernisation theory as a point of departure to argue that it is

essentially a variation on earlier themes, and derives not from the discovery of some hitherto unobserved social costs, but rather that these costs have helped reinforce deep-seated dissatisfaction about the modernisers' perspective on human society; and therefore, that in order to understand this failure and to search for reasonable and coherent alternatives, it is necessary to go to the roots of the world-view which helps sustain the impugned theory.¹⁸⁸

Against this backdrop, this part of the project discusses the discontents of modernity through dam building in North East India and argues that development that violates the right of the people is undesirable.

The energy that can be extracted from hydropower is economically renewable and does not cause pollution. Therefore, it is regarded environmentally benign.¹⁸⁹ Hydropower has inflation free generation cost which means the cost reduces with time. Hydroelectric projects last for life that extends over 50 years and it in such a way scarce fossil fuels are conserved. The table below provides information on hydropower potential of the North-Eastern states and its development. The table does not include hydropower power units below 3 MW capacity.

State	Potential Assessed (MW)	Potential Developed(MW)
Arunachal Pradesh	50,382	281
Assam	674	250
Manipur	1,784	105
Meghalaya	2,394	185
Mizoram	2,196	0
Nagaland	1,574	91
Tripura	21	15
Sikkim	4,286	84
Total	63,257	1,011

Controversies and debates have engulfed the proposal to built large dams on the rivers of the eastern Himalayas owing to the environmental and other issues associated with it.

¹⁸⁸ Available at <https://www.wider.unu.edu/sites/default/files/WP33.pdf>(Aug 23 2019 10 PM).

¹⁸⁹Kalpavriksh,LARGE DAMS FOR HYDROPOWER IN NORTHEAST INDIA,Ch 1.

The hydropower that will be produced will be used everywhere else but North-East India. The dams that will be built are solely hydropower dams and not multipurpose dams.¹⁹⁰ It is projected from the alert citizens that the distribution potential gains and losses cutting across regions and inhabitants will be greatly uneven.¹⁹¹ At present 10 large projects are operational in the region, 11 are under construction. The upstream, downstream, cumulative environmental and social impacts of the dams accounts for legitimacy deficit of these dams.

4.3 A Study of Five Dams of North East India

This chapter is an attempt to study five dams of North- East India and their implications and effects on environment, culture, social life of the region. The dams are 1) The Lower Subansiri Dam,2) The Ranganadi Dam,3) The Gumti Dam,4) The Pagladia Dam,5) The Tipaimukh Dam. The researcher attempts to study these dams as case study and induct its findings to the general scene of the region to show the effects of constructing such dams

4.3.1 The Lower Subansiri Dam

The Subansiri is the principal tributary of the river Brahmaputra and forms one of its largest basins.¹⁹² Sustained by snowmelt run off, ablation of glaciers and monsoon rainfall, this river originates in the Tibet at an altitude of 5340 m.¹⁹³ Before cutting through the greater Himalayan ranges of the Indo Tibet border and taking a south-easterly course, it flows west. The Subansiri enters the Brahmaputra plains at *Dulangmukh* in *Lakhimpur* of Assam. The river has a vast portion of its catchment in Tibet and some areas in India that lie above the snowline. Its catchment area and hydrological system is made up of several glaciers. Except the upper stretches, around 60% of the catchment area lies in India. This 60 % is covered with dense forests.

¹⁹⁰Sanjib Baruah,*Whose River Is It Anyway? Political Economy of Hydropower in the Eastern Himalayas*,17EPW (2012).

¹⁹¹ *Ibid* .

¹⁹² Available at <https://shodhganga.inflibnet.ac.in/bitstream/10603/98510/3/ch1.pdf>(Oct 30 2019 11 PM).

¹⁹³ *Ibid*.

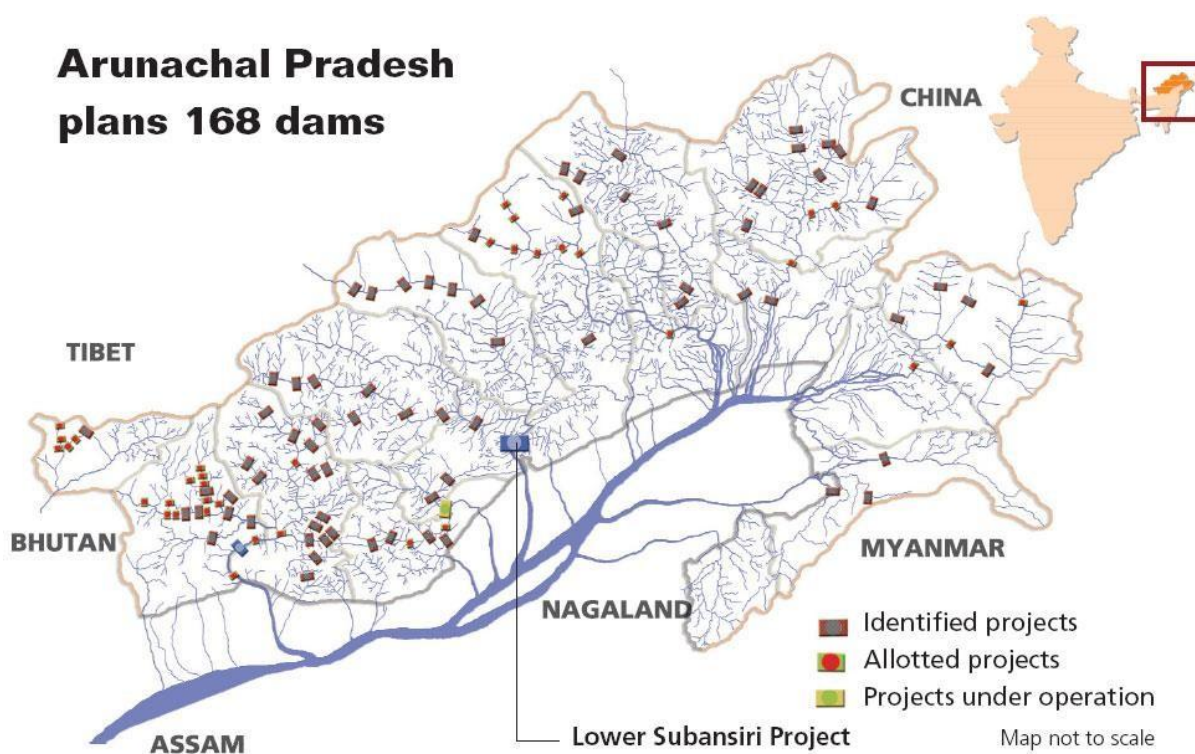


Figure 1. Lower Subansiri Project

Source: downtoearth.org.in

According to the Central Electricity Authority (CEA), 22 schemes have been identified in the Subansiri Basin. Each scheme is greater than 25 MW. The cumulative installed capacity of the basin is 15191 MW.¹⁹⁴ The earlier plan envisaged by the Brahmaputra Board was to construct a single dam to meet an installed capacity of 4520 MW. The project would submerge a huge area, therefore was opposed by the Government of Arunachal Pradesh. Upper, Middle and Lower Subansiri are the three divisions of the Subansiri Projects. National Hydropower Corporation (herein after NHPC) is now the developer of the Subansiri Project.

The hydropower potential of the lower reaches of the Subansiri is meant to be harnessed by the Lower Subansiri Project. The river's left bank would be in Assam and the right bank which in reality is the power house will be located in Arunachal Pradesh. The proposed dam site is located at upstream of *Gerukamukh* village in the Dhemaji district of Assam. It is estimated that the total height of the Subansiri dam would be 116 m. high dam that would submerge 3,436 hectares (ha.) of forests in the dam site. The

¹⁹⁴Preliminary ranking study of hydroelectric schemes (Oct 26 2019 10 PM)
http://164.100.60.14/reports/others/hydro/hpi/ranking_study/gen_report.pdf.

Subansiri is a flashy river. Located at a primary hotspot region, the dam will submerge important forests which are important wildlife habitats which include the important tale valley sanctuary, Tale reserved forests, Panir Reserved Forest and the Subansiri Reserved Forest in Assam. The project will be coming up at a spot that comprises of Kakoi, Dulung and Subansiri reserved forests of Assam and Tale reserved forests of Arunachal Pradesh. Dr.Anwaruddin Choudhury a noted environmentalist from North-East estimates that the dam project of Subansiri will call for the presence of about 15000 workers in the *Gerukamukh* village. Such an instance will hamper the movement of elephant, it being an important elephant corridor. The forest belt in Assam, Arunachal Pradesh has over 500 elephants and blocking this corridor with construction shall be disastrous. Other animals recorded in the vicinity of then Dam site are tiger, golden cat, clouded leopard, marbled catolden cat, dhole (wild dog), gaur, serow, capped langur, slow loris and gharial. These animals are listed in Schedule I of the Wildlife Protection Act 1972

Release of insufficient water from the project may jeopardize the scope of livelihood and avenues of the downstream riparian people are a grave infringement of Article 21 of the Constitution of India as right to life.¹⁹⁵ According to the Constitution of India and National Water Policy 2020 the ecological survival of any river and the livelihood needs of riparian people thereof is a must. The state cannot hold up adequate –sustenance waterl from being released from any hydel power project as release of adequate sustenance water is a requirement as per National Water Policy 2020 and Article 48A and Article 21 of the Constitution of India. As per the sixth schedule of Constitution of India the inhabitants of the Subansiri river bank are under Missing Autonomous Council, constituted by the Government of Assam which was formed by enacting an Act in the Legislative Assembly in 1995. The Missing Autonomous Council (Amendment) Act 2005 provides for constitution of core and satellite areas with at least 50% Schedule Tribe population. Despite there being constitutional provisions but planned dam and its downstream affect in these areas of Missing community reflects another picture of violating the ethos of constitutional provisions of the 6th schedule sixth schedule. A Public interest litigation was filed in the Gauhati High Court objecting against the construction of a big dam at Subansiri undertaken by National Hydro-

¹⁹⁵ Dr.Rupa Hazarika, *Subansiri Lower Hydro Electric Project: Hopes And Despair 2* RSASJ,47,50,(2016).

Electric Power Corporation. However after hearing the litigant parties the High Court rejected the same on the ground that according to Article 262 of the Constitution a hearing related to the interstate river water dispute is beyond the scope of any court. As per Clause 4 of Interstate Water Dispute Act of 1956, tribunal or special Court formed at the behest of the Central Government has the jurisdiction to resolve such disputes.

The Subansiri River is considered as a safe haven for the river Gangetic Dolphins (Platanista Gangetica), declared as a State and National Aquatic Animal in 2008 and 2010 respectively.¹⁹⁶ Even the local fishermen used to take the help of these dolphins for fishing as per the technique of Traditional Indigenous Knowledge System, where both fishermen and dolphins cooperate each other and advantage goes to both the fishermen and the dolphins. The Gangetic Dolphins have been declared in the red list of IUCN in 2002. It is listed in the 1st schedule of the Wild Life (Protection) Act, 1972. According to law not a single Gangetic Dolphin can be killed, violation of the provisions will attract the strict sanction under law as imprisonment up to 7 years, 3 years being the minimum. Hence release of sufficient water for the sustenance of the same is a legal requirement for the river as per the Wild Life (Protection) Act 1972 for survival of this endangered species.

The low and mid altitudes of this region is covered with tropical semi evergreen forest. Important species of trees are *Terminalia myriocarpa*, *Duabanga grandiflora*, *Steriosermumchelenoides*, *Canariumstrictum*, *Ailanthus grandis*, *Ficus spp.* etc. The threatened plant species near the dam site include *Heritieraacuminata* (tree), *Bambusamastersii* (bamboo) and *Cyathiaspinulosa* (fern). Though the project talks of some ex situ conservation, a large part of the area will be submerged. The area is also rich in amphibians and reptiles which are yet to be discovered in the region.

The Environment Impact Assessment report which is prepared by NHPC is silent on the effect on river dolphin. The lower reaches of the river Subansiri has been proposed to be declared a dolphin Sanctuary. When the natural flow of the river will be effected, it will have an adverse effect on the resident dolphin population of the river as opined by dolphin expert Dr.R.S Lal Mohan. The wetlands that are fed by the tributaries or the feeder channels have great ecological importance. They are important source of

¹⁹⁶ *Ibid.*

livelihood for the people as people engage in fishing in these wetlands. The EIA report does not talk about the impact on the ecology of these wetlands.

Fishing is the main traditional method livelihood in the Brahmaputra valley. Most of the studies for the project do not indicate the downstream impact of the project on the livelihood of the project. Researchers though reveal that a drop in the aquatic diversity does have an effect in the livelihood of the downstream people, but this should be better reflected through a cost benefit analysis. The report does talk on the benefits of fish reservoir but does not reveal anything related to the potential effects on economy and society because of loss of fisheries downstream.

Bikul Goswami from the Green Heritage of Lakhimpur observes that the studies are substandard in many fronts. The Subansiri river charges the wetlands and these wetlands are crucial both for fisheries and deep water rice cultivation called *Baodhan* in local language. A substantial portion of population depends on it for livelihood. The report neglects this aspect completely.

The section that talks of the land use pattern in the report says that the studied has been carried out through digital satellite imagery data supported by ground truthing. Nearly 60 percent of the total submergence area due to the dam is covered with dense mixed forest which is the major land use cover in the site. A reading of the section on terrestrial ecology' of the report of the study provides the following: -The forests that were studied were mainly Open forests having 10-40 % forest cover.¶ Therefore it is completely flawed and incomprehensive to extrapolate results of ecological studies conducted in open forests' for the entire submergence area where the main land use is dense mixed forest'. In the research conducted by the experts the three sampling sites for terrestrial ecology were primarily located in areas which have greater disturbance and as such cannot be used to extrapolate the results to the entire submergence. There is an urgent need for more representative sampling sites in between the earlier three sites.

As far as the Catchment area is concerned, the report says that the river Subansiri is approximately 34 900 sq.kms of which about 14 000 sq.kms which account for 40percent falls in Tibet and the rest 20, 900 sq. kms. (60%) is in India. The report states that Subansiri catchment is in good and fertile condition and there is hardly any barren patch in Indian portion of the Subansiri catchment. Lack of data on the catchment area of Tibet calls for a complete understanding of the catchment area which is crucial and

important for judging the viability of the dams as environmentally benign and economically viable. One of the chief characteristics of the Eastern Himalayas is that not only the catchment forests, but also the entire geophysical features of the region impact the erodibility of the catchment. The report fails to reflect upon this. The Universal Soil Loss Equation (USLE), of USA has conducted the survey of the erodibility. The issue with such a survey is that whether it can be applied to a unique condition like the Brahmaputra river system which carries the second highest sedimentation load in the world, and is located in the Eastern Himalayas, an extremely fragile zone is a question.

The region has a unique geophysical environment characterised by steep slopes and gorges and 6000 mm rainfall in the Southern Himalayas. The EIA reports that landslides are commonly observed in the project area. Landslides cause increased sedimentation load and the formation of landslide dams. Besides this the various quarry sites identified for extraction of clay for the construction purpose could have adverse impact on the flora and fauna of the region.

Another issue in relation to dam in Subansiri is the seismicity issue. Usually when seismicity is discussed in relation to dams, the only factors that are discussed in the popular discourse are reservoir induced seismicity, and dam damage due to an earthquake. However, seismic activity may cause changes in the geophysical feature and the river system which may have effect on the viability of dams. In 1950, a massive earthquake in Assam changed the course of the river moving 10 kms. towards the west. Brahmaputra River experienced a substantial increase in the minimum flow after the earthquake. The report lacks this aspect of seismicity of the Brahmaputra river system. Before constructing any dam on a river system, adequate understanding of the geophysical environment, seismicity, how communities depend on it for livelihood etc. has to be there and there needs to be cumulative impact assessment before commissioning such dams.

More than 50 species of mammals have been identified by researchers in the region and many more of them are likely to be discovered, but the impact assessment report lists only 10 such species. The Lower Subansiri area is a hub of more than 200 species of birds. The cliffs of the Subansiri is a breeding place of the Great Cormorants which will be submerged once the dam becomes a reality.

An interaction with A.K Bhagawati, Professor, Department of Geography, Gauhati University and member of the Expert group, on the downstream impact of the ongoing Lower Subansiri Hydroelectric project reveals the following facts: The public hearing for the Lower Subansiri project was held in the year 2001 in consonance with the mandatory requirement under the Environment Impact Assessment notification of 1994. It states that certain industries or activities mention in the first schedule of the notification need environmental clearance from the Central Government .In 1997, the notification was amended and it became mandatory to conduct public hearing for activities mentioned in schedule I. Since then many such hearing have been held in connection with dams across the country. Steps are being taken by government, NGOs and also local communities so that the hearings help attain the purpose it seeks to serve. Yet a lot needs to be done in making these public hearings fruitful. One glaring defect in the notification is that there are no clear cut guidelines for conducting such hearing .The notification is also silent on what needs to be done before and after the hearing.

The issues relating to the public hearing that took place are enumerated below:

- **Information dissemination about the Public Hearing:** Schedule IV of the notification states that information regarding the hearing must be circulated in at least two newspapers. Communities in Gerukamukh have no access to newspapers so they were not informed about the hearing and could not prepare themselves with objections and suggestions regarding the project. People should have been given handouts containing basic information about the dam so that they can form their opinions.
- **Medium of Communication:** The public hearing took place in Hindi and English. The people were unable to understand and participate
- **Inadequate Executive Summary:** The Executive Summary must be made available to the stake holders so that the information regarding the dam is available to the interested parties. But in this case, the executive summary was a short document of mere four pages with no information whatsoever about the environmental or social impact of the dams. It contained only some data on the physical and engineering aspect of the dam. The executive summary needs to be comprehensive, containing relevant information about every of the dam including environmental, social cultural impact, the cost benefit analysis and mitigating measures.

When the issue of scanty information in the executive summary was taken up then the authorities just told that the parties must refer to the Environment Impact Assessment report. But this is contradictory because as per law of the Pollution Control Board, the executive summary should be made available to the people and not the EIA report. Pollution control authorities in some states have allowed people to refer to the EIA report so that they can form their opinion.

- **Panel of Public Hearing:** Schedule IV of the EIA report lays down provisions for constitution of the panel for public hearing. The representative of Department of Environment from Assam was not present at the hearing and therefore the panel remained incomplete. The panel members were not informed about the date of hearing neither did they know the roles they were supposed to play. It is important that the panel members know about the hearing, the project reports, the executive summary and the EIA reports.
- **Lying at the Public Hearing:** The public hearing was conducted at the site of the project whereas the construction was taking place at the right side of the river. The project authorities said that no construction was taking place which was a blatant lie. The questions raised to the consultants met with unsatisfactory answers. The consultants agreed on the negative impacts on the rich biodiversity. But this was despite the fact that out of the entire 70+ kms. That will be submerged only 1 km. upstream of the dam site had been surveyed. When the issue of siltation and its impact on the life of the dam was taken up, the reply from the project consultants was that they are expecting the life of the dam to be 30-50 years! They could not produce data on the siltation rate. What is more interesting is that 40% of the catchment area of the river is in Tibet and beyond our control. Despite these factors they said that they plan to minimise the siltation in the 60%. This seems rather impossible
- **Abuse of Authority:** A public hearing is a forum where all the participants put forward their opinions and accordingly a report has to be prepared based on such opinions. It is not a decision making forum. At

this public hearing people were made to sign a resolution stating that they have no objection to the construction of the dam.

4.3.2 The Ranganadi Dam

Conceived in 1978 by the then Department of Power, Ministry of Energy Government of India, the Raganadi Hydroelectric Project would be executed as a part of the Paynor Dikrong Scheme in the Lower Subansiri District of Arunachal Pradesh.¹⁹⁷ North Eastern Electric Power Cooperation (NEEPCO) was given the responsibility to conduct investigation from 1978 by North Eastern Council (NEC). After detailed investigation modifications were incorporated in the earlier plan and reconceived as the Ranganadi Hydro Electric Project (RHEP) to be implemented in two stages on the river Ranganadi in Lower Subansiri District of Arunachal Pradesh.¹⁹⁸

RHEP Stage I involves a concrete rock filled diversion dam constructed near the 41 km post of the Kimin Ziro Road near Yazali of Arunachal Pradesh (27° 20' N latitude and 93° 49' E longitude). The project envisaged to produce 405 MW of power in three units at the power house to be built at Hoz on the bank of the river Dikrong through inter basin transfer of water by diverting the flow of Ranganadi through a tunnel 8.5 km long and 6.8 m in diameter to the Hoz power house to achieve a design head of 300 meters. RHEP stage II involves a 112 m high rockfilled storage dam to be built near the 51 km post of the Kimin Ziro Road at Yazali. It will be used to produce 30 MW of electricity.

The RHEP is controversial right from 1990 on two counts. The first issue was that the people were apprehensive about flooding of the area due to increased volume of water from the Ranganadi.¹⁹⁹ Secondly, the people also had the apprehension that the riparian there would be in drought in Ranganadi Valley because of the damming and transfer of water.²⁰⁰ Several organisations protested against the construction of the dam. However, neither the Government nor the NEEPCO took the protests seriously. An organisation named Aranyak took to investigate the case on its own. A

¹⁹⁷ Available at https://shodhganga.inflibnet.ac.in/bitstream/10603/103457/12/12_chapter%203.pdf (Oct 30 2019, 10 PM).

¹⁹⁸ *Ibid.*

¹⁹⁹ *Supra note* 197.

²⁰⁰ J.D Mali & P.Chutia, *Impact of Ranganadi Dam on Socio- Economic Condition of Fisher Community In The Downstream of Ranganadi River Dam, N.E. India*, 6 IJESI, 19, 19 (2017)

survey was taken on the Ranganadi-Dikrong valley with an aim to find out the impacts of flow diversion of NEEPCO. During the first phase, a survey was conducted in the Ranganadi and Dikrong valleys to get a picture about the effects that had taken place and the anticipated effects of the dam construction. Long term survey and monitoring of changes in eco hydrological behaviour of the river regime and the socio economic status of people in the basin are essentials to a detailed assessment of the impact of dams. It is more so because many of the expected impacts take time before becoming prominent enough so as to be observed and measured both qualitatively and quantitatively. Therefore a second phase of survey was conceived with an aim to assess the long term impacts of the dam.

The head stream of Ranganadi is called *Niyarpung Pabung*. It originates at a location with an elevation of 3,440 m above msl latitude 27 33' N and longitude 93 20' E bordering East Kameng and Subansiri districts of Arunachal Pradesh. The river flows eastward from its point of origin and after meeting a tributary called the *Niyorke Nala* near the Mingo village at an altitude 1,263 m the river takes the name *Panyor Pabung* and a southward turn. It is joined by a few rivulets like the Pak and the Pering, the river takes the name of Panyor. The Kale tributary merges with the Panyor one km upstream of the proposed Yazali dam site. From its origin upto its dam site, the catchment area of the river measures 1720 sq.km. The Panyor river takes in the Pit Nala, another major tributary before reaching the site where the Diversion dam is located. The Ranganadi falls in the River Subansiri which is a major tributary of the River Brahmaputra.

Thick deciduous forests and vegetation covers the upper Ranganadi basin with cold climate and occasional frost. The lower basin has dense subtropical forests with typical subtropical climate. Average rainfall measures 1700 mm of which 80 percent of water is received during rainy season from May to September. Snow feeds the upper reaches of the Ranganadi while rain feeds the lower and the middle reaches of the river.

One of the important north bank river of the river Brahmaputra in Assam is the river Dikrong known as Par. Rising in the Dafla hills of Arunachal Pradesh, the Dikrong sub basin measures 1925.60 sq.km and experiences a monthly rainfall of 244 mm and a mean annual rainfall of 2926 mm. Out of the total catchment area of 1528

sq.km., 270 sq.km. lies in Assam and remaining 1258 sq.km. lies in Lower Subansiri district of Arunachal Pradesh. The basin area of the rivers are rich in biological diversity and prone to earthquake and land slides.

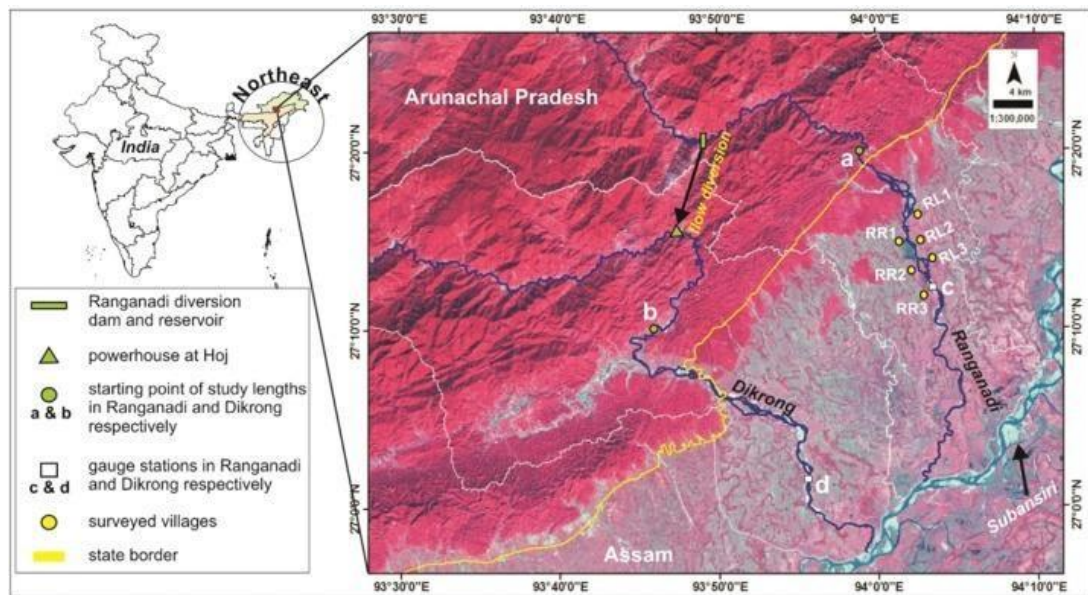


Figure 2. Ranganadi Dam

Source: Borgohain, 2019 (Environmental Development, Vol 30, June 2019)

The RHEP stage I involves inter basin transfer of water from the Ranganadi to the Dikrong river using a flow diversion plan to achieve 405 MW of electricity. The riverbed is rising alarmingly throughout the stretch from Duimukh to Badati where it merges with the Subansiri due to increased siltation. The overall carrying water carrying capacity of the river has decreased over the years. The north bank tributaries are characterised by high silt charge due to heavy rainfall, resulting in landslides and erosion. But persistent deposition of the sediment on the bed and consequent rise in bed level is a recent phenomenon of tectonic as well as anthropogenic origin. Being one of the most active seismic zones, the North East India is prone to earthquakes and these are primarily responsible for destabilizing the river regimes. Besides such tectonic factors the massive development activities pursued in Arunachal Pradesh has resulted in high siltation in the Dikrong.

The Dikrong River has an annual flow of 60-70 cumec which rises to 1200-1500 cumec in the flood season. The flow may increase in the coming years leading to inevitable inundation. The period of inundation may also increase which will adversely affect the agricultural fields and the human habitat that are in the high flood zone and are

regularly inundated by the river every year. The Detailed Project Report or the DPR is absolutely silent about these impacts. No investigation was carried out in the Dikrong River before constructing the dam. The report is also silent on the amount of water that is to be diverted from the Ranganadi to the Dikrong. In the early part of the 2001 when there were demands that NEEPCO divulge information on the water transfer scheme, it released some information. Engineering changes in the river regime and inter basin transfer of water are crucial information that needs to be made known to the stakeholders. These have far reaching impacts on the human habitat downstream. Lack of informed consent from the potential victims denies their basic human as well as environmental rights. People demanded information on the flow transfer plan and near the commissioning of the dam NEEPCO got a study done by Pune based Central Water and Power Research Station that never made the information public which is a flagrant violation of human right of the citizen.

Ranganadi river has an average flow of 200 cumecs in the lean season i.e November to March. Diversion of water will leave the river with only 40 cumecs in the dry season. In the absence of any major tributary in the 60 km long reach from the present damsite to Ranganadimukh, the confluence of Ranganadi with the Subansiri, the river will flow only very thinly and may gradually even dry up in the valley in the dry months. The result will be that local ground water table may lower down and heavy amount of silt and pebbles may be deposited in the debouching zone between Kimin and Pahumaraghat. Lack of flow and deposition of sediment will make the river go wild and floods more disastrous.

Drastic reduction of flow and water level in the lean season will have serious implications on the forests and the wetlands ecosystem as well as community livelihood. There are a host of wetlands in the floodplains of Ranganadi and they are rich in fish, reeds, on which the local people depend for livelihood. Because of the dam the feeder channels that connect the wetlands also called *beels* may dry up. Not only this, it will result in the recession of the ground water flow that connects the river regime to the wetlands. This will cause the degradation of the rich ecosystem of the wetlands.

As per the Right to Information (RTI) filed on 16.10.2020 An amount of Rs. 62 Crores was paid as compensation to the displaced people. 27 families residing in Rub & Chun

villages were shifted to newly created Potin village, which was developed with approach road, water supply facility, School Building, Teachers Qtr etc. Another 7 families of Rub village were given CGI sheets and drinking water facility. Construction of check dam, development of terrace cultivation were done in Potin. Construction of storage tank and water supply line in Rub village are under progress.

4.3.3 The Gumti Dam:

The Gumti Dam is located in Tripura .Tripura has a geographical area of 10,039 sq.km. It is the smallest state of North East India. After the advent of the British the tribal and the Bengalis who migrated from East Pakistan (Bangladesh) lived peacefully in the state. But when India took to a voting democracy, the divide between the indigenous tribes and the Bengalis widened. This was because in vote bank politics, community concerns and grassroots developments always took the back seat.

The collective sense of loss and marginalisation due to the influx of outsiders was intensified coupled with the land alienation of the tribals. In 1967,the Sengrak Movement started which was the first manifestation of overt ethnic militancy as a direct fallout of the large scale alienation of the tribal land under state patronage.²⁰¹ By the end of 70 s 20 to 40 percent of agricultural areas have been alienated. The unrest caused by the huge land loss was further aggravated by the submergence of a huge tract of arable land in the Raima valley due to the Gumti Hydel Project in south Tripura.²⁰² Apart from disturbing the fragile ecology,it left a permanent psyche on the tribal psyche. The communist backed *Gana Mukti Parishad* protested the commissioning of the dam which was crushed by the Congress determined to augment the hydropower .This; it did by dispossessing thousands of tribals from their land.

A 30 m. high gravity dam was constructed across the Gumti river about 3.5 km. upstream of Tirthamukh in south Tripura district, for generating 8.60 MW of power from an installed capacity of 10MW. The dam submerged an area of 46.34 sq km.2,558 families were displaced from the dam site according to official data. But this only includes families who could produce land deeds and were thus official‘ owners of land. According to unofficial statistics 60 to 70000 tribals were displaced by the project. In

²⁰¹ Malabika Das Gupta, *Development and Ecology: Case Study of Gumti River in Tripura*,24 EPW,2267,2267,(1989).

²⁰² *Ibid.*

the tribal societies of North East India ,land ownership is not personal and the system of recording land deeds against individuals is only a recent phenomenon.

People who were displaced by the Dumbur dam were not rehabilitated and were forced to return to the hills and engage in jhum cultivation. The peasant economy of the state was destroyed. Tripura's leading economist Malabika Dasgupta has shown in her study of the Gumti hydel project that *“attempts either to protect the environment to the exclusion of considerations for the well-being of the people or to improve their level of well-being without consideration for the environmental impact of such policies can neither protect the environment nor improve the standard of living of the people.”* (EPW, October 7, 1989)

Gumti is Tripura's principal river. It is formed by the confluence of Raima and Sarma. Raima originates from the Longtharai range while the Sarma originates from the Atharamura range. The upper catchment of the Gumti River consists of around 60 villages. The upper reaches are steep and hilly. Before the Gumti Hydel Project was commissioned, the upper catchment used to support a small tribal population. The Bengali population used to engage in wet rice cultivation while while the tribals did the jhum cultivation and were known as the jhumiyas. Because jhum cultivation was ecologically damaging, the Tripura King had settled some Bengali farmers in remote areas to encourage tribals to pick up wet rice cultivation. Before the construction of the dam, the hills around the dam project were sparsely populated and the area was full of dense forest. The area was rich in flora and fauna. But after the dam was commissioned a large section of people was displaced and they moved to the hills in the upper catchment of the river. Roads built in order to support the dam construction opened up the rich forests to illegal loggers. The peasantry was angry at the loss of flatlands and they were forced to return back to the slash and burn cultivation which is harmful to the ecology.

Reasons why the Gumti Project must be de commissioned are:

a) The Gumti Project now does not produce more than seven megawatts of power even in the peak season But the state government says that by investing an amount of 1.18 crore, it has been able to produce an output of 10 MW. It also says that while the running cost of the project is around three crore rupees per annum, it rakes in nearly Rs. 21 crores through the sale of electricity

b) Huge natural gas reserves have been discovered in Tripura and major gas thermal projects are in the pipeline. Therefore it is meaningless to invest in the project. There is strong case in favour of the state decommissioning the dam if the state can produce three times more electricity through the natural gas reserves. There is a plan to sell electricity energy deficit Bangladesh but if it augments its capacity the surplus could be shared with Mizoram by the regional grid.

c) Tripura is in food deficit and it is more important to turn this area into a modern agrarian zone. Apart from this the landless population can be gainfully resettled in this fertile tract. The root cause of conflict between the tribal and non-tribal is the issue of tribal land alienation, and it can be tackled in one go thus rectifying the injustice done to the tribal to some extent. Conflict resolution needs both symbol and substance this gesture could provide both. Never before has an existing development project been dismantled to preserve the interests of indigenous peoples. Since this project is proving to be a white elephant, it is easy to justify its decommissioning in view of its potential to solve the problem of tribal landlessness

d) The project area can be used to gainfully resettle the entire tribal landless population. Since most of the population practice *Jhum* which is ecologically damaging, it will be useful to resettle them in the wet land like that of the Gumti area. A political dialogue can be initiated to create the proper climate for decommissioning and suggest an alternative economy.

4.3.4. The Pagladiya Dam:

It was in the late 1960s that the Pagladiya dam project was first proposed. It now threatens to displace over 50,000 tribal.²⁰³ The Rehabilitation and resettlement measures are broadly unsatisfactory.²⁰⁴ The only solution for this dam project which is proposed to be constructed near Thalkuchi village, 26 km north of Nalbari town, in Nalbari district of Assam site near the Indo-Bhutan border is a broad based alliance of several anti dam movements across the country.²⁰⁵

This area has people of various castes and communities. Dominated the Bodo ethnic group there are 38 villages in this area and all the 38 villages will be fully or partially

²⁰³ Gita Bharali, *The pagladiya Dam Project: A case study*, (Nov 20 2019 10 PM), <https://www.google.com/search?q=Gita+Bharali%2CThe+pagladiya+Dam+Project%3A+A+case+study>.

²⁰⁴ *Ibid.*

²⁰⁵ *Ibid.*

shifted. These villages fall in the Bodo Territorial Council (BTC). It has been claimed by the Brahmaputra Board that the potential displacees will amount to only 20 percent and they belong to the scheduled tribes, but the affected people say that it is around 90 per cent.

Originally conceived as a minor flood detention project this dam was estimated to cost a cost of Rs 12.60 crore based on an investigation report conducted by the Planning Commission. During the period of 1968-71, Planning Commission of India approved it as a flood control project for Rs 12.80 crore at 1971-72 price levels. In 1984-85 the irrigation component was added to the project and the project was taken over by the Brahmaputra Board.²⁰⁶ The total cost of the dam project was finalised at Rs 287.86 crore at 1988-89 price levels. In 1990 the ministry of water resources development through its technical advisory committee on irrigation, flood control and multi-purpose considered the project and recommended, among others, to explore the possibility of hydro power generation so that maximum utilization of the river water happens. In November 1992 a detailed project report was submitted and in August 1995, the technical advisory committee cleared the project from the techno-economic perspective. The ministry of environment and forest also gave the "no objection certificate" from the government of Assam.

The basic objectives of the Pagladiya dam project are: (i) Protection of 40,000 hectares of land from flood and erosion, covering five revenue circles (190 villages) in Nalbari district; (ii) Irrigate 54,160 hectares of land of 145 villages in Nalbari.²⁰⁷ The proposed beneficiaries will be mostly non tribals inhabiting the southern bank of the Pagladiya river. 38 villages will be submerged either partially or complete. The government in the year 2003 issued notification for the acquisition of land from the villages. The Brahmaputra Board has drawn up a Resettlement and rehabilitation package at the cost of 47.89 crore which aims at rehabilitating total 18,473 people and 3,217 families. As pointed out by the civil, society group the *Pagladiya Bandh Prakalpar Kshatigrasta Alekar Sangram Sammittee* (Resistance Committee of the Affected Areas of the Pagladiya Dam Project), this figure is conservative and superficial as according to their estimate it should be more than 50,000 people and 5,000 people respectively. But this

²⁰⁶ Pagladiya Dam Project, (Nov 25 ,2019,10 PM)http://brahmaputraboard.gov.in/NER/Activities/Commissioning_of_Pagladiya_Dam_Project/commisioning_of_pagladiya_dam_project.html.

²⁰⁷ *Ibid.*

figure does not include five new villages that are to be added to the existing 33. The Brahmaputra Board and state government of Assam have also identified total 1,100 hectares of land in 33 locations of seven revenue circles for the rehabilitation purpose which has been rejected by the people under the aegis of a people's resistance committee - *Pagladiya Bandh Pratirodh Committee*.²⁰⁸ Under people's pressure the proposal for the construction of the project had been postponed for the time being. Many governments from the year, 1987, tried to start the construction of the dam to bring a permanent solution to the flood problem in Nalbari district. This unilateral and undemocratic move of the state government agonised the potential displaces who convened a general public meeting to build up resistance under the "*Pagladiya Bandh Prakashpar Kshatigrastha Alekar Sangram Sammittee*". This body was backed up by political and non-political organisations, including the central committee of All Bodo Students Union (ABSU). Under this organisation the potential displacees have gradually consolidated their movement. As a result of a popular resistance the Brahmaputra Board has not been able to carry out any survey work on the proposed dam site till date. But the way in which the board has worked and their chronology of the events on the part of the Brahmaputra Board, state government of Assam and the union government shows that they payed no heed to the peoples concern and coercion and propaganda has been devised to patronise two NGOs in the affected areas namely All Assam Council for People's Action and *Manab Sewa Sangha*. A coordination committee was formed in the meeting that took place at the board head office in Guwahati. This was formed with an aim of achieving cooperation between the people of the affected areas. Activities like preparing a list of contractors and other activities intensified the distress of the people.

The Pagladiya Dam project is a reflection of the incompatibility of interests between the board - the implementing agency of the project and the affected people. The question is what is the root of this incompatibility? A critical analysis shows that the root lies in the proclaimed rationality of the development paradigm of the Indian state, which is built around a homogenised vision of development, derived from the historical experience of the western capitalist world, now internalised and pursued by the post-colonial Indian state. In order to understand the politics of developmentalism associated with the Pagladiya Dam project it is, necessary to bring home the point that after

²⁰⁸ Available at https://shodhganga.inflibnet.ac.in/bitstream/10603/92812/10/10_chapter%203.pdf(Nov 25 2019,10 PM).

independence Indian nationalism was projected as the embodiment of higher rationality and universal interest transcending sectarian and sectional interests. The state was perceived to be the anchor of development keeping the whole issue of development a homogenous term thus keeping it independent of the purview of the contestational democratic politics. Jawaharlal Nehru said that development can result only from state industrialisation. It is true that, in the context of modern world, a country can be politically and economically independent only if it is industrialised and has harnessed all its potential whether man made or natural. Not only this, only modern technology can help one maintain a standard of living and liquidate poverty. But who will steer the course of industrialisation? The state steers the course of industrialisation through its own mechanism which in all probability transcends contestational democratic politics. and then appeared on the scene the planning commission which has been now abolished. In the 1930s itself planning started in order to rebuild the war torn nation. In 1938, Congress built government in eight states, under the new constitutional machinery. The working committee of Congress established a National Planning Committee under the, chairman ship of Jawaharlal Nehru which was dissolved within a very short period of time. But it was a prelude to the deplorable state of planning in India so, *the planning process in India emerged as a 'domain of rational determination' and 'pursuit of universal goals'*. It was founded on the whims and caprices of the bureaucracy which reduced important issues of the nation to mere technical terms. The so called 'committees of experts' resolved debates on issues plaguing the nation. Mahatma Gandhi however, saw this Nehruvian paradigm as wastage of money and labour, which would bring little or no fruit. Nehru turned down Gandhi's criticism, because he was very sure of his position in Indian Politics. This divergence of opinions and vision can be between Gandhi and Nehru can be related to the case of Pagladiya dam project. For example the potential displacees refer to Gandhi and they allege that the dam project will violate their right to life and security but the authorities including the Brahmaputra Board say that they have taken opinions of the expert committee and ever since the dam has been commissioned detailed investigations, topographical survey, hydro metallurgical data collection, geo-technological investigation, construction material survey, etc, have been carried out by the board through expert agencies like Geographical Survey of India, Central Soil and Material Research Station, Central Water Commission, Zoological Survey of India, etc.

The project has also been approved by the ministry of forest and environment. It may be enquired here as to where lies the illegitimacy of the project? The potential displaced and the affected peoples the project is illegitimate and undemocratic because informed consent has not been obtained from the potential displacees. In this connection they refer to Gandhiji: "The Brahmaputra board and the government of Assam have been forcing thousands of people towards death by constructing the dam project in Thalkuchi - the meeting point of Pagladiya and Daranga, which will submerge a huge area. And the bottom line is if any project which has been built with total disapproval of the stakeholders cannot be said to be a democratic and benign move. Human security is the key principle of democracy. If one puts it theoretically, the Pagladiya dam project represents a classic case of Nehru vs Gandhi, State vs People and development vs democracy. The Nehruvian policy of development was founded on industrialisation at the cost of people who were perceived to be sacrificed. The incompatibility of language between the state and the people pertaining to development and democracy is not confined only to the domains of objectives and principles; but also extends to question of property ownership, its possession and dispossession.

This can be equated with the case of the tribals of the Narmada Valley, who have been displaced by the construction of the Sardar Sarovar. Philosophically this case is an example of diversion between languages, the language of the tribals and the language of the Indian state, and the victory of one at the expense of the other. On being asked to a tribal person whether a particular land belonged to him by a revenue officer for estimating compensation, the person could not produce the patta or the legal document. The tribal person said that the particular land belonged to him as the bones of his forefathers are buried along the boundaries of the land. He was denied compensation and this shows that there is serious incompatibility between the language of the affected people and the state. Such a situation occurs every time the rights of the affected are measured in terms of technicalities and legal documents to which the affected may not have access to. -And this collision, at points, unleashes a series of coercions on the people of marginalised community, as is happening to the people of Pagladiya.

The Brahmaputra board understood strength and logic associated with the protests of the of the potential displaced and took recourse to propaganda, coercion and patronage. The Board had been patronising two NGOs. On the other hand the non-affected people demanded the immediate implementation of the project on the assurance that local

youth and contractors will be given a chance in the construction. These people were interested in the huge sum of money involved in the project. The board capitalised on these opportunists to sabotage the cause of the potential displaced. Information regarding the tribals seemed to be well planned. It intensified the agony of the victims. So under the garb of 'modern' and industrialized North East India, the tribals and the dalits had been rendered homeless and landless and were in the receiving end. In Assam almost all projects like whether the paper mill in Jagiroad, the refinery in Noonmati and Numaligarh, the capital complex in Dispur or the power generating project at Chandrapur, has rendered the tribals homeless

In the project site of Pagladiya, the tribals constitute around 90 per cent of the potential displaced as opposed to 20 percent which, the board has been propagating. The board alleges that the resistance movement is nothing but politically motivated and also it asserted that with the formation of the Bodoland Territorial Council the affected people will be demanding the construction of the dam. Living in the periphery of the state, these people were poor and were beyond the reach of media, hence could not counter the misinformation. Coercion on the part of the board has been another way to silence the voice of the people. Under the banner of *the Pagladiya Bandh Prakaalpar Khshatigrastha Alekar Sangram Sammittee*, on 29th October, 2001, the people planned a dharna at Last Gate, of the Dispur capital complex in which thousands of affected people, participated. But the Brahmaputra board, in with the help of the police, stopped the people on the way. There were arguments between the participants and the police and the people were not convinced at the argument of the police that they only followed orders from the top. Being unable to tackle the situation, the police beat up a good number of people. Lathi charge and tear gas were resorted to. People were injured and many of them had to be hospitalised. Arrested participants were released later with the help of All Bodo Students Union (ABSU). The administration also resorted to target firing on a group of potential displaced on other occasions. The contention on the part of the displaced was that, although the board had allotted Rs 1,24,620 for each model house, the constructed ones would not cost more than Rs 30,000. Moreover the house is not suitable for a joint family that encompasses three generations of people. The construction of model houses has led to unbridled corruption.

Now, let us return to the very basic question: why have the potential displaced opposed the project dam at Pagladiya? The leadership of the protest do not have sound

theoretical knowledge about the development paradigm pursued by the Indian state. Unlike the Narmada Bachao Andolan which was led by Medha Patkar provided a very sound and articulate protest against the euro American centric development pursued by the state. The cause of the displaced was understood very well by the leaders who also understood the aspirations of the Indian state. In contrast to that the leadership of the Pagladiya dam project resistance movement was in the hands of the affected people themselves who are mostly school teachers. So, their resistance the construction of the project dam has a practical experience perspective. Keshab Chandra Boro, who is the president of the sangram samittee opines that people would not have objected to the construction of the dam project, if the government would have provided them the addresses of the affected people of the Bhakra Nangal project, and if the government would have pledged before the Human Rights Commission that it would not commit any injustice in the name of rehabilitation." According to Boro the affected people of the following projects have also not been rehabilitated properly: Baralia river project, Shuklai river project, Champa river project, military base at Satgaon in Guwahati, Jagiroad paper mill, capital complex at Dispur, NEPCO Duliajan project at Kathalguri, Dinjan military base and Numaligarh refinery project.

The Brahmaputra Board did acknowledge the fact that there has not been proper rehabilitation of people affected by those projects but also said that that cannot form the ground of resisting the proposed project as it has in consideration a good Rehabilitation and resettlement package of Rs 47.89 crore. The package included the construction of model houses, provision of homestead land as well as cultivable land, compensation for existing house as well as other properties like fruit bearing trees, compensation for shifting, employment schemes for the oustees, provision for civic amenities, schemes for forestation and soil conservation at the rehabilitated area, etc. This package was fully rejected by the affected and said that it has serious defects. It was alleged that the package was not to be implemented by the board alone but the government too had vested interests in it. The track record of the government in this regard was not sound and the affected people had every reason to disbelieve in it. 8000 acres of land was being allotted to for resettlement and rehabilitation. The estimate was done for 33 villages and 9 revenue circles. But the displaced said that the land that was selected as site for rehabilitation was already occupied by thousands of people. In such a situation if the land is given to the displaced people it will lead to clash between the two categories

of people. For one out of 33 villages, only 10 bighas of land was been allotted. In some other villages the areas of allotted lands are 17, 41, 50 or 65 bighas. The compensation package provided that each land holding family would be eligible to get land according to their actual size of holding but to the maximum extent of 1.07 ha (8 bighas) including 0.94 ha (7 bigha) for agricultural purposes and 0.13 ha (1 bigha) for homestead land. Such an allotment could accommodated only a few families ,which will destroy their decade long community life styles developed and nurtured in their present villages. According to the potential displaced, the involuntary fragmentation of community structures, involving various aspects of social, cultural, economic and political lives, constitute neither development nor democracy. Even when the affected are settled at one place and agricultural land is provided at some other place they will have to bear the transportation expenses involved in agricultural activities. On the other hand, the updated cost of R and R package also mentions soil conservation at Rs 1,836/per ha for 1,059 ha (out of total 1,100 ha allotted land for R and R). The affected people could be also pushed to those areas which are vulnerable to flood and erosion in the name of flood control. This is one thing that the people were afraid of. Apart from these difficulties the R and R package did not take into consideration the storehouse and a cow shed which the families possessed

The construction of the dam project will dismantle and uproot the following numbers of public and social institutions:

- (i) four high schools;
- (ii) 13 medium level schools;
- (iii) 40 primary schools
- (iv) 50 libraries; 90 temples and religious institutions, etc.

But in the R and R package there is no mention of high school; and mentions only three medium schools; seven primary schools, etc. Such an arbitrary act by the Brahmaputra board, and the sangram samittee would result in wide ranging deprivation. These are only examples of few cases, which have created a deep sense of agony in the minds of the potential displaced coupled with propaganda and coercion which has intensified their agony. For the last three decades, they have been fighting against the sinister design of the Brahmaputra board, the union government and the government of Assam. Amidst uncertainty and disappointment these people have pledged to fight for their

constitutional rights till the last drop of their blood. They have very clearly stated that if they constitute only 1 per cent and their displacement benefits 99 per cent of population, then also they are not ready to get themselves displaced, as for them, democracy means development for and liberation of 100 per cent and not of 90 per cent or 99.9 percent of population. All the 38 villages to be displaced by the dam project fall in the Bodo Territorial Council created by the agreement between the Union Government, Government of Assam and the Bodoland Liberation Tiger. The signing of the MoS has been welcomed by most Bodo organisations, particularly by ABSU, who pioneered the movement for Bodoland and then Bodo autonomy till late 1990s. Now, ABSU has been backing the cause of these potential displaced. So, the potential displaced believe that the upcoming council will not sabotage their cause as expected by the Brahmaputra board. But, once Bodo Liberation Tigers becomes a part of the ruling class of Indian state and develops proximity with the union government, as the post MoS trend indicates, the upcoming council may be persuaded not to oppose the dam project. If it happens that way, the fate of the potential displaced will be left solely in their own hands. In that situation, the success of the resistance movement will depend on to what extent the potential displaced can integrate their movement with various anti-dam movements around the country; they can thus put pressure on various structures

4.3.5. Tipaimukh dam

The construction of the Tipaimukh Dam on the Barak River just 1 km north of Bangladesh's north-eastern border has been meanwhile stopped due to massive protests from within and outside India.²⁰⁹ Colossal disasters would result from the completion of the dam as the experts have argued and that also meant Bangladesh being vastly affected. The Dam would virtually dry up the Surma and Kushiara, two important rivers for Bangladesh.²¹⁰ This is the reason that its commission has generated widespread protests in India, Bangladesh and the world which have taken various forms ranging from simple resistance to a memorandum to the United Nations.²¹¹ It is important to know how environmental resistance against the Tipaimukh Dam has transcended national borders and taken on a transnational form by examining such questions as: who is protesting, why, in what ways, and with what effects in order to elucidate the

²⁰⁹ M.S Islam & Md, Nazrul Islam, *Environmentalism of the Poor, :The Tipaimukh Dam*, BJGS, 1, 1 (2016)

²¹⁰ Wahid Palash, *Hydrological Impact Study of Tipaimukh Dam Project of India on Bangladesh* (Nov 15 2019, 10 PM) file:///C:/Users/HP/Downloads/ImpactStudyofTipaimukh_FinalReport.pdf.

²¹¹ *Ibid*

impending social and ecological impacts, which would potentially disrupt communities in South Asia.

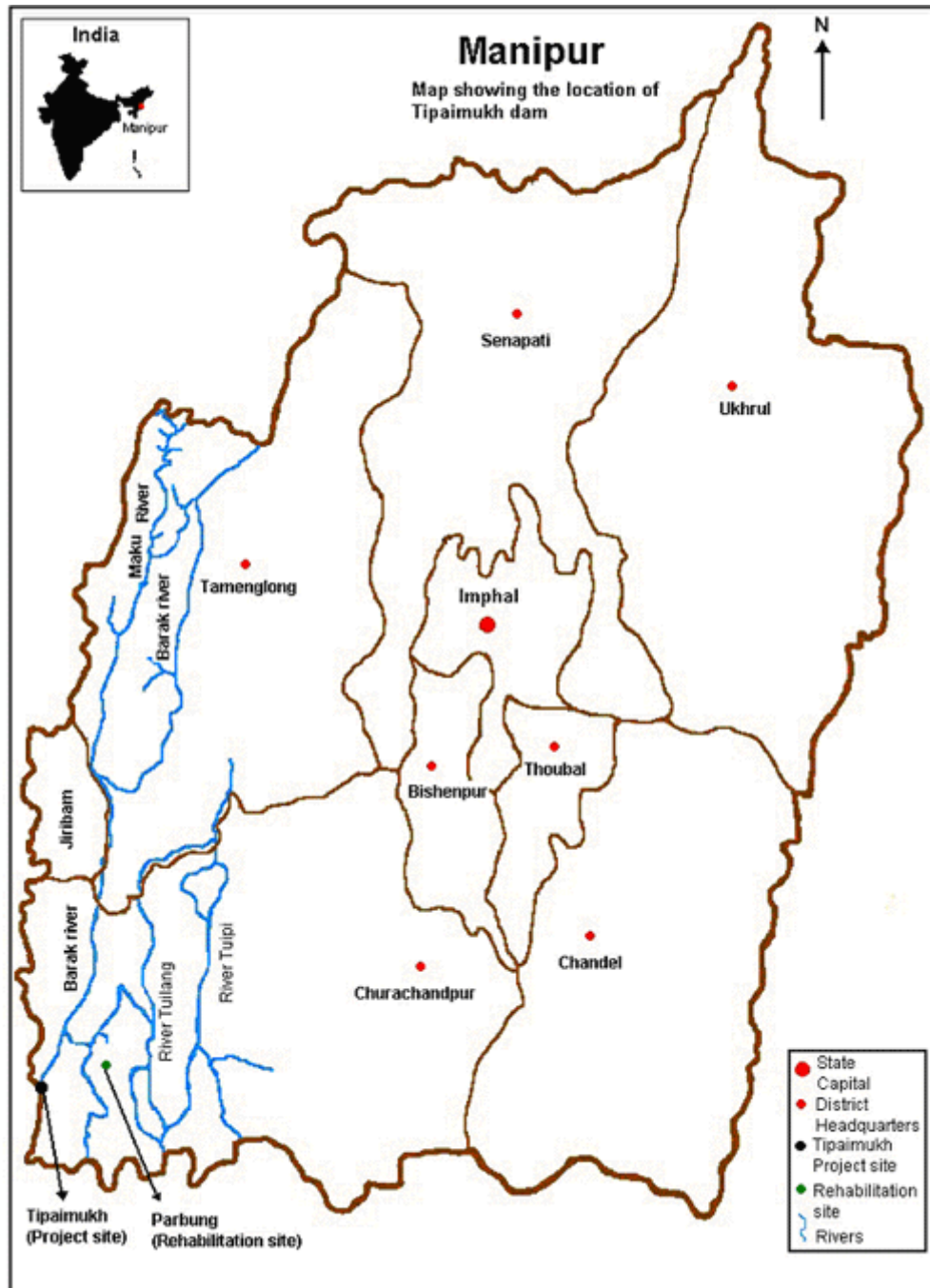


Figure.3 Tipaimukh Dam

Source: Centre for Research and Advocacy, Manipur

Lower-riparian Bangladesh and upper-riparian India share more than 50 international rivers.²¹² These rivers are historically very important to both the countries people depend on these water systems for agriculture and fisheries, vegetation and greenery, urban and rural water supplies, and navigation and communication. But under the enormous water diversion plan, India has set up constructions for water diversion in more than 50 percent of these rivers. The largest one is known as the Farakka Barrage upon the Ganges.²¹³ This puts Bangladesh's ecosystem at stake. In addition to this, Bangladesh River water is pumped stealthily from border-rivers by entities on the Indian side. India's arbitrary control over international watercourses and decisions to build diversion constructions in international rivers leads Bangladesh to suffer economically, socially and ecologically. This has triggered unending debates and resistances over the years. The debate with Farakka Barrage and the Gajoldoba Barrage on the Teesta River is conceived to be overshadowed by India's decision to build another Dam, at the Tipaimukh on the river Barak. Such an arbitrary move and India's unilateral plan has prompted a wide range of debate and discussion on its merit in both India and Bangladesh which has crossed the periphery of government offices, academics and strategists. It has transformed into protests and popular resistance in India, Bangladesh and the world.

This dam is officially called the Tipaimukh Multipurpose Hydroelectric Dam Project (henceforth the Tipaimukh Dam) .It is located on the Barak River and is just 1 km north of Zakiganj in Sylhet, Bangladesh. Located 500 meters downstream from the rivers of Barak and Tuivai this Dam is situated in the south-western corner of Manipur state of India.²¹⁴ If constructed, its reservoir will have a water storage capacity of 15,900 million cubic meters with a maximum depth of 1725.5 meters. Commissioned by India in mid 2000s, the Dam site lies in contiguity with two other states Assam and Mizoram that implies the involvement of three states of Northeast India in the project. The Barak River which flows downstream to join the Surma and Kushiara river systems in

²¹² *Ibid.*

²¹³ Farakka Barrage is a barrage across the Ganga river located in Murshidabad district in the Indian state of West Bengal. It is roughly 18 kilometres from the border with Bangladesh near Shibganj. Farakka Barrage Township is located in Farakka (community development block) in Murshidabad district. The Farakka barrage that India started constructing in 1962, was completed in 1970 at a cost of \$208 million. Operations began on 21 April 1975. The barrage is about 2,304 metres (7,559 ft) long.

²¹⁴ *Supra note*210

Bangladesh is considered to be the lifeline of the Sylhet region in Bangladesh. Estimated to generate 1500 MW of hydroelectric power, the dam was initially considered to contain flood water in the Cachar plains of Assam. However, according to experts there are apprehensions that the proposed dam would cause colossal damage to Bangladesh's economy, society and environment. Such a move would practically dry up two important rivers—the Surma (length: 350 km) and the Kushiara (length: 110 km)—which provide water for most of the north-eastern region of Bangladesh. It will also affect the virgin *haor* ecosystem of Bangladesh.²¹⁵

India continues to unilaterally control and manage most of the international rivers that Bangladesh shares with her and this is the reason the issue of water has been a bone of contention over the last few decades between India and Bangladesh. India has planned to divert waters from northeast of Bangladesh to its drought prone south and west because of climate change. This will be done in, notably some fifty-four common rivers which flow from upstream India to downstream Bangladesh. Intense debates and discussions have been going on over the last several years, between the academic circles, civil society, environmental groups, human rights organizations and the media in Bangladesh over the implications of the Tipaimukh Dam upon the dividend of water coming from upper-riparian India. And with the expansion of debates to the transnational space this debate continued to get new impetus.

It is pertinent to know

(a) how environmental resistance against the Tipaimukh Dam has transcended national borders and taken on a global and transnational form;

(b) who is protesting, why, in what ways, and with what effects.

This part of the dissertation provides an important insight to Asian environmentalism which has originated in Asia but formed a global alliance, and offers pragmatic policy recommendations aiming to spur social change and development.

This part of the dissertation also examines the potential environmental and social impacts of the Tipaimukh Dam. Accounts of diverse methods of environmental protests

²¹⁵ *Ibid.*

and alliances surrounding the Tipaimukh Dam also finds a place with a conclusion by raising some crucial issues which have broader policy implications seeking to encourage social change not only for the South Asian region but also for other parts of the world.

It is important to do a brief narrative of what are social or environmental movements. When a large number of people organize themselves to promote or resist social change, it is called social movement, which can be either proactive- to *promote* social change- or reactive- to *resist* any social change. According to political scientist Sidney Tarrow social movements are –collective challenges by people with common purposes and solidarity in sustained interaction with elites, opponents and authorities.¶ Four basic properties of social movements as per this definition are:

- a) collective challenge,
- b) common purpose,
- c) solidarity, and
- d) sustaining collective action.

Social or environmental movements arise from widespread, deeply felt discontent, from the conviction that some condition of society is no longer tolerable. Much has been written on nuances and contours of social and environmental movements. This ranges from nature conservation to deep ecology to new slogans of environmentalism for example sustainable development. The western discourse that constitutes environmentalism pertaining to deep ecology and conservation dominates much of the corpus of environmentalism literature; the new trend seeks to delve into the environmentalism of the Global South.²¹⁶ Also called livelihood ecology or liberation ecology this new trend, still in the making, has been nomenclated with various titles. ***Environmentalism of the poor*** is what other scholars of global environmentalism say.

The environmental justice movement can be traced back to its country of origin United States. The myriad of environmental movements in the Global South have been named

²¹⁶ The phrase –Global South¶ refers broadly to the regions of Latin America, Asia, Africa, and Oceania. It is one of a family of terms, including –Third World¶ and –Periphery,¶ that denote regions outside Europe and North America, mostly (though not all) low-income and often politically or culturally marginalized. The use of the phrase Global South marks a shift from a central focus on development or cultural difference toward an emphasis on geopolitical relations of power.

as livelihood ecology or environmentalism of the poor. In the global south environmentalism has always been about rights of the poor people that have been violated under the pretext of growth centric development pursued by the state. Such a movement takes two forms according to McMichael:

active resistance, which seeks to curb usurpation of habitats, forests and other natural resources by states and markets;

adaptation, which means revaluing local culture, and resuming the centuries-old practice of renewing habitats in the face of environmental deterioration.

It is always arbitrary to construct a boundary between Northern and Southern environmentalism. But such a thing is necessary and significant as the popular resistances of the Global South have found less space in academic and political debates. In this part of the dissertation the researcher shall elucidate the potential environmental, social risk associated with the Tipaimukh Dam in India. It will also focus on the dynamic and transnational nature of the resistance movement.

Environmentalists assert that if the Tipaimukh dam is completed, it will cause serious ecological and social disasters to Bangladesh and India. Bangladesh would be deprived of its share in international water course.²¹⁷ The larger contention is that such a move will dry up the Meghna river, Surma and Kushiara rivers in the greater Sylhet region and the nearby districts respectively.²¹⁸ The importance of these rivers lies in the fact that these rivers provide water for most of the north-eastern regions of the country.²¹⁹ Agriculture, fisheries, vegetation and flora and fauna will be affected. Added to this, there will be massive displacement of people. The dam will not only impact adversely in Bangladesh but the Indian states of Manipur and Nagaland will also be greatly affected as the Barak-Surma-Kushiara is an international river. The Figure below shows the nexus of rivers in north-east Bangladesh and India.

²¹⁷ Md.Mokkammal Karim Toufique, *India's Tipaimukh Dam and Bangladesh's Policy Response: An Analysis*, 65 ILSHS, 124, 125 (2015).

²¹⁸ *Ibid.*

²¹⁹ *Ibid.*



Figure 4. The nexus of rivers in north-east Bangladesh and India.

Source: Global Voices

Bangladesh would be perilously impacted, once the dam is constructed. In a study titled –Hydrological Impact Study of Tipaimukh Dam of India on Bangladeshll, Abu Saleh Khan, Md. Sohel Masud and Wahid Palash find terrible potential outcomes to be faced by Bangladesh from the construction of the Dam which they have summarized in six broad categories: hydrology, flooding pattern and river-floodplain-wetland ecosystem, morphology, water quality, Dam collapse, and other general impacts.²²⁰ They have pointed out that the main objections of the people from both Bangladesh and India have been grouped under six categories, albeit differently: location in a geologically unstable region; loss of biodiversity with submergence of land; economic feasibility studies and cost-benefit analysis; administrative lapses, procedural and human rights violations; social and cultural objections; and objections by Bangladesh.

It is argued that the proposed Dam site is located in Zone V of Seismic Zoning Map of India. The construction will submerge the flora and fauna of the hills in Tamenglong²²¹

²²⁰ *Ibid.*

²²¹ Located in the state of Manipur, Tamenglong is an Indian town and the district headquarters of the Tamenglong district.. The town is inhabited by the people of the Zeliangrong community. The Rongmei language is spoken in the town and surrounding area.

and Churachandpur.²²² Added to this, it will affect the hydrology of the region, the local indigenous people and will result in catastrophic effects on infrastructures including roads and highways. When talking of North East India the indigenous *Hmar*²²³ and Zelinangrong Naga people's *jhum* (shifting cultivation) lands, wet rice fields, and forest and riverine habitat will be submerged and destroy their way of life. 1461 families will be displaced according to official statistics and as far as land is concerned other estimate shows, the dam will submerge areas of about 311 sq. km covering 90 villages with 1310 families, including 27,242 hectares of forest and cultivable land and posing grave threat to biodiversity, flora and fauna of the region.²²⁴ About one –third of population of Bangladesh will be directly affected. In the Sylhet region sixteen districts will be directly and adversely affected

Noted environmentalist of Bangladesh Muzaffer Ahmad, has remarked that the Tipaimukh Dam would be –a disaster for Bangladesh's river system, livelihood and environment. He warns that it is going to be more disastrous than the Farakka Barrage that has already destroyed the Padma river and ecology in the country's south-western region.²²⁵ He added, what is –power-luxury for India is a –life-and-death question for Bangladesh. Development, generation of electricity and race for energy cannot be more important than human disaster, said the environmentalist. Similarly, M. R. Tarafdar a water-resources expert, apprehended that the construction of the proposed dam would bring catastrophe to the people and environment of the country.²²⁶ Some adverse effects of the Dam include hydrological drought which will result from the drying up of Surma and Kushiara. This would eventually result in agricultural, irrigational, navigational, and potable water crises. Agriculture, which is dependent on both surface as well as groundwater, would embrace catastrophic effects: rice production, the main component of Bangladesh agriculture, would drastically fall, leading to an increase in poverty.

²²² Churachandpur is also known as churachandpur district, is one of the 16 districts in the southwestern corner of the Indian state of Manipur that covers an area of 4,750 kilometres (2,950 mi). Churachandpur district which was previously known as Manipur South District came into existence in the year 1969 along with the district reorganization of Manipur.

²²³ Hmar is an ethnic group in northeast India, western Burma and eastern Bangladesh.

²²⁴ *Supra note 217*

²²⁵ *Ibid.*

²²⁶ *Ibid.*

According to other estimate, 7-8 percent of the water of Bangladesh is provided by the Barak River.²²⁷ This feeds hundreds of water bodies in the north-eastern region. Millions of agricultural and fishing people are dependent on these bodies for their livelihood. Since the dam will be constructed in the fifth active seismic zone of the world, the collapse of the Dam would impound billions of cubic meters of water and cause devastating floods because of its gargantuan structure.²²⁸ The Dam site is located at a hazardous zone that entails the highest risk seismically. Apart from this people in Manipur too feel that this dam would turn out to be a disaster in the form of loss of local biodiversity including flora and fauna, endangered species including pythons, gibbons, and herbal and medicinal plants, and the threatening of tribal land ownership. Within a 311 sq.km radius it would cause inundation of as many as ninety villages.²²⁹ For Bangladesh, the potential impacts are even more severe. A group of water experts in Bangladesh estimate that with the construction of the dam, 16 districts of Sylhet will be affected. This natural disaster will be irreversible even though the Indian state is of the opinion that when electricity is generated Bangladesh can import it.

Millions of people who are dependent on the Meghna River for occupation and food security will lose their livelihood. This is aggravated by water shortage due to climate change that Bangladesh is already battling with. And in such a case there is no doubt that the Tipaimukh Dam would add to the environmental cataclysm already predicted by environmentalists. Ainun Nishat, the country director of the International Union for Conservation of Nature (IUCN), opines that the dam would increase the risk of floods, make the water bodies overflow even during winters, and increase the average sea-water level. In such a situation it would be difficult to pursue surface irrigation for cultivation and livelihoods in the area would be adversely affected. If India made a barrage at Fulertal (through which it would be able to manage water according to its needs), and procure water from the Barak River, the Surma and the Kushiara would become virtually dry.

The healthy and prosperous picture that the proponents of this idea has may soon turn into history causing despondency desperation and misery to the people inhabiting the

²²⁷ Konthoujam James Singh, *Area Submergence of Tipaimukh Dam, India*, 4 IJETS, 266, 266 (2017) .

²²⁸ Adaina Khang Chian, *Developing a Participatory Model for the Assessment of the Proposed Tipaimukh Hydro Multipurpose Dam in Manipur: An Ethnographic Approach to Environmental Valuation* (Aug 25, 2020, 10:30 AM) <http://iasc2011.fes.org.in/papers/docs/976/submission/original/976.pdf>.

²²⁹ *Ibid.*

zone. This zone is known for abundance of water, lush green field of crops and fish sanctuary. The massive environmental degradation that will occur will add to affecting the weather and climate, turning a wet cooler habitat into a hot uncomfortable cauldron. The severity of micro-climate causing heat and dry conditions will gradually increase in intensity spreading over a large area over the years. It may be mentioned that rainfall that the area gets for 4–5 months and flood water that will be released from the Dam for a short period will not be enough to replenish the ground water. Climate and environmental change will force the farmers to reluctantly resort to planting low-yielding drought-resistant crops

Construction of the controversial Tipaimukh Dam has been opposed by Indian academics and environmentalists as well. Rabindranath, a prominent Indian water-rights activist and the coordinator of the River Basin Friends of Assam, expressed his sharp reaction to the construction of the Tipaimukh Dam. He argues that by 2020, the projected power requirement of the North Eastern states in India is 1900 MW. But Delhi is gearing up to generating 60,000 MW by building dams on rivers and tributaries, many of which are main sources of water for major Bangladeshi rivers. India decides to sell the additional power to Laos, Vietnam, Cambodia and Thailand but The 22-km chicken-neck dividing the seven sisters and the rest of India would not permit the transfer of such high-velocity additional power. According to him, the electricity thus generated will not light the, homes; rather it will choke the Surma and Kushiara in Bangladesh. These dimensions of the dam that encompasses human livelihoods and ecology are completely neglected by the Indian Government. The potential far reaching effects of the dam according to Namdingpou Kamei are:

- A total area of 286.20 sq. km would be submerged forever.
- Heritage including the Barak waterfalls and Zeilad Lake, which twine with the history of the Zeliangrong people, would forever be underwater; all folklore and legends would have no verifying monuments and would become made-up stories for the next generation.
- Number of people rendered landless will be more than 40,000.
- Eight villages situated at the Barak Valley would be completely submerged.

- More than 90 villages, mostly in the Tamenglong district, would be adversely affected.
- Cultivable land that will be lost will amount to about 27,242 hectares.
- The township of Nungba, subdivision headquarters, and the village along the NH-53 would be severely affected.
- Health hazards, water borne diseases, industrial pollution and other ecological problems would result from the installation of the dam.
- Increased salinity of ground water would make it unsafe for drinking and increase inconvenience to the people.
- As the dam will be constructed in a seismically active zone, frequent occurrences of destructive earthquakes in the area would be possible.
- The decision was made without sufficient study and information. This makes the people affected prone to future challenges and problems that people will have to deal with.
- People's livelihoods will be affected. Economic and financial would result when people who depend on river water and agricultural products would lose their livelihood.
- Consequent displacement and destruction of the people by implementing the project would pose a grave threat to people's right to live in a vibrant democratic system.
- The project, once completed, would submerge the exotic flora and fauna and rich gene pools, as Manipur is located in one of the genetic hot spots of the world where rare biodiversity resources exist.
- There would be problems of displacement, resettlement, rehabilitation, repatriation and development.
- Democratic principles such as participation and inclusiveness that accommodate voices of the indigenous people would be violated.
- The construction of the dam would be in total disregard for the Zeliangrong ancient indigenous heritage, reflecting negatively on the partiality of the government.
- The tributaries of the Barak basin will adversely be affected.

One cannot rule out the colossal damage that will result from the construction of the dam. The concern of the stake holders have been that the dam is not environmentally

benign from the very beginning of the commissioning of the dam. Because of the unilateral decision of the government of India, a sense of injustice looms large in the minds of the people of India and Bangladesh. Several quarters were employed by the government ranging from public relations strategies, to apparatuses and resources to convince the local people and the government of Bangladesh of the benefits and feasibility of the project. It is obvious that to maintain good relations with India the ruling party of Bangladesh will remain supportive to the Indian government's decision. However, people from all strata of society in Bangladesh have embarked on a massive social movement and have criticized their government's role and implicit support for the Tipaimukh Dam project.

Massive protests have been rendered against the Tipaimukh by all sections of people belonging to various political affiliations, intellectual and ideological background, ethnic and cultural variation, and religious affiliation as it is a life and death question for the country and the adjoining areas. Resistance, protests and demonstrations have, indeed, transcended the national boundary and taken on a transnational form. The movement thus turned to a global social and environmental movement embodying the –environmentalism of the poor.²³⁰

Bilateral tension between the two countries in the past over water sharing of rivers like the Ganga and Teesta and the border issues cannot be separated from the issue of the Tipaimukh project. The tensions between both the countries have been the key catalyst in the domestic politics of Bangladesh. The ruling government has always been accused by the critics and the opposition parties of being pro-Indian and thus adopting a –subservient foreign policy towards India. Such a lukewarm attitude towards the decision of India may bring devastating effects on the native soil.

The government sent a parliamentary delegation to survey the proposed dam site. It was led by Abdur Razzak the then water resources minister of Bangladesh and it had ten members who were the members of Parliamentary Standing Committee on water resources. They visited New Delhi en route to the Tipaimukh Dam site in Manipur in early August 2009 but failed to carry any survey due to bad weather. The delegation members stressed on the need to have a comprehensive study on the issues raised in

²³⁰ *Supra* note 217.

both the countries. Concurrently, Bangladesh offered to conduct a joint study with India to examine the implications of the Dam project on the region and the future flow of water in the concerned river system, which directly affects Bangladesh due to its position as a lower-riparian country.

The National Tipaimukh Dam Resistance Committee (NTDRC) was formed who marched along with Sylhet Division Unnayan Sangram Samiti (a committee that fights for development in Sylhet Division), supported by BNP and Bangladesh Jamaat-e-Islami (BJI)—the major Islamist party in Bangladesh towards the Tipaimukh Dam site on 10 August 2009, but was stopped at the international border by the Bangladesh Rifles (BDR). The frontline leaders of the movement were arrested by the government in 2010. Any popular resistance surrounding the project was attempted to be crushed with a strong hand. But the movement transcended the border to overseas despite the zero tolerance attitude of the state.

The NTDRC warned the people of the potential effects of the dam project and urged them to participate in the movement against it. They asserted that the construction of the Dam on the Barak River would dry up the North- Eastern region of the country. The people were called upon to remain alert and vigilant on this issue so that the Government of India do not proceed unhindered on the plan. The protests led by the NTDRC was supported by people in different district headquarters around the country and cities around the world, including Shilchar, Calcutta and Patna, India; Canberra, Australia; Tokyo, Japan; and New York, U.S. It was obvious that countries are now actively constructing more Dams on big rivers to realize their selfish interests which has also added to the global climate change

This movement was supported by social and human rights activists George Galloway, who called for an international enquiry into the potential environmental impact of India's proposed Tipaimukh Dam. He added that the impact of the construction on the population of both Bangladesh and China should be enquired into. Construction of the dam would be a crime against humanity which he termed more appropriately as a criminal offence. It is an international issue and therefore calls for serious attention from all quarters.

The Tipaimukh dam project is a clear violation of the Helsinki rules and International River Law. This was the contention of the memorandum of the leaders of Islami Andolan Bangladesh submitted to UN Secretary General Ban Ki Mun via the UNDP representative to Bangladesh. It also violated the 1996 Bangladesh-India Joint River Commission (JRC). The memorandum reiterated that the construction of the Dam would bring terrible ecological and environmental changes in vast areas of Bangladesh and many states of India. After 2009, the movement surrounding the Dam gradually became less vibrant as Bangladesh faced other political and social crises. Most leaders of this movement got arrested and some of them faced execution or forced disappearance.

North- East India too witnessed phenomenal protests against the Tipaimukh dam project. Hundreds of people in April 2009 belonging to various tribes including Bengali, Manipuri, Khasi ,Naga, Dimasa and Reang staged a protest against the project in front of the District Commissioner's office at Silchar. Their demand was the immediate abrogation of the Dam project. The demonstrations were supported by Pijus Kanti Das, the then secretary general of the Committee on Peoples and Environment (COPE), and a number of other leaders .A memorandum was sent separately to the then President Pratibha Patil; Prime Minister Manmohan Singh; Union Minister for Forest and Environment Jairam Ramesh; Chief Ministers of Assam and Manipur Tarun Gogoi and O Ibobi Singh respectively through the District Commissioner of Cachar. In these memoranda's, they expressed their concern for the people living upstream of Barak River and the potential environmental impact of the Dam's construction .Protests also took place in Manipur, Mizoram, and Barak Valley of Assam.

Initially the Government of India remarked that the dam was planned to contain flood water in the Cachar of Assam. Therefore the plan was supported by the people. But In reality when the impacts of the proposed construction were clear, they joined the protests against the construction. The people of Manipur and Cachar alleged that the people living in the downstream of the river were misled as to the effects of the dam. In the press release of 28 July 2009, the Hmar People's Convention (Democratic) of Manipur stated that the proposed Tipaimukh Multipurpose Hydroelectric Project is a war imposed on the indigenous Hmar people and various other communities located downstream and upstream. They said that the Government and the developers were

power-greedy. The indigenous people and their resources were put at stake by the government who are driven by short-term interests in their blind pursuit of profits. Important principle namely the right to informed consent was violated. The opinion of the people was that the rivers were rivers of life and no one can afford them being disturbed causing massive destruction of the ecology. When the Bangladeshi delegates visited the site, they were asked to look after the issues of Tuiruong and Tuivai too. This would be attained by working together for the collective good; and to save the rivers from irreparable damage.

Environmental resistance against the Tipaimukh Dam also occurred in North America through formal protests, organizing seminars, and submitting petitions to the United Nations. Wide range of debate, discussions and protests happened in the virtual world. A good number of blog sites were launched to organize and to disseminate the news and information related to the Tipaimukh Dam. Other online forums have been formed to resist the Dam's construction that mobilized people's support against the Dam throughout the world. This movement moved beyond Bangladesh, India, and North America, and South Asian people inhabiting other parts of the world have expressed their deep concern about the constructions of the Dam. The main objective of this widespread social movement, such as protests, petitions, and other form of resistance, their endeavors was building pressure on the Indian government to reconsider and to abandon the Dam project.

The project was halted in 2007. But the government of India, pursued its neoliberal agenda at the cost of ecological and social issues, pursued this project again. Government of both the countries took steps to address certain concerns. The then Prime Minister Sheikh Hasina brought up Bangladesh's concerns relating to the Tipaimukh Dam Project with the then Prime Minister of India Manmohan Singh during their meeting on the sidelines of the 15th Non-Aligned Movement Summit held in July 2009 in Egypt. The -Promoter's Agreement on the Tipaimukh Hydroelectric Project was signed to set up a Joint Venture Company (JVC) between the Government of Manipur, NHPC Ltd. and Sulej Jal Vidyut Nigam Ltd.. In September 2011, an MoU was signed between both the countries during the Indian prime minister's visit to Dhaka. It prevents India from taking any unilateral decision to construct the

Tipaimukh Dam. Official responses stated that technical teams from both countries should have regular meetings on this high-voltage issue

The protests against the construction of the Tipaimukh dam can be called the environmentalism of the poor because it has been largely initiated by the poor. The protests had been intense and widespread. It is still a debatable question whether and to what extent this movement is successful. The construction was halted in 2007. The resistance continued to gain momentum once the Indian government decided to continue with the project. Indian and Bangladeshi people were convinced that the dam in the name of development will actually result in large scale social and environmental injustice. They opine that Tipaimukh Dam is death to Sylhet and Bangladesh—it must be stopped. The protests took many forms ranging from street demonstration to indoor-protests, from seminars and discussion meetings to virtual protests through Facebook, blogs, and other online portals, from developing various environmental and social-justice organizations to making alliances among different groups to the submission of petitions to the United Nations. Originated by the poor in Asia, this environmental movement has spanned across Europe and North America.

It is the mercantile approach to rivers, that makes nation intervene in the river flow. According to this standpoint any flow of river water to the sea is a waste, and that all of it should be used up. Such an approach contributes to the downgrading of rivers and increased conflict among countries of the river basin. But now there has been a shift in perspectives. Approach has shifted to ecology that recommends preservation of the natural volume and direction of river flow. In this approach rivers are viewed as source of bond of friendship and good neighbourliness. Efforts are on in ushering in a multilateral approach that includes all the countries of a river basin in decision-making processes with respect to the use of the river. Few pragmatic policy recommendations for a holistic development of basin wide mechanism are:

First, Tipaimukh dam should not be constructed. Any dialogue with Bangladesh on the question of use of international watercourse is welcome. Simultaneously, participative democracy in the politics of Bangladesh and diminishing its dependency on India can go a long way

An unilateral approach from the side of India must be abandoned. A basin wide approach calls for participation from Bangladesh, Nepal, Bhutan, and China

Third, Bangladesh, India, and other countries of the subcontinent should abandon their current mercantile approach to rivers and adopt the ecological approach.

Myopic partisan and sectarian views should be abandoned .Stakeholders from both Bangladesh and India should jointly form a high-profile international committee to monitor the Tipaimukh project and disseminate necessary and updated data and information. This proposed committee can coordinate and contribute to movements against Tipaimukh in India, Bangladesh and elsewhere. For Bangladesh, all concerned stakeholders including members of civil society organizations, media, NGOs, human rights organizations, intellectual groups, business and religious communities, and research organizations need to develop and rally behind a common platform and take a united national stand regarding Tipaimukh Dam and other river sharing issues, as the nation needs national unity and solidarity in order to defend its rivers.

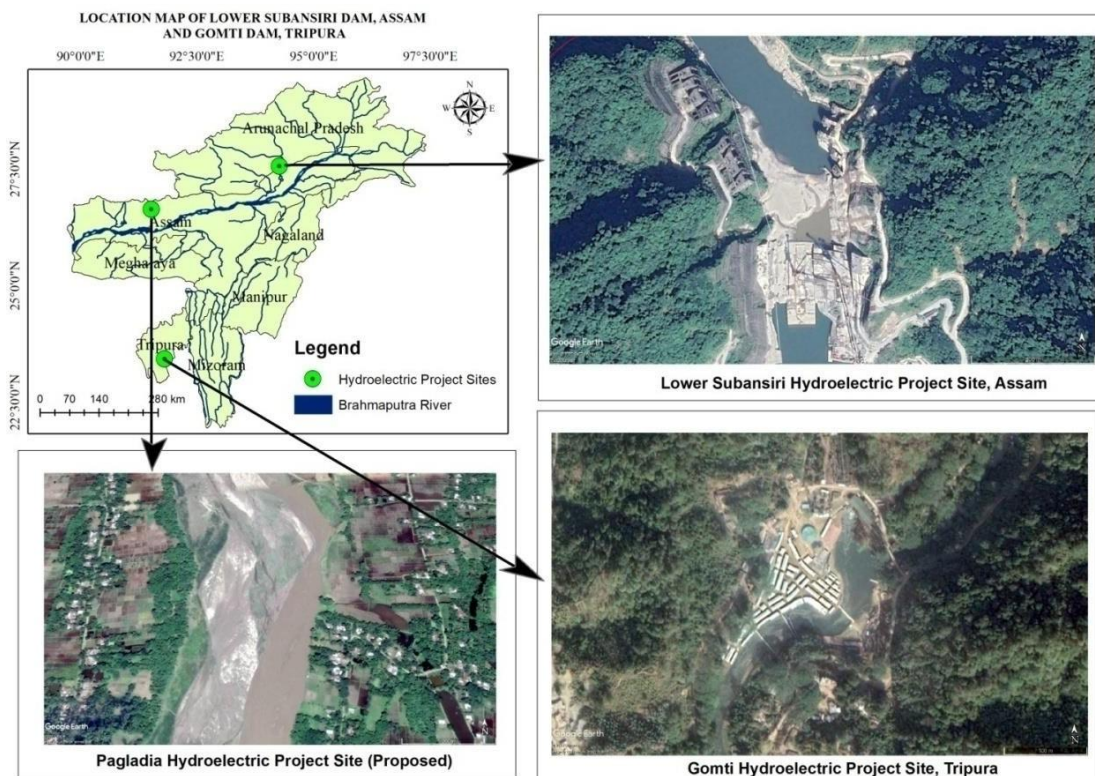


Figure 5:Map showing three important dams in North-East India

Source: Prepared by Kuladip Sarma, Department of Botany, Gauhati University

4.4 Conclusion

The social and environmental issues involved in five major dams of North-East India, has been viewed through the lens of modernisation theory in this chapter. But there are clearly larger issues related to the political economy of development in general, and large infrastructure projects in particular, which need to be addressed to make a headway vis-à-vis emerging conflicts on hydropower projects in the Northeast. For example, in May 2008 the then Union Minister of State for Power, Jairam Ramesh, raised concern about the MoU virus⁶ 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 and raised concern regarding the same. Absence of mandatory public hearing, environmental clearance and huge premium taken from the developers has rendered the environmental governance process meaningless. While there is clear opposition in Arunachal Pradesh to specific hydropower projects in certain river valleys, an important debate in the state is also on the manner in which a large number of projects are going to be simultaneously taken up and their cumulative impacts. Therefore, from a policy perspective how can we rapidly harness the hydropower potential of the Northeast?⁶ may be the wrong question to ask. Instead it might be more appropriate to ask: At what scale and in what manner can hydropower be produced in the region as a part of a larger development ethos which respects the ecological, social, and political context of the region? Both the central and state governments will need to go beyond existing technocratic institutions in the water and power sector to find the answer to this question and the people who actually inhabit these river valleys will need to be at the steering wheel of the process to find the answer. For example, an issue which has come up for discussion in popular debate is the possibility of staggering or pacing the construction of projects, which are otherwise found to be socially and environmentally acceptable, in a river basin. This will also enable learning lessons from the experience of ongoing projects for future planning of hydropower in each river basin. From a long-term perspective, technocratic institutions in the water and power sector (for example, the Central Water Commission and the Central Electricity Authority) need an urgent revamp to reflect diverse expertise beyond engineering and technocratic wisdom. In the current hierarchy of decision-making, environmental and social aspects of water (and the accompanying environmental governance framework)

are both subservient and downstream of techno-economic issues. But reforms of technocratic water and power institutions are likely to be a long and arduous process. In the short-term there is no alternative to addressing these issues but through a strengthened institutional framework for environmental and social governance. Such an environmental governance framework will need to have a level-playing field with technocratic institutions which decide on techno-economic feasibility of projects, which would also mean a more upstream involvement in the planning of river basins. While one suggestion by the government is having a multidisciplinary Northeast Water Resources Authority (NEWRA), the idea needs debate in the region. Critics fear that it will be another technocratic institution merely pushing mega water infrastructure projects, rather than ensuring socially and ecologically sensitive planning of river basins. Last but not the least, a more proactive engagement and scrutiny of financial institutions supporting water and hydropower infrastructure in the region on social and environmental issues is also much needed. The political economy of hydropower development in the region may not allow all the social and environmental issues to be fully addressed in the current environmental governance framework, hence relying on these clearances⁶ as certificates of the viability of these projects may pose serious risks to investments in the long term, as is evident from major protests in the region against projects which have already got a green signal. An underlying issue through all of this is that we will need to abandon a virtual dogma in current decision making that each and every project is a fait accompli. Creating genuine space for addressing social and environmental issues, including the option of saying no to certain projects based on thorough scrutiny and public consultation, will be beneficial for all concerned in the long term.

Free, Prior Informed Consent from the indigenous people (FPIC) of the indigenous groups has not been implemented. Community rights over land of the people have been violated. The UN Declaration on the Rights of Indigenous Peoples (UNDRIP) adopted in 2007 clearly outlines that all indigenous peoples have the right to control, manage and develop their land, territories and resources for their survival and for their ancestors. However there has been an onslaught of these rights by the dam developers. This onslaught constitutes a flagrant violation of indigenous peoples' right to develop and determine their rights to define their developmental priorities and needs in accordance to their wishes and aspiration to ensure their survival, sustenance of their ecosystem and

its wise use. This is coupled with non provision of detailed project report, the Environment Impact Assessment and the Environment Management Plan. The dams have a huge potentiality to damage the global biodiversity hotspots, result in huge displacement of people in Arunachal Pradesh and Assam, increase the risks of flash floods and environmental disasters in a particularly active seismic zone, and induce conditions for further conflict situations in the region. Many of these effects have already been seen, with some projects almost near completion, and the damage done in the past five years is starkly noticeable in the state. Inflow of huge hydroelectricity project has destabilised many tribal societies in the region. This has resulted in more vulnerability in terms of floods and other varied extremities of nature

CHAPTER SUMMARY

- This chapter has an introduction that focuses on the prelude to the chapter
- It explains the modernisation theory to bring home the point that linear progress of the nation theory does not hold good for a context like North-East India
- The Lower Subansiri Dam and the issues associated with it are discussed
- The chapter gives a pen picture of the Ranganadi Dam and issues associated with it which is another important dam in North East
- The Gumti dam and issues involved in it are discussed
- The Pagladia dan and related issues are articulated
- The chapter gives a pen picture of the Tipaimukh and associated hazards in the region.

CHAPTER V

**IMPACT OF BIG DAMS ON NORTH EAST INDIA:
AN ENVIRONMENTAL PERSPECTIVE**

SYNOPSIS

- **INTRODUCTION**
- **DEVELOPMENT DEBATE IN INDIA**
- **ENVIRONMENT AND DEVELOPMENT DEBATE**
- **INGREDIENTS OF GOOD DEVELOPMENT**
- **POLICY RESPONSES TO ENVIRONMENT AND DEVELOPMENT**
- **IMPACT OF CONSTRUCTION OF BIG DAMS IN NORTH EAST INDIA
FROM ENVIRONMENTAL PERSPECTIVE**
- **CONCLUSION**
- **CHAPTER SUMMARY**

5.1 Introduction

The term development in its present sense dates back to the post world war second era when the war torn nations embarked on economic development to rebuild themselves.²³¹ Since then development as a concept have had long a normative history and carried with it other paradigms that emerged in the context of different locations giving rise to different relations to different rights. Identity conflicts in different locations have been revolving around different issues, for example in the western democracies conflicts have been all about quality of life, belonging and self expression whereas in the rest of the world conflicts have been revolving around material concerns. This part of the research focuses on the point that development through dams is not desirable at a time of revaluing local culture and environment. This part will analyse the impact of dams in North -East India from the vantage point of environment. Before that it will be in order to introduce the development debate in India.

5.2 Development debate in India

Various ways of the Indian state like the National Water Policy, National Hydro Power Policy, etc has been devised to gain control over the water resources of the country. The development model that the state seeks to pursue is largely hydro power driven in the present era as evident in commissioning of various boards and committees like the Water Board, the Inter-State Water Commission.

The concept of development, whether economic, political or social, is a Western imposition.²³² After the 1990s with the dismantling of the erstwhile USSR the whole

²³¹ R.SRIVATSAN,HISTORY OF DEVELOPMENT THOUGHT,A CRITICAL ANTHOLOGY,1(2012).

²³² Development as a concept had a long normative history in the Euro American Liberal thought. A reading of R.Srivatsan's A History of Development Thought provides the following: First, with the end of Second World War and shifting of balance of power from USSR to US crystallised the framework for the development of the Third World Countries. The nineteenth century paradigm of master race dominating the world changed and the Soviet Union's stance on the liberation of the colonies of Asia and Africa was based on the premise that they should liberate as '_nations'. This had two consequences: first it meant that like the western liberal discourse, the soviet model was a linear model of development driven by an elite hegemony and next, in order to compete with the Soviet Union ,the First world had to be more generous in terms of its assistance to the third world. These factors including the fight by India and similar countries on the horizon against colonialism worked well in favour of America becoming super power and Britain slowly losing its foot as a race superior. A reading of Prakash Chandra Mahalonobis shows that after India won independence, planners stressed on indigenous production of capital goods to substitute its import .The Mahalonobis era marks the advent of state capitalist in the country On the international front, W.A Lewis theorised that a tiny market grew alongside with the large subsistence economy in the third world economies and it was this market that acted as the ground for germination of industrialist. .During 1970s development paradigm underwent a shift influenced by Neo Marxist idea about the world order and within this legacy Paul Baran asserted that the Third World countries were

world has prioritised concepts like human development, human security, etc. India is still in pursuit of economic development as one of the major means to meet the challenges of development. In order to mend the war torn nation, the government of India after independence opted for planned economic development. This process of industrialisation in India had brought its own set of problems. Post colonial development policies were biased, uneven, and unequal and have had unjust manifestations. The marginalised were at the receiving end and their socio-economic, political, cultural and traditional ethos was contaminated.

Vandana Shiva in 1998 theorised that the post colonial project of India's hegemonic development runs on commercialisation of resources. The problem of poverty and dispossession is deeply intertwined in the model. As such, development based on exploitation and degradation of nature often results in the loss of political control over sustainable natural resources thereby violating the right to self determination.²³³

characterised by a different dynamics of backwardness and Industrial development is the only way to improve the living standard but in the absence a functioning economic system, a new venture should break virgin grounds to develop with its own efforts. Within the same legacy, Andre Gunder –Frank theorised that underdevelopment was a historically linked process and the nations in the Europe developed by exploiting and under developing the colony . Another important thesis is that of Ernesto Laclau who emphasized that under development in the backward countries was an active product of the metropolitan rule and the periphery economy was not an independent entity that needed to be developed and brought closure to metropolitan, it was only maintained in a crippled condition by capital. These theorisations fleshed out the concept of core' and periphery' to explain the developed and the underdeveloped countries respectively. The structured and western model of development began to decline owing to its loose and incoherent methods. Dividing economics into two disciplinary claims Albert Hirschman on rise and decline of development economics within the –classical mould said that market was the _economic system' that was applicable throughout the world . Study of economics has only one set of rules to be discovered which he called the monoeconomics claim and in every economic system all participants benefit mutually which he said the mutual benefit claim .Based on the assertion and rejection of this claim there were four possible positions: monoeconomic and mutual benefit both asserted results in classical economics, monoeconomics asserted and mutual benefit rejected results in Marxism, monoeconomic claim rejected and mutual benefit claim asserted resulted in development economics and both claim rejected resulted in neo-Marxist theories. These resulted in the claim that special principles were needed to understand the problems of developing economies and it was possible for a mutual benefit to occur only when an advanced economy and a developing one worked to resolve the economic problems of the latter. Such an ideal' situation was rejected by Raul Prebisch who said that the accumulative agendas, industrial growth etc driven by western liberal thought outran the distributive agendas and resulted in atavism in the developing nations. With the passage of time social movements changed, the demands of rights changed and as pointed earlier the prominence of the non western groups' grew because states began to resort to authoritarianism to push their agendas on them, being perceived to be ones who can be sacrificed.

²³³ The Right to Self Determination is a human right. Right to self determination means that the political status of people shall be determined freely by and pursue their economic, social and cultural development. By the virtue of this right, people have the right to determine its own destiny. Essentially, the right to self-determination is the right of a people to determine its own destiny. This principle can result in a variety of different outcomes ranging from political independence through to full integration within a state. The right to self determination is important because, due to this right people enjoy the right of choice. But the outcome of a people's choice should not affect the existence of the right to make a choice. Practically, exercise of right to self determination will often determine the attitude of governments

Traditional land use rights for the indigenous communities are eroded by the development projects.

Ramachandra Guha in 1994 stressed on the Gandhian way prioritising common property resources (CPRs) to restore community-based environment management. According to Guha the conflict over natural resources is very much linked to the process of development, since development projects, like dams, have had a negative impact on nature. Therefore in the Indian context it can be argued that the degradation of the environment directly threatens the survival and livelihood options of the people especially the vulnerable ones. Environmental conflicts have close connections to questions of sustenance and survival, and have prompted a critique both of consumerism and of uncontrolled economic development. The account below provides an analysis of the link between environment and development.

5.3 Environment and Development debate

In attempting to improve our lot, one has added to the environmental crisis that involves not only social, political and economic aspects but also pose a philosophical question. The World Commission on Environment and Development (WCED) emphasized the need of a sustainable way of life where we also leave some resources for the future generation.

An unprecedented rise in consumerism has posed a threat to environment and has overburdened social systems. Unsustainable patterns of production and consumption have been inhuman and it has made environmental issue one of the biggest challenges faced by mankind today. The most vital task is to build an environment ethics that constructs an adequate theory of intrinsic values of nature. The preambular assertion of the Earth Summit of 1992 echoes the global concern for environment.

We are in the midst of the sixth era of extinction. This problem can be mitigated only through the conservation and sustainable use of biological diversity. 2010 has been marked as the International Year of Biodiversity.

Proponents of economic development view environment as an impediment to development. However Our Common Future recognised environment or development as a false dichotomy. Focus was shifted from this dichotomy to environment and

towards the actual claim by a people or nation. Thus, while claims to cultural autonomy may be more readily recognized by states, claims to independence or secession are more likely to be rejected by them.

development and subsequently to environment for development. As per Principle 1 of Agenda 21 the focal point of sustainable development is human beings. Human beings are entitled and have the right to a healthy and productive life in harmony with nature.²³⁴

5.3.1 Ingredients of Good Development

Good development entails increasing the asset base and its productivity, empowering poor people and marginalised communities, reducing and managing risks and taking a long term perspective with regard to intra and intergenerational equity. Sustainable management of all the assets, financial, material, human, social and natural is necessary for long term development. Natural assets including water, soils, plants and animals underpin the livelihoods of all people. Agriculture, fishery, forestry, tourism and minerals sectors provide social benefits to the population. The challenge is to efficiently manage all these resources. Sustainable development provides a framework for the management of all these resources while optimal functioning of the environment.

A healthy environment can help enhance development but the relationship is not always reciprocal. A school of thought opines that modern development is destructive and even violent.

5.3.2 Sustainable Development

The meaning of sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs.²³⁵ Put in the new globalised order, sustainable development is the integration of economic and social and environmental development considered as the inter dependent and mutually reinforcing pillars which operate at the local, national and global levels. This sets out two fundamental principles of intergenerational and intra generational equity.

Intergenerational equity means the need to preserve resources and energy for the need of the future generation and intra generational equity means equitable use of natural resources in a manner that takes into account the need of the other state by one state.

²³⁴ Agenda 21, the Rio Declaration on Environment and Development, and the Statement of principles for the Sustainable Management of Forests were adopted by more than 178 Governments at the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil, 3 to 14 June 1992.

²³⁵ Brundtland Report of 1987.

Long term development can be achieved only through sustainable management of various assets be it financial, material, social, human or natural. Local and national and international economies along with livelihoods of people can be threatened by non sustainable use. Human well being has been central to the debates on development.

5.3.3 Barriers to Sustainable development

Despite changes in the environmental governance in the present era, policies of many governments create environmental policies in isolation. There is a continued failure to link environment and development in decision making. As a result development strategies ignore the need to maintain the very ecosystem services on which the long term development goals depend. Healthy environment depends on biodiversity. Failure to conserve biodiversity will result in rampant illness of the environment and inequitable and untenable growth

5.4 Policy responses to Environment and Development

Policy responses to conservation of biodiversity and ensure sustainable developments are:

5.4.1 The Convention on Biological Diversity

The CBD is an important instrument in environmental field. It takes comprehensive approach to the conservation of Earth's biodiversity and sustainable use of the biological resources. The need to have a global convention on biological diversity started gaining momentum in 1984. In response the United Nations Environment Programme (UNEP) in the year 1987 recognised the need to streamline the international efforts to conserve biodiversity. It was signed in the Earth Summit Rio de Janeiro in 1992 June. India became a party to the convention in 1994. At present there are 175 parties to the Convention. The CBD has three main objectives: the conservation of biological diversity; the sustainable use of the components of biological diversity; and fair, equal and even benefit sharing of the resources that result from the utilisation of genetic resources. The Convention acknowledges the special needs of LDCs, among those of other developing countries

Intensive work and negotiations by civil societies, parties and the secretariat have made the CBD a more workable and have resulted in instrument like the Cartagena Protocol.

5.4.2 The Wild Life Protection Act, 1972

The Wild Life Protection Act has made provisions for the conservation reserves and community reserves to make it more people oriented. Presently the Biological Diversity Act, 2002 provides for National Biodiversity Authority to control access to genetic resources from international community

5.4.3 Biological Diversity Act, 2002

The Biological Diversity Act, 2002 regulates access to biological resources of the country with the purpose of securing equitable share in benefits arising out of the use of biological resources and associated knowledge relating to biological resources.

It focuses on conservation and sustainable use of biological diversity and aims at fostering respect and protection of knowledge of the local communities related to biodiversity. It aims at securing sharing of benefits with local people as conservers of biological resources and holders of knowledge and information relating to the use of biological resources.

Conservation and development of areas of importance from the perspective of biological diversity by declaring them a biological diversity heritage sites is yet another focus point of the Act. It aims at protection and rehabilitation of threatened species and fosters involvement of institutions of state governments in the broad scheme of implementation of the Biological Diversity Act through the constitution of Committees.

5.4.4 Constitutional Provisions

The Constitution of India contains specific provisions on environmental protection. The Fundamental Rights and Directive Principles of State Policy chapters enunciate the national commitment to protect environment. In view of the liberal interpretation of the Article 21, right to a healthy environment has been included within the ambit of Right to life coupled with Article 48- A AND 51- A (g)

5.5 Impact of Construction of Dams in the North- East India from Environmental Perspective

North- East has been identified as the future power house of the country.²³⁶ 63,328 MW (Central Electricity Authority) is the total installed capacity that has been proposed for the region. The main

²³⁶ *Supra note 1.*

states that are in the forefront to build big dams with power developers are Arunachal Pradesh and Sikkim. It can be said that hydropower projects are projected as a developmental intervention that will bring development to this ecologically, geologically, seismically and culturally sensitive region of North –East India. At present, 10 large projects are under operation in the region and 11 are under construction.²³⁷ Advocates of big dams and the government have painted an optimistic picture as far as the benefits of the big dams are concerned despite their probable catastrophic implications. They say that exploiting the country's largest perennial water system will lead to production of plentiful power for the nation; and also result in economic benefits for north eastern state governments. The other argument regarding its benefit is that there will be comparatively little direct displacement of local communities as compared to elsewhere in the country.

The upstream impact, downstream impact, the ecological impact, social and cumulative impact of the hydropower projects on the Brahmaputra and the Barak River systems are a major source of debate and concern. Some of the key impacts that can envisaged in the current form are:

5.5.1 Environmental Impact Assessment

The eight states of Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim make North-East a place of unique biological and cultural diversity. It is known for its unique Barak and Brahmaputra river systems. Important populations of wildlife species, such as the rhino, elephant, tiger, wild water buffalo, pigmy hog, and the Gangetic river dolphin are found here.²³⁸ Three out of 34 global biodiversity hotspots cover parts of India: Himalaya, Indo-Burma, and Western Ghats, and Sri Lanka. Two out of these three, Himalaya and Indo-Burma, cover extensive portions of the Northeast. As per the International criteria, the Bombay Natural History and Birdlife International, the region also houses 21 percent of the important bird areas.²³⁹

One of the world's largest rivers is the River Brahmaputra. It is a unique river that drains such diverse environments such as the cold dry plateau of Tibet, the rain-

²³⁷ *Ibid.*

²³⁸ Manju Menon et al, *Large Dams in the Northeast, A Bright Future?*, (Jan 21 2020, 10 PM), https://www.researchgate.net/publication/319127987_Large_Dams_in_the_Northeast_India_A_Bright_Future.

²³⁹ *Ibid.*

drenched Himalayan slopes, the landlocked alluvial plains of Assam, and the vast deltaic lowlands of Bangladesh. It interacts with the monsoon in an extremely dominant way. It has a fragile geological base coupled with an active seismotectonic instability together that makes the Brahmaputra world's most intriguing and gigantic river systems. In terms of water discharge this river ranks fourth and carries the second largest sediment yield in the world. The flood plain ecology of wetland (beels) is intricately linked with the Brahmaputra valley. Examples of such *beels*, are renowned eco-systems, 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.

Next important river in the region is the Barak River that has its source in the state of Manipur. The upper Barak catchment area spreads over north, north western, western and south western parts of the state. The middle portion of the river falls in the Cachar plains in southern Assam while the lower deltaic course is in the Bangladesh.

A rich diversity of indigenous communities is found in the region. A substantial portion of the population depends on natural resource-based livelihoods. Marked by unique socio-cultural, agro-ecological, and landholding systems (such as different forms of community control over forests in various parts of the region) this diversity seems to be unique. The social and the environmental impacts must be carefully assessed before deciding on the feasibility of large dams. One of the key features of the current environmental clearance process is the Environmental Impact Assessment report, which is a critical document aiding decision-making.

The documents evaluating the development of hydro projects in the North East India has one common feature. These documents show that environment and forest clearances get delayed in the process and the question remains as to how to address these. The EIA reports are shoddy in quality but most of the projects seem to get clearance on the basis of such inadequate reports. For instance Dr. Anwaruddin Choudhury, wildlife expert from North East India says that EIA reports of at least five large hydroelectric projects: the 600 MW Kameng, 2,000 MW Lower Subansiri, 1,000 MW Middle Siang, 1,500

MW Tipaimukh, and 3,000 MW Dibang and finds them all exceptionally poor on wildlife aspects.²⁴⁰ These reports use superfluous language and are full of incorrect data.

Here are a few examples from these reports: In the 1000 MW Siyom project the EIA lists 5 bird species in an area but in reality it has over 300 species. The EIA for the 600 MW Kameng project reclassifies carnivores, such as the red panda, pangolins, and porcupines as herbivores. For EIA for the 2,000 MW Lower Subansiri project, the EIA report lists 55 species of fish in a river, but in reality it has at least 156. All three projects have got a green signal based on these EIA reports. Bio diversity has been used as an indicator in these examples but these reports are poor in social and environmental aspects.

The current environmental decision-making processes suffer from one problem. That is that virtually the expert committees appraising these reports and the regulatory authorities concerned consider every project as a *fait accompli*. Due to this, the possibility of a proper environmental decision making gets subverted.²⁴¹ The scientific knowledge like hydrology etc is missing on the part of the developers and the committees. Knowledge of the sedimentation and hydrology are very much related to the economic life of the dams. In the absence of any comprehensive information, the wisdom of public policy that allows such dams has to be questioned. The tremendous ecological and the social costs that these dams bring with them are unacceptable.

In the light of all the above mentioned issues, EIAs should be commissioned by an independent body/regulator. At present this is done by the project developer. Public consultation is a prerequisite during scoping stage of the big dam. EIAs should be carried involving both local experts and communities (not only by outside consultants). Open peer review and scrutiny must be done for at least two months before a project is appraised for environmental clearance. Clearance granted based on poor may call for colossal damage. There should be clearly defined legal norms to manage the conflict-of-interest in relevant expert appraisal committees.

²⁴⁰ *Supra note 1.*

²⁴¹ Krishak Mukti Sangram Samiti, *Immediate moratorium sought on clearances for large dams in northeast India - Press release by Krishak Mukti Sangram Samiti (Assam)*, (Jan 30, 2019 10 PM) ndiawaterportal.org/articles/immediate-moratorium-sought-clearances-large-dams-northeast-india-press-release-krishak.

The Ministry of Environment has stressed that the current problem with the environmental clearance process will be addressed by the setting up of a new body, namely the proposed National Environmental Appraisal and Monitoring Authority (NEAMA), but the critics are of the opinion that new institutions will not pay proper attention to the issues of viability of the dams.

5.5.2 Social Impacts of Dams

One of the prominent arguments that the proponents of big dams that forward is that it is fair to install them in this region because the displacement that will take place is smaller as compared to that in the rest of the country.²⁴² But a careful perusal of the ground realities reveals that displacement of livelihoods and violation of rights is grossly underestimated. For example in Arunachal Pradesh, most of the land is hilly. And it is difficult to use the land for permanent cultivation. In such a situation, whatever land is left will be submerged by the 2700 MW Lower Siang project in the affected area in the Siang Valley. Therefore the impact has to be assessed keeping this context in mind. Thus, it is misleading to argue that the displacement that will take place will be minimum and thus pursue infrastructural projects such as dams.²⁴³

Another missing link in the impact assessment of dams is the impact on the resources under common use (for example, pasture land), vital to the livelihoods of local communities. Further, compensatory mechanisms required as per forest laws to offset the loss of forests due to a project, also lead to protection of other areas, affecting community access to land and resources.

For example, a considerable part of the forests in Arunachal Pradesh are classified as Unclassified State Forests (USFs).²⁴⁴ These forests are *defacto* under the control of the community. If such forests are brought under something called Compensatory Afforestation they will have to be declared as Protected or Reserved Forests, which means there will be greater state control on these forests.²⁴⁵ In such a case the impact on the rights of local communities in such cases also needs to be examined in terms of the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006. The notion that impact of dams on the local people will be only in the

²⁴² *Supra note 1.*

²⁴³ *Ibid.*

²⁴⁴ *Ibid.*

²⁴⁵ *Ibid.*

submergence area is flawed. These aspects are not considered or reflected in the decision-making on the overall viability of the project.

There are small populations of culturally sensitive indigenous communities in states like Arunachal Pradesh .If assessed from the vantage point of the local population; there is high possibility of both direct and indirect displacement. For example the total population Idu Mishmi tribe accounts for around 9500 and at least 17 large hydel projects have been planned in the Dibang Valley in Arunachal. If one has to follow the faulty argument of small displacement little social impact will be indicated even if entire population were supposedly washed away. Another feature of the state is that land has also been customarily delineated between different indigenous communities and clans. Therefore, contrary to popular belief, there isn't plenty of land for resettling people in the state, just because the population density is less.²⁴⁶

Issues in states like Sikkim and Arunachal Pradesh the issue are not limited to displacement alone. The Buddhist Monks community in Sikkim have extended support to the protest in Sikkim against big dams because a large part of their holy land may be washed away. Anti dam movement is not merely on grounds of displacement but the fact that region's cultural and ethnic traditions that are rooted in the river Teesta and its environs will be submerged has also triggered such protests.

Another issue within the fold of social impacts is that large influx of population has been witnesses by the region from time immemorial. Such migration adds to pressure in the places inhabited by the local communities. The constitutional and the land rights that have been vested in the people and it restrict the entry of outsiders. These projects will require skilled and unskilled labourers that Arunachal Pradesh for example cannot supply. In such a scenario around 150,000 labourers may migrate for 17 large projects in the Dibang Valley .Experts have raised concern for them remaining in the place for long periods, as these are long gestation projects. Thus there may be adverse impacts on the demography of the state and changes and other socio cultural impacts associated with this. Thus it can be said that the development policies are in glaring contradiction to the constitutional and legal protection the people have been given we have been given State specific Rehabilitation and resettlement policies in states like Arunachal Pradesh have been initiated to address some of the issues. But these laws are confined to

²⁴⁶ Available at panosrelay.panosnetwork .org(Jan 25,2020,12 PM).

increasing compensations for individual and community land (including forest land) to be directly acquired for the project. But the need of the hour is that a comprehensive social impact assessment should be done prior to addressing R &R considering the socio-cultural realities of the region as pointed out earlier, including identification of project-affected persons (PAPs) whose land may not be directly acquired but are clearly affected by the project.

5.5.3 Downstream Impact of Dams

In the popular discourse of dams, the downstream impact of dams is often neglected. When the flow of a river is blocked by a big dam, sediments and nutrients responsible for fertilizing downstream plains are trapped thus altering the natural flow regimes of the river.²⁴⁷ This is vital to drive the ecological processes in downstream areas. Therefore it is obvious that the connection between a river and its floodplain gets disrupted.²⁴⁸

Repeated incidents of dam induced flood across the state from upstream projects like the 405 MW Ranganadi in Arunachal Pradesh) in recent years have triggered the debate about downstream impact of dams.²⁴⁹ The downstream impacts of large dams in North-East include loss of fisheries; changes in *beel* (wetland) ecology in the floodplains; impacts on agriculture on the *chapories* (riverine islands and tracts); impacts on various other livelihoods due to blockage of rivers by dams (for example, driftwood collection, sand, and gravel mining); increased flood vulnerability due to massive boulder extraction from riverbeds for dam construction and sudden water releases from reservoirs in the monsoons and dam safety and associated risks in this geologically fragile and seismically active region.

The proposed large dams in the upstream will increase the vulnerability of the Brahmaputra valley. This realization has been significant for a civilization whose cultural identity customs, food habits, music, and religious belief is inextricably linked to its river systems.

One of the key issues associated with the construction of dams is the variation in the flow of the river during the lean season that is the winter. Let us take the example of the

²⁴⁷ Debangana Baruah, et al, *Probable Downstream Impact of 2000 MW Lower Subansiri Dam in Arunachal Pradesh of North East India*, 8, *Nature Environment and Pollution Technology*, 835-844 (2009).

²⁴⁸ *Ibid* .

²⁴⁹ *Supra note 1*.

Subansiri River. The average winter flow of the river in its natural state is 400 cubic metres per second. The people of the downstream areas in riverine tracts in winter are used to this lean but relatively uniform flow of water. Neeraj Vaghlikar says that

Chapories, for example, which are exposed and drier in winter are used for both agriculture and cattle grazing purposes by local communities, and simultaneously by wildlife. After the commissioning of the 2,000 MW Lower Subansiri project, flows in the Subansiri river in winter will fluctuate drastically on a daily basis from 6 cumecs for around 20 hours (when water is being stored behind the dam) to 2,560 cumecs for around 4 hours when the water is released for power generation at the time of peak power demand in the evening hours. Thus, the river will be starved for 20 hours and then flooded for 4 hours with flows fluctuating between 2 and 600 per cent of normal flows on a daily basis

If water is released from the Subansiri River in winter, it will be equivalent to the annual monsoon or a winter flood that will drown riverine tracts and people and wildlife on a daily basis. This unnatural flow and fluctuation will impact the downstream livelihoods and activities. Fishing, agriculture, river transportation, and livestock rearing in grasslands for dairy-based livelihoods are going to be adversely impacted. The downstream communities are yet to be officially acknowledged as project-affected persons due to upstream dams. These fluctuations in Lohit, Dibang, Siang, and Subansiri rivers will seriously impact breeding grounds of critically endangered grassland birds, such as the Bengal Florican, foraging areas of the endangered wild water buffalo, habitat of the endangered Ganges river dolphin, and important national parks, such as Dibru- Saikhowa and Kaziranga. For example, the combined operation of the 1,750 MW Demwe Lower (Lohit), 3,000 MW Dibang, and 2,700 MW Lower Siang, all terminal dams on their respective rivers, will cause an unnatural, drastic fluctuation of over 4 metres (13 feet) in water levels on a daily basis in winter in the Dibru-Saikhowa National Park located in downstream Assam.

Until very recently the EIA studies by MoEF ignored an assessment of downstream impacts. In most cases of big dams in North East India the baseline data is restricted to only 10 km downstream of the project. The actual prediction of impact has been suggested to be restricted to an even shorter distance downstream only between the dam and the powerhouse. If study has to be done for beyond 10 km downstream then only a

dam break analysis has to be done which studies the effect of floods on the downstream, in case the dam actually breaks. The downstream impact of dams is not the only confined to a dam. Unfortunately, most of the detailed downstream studies are done only at post-clearance stage as was done for the Tipaimukh Multipurpose project in October 2008 and in the 1,750 MW Demwe Lower project on the Lohit river in February 2010. Thus this indicates that the dams are treated as a fait accompli and the clearance processes as a formality. An incomprehensive picture of the downstream impacts of these projects provides for a recipe for future conflicts. Moreover, the mandatory public hearings are being held only in the upstream state, even for projects which clearly acknowledge impact on flow patterns in downstream Assam.

5.5.4 Run of the River Hydro

The policy domain regarding big dams in North East India projects RoR hydropower projects as environmentally and socially benign.²⁵⁰ The Bureau of Indian Standards Code IS: 4410 defines a RoR power station as: A power station utilizing the run of the river flows for generation of power with sufficient pondage for supplying water for meeting diurnal (daily) or weekly fluctuations of demand. In such stations, the normal course of the river is not materially altered. IS: 4410 defines a storage dam as: This dam impounds water in periods of surplus supply for use in periods of deficient supply.²⁵¹ These periods may be seasonal, annual or longer. Before the water is dropped back into the river at a downstream location after passing through a power house most of the so called run-of-the-river hydroelectric projects being installed in the Himalayan region involve large dams which divert river waters through long tunnels. The developers promote these projects environmentally benign as the prevalent notion is that they involve smaller submergences and lesser regulation of water as compared to conventional storage dams.²⁵² This perception conveniently ignores the impact of several features intrinsic to this design.²⁵³ For example, long stretches of the river will be bypassed between the dam and powerhouse, with up to 85–90 per cent of the river flow in the winter (lean season) diverted through the tunnels.²⁵⁴

²⁵⁰ Jaya Thakur, *Exploring the Hydropower Potential In India's North East*, (Jan 25, 2020, 10 PM) www.orfonline.org.

²⁵¹ *Supra note 1*.

²⁵² Manju Menon, *Infrastructure Development in the North East: Hydropower Natural Resources, Legal and Institutional Frameworks and Compliance*, (Jan 25, 2019, 10 PM), www.in.boell.org.

²⁵³ *Supra note 1*.

²⁵⁴ *Ibid.*

In the 510 MW Teesta V project in Sikkim the head race tunnel taking the water from the dam to the powerhouse is 18.5 km long and bypasses a 23 km length of the river. Not only will this destroy riverine ecology, but a cascade of projects will mean most of the river would essentially end up flowing through tunnels. These projects also involve extensive tunneling in a geologically fragile landscape, the environmental and social impacts of which are grossly underestimated. Impacts observed include cracks in houses above long tunnel alignments, drying up of water resources, and major landslides. The list of PAPs is clearly much longer than what is calculated at the planning stage which only looks at those whose land is to be directly acquired for various project components. Huge quantity of muck and rock and debris get generated through the process of tunnelling and disposal of such debris is a huge challenge. The indiscriminate dumping of such massive quantities of excavated muck in steep Himalayan valleys with little available flat land has been another cause of serious impacts and environmental violations in projects.

In another type of RoR project there is a dam-toe⁶ powerhouse located in the downstream of the dam. Examples of such a project are the 2,700 MW Lower Siang, the 1,750 MW Demwe Lower (Lohit), and the 2,000 MW Lower Subansiri located in the Arunachal foothills just before these rivers enter the plains. The popular discourse on dams and development neglect the enormous impact that these mega RoR projects will result in. The 2,700 MW Lower Siang project will submerge a 77.5 km length of the Siang river (total 100 km length of various rivers to be submerged in this project). There will be daily drastic fluctuations in winter due to power generation patterns. Dam proponents argue that these projects are benign since the total flow in the river downstream over any 10-day period in the year will be the same as in the pre dam condition. But they fail to acknowledge that the massively altered daily flow patterns will have serious social and environmental impacts in the Brahmaputra floodplains.

There has been a misleading campaign run by certain sections that RoR projects being built in states, such as Arunachal Pradesh do not even include construction of dams. It needs to be clarified that the dams that are being built are not just dams but big dams as defined by India's Central Water Commission, the International Commission on Large Dams (ICOLD), and the World Commission on Dams. No matter what the nature of the project is, dams fragment rivers, breaking the organic linkages between the upstream and downstream, between the river and its floodplain. The Ministry of Environment and

Forests in the recent times have started discussing environmental flows⁴ but it will be wrong to regard it as a panacea to make every project benign⁵, it being a contested and debatable concept which needs more widespread debate considering the local context.

5.5.5 Cumulative Impact of Dams

With the commissioning of multiple hydro electric projects the issue of the carrying capacity of the rivers have become a crucial issue whether they are installed in the upstreams of Sikkim or the floodplains of Brahmaputra. Currently the environmental governance do not provide for a comprehensive cumulative impact assessment of dams .The National Environmental Appellate Authority (NEAA), which has been dissolved with the coming up of the National Green Tribunal (NGT) observed that it feels the need for advance cumulative study of series of different dams coming on any river so as to assess the optimum capacity of any river giving due consideration to the human beings, wildlife and ecology dependent on it.

The MoEF has been repeatedly seen violating this order. In case of Teesta in Sikkim in the past and more recently for the Bichom, Lohit, Siang, and Subansiri in Arunachal Pradesh the assessment has not been done in advance. The studies have been specifically delinked from clearances to be granted to individual projects. Therefore, project clearances and assessment are commercial and seem like a cosmetic exercise without any cumulative studies on the dams.

There may be different studies focussing on different aspects when it comes to dam construction. A cumulative impact assessment studies hydropower, keeping it as key focus while carrying capacity study or river basin planning will look at the river basin as a whole with different competing land use/water use priorities and development options, of which hydropower projects is one.

River basin studies must be carried out in advance. The current practice of delinking individual clearances from cumulative impact assessment is untenable. The focus of such studies should be determined after consultations in the concerned river basin. Studies should be carried out independently and not by private entities or developers in each river basin. Rivers should be allowed to flow freely without disrupting natural ecology and riverine production systems (e.g. fisheries) on which local communities depend. Such rivers (or sections of rivers), identified and prioritised with the consent of

local communities, should be no-go' areas for hydropower projects i.e. areas where hydropower projects cannot be built.

5.5.6 Environmental Risk

Environmental risks have aggravated due to the presence of large dams in North-East India. In the Environment Impact Assessment framework the environment impact assessment is the weakest link now.. Currently, the only dam-break analysis' is focussed as a study which predicts the effects of flooding downstream, in case the dam actually breaks.

The Expert Committee studying the downstream impacts of the Lower Subansiri hydroelectric projects has highlighted risks of constructing large dams in a geologically and seismologically sensitive area. The Comptroller and Auditor General of India has expressed in the context of projects by NHPC and NEEPCO in the North eastern and Eastern region, expressed concern about the time and money being spent on geological survey and investigations being lower than global standards. This is closely connected with a poor understanding of geological surprises', a major environmental risk during construction of hydroelectric projects, particularly in the Himalayan region. A point to be understood here is that the CAG has expressed concern related to NHPC which is a public sector enterprise and has experience of building hydroelectric projects in the country. The situation is likely to be grimmer with the private players, with little or no prior experience of building large hydropower projects.

For example in earthquakes the focus is only on whether the dam will withstand the earthquake. The issue of whether the water reservoir itself can induce seismic activity is seldom discussed in the popular discourse on dams. Risks as far as dams are concerned are not limited to these two issues. Earthquakes can overall impact the river systems, which can increase risks to and from existing large dams. Even if a particular dam may survives a major earthquake, but even assuming that the actual structure is able to withstand a powerful tremor, quake-induced changes in the river system may have a serious impact on the viability of the project itself, as several basic parameters vis-à-vis the regime of rivers, and the morphology and behaviour of channels, may change. The two major earthquakes in the region in the year 1897 and 1950 caused landslides on the hill slopes and led to the blockage of river courses, flash floods due to sudden bursting of these temporary dams, raising of riverbeds due to heavy siltation, fissuring and sand

venting, subsidence or elevation of existing river and lake bottoms and margins, and the creation of new water bodies and waterfalls due to faulting.

The available scientific data clearly indicates and reflects that the neotectonism of the Brahmaputra valley and its surrounding highlands in the eastern Himalayas has drastic effects on the flooding, sediment transport and depositional characteristics of the river and its tributaries. This in turn has a bearing on the long-term viability of dams. In 1950, the earthquake raised the bed level of the Brahmaputra at Dibrugarh by at least three metres (10 feet). If earthquakes hit during the high flow period than it could cause sedimentation equivalent to several decades of normal sedimentation. This could certainly render many of the proposed dams economically unviable as dam life is intricately connected with rates of sedimentation.

With respect to the Dibang Multipurpose project, another important environmental risk was discussed for the first time on River Valley and Hydroelectric projects in July 2009. After critically examining all the issues it was noted that the Dibang high dam is located in high seismic zone V and the area receives very high rainfall during monsoon. The dam impounds huge reservoir stretch (43.0 km). If a situation arises of high rainfall together with a major earthquake the steep slopes charged with rain water and triggered with earthquake are very vulnerable and may lead to large scale landslide.

This will result in detrimental effect in areas, downstream even if the dam stands intact. In October 1963, the Vaiont dam in Italy, one of the world's tallest, set off earthquakes as soon as its reservoir began to fill. Levelling the town of Longarone and killing almost all of its 2,000 inhabitants. However, except for the one discussion the EAC has been silent on the need for such risk assessment studies while evaluating umpteen projects in the North eastern region for environment-related clearances.

5.5.7 Dams and Climate Change

There are scientific evidences that show that the Himalayan region is being impacted by climate change.²⁵⁵ The debate has been growing, with serious ramifications for Himalayan river basins and the Indian subcontinent.²⁵⁶ Hydrological characteristics such as discharge pattern, sediment load, snow melt run off and intensity and frequency

²⁵⁵ Partha J.Das , *The Hydropower Climate Change Nexus: Myth ,Science and Risk for North East India*,(Feb 24,2020,10 PM)chimalaya.files.wordpress.com

²⁵⁶ *Ibid.*

of flooding in Himalayan Rivers are changing due to climate change.²⁵⁷ The Brahmaputra river basin is particularly sensitive to climate change impacts. Climate change has the potential to alter volume of water, sediment and biogeochemical processes.²⁵⁸ Promoters of hydropower development in developing countries argue that energy from hydropower is –clean because, unlike thermal energy, its production does not generate green house gases (GHG). Therefore it is suggested that by investing in hydro power, developing countries like China and India that emit large amounts of GHGs can reduce or slow the growth of their carbon emissions and contribute to mitigating climate change. However recent studies have questioned this assumption, since dams are designed around known characteristics of rivers and local geology.²⁵⁹ It implies that changes in the hydrological regime triggered by climate change will affect the existence, operation and management of these projects considerably.²⁶⁰ However this aspect is usually ignored by the executing agencies and project developers and it as such makes it difficult for disaster management as well as communities to anticipate and prepare for possible hazards like flash floods. Inadequate knowledge base on hydrology, climate, ecology and geology of the Himalayan region is inadequate to support large scale interventions on the Himalayan Rivers. Climate change adds an additional layer of uncertainty to this evolving knowledge base. Therefore it can be argued that the present development paradigm that envisages a massive expansion in large dams in the northeast is full of risk and uncertainty. In the sections ahead the researcher discusses how the myth of green hydropower is being disproved and a body of evidence is being built up to counter the prevailing view. The implications of climate change for hydropower projects and consequences for people with respect to the North-eastern region, the Brahmaputra river basin in particular are also attempted to be discussed.

There are scientific evidences that greenhouse gas emissions (like methane, carbon dioxide and nitrous oxide) from the reservoirs of hydroelectric projects has been emerging since the 1990s.²⁶¹ However, for the first time, it was the WCD that strongly questioned the climate benign nature of hydropower. Evidences show that by the year 2000 that globally 70 million tonnes of methane and a billion tonnes of carbon dioxide

²⁵⁷ Partha J.Das, *Water and Climate Induced Vulnerability in North East India: Concerns for Environmental Security and Sustainability*,(Feb 24 ,2020,10 PM),www.indiaenvironmentportal.org.in.

²⁵⁸ *Ibid*.

²⁵⁹ Jatin Bharwani, *Dams in North East India Threaten Ecosystems*,(Dec 24,2019,10 PM),www.indians4sc.org.

²⁶⁰ *Ibid* .

²⁶¹ *Ibid* .

were emitted annually from reservoir surfaces. A recent study by Brazil's National Institute for Space Research estimates that the large dams of the world emit 104 million tonnes of methane annually from reservoir surfaces, turbines, spillways and downstream river courses. The main reason for production of greenhouse gases like methane and carbon dioxide in reservoirs is due to rotting organic matter (vegetation) and carbon inflows from the catchment. About four percent of total warming impact of human activities is contributed by large dams. They actually could be the single largest source of anthropogenic methane emissions, accounting for about a quarter of the total methane emissions from the earth's surface.

Shallow reservoirs where the natural carbon cycle is most productive are the highest emitters of methane while deep water reservoirs exhibit lower emissions. Dams in Brazil and India are responsible for a fifth of these countries' total global warming impact, although these sources of emissions are not considered in the national greenhouse inventories. As per the Inter Governmental Panel on Climate Change (IPCC) these revelations have challenged the conventional notion that hydropower produces only positive atmospheric effects (e.g., reductions in emissions of carbon dioxide and nitrous oxides), when compared with conventional power generation sources. Therefore, taking cognizance of the GHG emissions from hydropower projects, the executive board of the United Nations Framework Convention for Climate Change (UNFCCC) has excluded large hydro projects with significant water storage from its Clean Development Mechanism (CDM) programme. Arguably, hydroelectric projects with big storage dams are not considered as climate-friendly. They are therefore not accepted as desired alternatives for climate change mitigation or adaptation.

A recent study by Swiss scientists reveals that large amounts of the greenhouse gas methane are released from RoR reservoirs during high temperature in summer. This revelation disputes the conventional wisdom that RoR projects with smaller reservoirs, particularly in temperate regions, are a climate-neutral way of generating electricity. The project proponents have been rhetorically promoting hydropower as clean and benign energy to outweigh its other known detrimental impacts. It is important to analyse the facts emerging from recent scientific research to counter this misinformation.

Climate change will cause alterations in local and regional weather and climate patterns. Thus the dam operations will be substantially jeopardised and trigger more complex and intensive impacts downstream. It can be predicted that the Himalayan river basins like that of the Brahmaputra river may experience increased summer flows and more flooding for a few decades initially, due to rapid melting of Himalayan and Trans-Himalayan snow and glaciers. Again in the long run however, due to progressive reduction of flow, they will face scarcity of water. In fact, the Upper Brahmaputra river basin has already lost roughly 20% of its water reserves bound in glaciers during the thirty years between 1970 and 2000, which is equivalent to the loss of 175 cubic km of glacier mass in that period and about 7 cubic km of glacial mass loss per year¹¹.

Dry season run off in the short term due to melting of glaciers leads to a decline of dry season river run-off from glaciers in the long term could, turn perennial rivers like the Brahmaputra into seasonal river systems. It can be projected that there will be an initial increase in flow in the Brahmaputra basin due to accelerated glacial melt till about the fourth decade of this century and increase in mean rainfall over the upstream of Brahmaputra basin by about 25 per cent, the overall summer and late spring discharges are eventually expected to be reduced consistently and considerably, at least by 19.6% on an average during the years 2046 to 2065²⁶².

The EIA reports were being prepared have not incorporated any considerations for possible impacts of climate change on the rivers and dams which are now in the different stages of their operation. There is a lack of a reliable description on ,the meteorological and hydrological time series data of rainfall, extreme rainfall, water level and discharge used to design dams. In the changing climate scenario these trends become more uncertain that results in large fluctuations in the normal inflows to the dams. Such a situation usually disrupts normal operations of the dams affecting power generation. IPCC predicts that extreme rainfall i.e. episodes of very high and/or very low rainfall are likely to increase in the Asian region in the coming decades.²⁶³ Dams in such a situation will either underperform due to lack of adequate flow or will exacerbate flooding hazards triggered by excess flow. Therefore, to adapt climatically, such dams would need to be redesigned with inputs from high resolution regional climate models to generate reliable future climate scenarios for specific geographical areas of concern.

²⁶² *Supra note 210*

²⁶³ *Ibid*

This is not easy as of now, given the difficulty in developing reliable climate simulations at small spatial scales

Climate change will lead to water stress which will be felt more in winter. It will be aggravated in weak monsoon years, which consequently will affect agriculture, the principal livelihood of the people, and the overall economy of states like Assam, West Bengal, Sikkim and Arunachal Pradesh, the main Brahmaputra basin states in India.

Changing temperatures and evaporation rates can cause the soil moisture conditions to alter and the amount of run-off from the catchments into reservoirs.²⁶⁴ In such a scenario, it will become increasingly uncertain whether the required inflow of some rivers could be sustained to produce power efficiently, especially in the lean season in the future. This naturally goes against the wisdom of his also brings into question the wisdom of investing thousands of crores of money in hydropower ventures, which is laden with so much uncertainty over the hydrological changes in the rivers in the region under a changing climate. A recent study of hydro-electric power generation conducted in the Zambezi Basin in Africa, taken in conjunction with projections of future run-off, indicates that hydropower generation would be negatively affected by climate change.

Promoters of large dams say that large storage dams should be if precipitation and river flows are likely to become uncertain and vary widely due to climate change. There is a faulty logic behind this argument. That is that more storage is necessary to hold additional water volume if river flow increases and also to hold the occasional peak flows, which can then be used to augment winter flow from the reservoirs. If one has to consider the technical limitations and the very high financial stakes involved with building large storage dams in the Greater Himalayan region, then this argument appears to be faulty. Operation of dams will be difficult in light of the erratic increase in river flows and put the dams at high risk of flash floods due to Glacial Lake Outburst Flooding (GLOFs) and cloud bursts.²⁶⁵ On the other hand, big storage dams also become economically unviable if constructed only to store occasional high flows when average river run-off reduces because of retreat of glaciers and uncertain precipitation.²⁶⁶ In the hydropower governance adopting standards for evaluating the sustainability of hydropower projects under different climate change scenarios is

²⁶⁴ *Ibid.*

²⁶⁵ *Ibid.*

²⁶⁶ *Ibid.*

becoming an important aspect and this must be applied strictly to hydropower projects in the Himalayan region.

Dams often trigger flash floods in downstream areas. Erratic rainfall and run off in rivers will lead to such dam-induced flash floods in the North Eastern region. Most of the hydropower plants in the region are run of-the-river projects²⁶⁷, having little or no capacity to hold excess flows, therefore heavy rainfall in the upstream areas creates a situation where it is a normal practice to release the excess water to ensure the safety of the dam, thus resulting in flash floods downstream.

Dam authorities argue that only water coming and that does not add to the flood. But the reality is that the manner in which the dam is operated and the pattern of water release can accentuate the impacts of flood in the downstream even if total volumes of flood waters may not vary significantly from a no-dam situation in a particular case. The Himalayas has witnessed increase in intense rainfall events and high rate of soil erosion and landslides. River channels in steep Himalayan valleys are often blocked by sliding land, rock, mud and snow masses. When these naturally dammed rivers are eventually breached under the growing pressure of water accumulating behind the newly-formed dam, it leads to an avalanche of water gushing down the hills and creating havoc as flash floods in downstream areas. Landslide dam outburst floods (LDOF), as this type of flooding is called, have been responsible for several large floods affecting northeast India.

On June 10,2000 the Yigong flash floods²⁶⁷ triggered by the collapse of a land slide induced dam on the Yigongzangbu river - a large tributary of the Yarlung Zangbo (Tsangpo) is an apt example of this. This calamity, caused havoc in the river Siang in the bordering areas of Arunachal and China with estimated property losses of not less than a billion rupees, 30 deaths, more than 100 people missing, and more than 50,000 rendered homeless in five districts of Arunachal Pradesh.²⁶⁷

If man-made dam is located on the river further downstream of such a bursting natural dam, the severity of damage could be many times higher. In the event of a dam break or the release of excess water from the dam (a standard practice when the storage capacity is exceeded due to excessive inflows) it may lead to an unimaginable catastrophe. This will be common for both storage and run-of-the-river projects.

²⁶⁷ *Ibid.*

In 2004 massive floods hit western Assam that were caused by water released from the Kurichhu Hydropower Plant (60 MW) in Bhutan on the Kurichhu river. This was caused by the bursting of a landslide dam formed on September 10, 2003, on the Tsatsichhu river, a north–easterly flowing tributary of the Kurichhu River (itself a tributary of the Manas river that flows through western Assam). The dam failed on July 10, 2004. As a result it released a flood wave that had a peak discharge of 5900 cubic meter per second at the Kurichhu Hydropower Plant 35 km downstream.²⁶⁸ The flood waters were allowed to pass through the spillways of the dam, and flooded the rivers Manas, Beki and Hakuwa that caused devastation in Barpeta district of Assam. Flooding in the years 2007 and 2008 in western Assam is also attributed to releases from the Kurichhu dam. Many of the rapidly retreating glaciers in the Himalayas have shrinking snouts, that leave glacial lakes behind, allowing water to accumulate rapidly as snow and ice melts faster. Sudden discharge of large volumes of water and debris from these lakes causes glacial lake outburst floods (GLOFs) in valleys downstream.

There are many glacial lakes in the Brahmaputra basin in Tibet and some of these have the potential to cause GLOFs and create flood havoc in downstream areas in Arunachal Pradesh and Assam. Some potentially dangerous lakes are found in the Himalayan tributaries of the Brahmaputra such as the Manas, the Sankosh originating in Bhutan and the Teesta passing through Sikkim. They can cause flood disaster in Assam, in the northern part of West Bengal, and in Sikkim respectively.

Almost all the large dams are being implemented or planned on all these GLOF prone rivers by Government of India. The Mangdechhu hydroelectric Project (720 MW) proposed to be constructed with help from India on the Mangdechhu, a tributary of the Manas river, is prone to be affected by GLOFs since the headstream region of the river adjoins expanding glacial lakes. The three hydro projects planned on the Sankosh river (Punatsangchhu in Bhutan), viz. the Punatsangchhu hydroelectric Project Stage-I (1200 MW) and Stage II (990 MW), and the Sankosh Multipurpose Storage Project (4060 MW), may be a cause of aggravated flood hazards in future (both in Bhutan and Assam), as the upper reaches of one of its tributaries, the Pho Chhu in Northeast Bhutan, is severely GLOF- affected.

²⁶⁸ Himanshu Thakkar, *Dams and Floods* as cited in Partha J. Das, *The Hydropower Climate Change Nexus: Myth, Science and Risk for North East India*, (Feb 24, 2020, 10 PM) chimalaya.files.wordpress.com.

5.5.8 Dams and Floods

Dam proponents have been carefully building a perception that dams control or moderate floods. Despite this seemingly optimistic picture if actual experience with dams is objectively assessed, then there may be a different scene.²⁶⁹ Dam-induced floods in downstream areas due to hydropower projects like Ranganadi, Umtru, Karbi-Langpi, Kopili, and Kurichu are a cause of concern in Assam. While the technocracy keeps disputing the on-ground experience of people, it is in order to recount some of the instances of dam-induced floods across the country.

It was in August 2006, that the Surat city on Tapi River in South Gujarat experienced the worst floods in its history. This was due to a sudden release of 7 to 10 lakh cumecs (cubic feet per second) of water from the upstream Ukai dam. This calamity killed at least 150 people and 80% of the city was submerged under water. It rendered over 20 lakh people helpless as they were trapped inside the flooded city without drinking water, milk, electricity or communication for four days and nights.

The dam operating rules pertaining to the downstream river channel and the timing of the high tides were not adhered to. The Ukai Dam story was repeated in many river basins across India in 2006, including the Mahi, Sabarmati, Chambal, Narmada, Krishna, Godavari and Mahanadi basins. A sudden high release of water from dams (many of them having high pre-monsoon storages) was the prime reason for flood damages in these basins. Each dam has specific operation rules. Lowering of pre monsoon water storages to reduce downstream flood risk in monsoons is often a mandatory requirement in case of dam building. Faulty operations coupled with mismanagement of dams are also a reason for such failure and calamities. Lack of transparency and accountability in dam operation in the country is an important contributing factor to such disasters.

Similar instances include: Mahanadi floods in Orissa in September 2008 due to faulty operation of the Hirakud dam, floods in the Damodar basin in 2009, floods in Punjab in 1988 (and also in 2010) due to sudden releases from the Bhakra and Pong dams, floods in the Krishna basin in late September-early October in 2009 due to faulty dams, floods in the Bhagirathi and Ganga river basin due to faulty operation of the Tehri Dam in Sept 2010. Despite the fact that total area protected by flood control engineering projects has

²⁶⁹ *Ibid.*

grown, yet results have been disappointing. Often claimed by the government that India's 5,000 plus large dams bring flood control benefits, yet all too often the results have been increased flood damages, usually because of mismanagement.

The National Commission on Floods, set up by the Central Government, noted in 1980: -Most of the reservoirs completed in the country do not have any specific operation schedules for moderation of floods. In the Ganga basin, the Kangsabati dam is supposed to reserve more than a quarter of its reservoir for flood storage, yet the purpose it seeks to serve is not attained.

5.5.9 Dams and Indigenous People

The government and proponents of large dams in the Northeast paint a win-win picture: exploiting the country's largest perennial water system to produce plentiful power for the nation, economic benefits to states through power export to other parts of the country, flood control and small displacement of local communities. The North-eastern region has been identified as India's 'future powerhouse' and 168 large dams of a cumulative capacity of 63,328 MW are planned.

The government sometimes use false information in the construction of dams, for example for the construction of Lower Subansiri (2000Mw) in Arunachal Pradesh the government says that it will effect only 31 families, but according to Walter Fernandes they will be no less than 700 families, also they said that it will cover only 70 Sq Kms upstream, but expert says that it will cover at least 3436 ha of forest land and wildlife habitat area.

Free, Prior Informed Consent (FPIC) of the indigenous groups has not been implemented and even implemented their voices has sometimes not been heard and ignored. There are numerous cases of violation of indigenous people's rights with clear cut violation of their community rights over their land and resources. The UN Declaration on the Rights of Indigenous Peoples (UNDRIP) adopted in 2007 clearly outlined that all indigenous peoples have the right to control, manage and develop their land, territories and resources for their survival and for their ancestors. However, the continued onslaught by dam developers only constitutes a violation of indigenous peoples' right to develop and determine their rights to define their developmental priorities and needs in accordance to their wishes and aspiration to ensure their survival, sustenance of their ecosystem and its wise use.

The violation of the right to free, prior and informed consent (FPIC), again outlined in the UNDRIP is further testified by non provision of project related documents, such as the Detailed Project Report, the Environment Impact Assessment and the Environment Management Plan. Also often, there is absence of environment Impact Assessment Report to determine the nature and extent of the impacts of the projects. In all the projects studied, the project developer has failed to conduct any satisfactory consultation with the people in affected villages and the people been not been informed of the adverse impacts of the project.

Lack of progressive guidelines that guarantee rights, land and resources of the indigenous people results in a threat to their physical and spiritual survival.

5.6 Environmental and Dam Governance in North East India and Role of Judiciary

Since 1980's India has developed a considerable number of environmental policies.²⁷⁰ It was during the 1980s that most of the principles under which environmental law works were developed.²⁷¹ The Indian Judiciary has played a crucial role in the development of the policy principles. Sections 268 to 290 of Indian Penal Code (IPC) deal with public nuisance like pollution of air and water, blasting, excessive smoke, filth and other polluting activities and make them punishable offence. Other policies are Water (Prevention and Control of Pollution) Act 1974, The Environmental Protection Act 1986, Wildlife (Protection) Act 1972, Forest Conservation Act 1980, The Air (Prevention and Control of pollution) Act 1981, The Prevention of Cruelty on Animals Act 1960, National Environmental Policy 2006, and The National Green Tribunal Act 2010.

The Apex Court has enunciated several doctrines and principles to deal with environmental degradation. Few of them are the polluter pays principle, public trust doctrine, sustainable development etc. In the Vellore Citizens Case²⁷² of 1996 the Doctrine of Sustainable Development which resulted from the Stockholm Declaration 1972 has been applied by the Apex Court for the first time. Moreover, in the cases like

²⁷⁰ Dijamani Sharma, et al *Environmental Governance in North East India and the Role of the Judiciary*, 3 *International Journal of Legal Studies and Research*, 176, 181 (2014).

²⁷¹ *Ibid*.

²⁷² Vellore Citizens Welfare Forum v Union of India, AIR 1996 SC2715, Vellore Citizens Welfare Forum filed a Public Interest Litigation under Article 32 of the Constitution of India against large scale pollution caused to the River Palar due to the discharge of untreated effluents by the tanneries in Tamil Nadu.

*A.P. Pollution Control Board v Prof.M.V.Nayudu (Retd.) & Others*²⁷³ on 27 January 1999 and *M.C.Mehta v Kamal Nath and Others*²⁷⁴ 1997 etc the Hon'ble Supreme Court enunciated and applied such principles. Consequently, these principles have also been started following when the lower judiciary delivered judgments or orders.

In North-East India there are competing claims and counter claims over the use and management of natural resources and as such judicial intervention has become important. The judiciary has intervened to see that legislations are in conformity with the provisions of the constitution. It has also taken part in resolving conflicting claims and has ensure that the administrative agencies have complied with laws aimed at the protection and improvement of the environment.

Through the devices of Judicial Review and Public Interest Litigation(PIL), judiciary has become an important actor in environmental jurisprudence of India. The Supreme Court of India and the Gauhati High Court have played a very significant role. At present the National Green Tribunal has started functioning and various environment cases related to Northeast India have also been disposed of and the several are still pending.

In the year 1996 the famous Godavarman Case²⁷⁵ was filed as a writ petition in the Supreme Court of India to protect the Nilgiris forest. This forest was on the verge of extinction due to continuous deforestation by illegal timber operations. The Forest (Conservation) Act 1980 was reinterpreted and scope of the term -forest|| was expanded and suspended tree felling across the country. This case is a part of what is termed as -continuous mandamus||. Under such a scheme, the courts do not pass final judgements but keep on passing orders and directions with a view to monitor the functioning of the executive. The National Level Committee on Forestry popularly known as the Central Empowered Committee (CEC) which has been created under the Environment Protection Act due to this case.

The order in the Godavarman case had far reaching consequences on forest governance in the North-eastern region of India because the court in an order banned movement of cut trees from the states of Northeast India to other states of the country. However, in an

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²⁷⁴ (1997)1 SCC 388. Span Motels was ordered to pay compensation to restore the environment ,and the various constructions on the bank of the River Beas.

²⁷⁵ T.N Godavarman Thirumalpad v Union of Others,(1997)2 SCC 267.

order dated 23.04.2001 the Supreme Court modified its earlier stand and stated that the movement of sawn and unsawn timber from the North-Eastern States shall be permitted on an application made by the registered timber transporter to the District Forest Officer or any other registered forest officer. If any illegal timber is found to be transported and concerned forest official under whose supervision and control the seal has been affixed on the railway wagon, would be prosecuted. In the event the seals are tampered with, the railways can also be held culpable.

The Supreme Court further ordered that if the High Powered Committee cleared wood based units situated inside approved industrial states only then such movement of sawn and unsawn timber shall be permitted. This is not applicable in respect of Mizoram where no industrial estates exist. Thus, the Godavarman case illustrates that Supreme Court of India interfered with the forest policy of North eastern states and brought about a great deal of changes in the forest governance.

In the case of *M. C Mehta V/s Union of India* (1996) case, the Supreme Court interpreted Articles 21²⁷⁶, 47²⁷⁷, 48A²⁷⁸ and 51A (g)²⁷⁹ of the Constitution of India and gave a clear mandate to the state to protect and improve the environment including forests, lakes, rivers and wildlife and to have compassion for living creatures. The "precautionary principle" enunciated by the Supreme Court makes it mandatory for the State Government to anticipate, prevent and attack the causes of environment degradation. In the case of *Dr. Janardhan Bezbarua and ANR Vs. Oil India Ltd* (2006),¹⁵ Gauhati High Court held that the seismic survey in the bank of Brahmaputra River will destroy or harm the riverine ecosystem which in turn may harm the various species in the river. Hence, Court ordered Oil India Ltd. not to undertake the seismic survey in Brahmaputra River. Again, in *Sri Sunil Kumar Gupta Vs Rohit Chaudhury, Union of India and Ors* (2013) ¹⁶ the National Green Tribunal of India ordered the Authorities to take positive steps to ensure that no polluting industry should be permitted to operate within the 'No Development Zone' in Kaziranga National Park,

²⁷⁶ Right to Life.

²⁷⁷ The state is directed to raise the level of nutrition and the standard of living and to improve public health as among its primary duties and in particular the State shall endeavour to bring about prohibition of intoxicating drinks and drug which are injurious to health.

²⁷⁸ The state shall endeavour to protect and improve the environment and to safeguard the forests and wild life of the country.

²⁷⁹ It says that it shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes and rivers and wildlife and to have compassion to all living creatures.

Assam. The aforementioned cases illustrate the vital role played by the judiciary in safeguarding the environment in north-east India.

A scientific study that conducted in June 2010 found that dams have affected an estimated 472 million people and some of the world's most productive ecosystems. People have been protesting against the plan to install mega dams in the region. The dams such as Subansiri, Tipaimukh and Pagladia are being questioned by the ordinary citizens. The issue of ecological sustainability has been on the agenda of the protestors apart from concerns on population displacement, resettlement and rehabilitation issues. The *Krishak Mukti Sangram Samiti* (KMSS), a Pressure Group has been pressing on ecological sustainability and downstream impact; while the government is advocating development issues.

Again, experts reports reveal that there Mega Dam could be hazardous. The voice of KMSS and the All Assam Students Union were seldom heard by the government. Although given a green light by the NGT, it must be reiterated that the work of the Lower Subansiri Hydro Electric Power Project (LSHEP) had stopped since December, 2011 after agitation against the construction of big dam by several organizations including *Krishak Mukti Sangram Samiti* (KMSS), All Assam Students Union (AASU), *Asom Jatiyatabadi Yuba Chatra Parishad* (AJYCP). In this case the judgement of the Gauhati High Court was issued in response to a Public Interest Litigation (PIL) (No-83 of 2009)⁴⁵ filed by the voluntary organization Appropriate Technology Mission, Assam (ATMA). According to the said judgment, the Assam Government is the appropriate authority to take up the issue of the apprehensions expressed by the downstream people or for that matter any organization, on the possible devastating impacts of the LSHEP with the other authorities. However, the judgement remained in abeyance for a period of over one year.

5.7 Conclusion

This part of the research primarily focused on social and environmental issues viewed through the perspective of environmental lens. But there are larger issues related to the political economy of development in general.

States like Arunachal Pradesh and Sikkim have been signing many MoUs with the central government and also with private project developers at a very rapid pace. Premiums have been taken from developers even before environmental clearances

have taken place thus making the entire environmental governance meaningless. Arunachal Pradesh has been opposing to specific hydropower projects in certain river valleys; an important debate in the state is also on the manner in which a large number of projects are going to be simultaneously taken up and their cumulative impacts. Therefore, from a policy perspective and in order to protect the larger ecological and social ethos of the region the appropriate question would be to ask at what scale and in what manner can hydropower be harnessed so that the ecological, social, and political context of the region is considered and protected.

Solutions need to be found beyond existing technocratic institutions in the water and power sector to find the answer to this question and the people who actually inhabit these river valleys should be at the centre to be at the steering wheel of the process to participate in the governance and developmental process to find the answer.

Wisdom beyond technicalities is the need of the hour to revamp the technocratic institutions in the water and power sector like the Central Water Commission and the Central Electricity Authority. This will have a long term effect in the environmental governance process. In the current hierarchy of decision-making, environmental and social aspects of water (and the accompanying environmental governance framework) are both subservient to the technical or the economic issues.

A strengthened institutional framework for environmental and social governance can help manage the situation at the present stage coupled with a level-playing field with technocratic institutions which decide on techno-economic feasibility of projects. This also means a more upstream involvement in the planning of river basins.

In the current framework for environmental governance, the political economy of hydropower development needs to be taken into account. Therefore only depending on the clearance as certificates of the viability of these projects may pose serious risks to investments in the long term. This is evident from major protests in the region against projects which have already got a green signal. The conventional wisdom of regarding every project being a *fait accompli* needs to be abandoned. In the long term, space for informed consent from the part of the affected people including the option of saying no to certain projects based on thorough scrutiny, will be beneficial for all concerned.

CHAPTER SUMMARY

- The chapter has an introduction that introduces the theme under survey.
- It discusses the political economy of the development debate in India.
- The nexus between environment and development in the context of India has been analysed in the chapter.
- It discusses the ingredients of good development.
- The policy responses to environment and development have been discussed.
- The impact of construction of big dams in North- East India has been discussed from environmental perspective and it forms the core of this chapter.
- Environmental Governance and the role of the Judiciary of India in the North-East has been analysed.

CHAPTER VI

**DEVELOPMENT INDUCED DISPLACEMENT AND
THE HUMAN RIGHT TO REHABILITATION AND
RESETTLEMENT: THE STATE'S RESPONSE**

SYNOPSIS

- **INTRODUCTION**
- **MEANING OF DEVELOPMENT INDUCED DISPLACEMENT**
- **TRIBAL LAND ACQUISITION WAYS IN NORTH EAST INDIA**
- **LAND ACQUISITION AND DEVELOPMENT IN INDIA**
- **INTERNATIONAL LEGAL FRAMEWORK FOR LAND ACQUISITION AND DISPLACEMENT**
- **FORMER LAND ACQUISITION LAWS**
- **THE RIGHT TO FAIR COMPENSATION AND TRANSPARENCY IN LAND ACQUISITION, REHABILITATION AND RESETTLEMENT ACT, 2013**
- **IMPACT OF LARR ACT, 2013 ON DIFFERENT PROJECTS**
- **ISSUES OF DIAPLACEMENT ,COMPENSATION REHABILITATION AND RESETTLEMENT**
- **SHORT COMINGS IN REHABILITATION AND RESETTLEMENT POLICIES**
- **REHABILITATION AND RESETTLEMENT SCHEME UNDER THE NEW LAND ACT ,2013**
- **RESETTLEMENT FRAMEWORK IN NORTH EAST INDIA**
- **STAND OF NORTH EAST ON THE NEW LAND ACT ,2013**
- **CONCLUSION**
- **CHAPTER SUMMARY**

6.1 Introduction

Right to development is a fundamental human right.²⁸⁰ Among the many ways of developing a nation, developmental projects in different fields are also vital for the progress of the nation. But the environmental and the social impact on the common people of such developmental projects must also be weighed against.²⁸¹ Development induced displacement is the most significant impact on the population whose land is acquired for the projects.²⁸² The people are forced to uproot from their present habitat and have to start their life elsewhere. Developmental projects ranging from dams and roads to mining projects forcibly displace millions of people each year.²⁸³ While such projects can bring enormous benefits to society, they also impose costs, which are often borne by its poorest and most marginalized members. The agony of those displaced by developmental projects can be very severe and has several dimensions to it. E.g., the displaced people suffer from financial and social insecurity because of their shifting to new set up and face many problems in adjusting to the new environment. More importantly, they have deep emotional attachment to their ancestral land, tradition, culture and way of life and hence the displacement also affects them mentally and psychologically. Development-induced displacement has become a common feature in all countries particularly developing countries.

In the recent years development induced displacement and rehabilitation has become a controversial issue. One school of thought is of the opinion that displacement is inevitable although painful.²⁸⁴ While the other school of thought opines that the effect of displacement could be compensated only by adequate rehabilitation process.²⁸⁵ Whatever be the narrative the reality is that development has not benefited everyone equally. Development projects have affected the lives, health, and livelihood across the world which is a challenge for the entire international community.

Construction of dams, irrigation schemes, urban development, mining etc impact negatively on people who are forced to relocate to other places to facilitate the pursuit

²⁸⁰ Available at <https://www.ohchr.org/en/professionalinterest/pages/righttodevelopment.aspx#:~:text=The%20right%20to%20development> (Dec 9, 2020, 1 PM).

²⁸¹ Development induced displacement in the north-east India and the R & R policy, (Dec 9, 2020, 1 PM), <http://www.mcrg.ac.in/Sayantini.pdf>.

²⁸² *Ibid*.

²⁸³ *Ibid*

²⁸⁴ Balaji Naika, *Land Acquisition And Development Induced Displacement: India And International Legal Framework*, *ILI Law Review*, 65, 66 (2016).

²⁸⁵ *Ibid*.

of such projects. The cumulative impact of such projects includes interference on the social and cultural life of dates back to the year of independence in order to achieve socio-economic progress and rebuild the war torn nation, devastated after the aftermath of partition. India has invested in numerous industrial projects, dams, roads, mines, power plants and new cities. These projects have been made possible through large scale acquisition of land. As a result around 50 million people have been displaced due to development projects in over 50 years. The rehabilitation of these displaced people is one of the most complex and sensitive issue and needs to be viewed from socioeconomic as well as human rights perspectives

6.2 Meaning of Development Induced Displacement

When people are forced to abandon their habitat and relocate to other places due to development then it is called Development-induced displacement (hereinafter DID).²⁸⁶ Development-induced displacement can be defined as the forcing of communities and individuals out of their homes and homelands for the purposes of economic development. The core ingredient of such a displacement is coercion or force of any nature on the part of the state. At the international life, it is viewed as a violation of human rights.²⁸⁷ It is a subset of forced migration. Throughout history displacement has occurred and it has been associated with projects like dams, road, mining and industries. Other factors that may result in DID are military installations, airports, weapon testing grounds, railways and road developments, urbanization, conservation projects, forestry, etc.

DID may be divided into two—direct and indirect. When at the initiation and construction of the development project say for example due to dam construction or mining, people have to move out from the land they inhabited for generations, it results in direct displacement. Developmental projects affect people indirectly too. It not only affects people directly but also impacts the surroundings and the environment and circumstances on which a person lives and grows. The functioning of the development projects consumes the natural and environmental resources in the surrounding and deprives their traditional means of livelihood. It is to be noted that these types of

²⁸⁶ Jay Drydyk, *Unequal Benefits: The Ethics of Development-Induced Displacement*, 8 GJIF. 105 (2007)

²⁸⁷ Dhru, A. Kelly, *Acquisition of Land for Development Projects in India: The Road Ahead*”, *Research Foundation for Governance: in India*, (Nov 30 2019 10 PM) www.rfgindia.org.

displacements affects mostly indigenous people who depend on their natural surrounding for their livelihood.²⁸⁸

Yet another way in which DID can be classified are physical, economic, or both depending on the impacts of such displacement on people. The direct and actual uprooting of people and communities from their habitat and their transfer to another is called physical displacement, and when people lose their vital natural resources that they need to sustain their livelihoods such as forests, grazing lands, and fresh water, it is termed as economic displacement. The factors that lead to DID may include water supply (dams, reservoirs, irrigation), urban infrastructure, transportation (roads, highways, canals), energy (mining, power plants, oil exploration and extraction, pipelines), agricultural expansion, parks and forest reserves, and population redistribution schemes

According to the World Bank from the year 1990, approximately 10 million people have been displaced by developmental projects world .Displacement can take place within the city, district or from one village to another village. It can also occur across long distances from one cultural setting to another one. Globalisation has intensified the nature of displacement in the recent years. In India there is a lack of reliable data regarding the number of development induced displacees but based on the data regarding dams built in the country the figure may go upto 21 to 33 million.²⁸⁹Eight percent of India's total population comprises of the indigenous people or the Scheduled tribes. Over 50 percent of this population has been displaced by the developmental projects out of which 75 percent of those displaced remain without any proper rehabilitation.

The renowned social scientist of North- East India Walter Fernandez has made an unofficial report on the number of displaced persons from the year 1947 to 2004 and says that around 60 million people have been displaced from developmental sites which account for 25 million hectares of land out of which seven million hectares are forests and six million hectars are common property resources. Countries in South East Asia

²⁸⁸ Nalin Singh Negi & Sujata Ganguly, *Development Projects v. Internally Displaced Populations in India: A Literature Based Appraisal* (Nov 30 2019 10 PM),http://www.uni-bielefeld.de/tdrc/ag_comcad/downloads/working_paper_103_negi_ganguly.pdf.

²⁸⁹*Ibid* .

like India, Pakistan Srilanka have taken to a policy of liberalisation and policies of these nations have not paid a heed to the issue of internally displaced people.

The biggest sources of population displacement across the world are Mega dams. Extensive discourses have been deliberated and research carried out over the last several years to assess the adverse impact of dam people, biodiversity, ecosystem and culture. However the first independent study was conducted by World Commission on Dams (WCD) in 1998.

6.3 Tribal Land Acquisition Ways in North-East India

Individuals in North East India can acquire lands through the following ways:²⁹⁰

- 1) Alienation
- 2) Inheritance
- 3) Sharing Forest Lands

In North- East India there are two modes of cultivation –shifting and sedentary. And land rights differ according to these modes of cultivation. Most of the tribal people engage in shifting or what is locally known as the *jhoom* cultivation. The *jhoom* cultivators have only temporary right to use and occupation over land. People engaged in permanent cultivation have permanent rights and have a higher right of transfer. North Eastern communities have their own system of land management and the land revenue system in the region can be classified into:²⁹¹

- 1) Community forest land,
- 2) State forest,
- 3) Protected forest land,
- 4) Unclassified forests or *jhoom* land under habitation,
- 5) Family
- 6) Individual land.

²⁹⁰*The Changing Face of Land Ownership in North East India*(Dec 9,2020,2PM)
<https://www.99acres.com/articles/the-changing-face-of-land-ownership-in-north-east-india.html>. ²⁹¹
Ibid .

The community land is protected and managed by the community. Communities have their own ways of maintaining and protecting their community forests. The Constitution of India has given sizeable amount of autonomy for example to the Bodos based on their culture and distinct way of land use system to govern themselves. Matters of proximate interest to them can be governed by themselves such as marriage, social customs, inheritance of property, village administration, shifting cultivation, forests, land, use of canal or water course for agriculture etc. In 1963 the Constitution recognized the customary laws of Nagaland and in 1986 Mizoram were recognized by the Constitution of India.

Under the modern narrative land is a commodity and it is helpful in commerce and construction but for the tribal people land is their identity, an ecosystem on which they thrive.

6.4 Land Acquisition and Development in India

In the year 1946 the Central Waterways discovered high intensive hydropower potential in the Narmada basin, a river that runs through Madhya Pradesh, Gujarat, Maharashtra and Rajasthan.²⁹² Thus the construction of the *Sardar Sarovar Dam* on River Narmada was conceived in that year.²⁹³ A committee known as the Khosla committee in 1964 recommended that all water of the Narmada Water system should be used to the maximum extent possible. This went in tandem and hand in hand with foreign help to India to address the food shortage that occurred in India during 1960s. Secondly the committee forwarded a –national interestll argument, which was again a reflection of nothing but an elitist stance on the injustice of the colonial regime. The committee failed at arriving at a solution regarding allocation of the river water between the three states and that led to the setting up of the Narmada Water Disputes Tribunal.²⁹⁴ The tribunal did give green light to the construction of the *Sardar Sarovar Dam* on river Narmada, one of the country’s most ambitious river water projects.²⁹⁵ There were no apprehensions about depletion of resources or displacement of people as the river was a virgin river. The politics of the four states got involved only when they learnt that the construction of dam in one of the states could affect the interest of the remaining

²⁹² *A short history of the Sardar Sarovar Dam on river Narmada*, THE INDIAN EXPRESS Sep 17, 2017.

²⁹³ *Ibid.*

²⁹⁴ Aishwarya Iyyer, *Why Is Narmada’s Sardar Sarovar Dam Controversial?*, THE QUINT, Oct 8, 2017.

²⁹⁵ *Ibid.*

states.²⁹⁶ In 1979, the Narmada Water Dispute Tribunal was formed in and it gave assent to the construction of dam on the river. In 1980, with the emergence of human rights and environment protection discourse in the international arena, the dispute extrapolated to a different set of issues. Because of the generation theory of rights, the prominence of non western groups, Neo Liberal era where state driven accumulation of wealth and nation building became all the more rigorous, this time through the *generous* International Monetary Fund and World Bank, it meant more usurpation of land and resources to the detriment of who were perceived to be potential of being sacrificed.

The award of the tribunal was legitimised as per the national interest‘ justification. But it did not end there. The award gave rise to many contemporary debates on dams and development in the country.²⁹⁷ Nevertheless the award within the equitable apportionment principle facilitated such a trade off by the Indian State was not possible during the previous two decades because till 1980s development state in India focussed only on agriculture which had run into controversies as stated in one of the forgoing accounts.

The emergence of nongovernmental organisations as the new actors in the political economy of the country directed the protests against Narmada Dams to a different dimension. The struggle became more prolonged with human rights issues and it became a test case for India whether development would be sustainable and just, thus making them a part of a global movement and an alternative political order and ‘alternative development model’. The rise of human rights and environment protectionism during the 1980s added a new dimension to the Save Narmada Movement and with its focus on basic questions of human rights, environment protection and rehabilitation and resettlement of the project affected people earned it nationwide attention forcing governments to reconsider their development models. In the year 1991 it was recommended, that the dam construction should be considered by World Bank as an independent reviewer. This added an international dimension to the Narmada Controversy. This added to further polarisation of the issue because considering afresh meant missed opportunities in productivity for the ones in favour of dams and unnecessary sufferings for the ones against it. Finally the case went to the Supreme

²⁹⁶ *Ibid* .

²⁹⁷ Tanmayee Sahoo,et al,*Sardar Sarover Dam Controversy:A Case Study*,6 Global Journal of Finance and Management,887,890,(2014).

Court in 1994 as *Narmada Bachao Andolan v Union of India and Others*²⁹⁸ a time when the Apex Court took the lead in protecting the rights of the bonded labourers, tribals, under trials, women etc by allowing the mechanism of Public Interest Litigation from 1970. The context of the movement changed when sustainable development‘ became the slogan internationally and helped moderate the anti and pro dams divide. It shaped much of the human rights thinking during the 1990s and fact that the World Bank in 1997 with the World Conservation Union set up the World Commission on Dams to examine human rights and environment viability of dams testifies the importance of the slogan.

The Supreme Court said that the environmental clearance in the case of the Narmada Dam was a conscious decision‘. It rejected the contention that the dam would result in the violation of Article 21 of the Constitution of India and observed that for the burgeoning population increased water storage, irrigation, hydroelectric power projects were necessary. The apex court extolled the Rehabilitation and Resettlement Policy of the Government and said that it was a well thought mechanism to help the Project Affected People. Arguably the jurisprudence of river water management and the mitigation of the risk associated with it can be said to have started with the onset of the Narmada issue.

The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 has been devised to mitigate the difficulties arising out of developmental projects like dams. It came into force from January 1, 2014. This Act overrides the colonial legislation of Land Acquisition Act 1894. The colonial legislation of 1894 serves as a basis for all land acquisitions in India for public purpose‘. When the first land acquisition law was enacted during the British Raj in 1824, it had defects which are not in order of our discussion, after several modifications it was finally replaced by the Land Acquisition Act 1894 and it was adopted by the Government of India in 1947.²⁹⁹ The researcher is not inclined to associate the year 1894 with any specific world order that holds a prominence in development talk and the adoption of that archive during the independence itself can be equated with the presumption that such a model does not fit into the present times when social movements have shifted to

²⁹⁸ AIR 2011 SC 1989.

²⁹⁹ G.Raghuram, Simi Sunny, *Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Ordinance 2014: A Process Perspective*, Working Paper No.2015.

an entirely different set of goals like revaluing local culture, indigenous knowledge and traditional resources in the wake of neoliberal regime.

The Constitutional³⁰⁰ entry 42 in the Concurrent List flows from this Act. Both the centre and the states can make laws in case of a land acquisition. In case of conflict, the central legislation would prevail. The British legacy of 1894 was amended 17 times after independence in 1947 by various elected governments. The gist of the changes brought by the amendments over the years in this law is : the doctrine of Eminent Domain was limited to acquiring land for public purpose such as roads, railways, canals and social purposes like state run schools and hospitals .The Act permitted state to acquire land for public purpose and also land for a company engaged in works for public purpose.

During the time of independence the development model was based on the development of the heavy industries .Large scale displacement as a result of such industries was considered something obvious and Jawaharlal Nehru asserted that if the ones displaced had to suffer, they had to suffer at the interest of the nation. Since 1947 Land Acquisitions in India was done through the British Era Act. In 1998,the Rural Development Ministry initiated the actual process of amending the act and the Congress Led United Progressive Alliance(UPA) government in its first term amended the Act in 2007.The Bill called for a mandatory Social Impact Assessment study in case of large scale –physical displacement in the process of Land Acquisitions, the government had to pay for loss or damages done to the land and standing crops in the process of acquisition and additionally the costs of resettlement and rehabilitation of affected families. The UPA Government came back with a bigger mandate in 2011 and it sought to reintroduce the bill in 2011 as the Land Acquisition Rehabilitation and Resettlement Bill, 2011 where it was proposed that for a private project, land could be acquired only if 80 percent of the affected families agree to its acquisition and in case of a Public-Private Partnership 70 percent of the affected families had to agree. It was also proposed that the compensation would be four times the market rate in rural areas and two times the market rate in urban areas. Now this bill was passed in August 2013 as –The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation Act 2013 that came into effect on 1 January 2014.With the coming of the Bharatiya Janata Party

³⁰⁰ Constitution of India.

Lead National Democratic Alliance(NDA) government ,it sought to bring reforms in the law that resulted in an amendment ordinance in December 2014.Driven by its industrial development agenda and specially the -Make in India project Five categories of projects were exempted from the Consent Clause and the Social Impact Assessment Clause. The categories of projects are: projects relating to national security, defence production, rural infrastructure including electrification, affordable housing for the poor, industrial corridors and Public Private Partnership. This posits a striking point. The absence of the word 'dam' in the land acquisition acts from 1894 till date makes it untenable that they do fall in the category of 'public purpose' when experiences show that big dams shall cause massive violation of human rights.

In 2007, provisions of Resettlement and Rehabilitation were included in the land acquisition law. One of the loopholes is that the rehabilitation policies do not address second generation problems for example Right to Livelihood. But the reality is that large section of riparian people depends on rivers for livelihood in North East and an embankment breach will violate this as discussed above. Next the policies appear to be insensitive to the gender question in displacement. The definition of Project Affected Families provides it consists of members who are dependent on the man for their livelihood and even the World Bank in its socio economic studies have adhered to such a definition of Project Affected Family. The draft policies of 1985, 1993 and 1994 formulated by the Centre and some of the states were prepared under the pressure of the World Bank. The policies make no attempt to address human rights violations when new settlers move into existing population and give rise to communal violence. A close scrutiny of the major versions of the Land Acquisition law will be done in this part of the project.

As per the theory of cultural difference proposed by Samuel Huntington it may be said that the debates around the theories of development have outran the problems of the developing world. This regime has resulted in flagrant violation of the five goals of development i.e. growth, equity, democracy, order and autonomy. The misconstrued notion of coherence of development changed by 1970s because the conflict theories gained ground and discussed in generalized terms led to the question of what should be prioritised by a state and in attaining those priorities what should be sacrificed. Cultural explanations do not provide universal solution to a problem but tend to provide specific circumstantial explanations about why a nation may succeed and the other may not

because the cultural grouping a nation belongs to is an important factor and a particular model of development may not suit a particular cultural group.

Land and forest in North East India is essentially a community resource embedded in the social life of the community which is a defining characteristic of the indigenous people. Today land relations are defined by factors like immigration and encroachment. The process of turning land into commodity for the colonial purposes began with the Permanent Settlement 1793 and culminated in the Land Acquisition Act 1894

It is pertinent to know what land acquisition for the purpose of this project is. Land acquisition in India may be defined as the government acquiring land from its owner for public purpose or for company. The Act authorizes governments to acquire land for planned development, town or rural planning, provisions for town or rural planning, provision for residential purpose to the poor or landless and for carrying out any education, housing or health scheme of the Government. In India Land Acquisition refers to the central government or state government acquiring land for various infrastructural projects and economic growth. The controversy associated with such acquisition is that the owners from whom land is being acquired are not adequately compensated. Given the various controversies associated with land acquisition the then Congress government was forced to re-examine the existing land acquisition mechanism as given under the Land Acquisition Act 1894. The Land Acquisition Act of 1894 allowed the government to acquire the private land for public purposes, which could be used for large developmental projects like building roads, industries, mining, Public Private Partnership (PPP) projects, etc. but the Congress government in 2013 passed the Right To Fair Compensation and Transparency in Land acquisition, Rehabilitation and Resettlement Act (RFCTLARR) to repeal the 19th century Act. Article 254(2) of the Constitution of India states that the Indian states can legislate on matters listed in the concurrent list even if such legislation is at variance with an Act approved by Parliament and apply it in the state after obtaining presidential assent.

6.5 International Legal Framework for Land Acquisition and Displacement

The Guiding Principles on Internal Displacement make a unique part at the international level available to confirming the human rights of displaced peoples. These principles are made exclusively for addressing the problems of displaced peoples.

6.5.1 Guiding Principles on Internal Displacement

The guiding principles contain preventive guidelines. They are relevant during the time of people remain in displacement. The guiding principles on internal displacement contain thirty such articles. These principles provide for the rights to have adequate housing and land and property in the context of displacement. Guiding principle number five forms the most important corpus of this scheme and it provides for the responsibility of states to avoid displacement. All authorities and international actors shall respect for their obligation under international law including human rights and humanitarian law in all circumstances so as to prevent and avoid condition that leads to displacement of people as per this principle. The principle 6 provides inter alia that –every human being shall have the rights to be protected against being arbitrary displacement. This principles further provides that the prohibition of arbitrary displacement includes displacement in case of large scale development project which are not justified by the compelling and overriding public interest and displacement shall last no longer than the required by the circumstances.³⁰¹ According to principle 7 prior to any decision requiring the displacement of persons, the authorities shall ensure that there should be a proper alternative arrangement explored in order to avoid displacement. As per principle 7(2) if no alternative exist then –the authorities undertaking such displacement shall ensure that the proper accommodation is provided to the displaced persons. In addition, this principles also provides that the authorities also has to consider the safety, nutrition, health and hygiene condition of displaced.³⁰² According to the principles 8 –the state authorities make sure that the any forms of displacement shall not be carried out in a manner that violates the rights to life, dignity, liberty, and security of these affected.³⁰³ Principle 9 provides that –states are under a particular obligation to protect against the displacement of indigenous people, minorities, peasants, posterities and other group with a special dependency on their land.³⁰⁴ Displaced people enjoy –the rights to seek safety in another part of the country and the rights to be protected against forcible return to or resettled in another place where their life, safety, liberty and health would be at risk, which is provided under

³⁰¹ *Guiding Principles on Internal Displacement*, (Dec4,20209PM)<https://www.unhcr.org/protection/idps/43ce1cff2/guiding-principles-internal-displacement.html>.

³⁰² *Ibid.*

³⁰³ *Ibid.*

³⁰⁴ *Ibid.*

principle 15. In addition, to this the competent authorities shall provide displaced persons with and ensure states access to essential food, potable water, basic shelter and housing without any discrimination as per principle number 18.³⁰⁵ Arbitrary deprivation of property and possession of internally displaced persons is prohibited under principle 18 and state authorities should ensure that the property left behind by displaced people should be protected against destruction, illegal appropriation, occupation or use.³⁰⁶ And finally principles 28 provides that the competent authorities have the primary duty and responsibility to establish condition as well as provides the means which allow displaced people to return voluntary with dignity to their home or place of habitual residence or to resettle voluntary in another part of the country such authorities shall endeavour to facilitate the return or reintegration of IDPs.³⁰⁷ The state authorities should take special efforts to ensure the full participation of displaced in the planning and management of their return or resettlement and reintegration which has also been provided under principle 28.

6.5.2 Other relevant legal provisions

Apart from the above provision, international law specifically recognizes the human rights to land of indigenous people in article 17 of the 1989 Indigenous and Tribal People Convention (No 169)⁴⁷ and article 25 and 27 of the UN Declaration on Rights of Indigenous Peoples.³⁰⁸ Despite of all these provisions which are available under the existing international law scholar's views that the international law not yet evolved for legally recognizing the right to land as a human right. In this circumstance, the government can take the lead by incorporating the element of this rights which have already been widely recognized and promoted in their own national law and policies.

6.6 Former Land Acquisition Laws

The principle legislation providing for acquisition of private land by the government for any public purpose was the Land Acquisition Act, 1894.

³⁰⁵ *Ibid.*

³⁰⁶ *Ibid.*

³⁰⁷ *Ibid.*

³⁰⁸ *Ibid.*

6.6.1 Main Features of the Land Acquisition Act 1894

The main features of the legislation, which was repealed simultaneously with the enactment of the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (LARR Act, 2013) are described below

Public Purpose: This law allows central and state governments to acquire land for various infrastructural projects, for companies owned by them and also for privately owned companies. Examples of public purpose mentioned in the law are town or rural planning, residences to the poor, landless persons, carrying out any educational, housing or health or slum clearance schemes sponsored by the Government. There was also more broadly phrased language, referring to –the provision of land for planned development of land from public funds in pursuance of any scheme or policy of Government and subsequent disposal thereof...with the object of securing further development as planned. The Act also provided for acquisition of land by a company which is engaged in any industry or work for public purpose.

Procedure: The Act provided that for any such acquisition of land a preliminary notification was to be given in the Official Gazette informing the public about the likely acquisition of land for public purpose. Such a notification is to make the public aware of the government’s intention to acquire land and freeze any development and ownership of the land.

Objection hearing: Any person interested in the land that is so is to be acquired could file an application within 30 days from the date of publication of such notification who was to be given an opportunity of being heard near the collector.

Declaration: After hearing the objections and making further inquiry, the collector had to give his report to the government for a decision. After receiving the report, if the government felt that it has to acquire land for public purpose then it had to give a declaration to that effect.

Compensation: The Collector had to proceed to mark out the land and measure it and then notify the people that the government intended to acquire land and accordingly all the parties interested were invited with claims for compensation. After making enquiries on the claims, the Collector made the award, specifying the area of land, compensation to be paid and –the apportionment of the compensation among the persons known or

believed to be interested in the land. Within two years of the declaration the award had to be made or else the proceeding had to be deemed to have lapsed. Any person dissatisfied with the measurement of land, amount of compensation etc had the right to move the matter to the court.

Amount of Compensation: Compensation to be paid to the interested persons was the market value of land that prevailed at the time of the initial notification. 12 percent of interest had to be added to the amount of compensation for the period between date of publication of notification and the date of award. 30 percent of the market value had to be added to the compensation due to the compulsory nature of the acquisition. On account of damage to the standing crops or other property at the time of taking possession the owner was entitled to compensation. Reasonable expenses had to be paid for change of residence or place of business if such a change was necessitated by the acquisition.

Possession: The Collector would take possession of the land after the award has been made. The land would be then vested in the government free from all encumbrances. In cases of urgency, the Collector would take possession of the land even before the award of compensation once notice had been given of the intention of the government to acquire the land. In cases of urgency, the declaration of acquisition could be made even without hearing of objections. A criticism of the relevant provision is that the law did not define urgency and the determination of what constituted urgency was left to the subjective determination of the government.

6.6.2 Analysis of the Act

The most criticised and misused section of the Land Acquisition Act 1894 was the Urgency Clause. This law has been said to be a draconian law because the person from whom the land is being acquired cannot move to the court for an injunction for the urgent nature of the Act. Under Section 5 and 6 of the Act an objection could be filed against the acquisition of land under the natural justice principle of *Audi Alterem Partem*.

There have been many instances where various state governments have misused the provisions of Section 17(4) of the urgency clause and have denied rights of natural

justice In a case *Radhe Shyam(D) through LRs and others v State of U.P and Others*³⁰⁹ it was held that

“In cases where the acquisition is made by invoking Section 4 read with Section 17(1) and 17(4)...excluding the application of Section 5A is likely to make the land owner a landless poor and force him to migrate to other nearby city only to live inasmuch as a departure from this rule should be made only when the land is required to meet really emergent situations like those enumerated in Section 17(2). If the acquisition is intended to benefit private person(s) and the provisions contained in Section 17(1) and/or 17(4) are invoked, then the scrutiny of the justification put forward by the State should be more rigorous in cases involving the challenge to the acquisition of land.”

So we see that the rule of *Audi Alterem Partem* has been held to be of paramount importance and the provisions of urgency clause should be invoked only if there is real and substantive urgency.

There are no provisions of rehabilitation and resettlement of persons due to acquisition of land. Another criticism against the Act is that low compensation is paid to the people from whom land is being acquired. The government pays at their own market rate which is nowhere near to the actual prevailing market rates. Lack of safeguards pertaining to forced acquisition of land makes the law draconian. Once the government decides to acquire land there is no mechanism whatsoever to file complaints against it except that under Section 5A within 30 days from the date of publication of notification objections can be filed with the Collector to which the collector is not bound. He prepares a report to be submitted to the appropriate government. On the basis of this report, the government gives a notification under Section 6 declaring its intention to acquire the land for a public purpose.

Another criticism levelled against this Act is that nothing can stop the government from acquiring land once it has made up its mind for doing so. The deprived cannot go to the court to get an injunction what he can do is file objections in the written form under Section 5A and to appear before the Collector under Section 5A (2). The Collector shall prepare a report on the basis of his objections which shall be submitted to the

³⁰⁹ Arising out of Special Leave Petition (C) No.601 of 2009

appropriate government, the decision of the appropriate government shall be final. The government can overrule the objections on the ground that land is required for a public purpose under Section 6. Thereafter, the acquisition cannot be challenged. The landowner can only challenge the amount of compensation decided by the government. Under the Act, the collector's award of compensation is final, unless altered by a decree of a Civil Court in a regular suit.

Another issue is the definition of PUBLIC PURPOSE. The Act of 1894 gives an inclusive definition of the term Public Purpose. The term public purpose has been defined in Blacks Law Dictionary as

“ A public purpose or public business has for its objective the promotion of public health, safety, morals, general welfare, security, prosperity and contentment of all the inhabitants or residents within a given political division, as, as, for example, a state, the sovereign powers of which are exercised to promote such public purpose or public business”.

The Supreme Court finally in *Ramji Veerji Patel and others v.Revenue Divisional Officer*³¹⁰ held that:

“The provisions contained in the Act, of late, have been felt by all concerned; do not adequately protect the interest of the landowners/persons interested in the land. The Act does not provide for rehabilitation of persons displaced from their land although by such compulsory acquisition, their livelihood gets affected. For years, the acquired land remains unused and unutilised. To say the least, the Act has become out dated and needs to be replaced at the earliest by fair, reasonable and rational enactment in tune with the constitutional provisions, particularly Article 300A of the Constitution. We expect the lawmaking process for a comprehensive enactment with regard to acquisition of land being completed without any unnecessary delay.

6.7 The Right to Fair Compensation and Transparency in land Acquisition, Rehabilitation and Resettlement Act, 2013

This Act is a more humane and participatory mechanism for land acquisition for industrialisation and infrastructural development. It provides for transparency in compensation and rehabilitation of the affected people. It further ensures that the

³¹⁰ (2011)10 SCC 643.

cumulative outcome of compulsory acquisition should be that the affected persons become partners in development leading to an improvement in their post acquisition social and economic status and for matters connected there to or incidental there to provide for transparency in compensation and rehabilitation of the affected people.

The land acquisition act of 2013 has done away with the most of the draconian provisions of land acquisition act of 1894. Under this Act land has been made an easily accessible asset. The Act's most important contribution is it provides for introduction of compulsory prior consent from the farmer for acquiring land. Then again it replaces the administrative coercion for land acquisition with market transaction, and increased finance to those left without land or livelihood. Thirdly, the new act also provides for a new nationwide institutional mechanism for rehabilitation and resettlement. Therefore the Land Acquisition Act 2013 is considered a people oriented and progressive legislation. In addition to this, the land acquisition act of 2013 provides for resettlement of the affected community by the project owner. The following section identifies some of the important features of this act.

Prior consent for land acquisition: The Act of 2013 Act provides that prior consent of land owner or local people is to be obtained before land acquisition. This is required in private projects and public projects, but this rule does not apply to state projects for public purpose. State maintains its forced expropriation approach by invoking eminent domain law.

Five categories of land: Five categories of land has been created (i) Defence and national security projects (ii) Affordable Housing housing for the poor (iii) Rural/ Social Infrastructure (iv) Industrial Corridors (v) PPP infrastructure projects, wherein Central Government own the lands And these five categories do not require the Social Impact Assessment to be done and neither requires 70-80% approval of the landowners for private/ PPP projects respectively.

Restrictions on acquisition: To protect the farmers and farmlands there are restrictions imposed on acquisition of irrigated multi-cropped and other farmlands. Since India's major population thrives on agriculture and agricultural land owners are poor this one is to safeguard their interests.

Employment: One person from each family of farm labourers will be given (guaranteed) employment when the land on which they were employed as farm hands is acquired.

Private entities: The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 has changed the wordings –private companies to –private entities which bring many other institutions under the purview of the Act, such as companies, NGOs, NPOs, corporation, firms and individual etc.

Unutilised land: Land if unutilized will be returned after the later of (i) 5 years, or (ii) such period as is mentioned at the time of setting up of the project agreement. Earlier it was just 5 years. Some projects may by their inherent nature require more time to materialize and hence the „later“ period clause has been introduced.

Exclusion of other Acts: The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 does not apply to 13 other Statutory Acts, such as the Atomic Energy Act, Petroleum Act, Railways Act, Electricity Act etc. These have been brought under the purview of the Land Ordinance, 2014 and to be included ultimately into the Amendment Act, 2015 which will require amendments and Rajya Sabha approval on those 13 Act separately too.

Private Hospitals and Private Educational Institutions: Private Hospitals and Private Educational Institutions which were earlier excluded from The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 are now through the Act brought under the purview of the Act.

6.7.1 Analysis of the Act:

Section 2 of the Act provides for three kinds of land acquisitions .They are: Appropriate government acquiring land for its own use and for public purpose, appropriate government acquiring land for any Public Private Partnership Projects or for any private companies for public purpose, purchased by private companies through private negotiations

Section 3(za) of the Act provides for what is meant by public purpose. In section 2(1) of the Act the following activities are defined as public purpose :a) For strategic purposes related to naval ,military, airforce, armed forces of the Union ,including paramilitary

forces of any work vital to national security or defence of India state policy or safety of the people (b) For infrastructure projects, agriculture, industry, educational purposes, sports, tourism and transportation and any other infrastructural facility; (c) Relief Development; (d) Planned Housing; (e) Planned Development; (f) Housing for Displaced Persons.

India adopted the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act In September 2013. This legislation is historic and important because it was for the first time that steps would be taken to address the concerns of displacement caused by land acquisition under this Act. The colonial legislation of Land Acquisition Act 1894 has been replaced by the 2013 Act, thereby addressing the coercive land acquisition through the state power. Not only this, the practice of expropriating land under the eminent domain principles 'to acquire the land not only for public purpose but also for private purpose was supposed to be checked through this new legislation.

Forceful usurpation of land for developmental projects has rendered people landless, homeless, and jobless. Displacement has led growing resistance by people especially in cases like Narmada, Sardar Sarover in Gujarat, and Singur in West Bengal. Therefore the land acquisition laws have been protested against.

6.8 Impact of LARR Act, 2013 on Different Projects.

The LARR Act 2013 has impact on different kinds of projects. They are discussed below

6.8.1 Impact on Infrastructural Projects³¹¹

In the present era construction of public infrastructure projects is at the heart of the process of development in the country. It was estimated that India's Eleventh Five-year Plan (2007-2012), would require an investment of US \$ 500 billion for infrastructural development which increased to US \$ 1 trillion during the Twelfth Five-year Plan (2012-2017). Projects, such as railways, highways, metro railways, and irrigation canals which fall under infrastructure require large amounts of land and electricity lines, telecommunication lines and petroleum pipelines need to acquire the right of user of

³¹¹ Anwarul Hoda, *Land Use and Land Acquisition Laws in India*, Working Paper No 361, (Dec 2, 2020, 2PM <http://documents1.worldbank.org/curated/en/790851468773055283/pdf/multi-page.pdf>).

land. Higher cost of acquisition of land including compensation to interested persons and the R&R package are likely to affect infrastructure. Delay in social impact assessment is a cause of concern in such infrastructure development. The provisions of the LARR Act, 2013 are inapplicable to the enactments relating to land acquisition listed in the Fourth Schedule of the Act which includes legislation relating to railways, national highways, metro railways, petroleum pipelines, electricity etc. There is no need for the social impact assessment; therefore, such provisions will not apply to infrastructure projects covered by the enactments listed in the Fourth Schedule. In addition, to this, if irrigation projects have been already subject to environmental impact assessment, then in such cases social impact assessment is not required. It has to be noted that although many of the big infrastructure projects would be excluded from the purview of the provisions on social impact assessment, several infrastructure projects that fall outside the enactments listed in the Fourth Schedule would still be covered by these provisions, e.g., airports, logistics parks, state highways, and major and minor district roads, to name a few. The requirement of social impact assessment is exempted in these projects because these projects would be delayed, due to the need to undertake social impact assessment. Due to the presence of PPP projects, there would be further delays because of the need to obtain the consent of 70 per cent of the land-holders. Further, the benefits of LARR Act, 2013 has been extended by the government vide a notification to the projects falling under the enactments in the Fourth Schedule relating to compensation and R&R. Consequently the costs of land acquisition for these infrastructure projects, as well as those not covered by the enactments listed in the Fourth Schedule, will certainly go up. Thus, we come to the conclusion that the procedural complexities of land acquisition (particularly the requirement for social impact assessment) will affect a subset of infrastructure projects but the higher costs will affect all of them. PPP projects will also be subject to the additional procedural hurdle of obtaining consent of 70 per cent of the landholders.

However, most major infrastructure projects will be unaffected by the constraint imposed on the acquisition of agricultural land as the Act specifically exempts –projects that are linear in nature such as those relating to railways, highways, major district roads, irrigation canals, power lines, and the like, as mentioned earlier. For the purpose of this research work, this brings us to the conclusion that dams⁶ has not been included under any interpretation or definition under the land acquisition scheme of the country.

It has been left to the interpretation of the government or the project developer. Therefore it can be said that the R and R scheme is not adequate to mitigate the repercussions of the big infrastructural projects like large dams.

6.8.2 Impact of the LARR Act, 2013 on Industrialisation³¹²

Policy makers of the country are of the opinion that if India has to significantly improve its GDP growth rate, eradicate poverty and raise the standard of living of its population to a decent level, it must revive manufacturing and stress on industrialisation. Manufacturing will expand only if entrepreneurs are provided with land at a price that does not affect the competitiveness vis-à-vis emerging countries in Asia. Competitiveness is important not just for being able to export to foreign markets. In the era of globalisation, due to falling tariffs, it has to be ensured that the manufacturers are able to compete with imports in the domestic market as well. An important constituent of manufacturing cost is land and the costs of land for manufacturers in other countries have to be looked after.

We may take an example of resettlement allowance in another country. In China, the payment of compensation as well as of resettlement allowance is calculated on the average value of annual production in the past three years. Law in China requires payment of compensation to be in the range of six to 10 times the annual production value, and for resettlement in the range of four to six times, provided that the maximum payment does not exceed 15 times the annual value of production. The overriding clause is that that this limit may be undone with and exceeded if it is insufficient for the dispossessed farmer to maintain the original quality of life. The total payment however must not exceed 30 times the average value of annual production. What needs to be noted is that the compensation is in terms of the annual production value of the land, not its market value.

In Malaysia the Land Acquisition Act, 1960 governs land acquisition. This enactment allows compulsory acquisition of land with adequate compensation for any public purpose, for any purpose beneficial to the economic development of Malaysia, or for mining, residential, agricultural, commercial, industrial or recreational purposes.

³¹² *Ibid.*

The law in Malaysia provides for payment of adequate compensation⁶ for compulsory land acquisition. The amount of compensation must be based on all possible aspects related to the market value of land. The incidental expenses incurred as a result of change of residence or place of business must also be paid to the affected party. The law also lays down that there must be public hearing, not on the purpose of the acquisition but on the amount of compensation.

The concept of eminent domain⁶ is recognised in Thailand's Constitution whereby the state has the right to take over private immovable property compulsorily without the consent of the owner for a public purpose, which includes public utilities, national defence, exploitation of natural resources, town and country planning, promotion and preservation of the quality of environment, and agricultural and industrial development. Fair compensation has to be paid promptly to the owner as well as to all persons having rights on the land.

Thus, it can be concluded that countries that compete with India in manufacturing, follow an uncomplicated process of acquisition of land and the compensation for land or for resettlement is based on the market value or on the average value of annual production of agricultural land as seen in the case of China. In no other country is compensation for acquired land a multiple of the market value. If in India industrial units have to pay the price of land allocated to them in industrial parks, national manufacturing zones or industrial corridors on the basis of the cost of acquisition of land by the government, including the compensation paid to the –interested persons⁶ and the amount spent on the resettlement and rehabilitation of such persons as required by the new land acquisition laws, it would certainly affect their competitiveness.

It is not realistic to envisage any changes in the land acquisition laws for downward revision of the scale of compensation or R&R. The landholders across the country are inclined to regard the scale of compensation and R&R embodied in the LARR Act, 2013, as acquired rights and it would be politically impossible for the government to attempt such a revision. The only way the situation can be remedied is for government not to pass on the full cost of land to the industrial units and charge concessional or subsidized rates.

As seen in the case of infrastructural development there is also a concern that the newly introduced procedure for social impact assessment will cause delays in the acquisition

of land by government for allocation to industrial units. There will be more delays in PPP projects because of the need to obtain the consent of 70 per cent of the land holders. Governments have for long followed a policy of establishing industrial areas and industrial areas and industrial parks. In the last decade, industrial parks were also set up for specific groups of products. In 2011, the UPA government had enunciated the National Manufacturing Policy (NMP) in which it was envisaged that the share of manufacturing in GDP would be increased from 15 to 25 per cent by the year 2025. The NMP had envisaged the establishment of national investment and manufacturing zones to facilitate the growth of manufacturing. Separately, the concept of industrial corridors also emerged in 2007 with the commencement of the Delhi Mumbai Industrial Corridor (DMIC) project in the states of Uttar Pradesh, Haryana, Rajasthan, Madhya Pradesh, Gujarat and Maharashtra. Subsequently, the following five industrial corridors have also taken shape:

1. Chennai-Bengaluru Industrial Corridor (CBIC) covering Tamil Nadu, Andhra Pradesh, and Karnataka.
2. Bengaluru-Mumbai Economic Corridor (BMEC) covering Maharashtra and Karnataka.
3. Amritsar-Kolkata Industrial Corridor (AKIC) covering Punjab, Haryana, Uttarakhand, Uttar Pradesh, Bihar, Jharkhand and West Bengal.
4. East Coast Economic Corridor (ECEC) covering West Bengal, Odisha, Andhra Pradesh and Tamil Nadu.

There has been an apprehension that the provisions of Chapter II of the LARR Act, 2013, on social impact assessment will delay the acquisition of land needed for the establishment of industrial corridors. The procedural delays will be even longer in PPP projects on account of the need to obtain the consent of 70 per cent of the landholders.

6.8.3. Impact of the LARR Act, 2013, on Urbanisation³¹³

Witnessing the experience in the developed and other developing countries it is expected that the process of urbanization will gather pace as the rural people move out in search for livelihood in industries and services. It is expected that by the year 2050, India will have an additional population of about 400 million people. In such a situation

³¹³ *Ibid.*

agriculture and allied activities that provided livelihood to about 220 million people in 2011 cannot be expected to absorb any more. Consequently, there would have to be a major exodus from rural to urban areas. However, the statistics as revealed in the past four decennial censuses show that the decadal rate of growth of urban population has been decelerating, having declined from 24.66 per cent in 1971-81 to 23.87 per cent in 1981-91, to 21.54 per cent in 1991-2001 and 17.70 per cent in 2001-11. The percentage of urban population has risen only modestly from 20.2 in 1971 to 31.16 per cent in 2011.

A school of thought doubts whether there is some amount of undercounting of urbanisation in the periodic censuses. The Census of India uses three criteria for identifying urban settlements: the population size must be above 5,000; the density must be more than 400 persons per square km; and more than 75 per cent of the male workforce must be employed in non-farm occupations. The censuses have reflected lower rate of urbanisation partly due to the use of multiple criteria for identifying urban areas. The peripheries of large cities and rural areas between urban settlements mainly witness urbanisation in India. Urbanisation in these areas is seen in somewhat unplanned manner. At many places, newly built or improved highways form the axis of urbanisation. The population has a preference for developing habitations and commercial complexes and establishing even small industrial units in rural areas outside the jurisdiction of urban municipal bodies in order to be outside their regulatory reach. Growth of urban slums can be seen in the vicinity of big cities, housing low-income segments of people who provide various types of service in the commercial and industrial complexes and residential colonies in the cities. The result of these spontaneous processes is that much of the urbanisation that is happening in India is -messy and -hidden as observed in a World Bank report on urbanisation in South Asia (World Bank, 2016).

The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) was devised as a way to tackle the problems of urbanisation which began to be implemented in the middle of the Tenth Five-year Plan in 2005 and continued over the Eleventh Plan (2007-12) and the Twelfth Plan (2012-17). It had four components, namely, urban infrastructure and governance (UIG) in 65 cities, the urban infrastructure development scheme for small and medium towns (UIDSSMT), basic services to urban poor (BSUP); and the integrated housing and slum development programme (IHSDP). However, the

main aim of the JNNURM was to essentially rejuvenate the city core. But in order to tackle the challenges of urbanisation, we attention needs to be focussed not only on the core but also on the periphery of these cities. The Working Group on Urban Strategic Planning for the Twelfth Plan (Ministry of Housing and Urban Poverty Alleviation 2011) had recommended the replacement of the current system of regulating land use through master plans by a system based on urban strategic planning. Master plans would be replaced by spatial and development plans (SDP), embodying both the proposed land use and development control regulations. A strategic densification of existing cities was proposed together with the development of new cities along the transport and industrial growth corridors. The working group placed emphasis also on integrating land use and transport planning to facilitate functional and spatial linkages between housing, workplaces and commercial areas.

Emphasis has been put on the improvement of transport links and connectivity between urban areas and on spatial planning of city peripheries by the World Bank Report on Urbanization in South Asia (World Bank, 2016). Providing affordable housing to the poor as well as to the middle class has also been stressed upon. To undertake spatial planning, the existing law for town and country planning will provide the statutory authority but such planning will also entail land acquisition, as in the past. Under the Master Plan for Delhi, 1962, for instance, over 60,000 acres of land was acquired for residential and commercial purposes and for parks. As far as residential purposes are concerned, the government may choose to leave it to private estate developers. But such a step will result in acquiring land for the upper income brackets, while providing only the trunk lines for power and water supply as well as for sewerage. The government may have to go in for substantial land acquisition on a compulsory basis for affordable housing as well as for providing such facilities as parks, hospitals, public educational institutions and marketing complexes in all housing projects. In fact, the government may need to subsidise the cost of land for affordable housing as without such support, housing will not be affordable for the lower income groups. The increase in compensation provided by the LARR Act, 2013, will facilitate acquisition. In urbanisation projects 20 per cent of the developed land will be reserved for allocation to land owners (on payment of the cost of land acquisition and the cost of development) in proportion to the land acquired according to the provision in the Second Schedule to the Act. This is expected to facilitate acquisition. The requirement for social impact

assessment may be a procedural hurdle but, as mentioned earlier, the government has proposed to remove this impediment in respect of affordable housing through an amendment in the Act.

Now, the pertinent question that remains is that how will agricultural land be affected by urbanisation and what difference will the LARR Act, 2013, make in terms of reducing the loss of agricultural land?

The process of urbanisation needs to be accelerated if the country is to live up to its potential for development and if the dire economic situation of the rural population is to be remedied. We have recommended above that in order to save the country from chaotic urbanisation spatial planning needs to be undertaken and the spontaneous development of urban sprawls prevented. The sprawls result in low density urbanisation and have the tendency to swallow large areas of cropland. No estimates exist on the area of land at present occupied by infrastructure projects or by industrial areas or by individual industrial units. Estimates have however, been made in respect of urban area expansion. Bren d'Amour et al (2016) have projected an expansion of urban area by 3.3-3.7 million hectares in India and the consequent loss of an equivalent amount of croplands by 2030. The World Bank (Ellis and Roberts, 2016) estimates, made on the basis of observation of the night-lit areas, suggest that during the period 1999-2010, the urban footprint expanded in South Asia by five per cent per year, which was twice the urban population growth of about 2.5 per cent. This rate of growth suggests that without strong intervention, urban areas in India will need to expand more than six-fold from 23.6 million hectares in 2010 to 146.8 million hectares in 2050. Even if the process of urbanisation is properly regulated, World Bank projections suggest that very large areas of land would need to be provided for meeting the housing needs of the population.

According to these estimates, against the total urban area in 2010 of about 23.7 million hectares (236,934 square km), the requirement will be about 54.8 million hectares (547.553 square km) in 2050, so that urban land as a proportion of total available land will rise from 7.70 per cent in 2010 to 17.78 per cent in 2050.

6.9 Changes proposed in the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Amendment) Bill, 2015³¹⁴

The provisions of the LARR Act, 2013, will result in a significant increase in the cost of acquisition. Such an impediment will place procedural hurdles leading to delays in the implementation of projects. The central government has made an attempt to eliminate the delays inherent in the provisions on social impact assessment and for securing the consent of land holders by introducing an amendment bill. But the main changes being sought in the proposed bill is to exempt the following categories of cases from the requirement of obtaining prior consent of affected persons: (a) Projects vital for national security or defence (b) Rural infrastructure projects (c) Affordable housing and housing for the poor (d) Industrial corridors (e) Infrastructure and social infrastructure projects including PPP projects

Through the proposed legislation the government can exempt by notification projects in these categories from the need to undergo social impact assessment as well as exempt land acquisition from the restrictions in respect of agricultural land. The bill is yet to be passed by the Rajya Sabha, but a number of states, like Andhra Pradesh, Gujarat, Haryana, Maharashtra, Tamil Nadu and Telangana, have already enacted legislation amending the LARR Act, 2013, exempting or enabling exemption of land acquisition in respect of the five categories listed in the amendment bill from prior consent, social impact assessment requirements and the restrictions in respect of agricultural land. The Gujarat land Act has specified that industrial corridors are those that are –set up by the State Government and its undertakings (in which case the land shall be acquired up to one kilometre on both sides of designated railway line or roads for such industrial corridors)¶. The Maharashtra Act also specifies the width of industrial corridors similarly, while the Telangana Act leaves it open for the government to decide up to what distance on both sides of the railway line or roads the industrial corridor would extend. A provision in the Maharashtra Act adds industrial estates and industrial areas to the list of projects exempted from the requirements of prior consent, social impact assessment or restriction for acquisition of agricultural land. The Gujarat Act also gives the government the alternative to pay a lump sum equal to 50 per cent of the amount of compensation paid to the land owner in lieu of R&R in two situations, (i) if an area of less than one hundred hectares is to be acquired for government’s own use or (ii)

³¹⁴ *Ibid.*

whenever the land is to be acquired for projects of a linear nature such as railways, roads etc. There is a similar provision in the Maharashtra Act. The Telangana Act also has a provision for lump sum payment in lieu of R&R but with a difference. It is applicable to all categories of cases in which land acquisition has been exempted from the requirements for prior consent, social impact assessment and restriction on acquisition of agricultural land. Furthermore, the Telangana Act keeps it open to government to pay –such lump sum amount as may be prescribed in the Rules, instead of limiting it to 50 per cent of the compensation amount for land

6.10 Issues of Displacement, Compensation, Rehabilitation and Resettlement

As discussed in the forgoing chapters although, in the North-East, the state acquires vast tracts of land for building dams, the local communities are yet not convinced of the idea of constructing dam projects specially, the big dams due to several ecological, socio-economic and cultural reasons associated with it. Few of them are fear of land submergence, cultural sites and religious places, dispossession of property, livelihood crisis, breaking of community bonding etc. The tribal and non tribal communities do not want to get displaced. It must be remembered that in North East India land is the basis of a community's identity. In some of the states of the region the tribal communities are dependent for food, shelter, and livelihood source from communal forests. It can be argued here, that people share an emotional relationship with their land, livelihood, family, history and culture, and such deep attachments may constitute one's own or communal identity. The Land Acquisition Act of 1894 has not prioritised on informed consent and implementation of R&R. In practice land is to be undertaken from the owner only on payment of compensation but in reality, no such fair compensation was paid as per the market value of the acquired land. Because of lack of any comprehensive scheme of Resettlement and Rehabilitation, people have to face problems like lack of livelihood and other socio economic crisis. Added to this, there is the issue of compensation being paid only to the land owners and not to the dependents of common property resources. Therefore it can be argued that the condition of the CPR dependents is also worrisome. They do not possess legal documents or land *pattas* to claim compensation. According to a research 48 major dams will cause a million of both displaced and project affected persons and other projects will cause half a million of

them in a decade.³¹⁵ Thus, India alone may displace 20 millions and China similar numbers in ten year. In India, for example, statistics shows, around 40 percent of the 60 million displaced and project affected persons are tribals who are 8.08 percent of the population. At least 20 percent are Dalits and another 20 percent are from other landless rural poor classes according to Walter Fernandez, a renowned social scientist of North East India.

Arguably, displacement cannot be understood merely as physical dislocation from the original residing place but it also, means directly affecting the livelihood of the displaced people. Michael Cernia, a social anthropologist opines that the displaced people in case of displacement has to face a set of interrelated insecurities, impoverishment risks in the form of landlessness, joblessness, homelessness, marginalisation, food insecurity, loss of access to common property and services and social disarticulation.³¹⁶ The rehabilitation and resettlement schemes do not take the issue of unproductive land into consideration and as a result of this it takes a long time; almost years to rehabilitate displaced population in many dam projects. In India itself it can be witnessed that in most of the projects, the rehabilitation is yet not properly completed. Displaced persons have to experience these impoverishment risks. Hence, it can be said that Cernia's explanation on risks of displacement is quite practical.

Walter Fernandez has researched that in most dam projects, R&R was provided either in those projects funded by the World Bank or in projects against which active protest campaign is launched by the displaced population like the Farakka Super Thermal Plant, Subarnarekha dam, Indravati and Rengali dams etc. But an adequate scheme of R&R is still lacking in India because a huge number of displaced and project affected population still remains unsettled, so far. For example, the Sardar Sarovar dam displaced farmers and *adivasis* are still struggling for an adequate R&R.

6.11 Shortcomings in Rehabilitation and Resettlement Policies

When we look at the history, it took eight long years of research and study for the Ministry of Rural Development to formulate a policy draft in 1993. Around 1,500 plus activist groups joined thousands with the displaced and project affected persons, while

³¹⁵ Ravi Hemadri, et al *Dams ,Displacement,Policy and Law In India*,Contributing Paper(Sep 20 ,2020,8 PM), <https://core.ac.uk/download/pdf/162463595.pdf>.

³¹⁶ MICHAEL CERNIA,THE ECONOMICS OF INVOLUNTARY RESETTLEMENT QUESTIONS AND CHALLENGES,(1997).

preparing for an alternative to it and to the LAA, 1894. The good points mentioned in the draft were not adhered to despite the fact that, fifteen departments of the government of India got together to revise the draft policy. No remorse was shown about the sufferings of the millions of displaced persons who were not resettled till then. Instead it was reiterated that with the liberalisation, globalisation and the economic policy of 1991 more land would have to be acquired to attract both the Indian and foreign private capital, as stated by Walter Fernandez. According to this policy, minimal benefits were rendered to the displaced and the project affected persons so that they would not pose further troubles in the land acquisition process. The very need to minimise enormous displacement was not asserted. Therefore, it can be argued here that the revised draft 1994 was found to be lacking in understanding the grievances of the displaced persons and quite insensitive towards their pitiable conditions of displacement.

The Committee of Secretaries, Government of India, approved a new draft in November 1997. But main thrust of the 1993 and 1994 drafts which stated that more land acquisition is required for liberalisation was left undisturbed thus supporting the idea of acquiring more land and turning rehabilitation into a palliative. The 1997 policy draft and the Land Acquisition (Amendment) Act 1998 were formulated by the Ministry of Rural Area and Employment, to make acquisition for companies easier than in the past. The District Collector still upheld the authoritarian role in deciding on the payment of compensation. The Amendment, in the year 1998, also provided compensation to be paid to those having ownership of legal documents or to the *patta* owners only. Finally, the Union Cabinet approved the Land Acquisition (Amendment) in October 1998 but rejected the draft policy. However, because of the pressure from all the stake holders including the displaced, project affected persons and civil society at a meeting convened in January 1999, the then Minister for Rural Development gave the impression that he was open to the idea of formulating a policy first and then drafting a law based on it.

The National Policy for Rehabilitation and Resettlement 2004 was introduced and it applied, to projects displacing 500 or more families in the plains and 250 families in the hills or the scheduled areas. It provided for allotment of agricultural or cultivable wasteland to each project affected family (PAF) to the extent of actual loss subject to a maximum of 1 hectare of irrigated or 2 hectare of un irrigated land/cultivable wasteland on the basis of availability of government land in the district. According to this policy, each PAF whose house has been acquired will be allotted a site free of cost but only the

families below the poverty line will be given a one-time grant of Rs 25,000 for house construction and land losers will be given a one-time grant of Rs 10,000 per hectare for land development and Rs 5,000 per family for agricultural production.³¹⁷ Rural artisan, small trader and self-employed PAF will get financial assistance of Rs 10,000 for construction of shops or working sheds.³¹⁸ Those who lost their customary grazing, fishing or other rights will get one-time financial assistance. Tribal PAFs were to get other R&R benefits. Their families resettled out of the district will get R&R benefits to the extent of 25 percent in monetary terms. But the NPRR, 2003 was not above the shafts of the critics. It had its shortcomings too. Like it did not take up rehabilitation as a right but took it merely as a need. It provided that rehabilitation is a matter to be decided by the rehabilitation agency. They will decide whether to rehabilitate the displaced persons which made rehabilitation a non mandatory thing. The policy lacked in proper guidelines to prioritise the livelihood issues, need of a social and economic infrastructure for the want of a quality life after resettlement. Thus, broadly it can be said that NPRR, 2003 did not provide a comprehensive R&R policy to remove impoverishments and risks of displacements. NPRR 2003, further indicated that many issues addressed by this policy needs to be reviewed. A careful assessment of the costs and benefits to be accrued from each project should be made along with an assessment made on the impact of displacements and the socio-economic, cultural needs of the affected people. As a result of it, a new policy was introduced known as the National Rehabilitation and Resettlement Policy (NRRP), 2007. It was introduced to provide for the basic requirements and all projects leading to involuntary displacements of people must address the R&R issues, comprehensively (NRRP 2007). The objectives of the NRRP, 2007 are: to minimise displacements, to ensure adequate rehabilitation package, to protect rights of the weaker sections of the people like SC and ST's, to provide better standard of living, to integrate rehabilitation concerns into the development planning and implementing process (NRRP 2007).

Even though the new policy has many improvements but it still has a number of limitations. Some of the most consequential loopholes in NRRP 2007 are that the prime objective of this new policy on R&R is to minimize displacement but it doesn't say what should be the steps taken by developers to do so and at what stage such

³¹⁷ *Ibid.*

³¹⁸ *Ibid.*

considerations should be made. One of the most effective ways to do so is through the choice of technology and not just the size of it. It is not clear how the policy would ensure that such criterion is followed at the different stages like conception, design and preparation.

This policy should have had provisions for making the project developers opt for areas which are less accessible and are not densely populated, in addition to this it could have come up with clauses that would have made using arid and waste land more favourable. Such provisions would have been probably the most effective tool to counter displacement related issues. However, from the above account of draft policies on R&R, it can be argued here that the policies on R&R were not comprehensive in nature and have its shortcomings. In practice, the implementation of the R&R policies was not adequate and transparent. The previous policies on R&R did not emphasise on reduction of enormous land acquisitions and land transfers meant for the private companies or the corporate. Coupled with this it limits the involvement and participation of displaced persons in preparing the rehabilitation package and excludes them from taking decisions regarding the land acquisition process. Moreover, over the years, R&R of the displaced and project affected persons were not taken place adequately. Hence, in such a situation, rehabilitation of the already displaced and potential oustees of the future land acquisition cases remains a contentious issue. The irresponsibility and lack of accountability on the part of the administration to carry out the land acquisition process and to figure out accurately, the displaced population in each developmental project remained neglected so far. The District Collectors are responsible for the corrupt and

The R&R policy makers have been quite liberal with clauses like as far as possible and if available. Phrases like these are ambiguous and lack precision leaving enough space for the project developers to evade obligations. A policy as crucial as NRRP, or for that matter any policy, should have no place for such loopholes and if they are still there they would again be used very wisely by the project authorities.

The policy has some very important mechanism for grievance redressal, like Project/District R&R Committees, an Ombudsman, a National Monitoring Committee, a National Monitoring Cell and a National Rehabilitation Commission, but stays silent on what powers these bodies would have and what authority they would be able to command if some issue comes up.

non-transparent land acquisition and non-implementation of an adequate R&R scheme. The entire North-East in general and Assam in particular, have to bear the consequences of inadequate rehabilitation for a huge number of displaced populations. Less than 9 percent of its displaced persons have been resettled only. Moreover, rehabilitation is not mentioned in government files or documents and project budgets have made no provisions for it. In contemporary times too, the North-East region has been witnessing resistance movements like in any other parts of India, against the forcible land acquisitions by the state using the power of eminent domain'. The displaced and project affected people are demanding their rehabilitation rights from the state and are resisting against the compulsory acquisition of their ancestral land. It can be argued that due to the lack of a comprehensive R&R policy in India, the UPA II have introduced the new land Act, 'The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013' which has prioritised the issue of R&R before land acquisition is made. Perhaps, the focus on R&R is intentional to reduce the number of resistance movements all over India due to lack of an adequate and non-transparent R&R policy. Thus, it can be said that the new land Act, 2013 is made to deal with the lacunae on R&R policies so far. The new land Act, 2013 has deliberately, focused on to strengthen the administrative machinery, to preserve transparency in matters of land acquisitions and to monitor the R&R of the displaced people. What is of foremost requirement today is the responsibility of the state agents to maintain transparency and accountability in implementation of such R&R policies. So that no displaced and project affected families and communities will be left to suffer the consequences of development induced displacements. Therefore, the monitoring of the R&R scheme as per the new Act, 2013, is indeed, a necessity to be implemented by the state.

6.12 Rehabilitation and Resettlement Scheme under the New Land Act, 2013

The new Act namely, 'The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013' has claimed to repeal the age old colonial Land acquisition Act, 1894 (LAA) and prioritised on informed consent, facilitation of R&R programmes, to provide rehabilitation as a right of the displaced people and also, to maintain transparency and accountability in matters of land acquisition by the state. Some of the entitlements for the displaced families and individuals as per the Section 31 of the new Act, 2013, are ,rehabilitation amount

must be payable to the family and it should be transferred to the bank account of the displaced person, particulars of the house site and land to be allotted, one-time subsistence allowance and transportation allowance must be allotted, one time amount to artisans and small traders to be paid, payment for cattle shed and petty shops also to be paid, mandatory employments to be provided to the members of the project affected families, special provisions for the Scheduled Castes and Scheduled Tribes should be provided, along with annuity and other entitlements to be given to the affected families. The district collector has to ensure the provision of all infrastructural facilities and basic amenities for the potential displaces and he has to keep a summary of the entire proceedings of the land acquisition and amount of compensation paid, along with details of the land finally, acquired to maintain transparency and accountability in the public eye. Moreover, the collector can take possession of land only after payment of compensation and providing resettlement entitlements to the entitled persons. The Act also provides additional safeguards for double displacements. Two Committees are proposed to be set up namely- The National Monitoring Committee for Rehabilitation and Resettlement and State Monitoring Committee for Rehabilitation and Resettlement, to monitor the rehabilitation programmes in the states. These two bodies will be consisted of the representatives of both the central and state governments along with some experts. Both the states and the Union Territories have to provide all the necessary information regarding land acquisition to these two bodies in a regular manner to ensure a fair recording of all proceedings. However, it should be noted that according to the new land Act, a fixed rate of 70% consent is required by the project affected families in case of public-private partnership projects and 80% consent, is necessary to be acquired for a private company. But consent is not required for projects where the government is acquiring land for its own use, hold and control (meaning it does not intend to sell the land or develop it to benefit specific private parties). Therefore, it can be argued here, that non fixation of informed consent in the context of sole public sector projects may lead to forced land acquisitions by the state using the power of eminent domain' in near future.

6.13 Resettlement Framework in North -East India

Largely, a Resettlement Framework (RF) was prepared and disclosed in 2009. It was revised again for the Multi-Tranche Financing Facility (MFF) under the Asian Development Bank. The aim of ADB was, to provide funds to the Power Sector

Enhancement Investment Program, on the basis of the new land Act, The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013⁶ and the ADB Safeguard Policy Statement (SPS), 2009.³¹⁹ The RF has been formulated to configure the resettlement plans. It outlines the objectives, policy principles and procedures for any land acquisition, compensation to be provided to the affected persons. As per the scheme involuntary resettlement principles will be followed for each sub-project like land acquisition and involuntary resettlement impacts will be avoided. It stresses on time bound resettlement plans, consultation with affected persons on compensation, including compensation to be paid to non-titled affected persons prior to the contract. Physical acquisition of land shall be taken, resettlement information shall be disclosed to the affected persons and their participation in planning and implementation of sub-projects will be prioritised. Vulnerable groups will be provided special assistance, and establishment of grievance redress mechanism shall be established. The RF will also follow ADB SPS like safeguarding requirements for environment, to minimise involuntary resettlement of indigenous people, to enhance livelihood of all displaced people, to improve the standard of living of the displaced poor etc To bring the RF in accord with ADB requirements, the RF mandates that in land acquisition, the date of publication of preliminary notification for acquisition under Section 4 (1) of the RFCT in LARR Act, 2013, will be treated as a cut off date for title holders and for non-titleholders such as squatters, the cut-off date will be the start date of the. However, the ruling of the new alliance government and its decisions on land acquisition processes and R&R plans will highlight as to what an extent the RF would be implemented and how effective, it has been proved in rehabilitating and resettling displaced persons in North East under their regime, in the coming years.

6.14 Stand of North-East on the New Land Act, 2013

The present government in the centre passed ordinances to amend some of the provisions of the new land Act, 2013. The governments of few states of North East then were of the opinion that the government at the centre would not implement the amended land Act, 2013 as per the ordinances. The NDA government will not re-promulgate the ordinance again but will include a 13 points reform to the land acquisition law to benefit the farmers in the form of direct financial benefit, so that they do not have to face financial crisis. States like Maharashtra, Assam and Karnataka are keen to make

³¹⁹ Available at <http://www.mcrg.ac.in/Sayantini.pdf>(Aug 5 ,2020,10 PM)

changes in the new land Act 2013. They are keen and to enact legislation specifically, for promotion and construction of infrastructure to get around the difficult provisions of social impact assessment. However, the centre has advised the states to frame their own Act with the centre's approval. The present BJP alliance government should focus in the implementation of smaller dam projects rather than big dam projects and it must take suggestions from expert committees in case of big dam projects in the region. The stand of the present government on land acquisition is crucial to further say to what extent the new land Act, 2013 is implemented. It will be tested in the years to come.

6.15 Conclusion

R and R was never the focus of the LAA, 1894. It only prioritised the acquisition of land compulsorily, even without the consent of the land owners, in order to provide mechanism for development and economic prosperity. Since India's independence a large quantum of land has been acquired and infrastructural projects like the hydropower projects and dam projects are evidences to it. It is primarily due to inadequate rehabilitation and resettlement scheme that has lead to huge number of displacements. Over the years, although the Indian state has implemented the draft policies on R&R, which are inadequate and a lot need to be done in this field. The impoverishments and risks of displacements are often reflected in the socio-economic and cultural issues of displacements. The new Land Acquisition Act has positively focussed on R & R, but its proper implementation depends on the stand and actions of the government. In order to annihilate the deplorable plight of the displaced people and communities a comprehensive and transparent R & R policy is a grand essential. In the contemporary times in the light of the state pushing its development agenda land acquisition is inevitable. Principle of informed consent along with a comprehensive R&R policy is of utmost necessity to make the process democratic. To make R&R policy a suitable alternative to ensure lesser objections on land acquisitions, it is necessary to acquire informed consent and participation of the potential oustees and displaced people in the decision making process concerning their livelihood issues. The CPR dependents need to be fairly compensated along with the individual owners of the land. The R&R provisions in the new Land Act, 2013 rekindle the hope of an adequate and fair compensation. What is now required is the accountability on the part of the state administration and they must maintain the accurate account of the displaced people

and communities of every developmental projects and to implement R&R policy in letter and spirit in order to ensure lesser objections to the land acquisitions.

CHAPTER SUMMARY

- The chapter starts with an introduction.
- It gives a sense of what is development induced displacement.
- It articulates on tribal land acquisition ways in North East India.
- Gives a pen picture of history of land acquisition and development in India.
- International Legal framework for land acquisition and displacement has been highlighted in the chapter.
- Analyses the former land acquisition laws.
- The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 is analysed.
- Impact of the LARR Act, 2013 is analysed.
- Issues related with displacement, compensation, rehabilitation and resettlement are highlighted.
- Short comings of the Rehabilitation and Resettlement policies have been articulated.
- The chapter highlights the rehabilitation and resettlement scheme under the LARR Act, 2013 is analysed.
- Resettlement framework in NEI is analysed.
- A brief overview on stand of NEI on the new LARR is provided.

CHAPTER VII
CONCLUSION AND SUGGESTIONS

SYNOPSIS

- **STATEMENT**
- **RESEARCH FINDINGS**
- **ACCOMPLISHMENT OF OBJECTIVES**
- **TESTING OF HYPOTHESIS**
- **SUGGESTIONS**
- **CHAPTER SUMMARY**

7.1 Statement

This research enterprise is titled –Construction of Big Dams in North- East India: A Critical Study. After the investigation it has been found that although dams are projected as signs of progress and development of a nation, their construction in North-East India will result in catastrophe, destruction of ecology and violation of the rights and entitlements of the people. Therefore such a plan for commissioning infrastructural projects such as big dams must be carefully weighed against its anticipated implications

The concept of development whether economic, political or social is a western import. When the entire world is stressing on issues of human development human security etc, the Indian state is prioritising economic development as a major means to meet the development needs of the country. The process of industrialisation has brought in its own set of problems after independence. Post colonial development agenda has shown that development has been biased, unequal and uneven. Dams in North East India will result in issues ranging from ecological sustainability to displacement of people. The issues are articulated in the previous chapters.

Such a move by the postcolonial nation state shows that the lessons from the past interventions in the water regimes in India have not been learnt. The real economic costs and the adverse social and environmental consequences of this vast intrusion have not been paid attention to. For example regarding the Gumti Dam in Tripura, where significant tribal lands were inundated, devastating their livelihood base, most did not receive more than minimal compensation.

7.2 Research Findings

Big dams have been the largest development intervention of the government. But such a perception of development goes against the tradition of human rights and environmental justice.

The physiographic profile had been discussed in the research and it has been understood that the North East India is a mosaic of different culture, races, tribes. This diversity is the result of people migrating to the region during different era. This has resulted in a clash for territorial stake and the dam issue has added to the issue of land and resource crunch. The most crucial feature that has been identified is the seismicity of the region. As far as harnessing hydropower is concerned Comprehensive environmental risk

assessment assumes great significance in the North-East to decide the viability of mega dams in the region. These environmental risks need to be properly understood while evaluating the viability of dams in the Northeast. On the other hand, one of the most serious impacts of the dams on rivers is the ecological degradation suffered by the river and the riparian land in downstream areas. Since in all operational dams norms of environmental flows are not maintained, the storage and release pattern is anomalous and erratic. In the existing dams the no assessment of environmental flows were made, that means there is no knowledge of how much flow in the river is to be ensured down the dam in different stretches of the river so that needs of environmental use and human consumptions are adequately fulfilled.

Five dams have been studied in this project through the prism of modernisation and its discontents. It has been found out that the modernisation theory which is premised on the notion that in order to develop a nation has to have a linear progress cannot be applied to the context of North East India. A common thread that runs through all the dams is that resistance movement against all the dams revolve around the following

- Lack of prior informed consent
- Want of legitimacy of the Environment Impact Assessment report
- Insufficient compensation
- Inadequate resettlement and rehabilitation packages

As far as assessing the legitimacy of dam construction on international water course is concerned the International Water Law in the form of United Nations Convention on Non Navigable Use of Water courses do provide principles to solve the issues pertaining to management of an international river. The Convention on the Law of the Non-Navigational Uses of International Watercourses was adopted by the United Nations General Assembly on 21 May 1997 (UN 1997a). It was drafted to articulate and codify the prevailing state practice and *opinio juris* – an action taken out of a sense of legal rather than moral obligation – in the area of international water law. It was designed to serve as a framework for more specific bilateral and regional agreements relating to the use, management and preservation of transboundary water resources. It was also designed to help prevent and resolve conflicts over international water resources, and to promote sustainable development and the protection of global water

supplies. The bottom line of all the principles is the principle of do no harm'. As the main philosophy of International law is the peaceful co existence of countries, therefore both the countries must adhere to the following principles namely

- Principle of Equitable and Reasonable utilisation
- Obligation not to cause significant harm
- Principle of Notification, Consultation and Negotiation
- Principle of cooperation and information exchange
- Peaceful Settlement of Dispute

The research has focussed on the environmental harms that would result from construction of big dams in North East India. First, the Environmental Impact Assessment report which is a critical document in aiding decision making does not take into account socio cultural aspects. Projects seem to get clearances based on shoddy reports. Bio diversity issues are completely neglected in the EIA reports. For example, in the Siyom project, the EIA report lists 5 bird species in an area which has over 300. For the 600 MW Kameng project, the EIA reclassifies carnivores, such as the red panda, pangolins, and porcupines as herbivores and; the EIA for the 2,000 MW Lower Subansiri lists 55 species of fish in a river which has at least 156 and reports an area called the Arctic in the Eastern Himalayas.

The small displacement argument forwarded in the context of big dams in North East India is faulty. This has been highlighted under the social impact under the rubric of environmental harms in the research. The reality is that in states like Arunachal Pradesh very less amount of land is suitable for permanent cultivation. In such a case if land is encroached upon for building dams then, the idea of building dams must be judged keeping the context in consideration.

Run of the River dams will alter the flow of the river which will affect the riverine ecology. These projects are being projected as environmentally benign, but the reality is when the large dams which divert river waters through long tunnels, long stretches of the river will be bypassed between the dams and the powerhouse.

Carrying capacity of river will degrade because of dams, which has been highlighted under the cumulative impact of dams. A cumulative impact assessment needs to be done

so that rivers to flow freely so as not to disrupt natural ecology and riverine production systems (e.g. fisheries) on which local communities depend.

In the Northeast the downstream impacts of dams has often been neglected in the broader popular discourse on the impacts of dams in the country. The normal wisdom is that dams primarily influence upstream submergence and displacement. Sediments and nutrients vital for fertilising downstream plains are trapped when big dams block the flow of the river. The natural flow regimes are altered that drive the ecological processes in the downstream areas. Thus, they disrupt the connections between the upstream and the downstream, between a river and its floodplain.

The Himalayan region is being impacted by climate change is growing, with serious ramifications for Himalayan river basins and the Indian subcontinent. Climate change is changing hydrological characteristics such as discharge pattern, sediment load, snowmelt run off and intensity and frequency of flooding in Himalayan Rivers. The Brahmaputra river basin is particularly sensitive to climate change impacts, implying changes in volume of water, sediment and biogeochemical processes

7.3 Accomplishment of Objectives

The study in this research enterprise has fulfilled the objectives which were set out at the beginning of the project.

Objective 1: To analyse the need for construction of big dams in the region of North East India.

Chapter 2 which is titled **CONSTRUCTION OF BIG DAMS IN NORTH EAST**

INDIA AND ITS HYDROPOWER PROSPECTS gives a pen picture of the hydropower potential of the North east India and also reflects on the power surge of the region. The Government's proposal to construction big dams in the region and the reason behind such a proposal finds a place in this chapter and therefore, the objective number 2 stands fulfilled.

Objective 2: To analyse the impact of big dams, which are being currently pursued in North-East India

The entire project revolves around the theme of impact of large dams in North East India. Chapter 5 titled **IMPACT OF CONSTRUCTION OF BIG DAMS ON NORTH EAST INDIA: AN ENVIRONMENTAL PERSPECTIVE** more specifically deals with the above objective under the headings of Environment impact Assessment, social impact, cumulative impact, environmental impact, downstream impact, Run of the River Hydro, Climate change, Impact on Flood, Impact on Indigenous people and hence the objective has been fulfilled.

Objective 3: To understand the hydropower scenario of North East India

Chapter 2 which is titled **CONSTRUCTION OF BIG DAMS IN NORTH EAST INDIA AND ITS HYDROPOWER PROSPECTS** explains the scenario of hydropower in North- East India. It describes the political economy behind hydropower and also describes the scenario in the light of the Standing Committee on Energy 2019.

Objective 4: To evaluate the state of five big dams in the region

Chapter 4 titled **DAM CONSTRUCTION IN NORTH EAST INDIA: CASE STUDIES** is written as case studies on five important dams in the region. The state of five dams Lower Subansiri, the Ranganadi, the Gumti, the Pagaladia and the Tipaimukh are taken as case studies from the perspective of the modernisation theory to bring home the point that the linear progress of a nation that the modernisation theory advocates does not hold true for the context of North- East India. It has been seen that the resistance that has been built against almost all the dams is by poor people and therefore it is called environmentalism of the poor.

Objective 5: To analyse the legitimacy of dam building under international law

Chapter 3, titled **LEGITIMACY OF DAM BUILDING UNDER INTERNATIONAL LAW AND INDIAN APPROACH TOWARDS INTERNATIONAL WATER LAW** is an assessment of legitimacy of dam building to bring home the point that despite the fact of absence of any concrete mechanism to govern dam building in an international water course, the UNWC and the principles of customary international law can act as a prelude to water governance and dams between two riparian countries and therefore objective 4 stands fulfilled. It explains the stand of

World Commission on Dams on Big dams and throws light on the guidelines that must be adhered to by any state to make dam more ecologically viable and benign

Chapter 5 titled **IMPACT OF BIG DAMS ON NORTH EAST INDIA: AN ENVIRONMENTAL PERSPECTIVE** discusses the impact of big dams on North East India from an environmental perspective. It discusses the impacts under nine headings to bring home the point that the hydropower projects do have a hazardous impact on the fragile ecology of the region

Objective 6: To examine the human right to resettlement and rehabilitation and the approach of the government in responding to the people displaced due to construction of big dams in cases of development induced displacement in the region

Chapter 6 titled **DEVELOPMENT INDUCED DISPLACEMENT AND THE HUMAN RIGHT TO REHABILITATION AND RESETTLEMENT:THE STATE'S RESPONSE** deals with the Indian Legal Framework for land acquisition for any infrastructural project including dams. Dam induced displacement calls for resettlement and rehabilitation of the displaced. This chapter is a succinct explanation of the Indian legal mechanism to deal with the issue It examines the efficacy of the legislation meant for the purpose and its effect on a context like North East India and hence the objective stands fulfilled.

7.4 Testing of Hypothesis

The hypothesis of the research is –Big dams, while recognised as important indicators of modern development, have proven to cause long-term ecological degradation and invariably displace human habitations. In the region of the North-Eastern states, the ecology is identified as delicate in nature, unique to the region and has higher potential risks if the balance is disturbed. The construction of big dams in the region thus poses a higher risk to both the delicately balanced unique ecology of the region as well as displacing people and their livelihoods.¶

The term development is a western import and development based on linear progress which the state desires to achieve through various infrastructural projects is not suitable for North East India. It is reflected in the analysis of the five dams namely the Lower Subansiri, the Ranganadi, the Gumti, the Pagladia and the Tipaimukh in this research. The existing dams clearly tell what the negative impacts of the present proposals will

be. The fragile eco systems of the region, many identified as important biodiversity hotspots of the world are at stake. This destruction has affected the livelihood of the communities living in the vicinity of the ecosystems. Most of the project reports have been made by substandard work and inadequate research. For example, in the Environmental Impact Assessment the for Lower Subansiri hydropower project, the number of species affected has been considerably underestimated; it includes a species called '*mastheis*' that is reportedly non-existent. The EIA report does not give any account of how vast will the submergence of forest tracts be, or what the impact of impounding water in the reservoir will be on the water regime of the area and its consequent (negative) impacts on agriculture and livelihood

There are two arguments that the officials merit for such secrecy. Politically sensitivity; and national security' demands strict confidentiality. Even if such imperative is conceded then also national security does not merit social and environmental harm, and the bypassing of the democratic process. Secondly, officials invariably mention that local communities are "innocent" and "incapable" of understanding the complexities of dam building. In such a situation access to detailed public reports pertaining to dams and conducting public hearings are meaningless. This happened when the Citizen's Concern for Dams and Development (CCDD), a coalition of about 45 organisations in Manipur, sought information on neepco's plan to build the Tipaimukh Dam. Thus lack of established norms of reports be made available to the locals in local languages subvert the democratic process.

Another crucial issue that stands neglected is the question of territoriality, land alienation and tribal resistance. When rivers traverse diverse geographical areas inhabited by different ethnic communities, impounding the flow of the river, it will lead to tension and the confrontation of the region as ethnic boundaries collide with claims over natural resources.

Conflicts also arise when displaced people are relocated in places already inhabited by other communities. For example due to the construction of the Kaptai Dam, the Chakma and the Hajong tribes were relocated to places which were already inhabited by other communities . There were internecine fights between them and already settled communities. Studies also suggest that many members of the tribal guerrilla movement in Tripura are the victims of displacement caused by the Gumti hydroelectric project.

The plan of the state for building dams is sightless about the far-reaching *individual* and *cumulative* impacts of building hundreds of dams on the socio-cultural fabric of the region and its long history of inter-tribal and tribal-state conflicts. This is especially galling because, as already argued, most of the dams are not even needed, the region being almost self-reliant in power production.

The planners' neglect of the ecological impacts and the geological factors reflect on the legitimacy deficit in these projects. One major inconvenience is the fact that the Brahmaputra floods extensively during monsoon season will hinder the dams' utility and efficiency. The North eastern part of India is seismically active and prone to earthquakes. A major earthquake in 1950 completely altered the shape of the river basin. This makes the Brahmaputra a dangerous place to invest in dams because an earthquake could have severe impacts for the many people downstream.

Another contention of controversy is the dams' relationship with pollution, energy, and climate change. The conventional wisdom on dams is that the dams are being created to produce renewable energy in the form of hydroelectricity. This will help the nation transit away from coal and fossil fuels. The government views the dams as a crucial step to lowering pollution throughout the nation.

7.5 Suggestions

Dams around the world provide critical water supplies and hydropower to growing communities and hundreds of new dams are proposed for developing economies. Though viewed as sources of potential green energy, their construction also poses a significant environmental cost.

Managing rivers to better meet both human and ecosystem needs is a complex societal challenge. People need water and power, but damming rivers causes substantial damage to ecosystem functions and services. New research conducted at Glen Canyon Dam on the U.S. Colorado River offers insights into ways to temper detrimental effects of dams, including a proposed management technique to mitigate the impacts of a common hydropower practice called "hydropeaking" that affects river food webs.

Hydropeaking, is a practice used to increase river flows from hydroelectric dams during periods of peak demand by electricity consumers. Hydropeaking creates a fluctuating

daily pattern of water flows that can severely impair productive shoreline habitats through repeated wetting and drying.

Organisms particularly vulnerable to hydro peaking are aquatic insects, vital strands of the river food web, which lay their eggs near shorelines. Although hydroelectricity is renewable energy, hydropower is not necessarily 'green' unless dams are located and operated in a carefully considered way. In a world of growing demand for water and energy, we face an increasingly uncertain hydrological future. We have to balance economic gain against environmental degradation.³²⁰

There must be comprehensive assessment of dam projects with mandatory emphasis on the impact on ecosystems in consultation with relevant experts. In order to assess the ecological and economic and social impacts of dams a feasibility study should be conducted on a regional level. The needs of power and irrigation should be balanced with the maintenance of ecological equilibrium. For all the direct and indirect consequences of the Project the project implementing authorities should be made accountable. The evaluation of any project should take into account the impacts of projects on the productivity of the surrounding soil, on genetic resources and loss and damages to habitat both up and downstream of the river. There should be compensatory a forestation to replace natural forest by plantation.

Resettlement and rehabilitation cannot be a matter of a single day ,therefore resettlement and rehabilitation plan for the people should be well thought out. The process needs to be carried out in different phases over a longer period. Physical relocation of people to safer places followed by rehabilitation measures such as giving compensation, allotment of agricultural land, provision for housing and civic amenities at relocation sites, shifting of families etc must be adhered to in the first phase. In the next stage, attempts should be made to keep intact as far as the social, economic, and cultural fabric of the displaced people. Cultural ties weaken if there is displacement by dispersing kin groups and dismantling resource base and production system etc. Therefore the distance between the old and new sites should be kept at the minimum possible level.

Employment opportunities should be given to the people in the relocated sites coupled with training for skill development. There should be ecological rehabilitation for those

³²⁰ Available at <https://www.sciencedaily.com/releases/2016/09/160909112300.htm>(Dec 9,2020,10 PM).

who depend on nature for their day-to-day living. This includes providing access to fuel and fodder and other forest produce on which the displaced depend on. State agencies, Non Governmental Organizations, and other non-state actors should have regular meetings and consultations with the displaced people to ensure their involvement and participation, which will in turn help to resolve conflicts and public grievances and would help in better implementation of resettlement and rehabilitation programmes.

There should be in-depth studies (Environment Impact Assessment), which are critical to evaluate and quantify potential project impacts and pre-dam, present and post-dam ecological survey of dams should be put into public domain and made easily available for common people and researchers.

North East is a geologically and seismologically sensitive region. Therefore comprehensive environmental risk assessment in the Northeast is the pre requisite to decide the viability of big dams in the region. The Lower Subansiri Expert Committee report has shown that there is paucity of understanding of earthquakes and their impacts in the region while planning and designing dams. These environmental risks need to be properly understood while evaluating the viability of dams in the Northeast.

On the other hand, dam construction has the potential of altering the course of a river and may result in ecological degradation of the river and the riparian land in downstream areas. Environmental flows are not maintained in most of the operational dams. This results in anomalous and erratic release patterns. This suggests that there is no knowledge of how much flow in the river is to be ensured down the dam in different stretches of the river so that needs of environmental use and human consumptions are adequately fulfilled.

There is another issue and concern which aggravate the dam issue in the North East India. Dam construction in the upper stretches of river Brahmaputra by China will also affect the life and living structure of the NER. Therefore, while taking decision on large dams within India these factors must be considered so that the native people do not feel deprivation and stagnation from the development initiatives.

Whatever stage they are all the project related activities should be stopped. Comprehensive review of all projects should be carried out by taking into consideration all the contentions of activists, academics and affected people. Information should be made available in the public domain.

There are issues associated with the manner in which the environmental impact assessments of various projects have been carried. There is conflict of interest and the institutions that carry out the assessment lack credibility. They lack independence and at times capability. These issues are further aggravated by lack of transparency, a denial of the right of people. They are not involved in decision making process or the, project planning and implementation process. Often the EIAs appear *fait accompli*, and apparently not a single project in India has been rejected based upon the EIA report. The issue with EIAs is not limited to the Northeast alone; this is the norm all over the country. It is high time that the entire process is streamlined and restructured in a more transparent, democratic, participatory, scientific and objective manner.

The recent measures implemented by the Ministry of Environment and Forests (MoEF) to accredit qualified EIA consultants following stringent selection procedures is welcome but not adequate. There must be cumulative impact assessment. The civil society has engaged enough on this issue that can be said to be a prelude to determining the methodology of the EIAs. The entire process needs streamlining and this streamlining requires political will from the side of the MoEF. Fresh EIAs for all projects in the Northeast as part of this comprehensive review should be conducted as a part of this protocol.

Northeast is known for its ethnic diversity and socio-culturally vulnerable communities. There must be Social Impact Assessments (SIAs) as they are as important as EIAs especially in a sensitive region like North East India. A comprehensive socio-anthropological assessment of the likely impacts of the hydropower projects on the lives and livelihoods of ethnic people should be included in the comprehensive review considering the intrinsic vulnerabilities of different ethnic communities in the region in terms of their livelihoods, culture, customs and traditions as well as their sacred spaces.

Hydropower projects are being promoted in the Northeast region often for exogenous reasons. It is time to reverse this trend. The comprehensive review process should include the developmental needs of the region, taking into account its biophysical, socio-economic and cultural diversity. The people should be made to involve and participate in defining its developmental agenda and use its natural resources. Enormous stress is put on natural resources. India as a nation needs to rearticulate its developmental strategy. In order to mitigate climate change in this era, developmental

pathway with a low energy and water footprint is an essential. This would help to redraw the future energy policy and strategy of the country with energy efficiency measures, and tapping renewable like wind, solar, biomass and small hydro, thus opening up a wide range of options. This would help to move away from a large hydro centric energy strategy, and as a result, the need for large-scale hydropower production in the Northeast could be substantially reduced.

People should be allowed to choose from the alternatives to hydropower. The concerned government and the departments together with the academy, civil society need to facilitate this in line with the key recommendations of the World Commission on Dams. The revenue accruing from these projects should be shared fairly with the affected communities and that too with minimal ecological and social costs.

States like Arunachal Pradesh have attempted to address some of the issues through state specific resettlement and rehabilitation (R&R) laws, but restricting themselves to increasing compensations for individual and community land (including forest land) to be directly acquired for the project. Prior to addressing R and R a robust social impact assessment should be carried out to considering the context of socio cultural realities of the region including identification of project-affected persons (PAPs) whose land may not be directly acquired but are clearly affected by the project

In all the ToRs for EIA studies for hydropower projects should be determined on a case-to-case basis according to the local context after proper consultations. Downstream impact assessment should be made mandatory. Environmental risk-assessment as part of EIA studies should be comprehensive, going beyond the current practice of restricting it to only a dam-break analysis.

There must be mandatory public consultations in downstream affected-states and; based on this impact assessment and consultation processes, project-affected persons (PAPs) in the downstream should be identified too.

The immense unexplored hydropower potential of the North-Eastern Region could meet the future energy demand of this region as well as India. More over this region has the potentiality to partially fulfil the energy demand of the neighbouring countries especially Bangladesh. Exploring this untapped hydro power this region could be the 'Power House of India'. However, we can't ignore the issues associate with the

generation of North-Eastern Hydro Power. We have to seriously concern about these issues and take concrete steps to minimize the problems.

For a proper EIA report, a multi disciplinary (joint task force of social scientist, engineer, and environmentalist) task force is needed to assessment the socio-environmental challenges associate with the proposed projects. Wisdom must go beyond technocratic institutions and an approach based on all perspectives must be adopted.

Building dams in vulnerable areas should avoid the vulnerable areas (very high terrain with slope factor and week lithologic character) for big dams. Instead of big dams small dams like cheek dams can be constructed (micro integrated control dams) according to the stream order and distribution of contours. Size and the height of these dams must be increased according their stream order. In this way an ascending order of dams in the catchment area can delayed the flood and provides relatively much more time to evacuate the people of lower area. This type of dams can also play vital role in village electrification generating the hydro power as well as can provide irrigational water to the agriculture field.

The rivers of North-Eastern states having hydro-potentiality are all trans-boundary River. So, water dispute is a common phenomenon in this part of the world. As a lower stream country Bangladesh is always anxious about Indian Hydro- Projects but it occasionally raises its voice on China's water piracy in Brahmaputra river system. Both India and Bangladesh have formed the Joint River Commission which discuss about the sharing of water wealth of India and Bangladesh. India can use this Joint River Commission to raise the protest against China's river divert project of Tsangpo or Brahmaputra.

Bangladesh is facing the serious scarcity of electricity. Its' various development projects are being hampered due to power shortage. If the Central Government will ensure to export a considerable amount hydro power to Bangladesh, the objection of Bangladeshi people may reduced on Indian Hydro projects of North-East. If it would be possible then the hydro power of North-East will be directly reached to rest part of the country through Bangladesh. In that case transmission loss will be minimized and transmission problem through Siliguri corridor could be resolved.

Everybody knows that transmission loss due to load factor is a serious problem of power grids. When the distance between demand area and supply area is minimized, only then transmission loss can be less. The power consumption rate of the North-Eastern States is lower than the national average; the annual per capita consumption in the region is 119 kilowatt/hours where national average is 390 kilowatt/hours. So, if the rate of village electrification and industrialization processes will be increased, the proper utilization of hydropower of this region would be possible.

The development of the Northeastern Region's hydro potential should be satisfactory after the formation of a South Asia regional power grid system with equal transmission frequency with the cooperation of the countries in this region

Last but not the least, without the participation of local people any development activity can't be successful and it is also very truth that these development activities are also be acceptable to them. So, continuous awareness programs must be run in local people to enhance their perception on Hydro projects of NorthEast India.

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

CHAPTER SUMMARY

- The chapter provides a statement to sum up the research.
- Research findings have been highlighted.
- The accomplishment of objectives has been highlighted.
- Hypothesis has been tested.
- Suggestions and recommendations have been provided.

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ANNEXURE

REPORT
ON
DC DOWNSTREAM IMPACT STUDY OF THE ONGOING
SUBANSIRI LOWER HYDROELECTRIC POWER
PROJECT AT GERUKAMUKH

OF
NATIONAL HYDROELECTRIC POWER CORPORATION
LIMITED

Submitted by

The Expert Group

**Downstream Impact Study of the ongoing
Subansiri Lower Hydroelectric Power Project**

Gauhati University, IIT Guwahati, Dibrugarh University

Members of the Expert Group

From Gauhati University (GU).

1. Dr. Jatin Kalita, Professor, Department of Zoology (Co-Ordinator)
2. Dr. A.K. Bhagawati, Professor, Department of Geography
3. Dr. S. Kalita, Professor, Department of Environmental Science
4. Dr. B.P. Duarah, Reader, Department of Geological Sciences

From IIT Guwahati

1. Dr. A.K. Sarma, Professor, Department of Civil Engineering
2. Dr. Chandan Mahanta, Professor, Department of Civil Engineering

From Dibrugarh University (DU)

1. Dr. S.P. Biswas, Professor, Department of Life Sciences
2. Dr. J.N. Sarma, Professor, Department of Applied Geology

Project Assistant

Mr. Dhruva Jyoti Deka (Geology, GU), Ms. Chinmoyee Gogoi (Geology, GU), Mr. Pranjit Sarma (Geography, GU), Mr. Khairul Islam (Geography, GU), Mr. Biswajit Sarmah (Zoology, GU), Mr. Rajesh Shah (Environmental Science, GU), Mr. Bikramaditya Bakalial (Life Sciences, DU)

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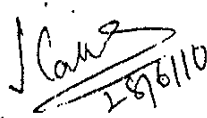
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PREFACE

The Lower Subansiri Project, as envisaged by Brahmaputra Flood Control Commission as back as 1955, was a multi-purpose project primarily for flood control and irrigation with a 122 m high dam near the present dam site. Three other alternative sites were also investigated in the upstream because of the soft nature of Siwalik sandstones at the proposed site. In 1977, the 'Board of Consultants' of Brahmaputra Flood Control discussed the merits and demerits of all the alternative sites and ultimately the present site was chosen. Originally a 257 m high rockfill dam was proposed at the present site and detailed investigation was carried out for the purpose. The proposed height of the dam was subsequently reduced to 116 m on the point that some towns of Arunachal Pradesh would be flooded if the proposed height was maintained. Later on the Brahmaputra Board handed over the project to NHPC in May 2000 without any decision regarding the suitability of the dam site after initial investigations. Since the earlier investigations were not sufficient, NHPC did additional investigation on the basis of which the present 116 m high concrete dam was initiated.

The initiation of the project in due course created great fear among the downstream dwellers, which had the fate of experiencing a devastating flood hazard caused by breaching of a huge barrier resulting from landslips caused by the Great 1950 Assam Earthquake. Such a fear compelled the people to get organized and to raise a demand for a detailed study of the probable downstream impact of the project. Their demand eventually led to the decision to form an Expert Group jointly by the Ministry of Power, Govt. of Assam, All Assam Students Union and NHPC. Accordingly, the Expert Group was constituted with faculty members from Gauhati University, Indian Institute of Technology Guwahati and Dibrugarh University, and as negotiated, necessary fund for the study was provided by NHPC.

The Expert Group after threadbare discussion on various aspects of the hydroelectric project, especially geological and seismological appraisal of the dam site and the downstream impacts of the project, identified eleven major components and accordingly carried out necessary studies from September, 2008. The theoretical bases and methodology followed the results obtained and the recommendations made finally are systematically presented in this report.


(Jatin Kalita)

Co-Ordinator, Expert Group
Downstream Impact Study of the ongoing
Subansiri Lower Hydroelectric Power Project

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CHAPTER I

INTRODUCTION

The 2000MW capacity Lower Subansiri hydel project, which envisages annual power generation of 7421MU, is one of the major hydropower projects in the Northeastern part of India. This project being a single purpose project in principle, downstream area will not get any direct benefit such as irrigation, navigation and recreation (promotion of tourism). On the other hand, besides the safety aspect of the project change in the water regime may cause adverse impact on the downstream. Thus, necessity of conducting a *Downstream Impact Study* was felt to assess impact of the Lower Subansiri Project on the downstream area so that necessary possible measures can be taken up for mitigating the adverse impact, if any.

1.1 The Subansiri river

Subansiri river originates in the Himalayas beyond the Great Himalayan range at an altitude of 5340m. In its upper course the river takes an easterly course from its origin around $91^{\circ}33'04''\text{E};28^{\circ}29'38''\text{N}$ to $94^{\circ}01'48''\text{E};28^{\circ}21'32''\text{N}$ and then takes south-easterly course up to the point $94^{\circ}20'49''\text{E};27^{\circ}43'26''\text{N}$, from where it takes sharp turn towards southwest and continues up to $94^{\circ}12'43''\text{E};27^{\circ}36'18''\text{N}$. It afterward journeys to the position $94^{\circ}17'02''\text{E};27^{\circ}13'52''\text{N}$, in which section the ongoing project is located and then takes a curvilinear trend, convexing southeastward, and meets the Brahmaputra river at an acute angle. The river takes its southerly course emerging out of the Himalayas and enters the Brahmaputra river valley near Gerukamukh. In upper reaches, the river is known as Tsari Chu. The total length of the river in the mountainous terrain is 208km. It's length is 126km from the dam site to the confluence with the Brahmaputra (near Jamuguri, about 5km southeast of Hawajan). Total drainage area up to the confluence with the Brahmaputra is 35,771 sq.km. as measured from SRTM (shuttle radar topographic mission) digital elevation model data derived catchment area map (37,000 sq.km in the NHPC Hydrology report; 34,900 sq.km in the Site Investigation and Geology report). The catchment area, up to the proposed dam site, is found to be about

26,213 sq.km. from SRTM data (34,900 sq. km. in NHPC Hydrology report) of which about 10,345 sq. km. (14,000 sq. km. in NHPC Hydrology report; 11,200 sq.km in the Site Investigation and Geology report) lies in Tibet and the remaining in India. The basin extends between latitudes $26^{\circ}54'14.72''\text{N}$ and $28^{\circ}55'24.79''\text{N}$, and longitudes $91^{\circ}33'09.83''\text{E}$ and $95^{\circ}04'38.44''\text{E}$ (Fig.1.1). The drainage pattern generated from SRTM data is given in Fig.1.2. The dam site is located at latitude $27^{\circ}33'15''\text{N}$ and longitude $94^{\circ}15'30''\text{E}$. The deepest river bed elevation at the proposed dam site is around 94m above *m.s.l.*

The contribution of the Subansiri river is estimated to be about 10 percent of the total discharge of the Brahmaputra river at Pandu near Guwahati. One of the important tributaries of the Subansiri is the Kamala river that joins the Subansiri at latitude $27^{\circ}46'17''\text{N}$ and longitude $94^{\circ}19'18''\text{N}$ and is about 175 km in length.

Except the short braided stretch in the foothill zone, the Subansiri is typically a meandering river with drastic channel shifts. Chute cut-offs and neck cut-offs are common processes observed. The westerly migration of the Subansiri river considered to suggest a post Pleistocene tilt in the basin (GSI, 1977).

In the 10 km reach from the foothills near Gerukamukh to Chauldhoaghat, the riverbed is composed of sand mixed with pebbles and boulders. Further downstream, it is mostly composed of sand. The average slope of the river bed from the foothills to 5km downstream of the dam is 0.000826, from 5km to 40km is 0.000354, and from 40km to the confluence of Brahmaputra is 0.000165. The river banks from the foothills to Chauldhoaghat are composed mostly of sand, gravel and silt, beyond which they are composed almost exclusively of alluvial silt.

Average annual rainfall is 2,356 mm. Average minimum temperature is 7.85°C , Average maximum temperature is 34.15°C , minimum monthly mean temperature is 16.73°C and maximum monthly mean temperature is 30.23°C .

Maximum observed discharge at dam site is 12,024 cumec and minimum observed discharge is 188 cumec (NHPC report). However, the maximum discharge recorded by Brahmaputra Flood Control Commission at Chauldhoaghat on 11 July, 1971 was 21,230 cumec (GSI, 1977) and is a big figure to be attributed to the small tributary rivers, viz., Dulang R., Dirpai Nala, Geruka Nala and Chauldhoa Nadi

1.2 The hydroelectric power project

The Subansiri Lower Project lies in the Siwalik foothills bordering the alluvial plains of the Brahmaputra on the borders between Arunachal Pradesh and Assam. The Subansiri debouches in the foothills forming great fan deposits of the piedmont zone with big boulders, and gravels (pebbles, grits, coarse sands). The dam site is located about 2.3 km upstream from Gerukamukh. The project site is approachable by road from Gogamukh.

The Brahmaputra Flood Control Commission (BFCC), Brahmaputra Board and Geological Survey of India (GSI) have done the initial investigations and in May, 2000, the project was handed over to NHPC. Since the data of investigation were not sufficient, additional investigations such as geological mapping, drilling and rock mechanic tests have been carried out by NHPC subsequently to prepare the Detail Project Report (DPR) of the project. Before NHPC's investigation, very little information was available to evaluate geological conditions for the later proposed concrete dam.

Originally a 257m high rockfill dam had been proposed in the site. This proposal could not get through due to submergence of Daporijo, Damporijo and Tamen towns of Arunachal Pradesh. Subsequently, height of the dam was reduced to 116m to avoid submergence of the above townships.

1.3 Salient features of the hydroelectric power project

Reservoir characteristics: Maximum water level (MWL) El 208.25m, full reservoir level (FRL) El 205m, minimum reservoir level (MRL) El 190m, minimum drawn down level El 181m. Gross storage at El 205m, 190m and 181m are 1365, 923 and 720 million cubic

CHAPTER-II

GEOMORPHOLOGY AND GEOLOGY

2.1 Introduction

Geomorphological and geological study are the important aspects that need to be studied thoroughly, since it reflects the processes involved and their intensity in moulding the landscape and the subsurface. The downstream of the Subansiri is a fluvial landform controlled by the tectonic setting in a foreland basin. For the study, digital elevation data, satellite images, published data and reports and fieldwork data have been used.

2.2 SRTM data

The SRTM data have been utilized to generate the Subansiri river morphometric and topographic parameters. The 90m resolution data have been used for the purpose to get simulation for 1:50000 toposheets which we use as the base map for the entire work. The catchment area, catchment shape, stream order, stream density, stream length, sub-basins shape and size etc. have been calculated by analyzing SRTM data using River Tools 3.0 software.

2.3 Relief map

Relief maps of the Subansiri catchment (Fig.2.1) and the downstream area (Fig.2.2) have been generated using the SRTM data. High relief in the upper catchment with sharp rise mountain tops is indicative of hard rock terrain associated with low erosion rate. On the other hand the southern part (the Lesser Himalayan region) has relatively low topography with flat hill tops, characteristics of a loose, friable rocky terrain with high erosion rate and appears to be influenced by the excessive rainfall that do occur in this part along the southern foothills of the Himalayas. This is also in all probability controlled by the complex tectonic setting of the region with several major faults / thrusts that are present in the area. The map in figure-2.2 shows an arcuate wide depression with its convexity towards south-southeast. It is an asymmetrical basin and has gentle slope in its eastern flank. The Western flank has steeper slope and narrow zone of depression.

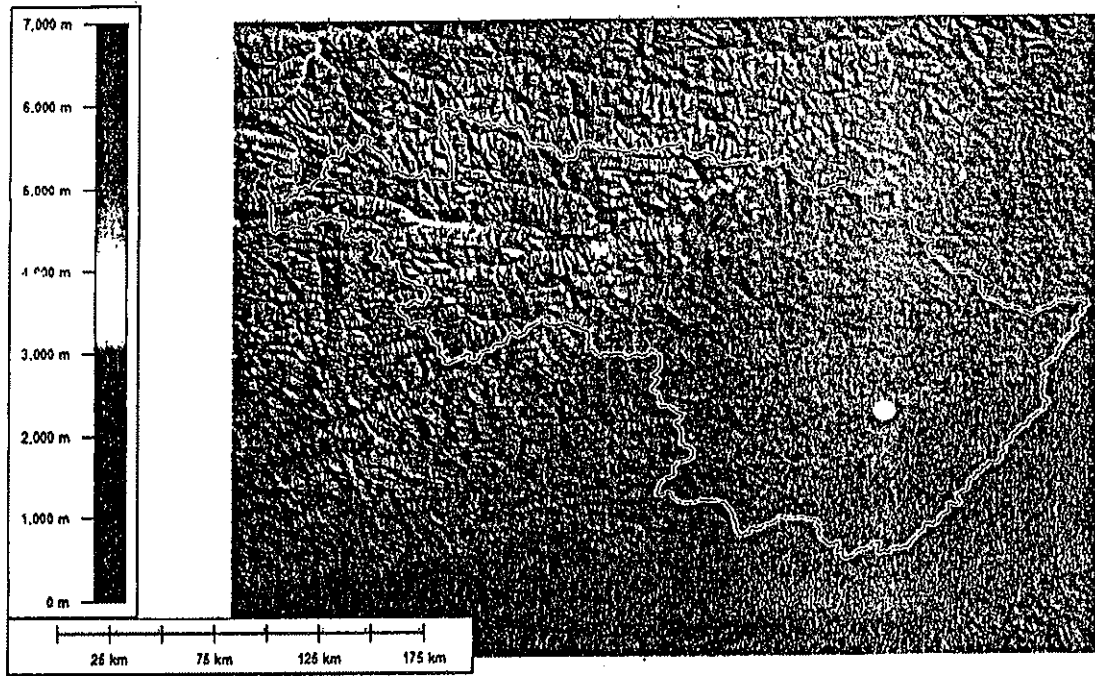


Fig.2.1a : Topographic relief of the catchment area. The yellow line represents the trace of the catchment boundary. The white filled circle indicates the position of the dam site.

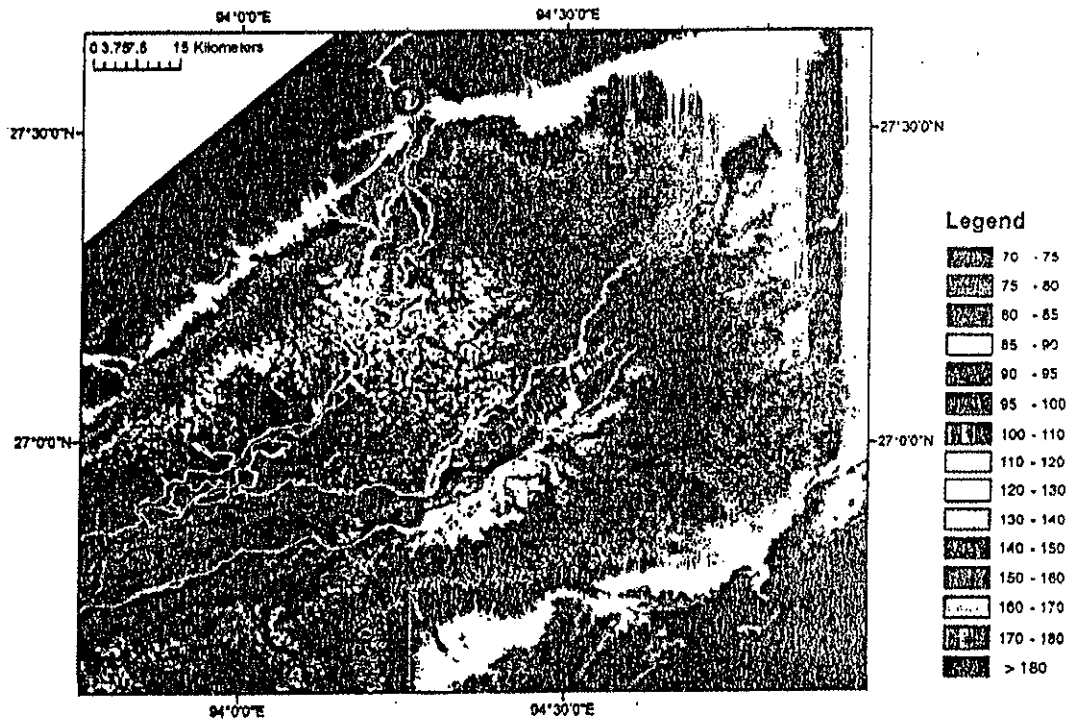


Fig.2.1b: Relief map of the Subansiri basin and its surroundings. The relief values are given at 5 metre interval from 70m to 100m and the rest at 10m interval.

2.4 Geomorphological mapping of the area

2.4.1 Introduction

Within the Subansiri Basin, the foothills region exhibits a southerly sloping landform from the outer most range of the Arunachal Himalaya. The zone is confined approximately between 137m and 107m, extending in an approximately NE-SE direction, which is also the trend of the outer most hill range in this region. In this zone two terraces are recognized: the 'high level terrace' above 122m and the 'low level terrace' between 122m and 107m, and its southern limit merge with the flood plain of the present river system. The high level terrace is dissected by all the major rivers of the area namely Subansiri, Ranganadi, Dikrang and their tributaries and have incised valleys, at places 15m to 20m deep, in this surface. There is a distinct difference in level between the high Level and the low level terraces. In section of the Harmati Tea Estate, the difference in level is about 15m. The low level terrace is also dissected by the present river system but the height of valley walls does not exceed 5m. The

Chapter-III

CLIMATE AND HYDROMETEOROLOGY

3.1 Introduction

Climate representing the long term weather conditions of a region is an integral part of the natural environment of the region which mainly determines the flora and fauna, and thereby directly or indirectly influences the livelihood, economy and culture of the populace living in the region. It is the outcome of synthesis of spatiotemporal variations of all weather elements and weather related phenomena. Any significant change in the characteristics of the major weather elements, especially rainfall, ambient air temperature and relative humidity due to manmade or anthropogenic activities influence the biodiversity of the region. The effects are more prominent in case of microorganisms and small species (both floral and faunal). Therefore, the study of the major weather elements is considered generally as a part of the baseline investigation in case of EIA study associated with any kind of developmental activities.

The whole of the Brahmaputra valley including the Lower Subansiri Basin is an integral part of the Southeast Asiatic Monsoon regime having a typical climatic personality in comparison to any other parts of India. In Koppen's climatic classification, the river basin shows Humid Mesothermal Gangatic type of climate (Cwb). Being a monsoon dominated region, rainfall in the basin is highly seasonal. The basic characteristics of the three major weather elements viz., rainfall, temperature and humidity have been studied on the basis of the data supplied by NHPC and the data available with the tea gardens located in and around the lower part of the basin, and the observations are discussed in subsequent paragraphs. IMD data available for the stations North Lakhimpur and Dibrugarh (Mohanbari) are also used for the study. Water balance analysis for rational classification of climate developed by Thornthwaite (1948) has also been incorporated in the study.

Literature shows that the catchment of the Subansiri falls in Dfh, Cwa and Cwb classes of climatic regions (Fig.3.1). The lower catchment in the plains and in Lesser Himalayas is dominated by subtropical monsoon climate with heavy rainfall (Fig.3.2a) exceeding 350cm. The annual rainfall near the Lower Subansiri dam site is about 440cm (Fig.3.2b). Most of the rainfall in Lakhimpur and Dhemaji occurs in the monsoon period (Fig.3.2c). Pre-monsoonal rainfall is also relatively high near the dam site and its surroundings, exceeding 80cm (Fig.3.2d).

Average annual rainfall in the Subansiri catchment increases to the foothills from the plains of Assam. In the Brahmaputra valley it is 250cm and near the dam site it exceeds 440cm. About 934.88cm rainfall occurred during 2000, as per the record of Ziro, the district Headquarters of Subansiri district of Arunachal Pradesh. The Subansiri river foot hills witnesses heaviest rainfall in Assam and is one of the prime causes of flood in the Dhemaji and Lakhimpur districts in Assam. Relative humidity is always high throughout the year except in the winter months being slightly less humid. Generally, it remains moderately clouded in the period of March to May, heavily clouded to overcast in the monsoon season and clear or slightly clouded during the post-monsoon season.

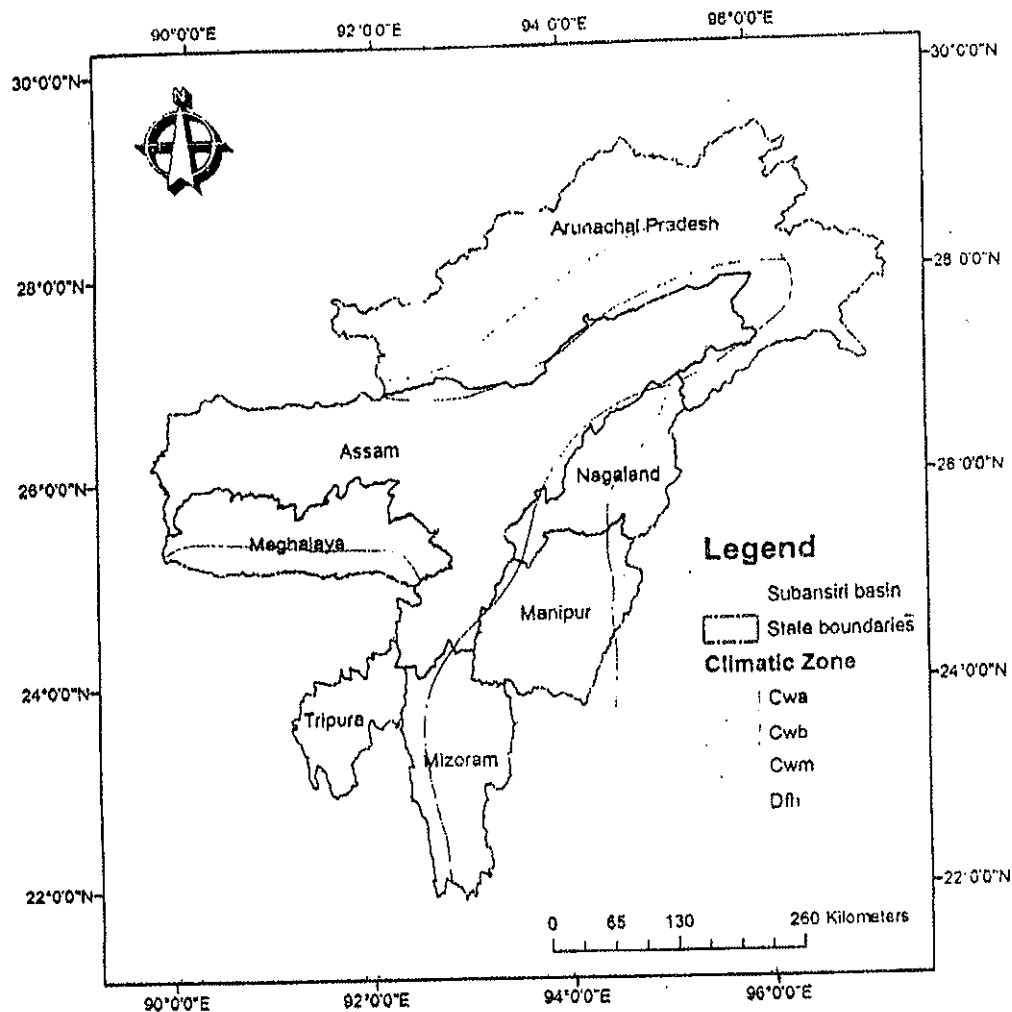


Fig.3.1: Climatic region of North-east India (After Borthakur, 1986). Cwa – Subtropical monsoon, mild dry winter; Cwb – Subtropical monsoon, mild partially dry winter, warm humid summer; Cwm – Subtropical monsoon with very heavy monsoon rains; Dfh – Humid continental severe winter, short summer, moist in all seasons.

Chapter -IV
**RUNOFF CHARACTERISTICS, SEDIMENT LOAD AND WATER
QUALITY**

4.1 Introduction to the problem

The study of the runoff characteristics of a river is of utmost importance; especially in connection with the construction of a dam on the river as it significantly modify the flow characteristics and the water quality in the downstream even in case of a ROR project. In a highly seasonally rain-fed river, the fluctuations in terms of discharge, water level and sediment load take place to a great extent in the downstream, if the reservoir operation is aimed to generate power only. Huge amount of water received by the river basin is stored and released even in case of a ROR project to harvest the maximum possible useful energy. It is evident that on the average, it leads to the decrease of the diurnal (during the day) and even seasonal variation of river discharge in the downstream. However, flood moderation in the downstream cannot be ascertained, because of the occurrence of intense rainfall during the middle or latter part of the rainy season by which time the reservoir may be almost in full capacity. It is not possible to predict the occurrence of intense rainfall well ahead of time (a week or so) accurately, so that the reservoir could be vacated to accommodate the volume of water poured by the intense rainfall in the basin. In such a situation, release of reservoir water in bulk quantity for the safety of the dam or even passing out the flood peak may aggravate the flood situation in the downstream compared to the normal floods experienced before the construction of the dam. Such event have already been observed and reported from time to time in case of other tributaries of the Brahmaputra river, namely, the Kopili, Kurichu and the Ranganadi rivers.

Although, the daily average discharges in the downstream during the lean period may increase due to the controlled release of water, significant diurnal variation of discharge is unavoidable for the profitable reservoir operation, since the demand for power varies during the hours of the day. The diurnal variation of discharge results in the fluctuation of velocity and water level in the river often leads to fatal impact on the aquatic life in the downstream of the river by completely destabilizing the aquatic habitats.

Another important point is that generally in the piedmont zone having sandy soil and coarse materials and considerable slope, the river feeds the ground water during the lean period significantly. In that case, significant diurnal variation of water level in the river may disturb ground water recharge process. All these observations are valid for Subansiri.

Water quality in the downstream of the river, especially in terms of turbidity and the DO, changes because of the controlled release of reservoir water. Major part of the sediment is deposited in the reservoir and the water routed through the generators of the power plant has low turbidity and DO. The low turbid water is more energetic and tends to accelerate bank-side erosion to regain its sediment load. Moreover, at the time of flush out of sediments from the reservoir, turbidity of river water in the downstream increases continuously affecting the aquatic life to a great extent. The flushed out sediment generally is deposited in the downstream beyond the dam site that lead to the rise of river bed aggravating flood situation during the rainy season as has been observed in case of the neighbouring Ranganadi project of NEEPCO.

Keeping these points in mind, it was essential to analyze the behaviour of both high and low flow (including environmental flow) in the Subansiri river before causing any interference in the flow of the river by the dam, so that proper planning in reservoir operation could be made to minimize the effects on the downstream environment.

Hydrological measurements pertaining to the gauge, water discharge and suspended sediment load of the Subansiri river, along its reach through the plains, was carried out at four stations: Dam site (Gerukamukh), Chauldhoaghat, Bhimparaghat and Daporijo.

The maximum discharge recorded by Brahmaputra Flood Control Commission at Chauldhoaghat on 11 July, 1971 was 21,230 cumec (GSI, 1977).

Hydrological data analysis for the period 1960-1978

Hydrological characteristics

The monthly discharge data (Table 4.1, Fig.1.1) based on the available daily discharge data for the period 1960-1978 at 'dam site' (Gerukamukh) have been analyzed. The minimum

4.2 Hydrological data analysis for the period 1960-1978

4.2.1 Hydrological characteristics

Mean monthly discharge data (Table-4.1, Fig.1.1) based on the available daily discharge data for the period 1960-1978 at 'dam site' (Gerukamukh) have been analysed. The minimum mean flow during this period is measured as 277.26 cumec during January, 1967 and maximum mean flow is measured as 6806.23 cumec during July, 1975.

Table 4.1: Mean monthly discharge data of Subansir river at dam site during the period 1960-1978.

	1960	1961	1962	1964	1965	1966	1967	1968	1969	1970
Jan	351.82	395.92	381.63	432.87	369.81	336.05	277.26	527.55	693.72	540.12
Feb	302.76	385.94	339.33	450.24	408.03	316.67	347.84	573.43	624.69	544.12
Mar	395.74	638.28	474.02	740.99		470.67	593.03	817.87	850.53	640.41
Apr	628.32	944.72		1112.18	802.48	843.63	567.53	972.31	762.99	938.66
May	1982.39	2531.01		1240.89	1423.64	1168.42	1754.82	1874.89	1751.87	1690.09
Jun	4580.48	2642.72		2055.97	2014.69	1749.95	3211.68	2314.24	3355.75	3234.50
Jul	5665.04	3753.86		2586.03		2416.19	2900.84	3368.03	1883.28	471.81
Aug	3614.45	4628.97		2634.51	2606.21	3031.30	1645.89	2714.29	1443.53	3400.81
Sep	3934.85	1972.96		2963.19	2428.47	2174.79	2102.49	2974.62	1215.96	3131.72
Oct	1705.17	2019.59		2202.77	1328.25	1377.66		2367.87	909.00	1840.00
Nov	760.44			967.19	749.56	707.53	599.88	1038.77	658.38	872.00
Dec	414.55			532.32	375.17	393.51	502.01	829.01	591.28	
Jan	1971	1972	1973	1974	1975	1976	1978	total	%	Mean
Jan		513.48	463.68	351.48	445.47	439.87	406.59	6930.35	2.05	43.61
Feb		512.62	476.29	458.32	487.71	520.93	471.68	7220.61	2.15	452.41
Mar		661.63	612.26	756.03	558.29	644.68	603.33	9460.81	2.97	625.80
Apr		1193.71	1000.00	1256.86	851.20	914.85	1398.26	14187.07	4.72	990.62
May	2109.38	2693.61	1919.00	1821.03	1870.40	2031.36	2573.27	30439.06	9.13	1918.81
Jun	6576.18	3596.93	4652.07	3529.27	3907.97	4677.50	4790.89	56890.90	15.66	3290.14
Jul	4586.31	4332.26	3505.55	5749.29	5575.90	5575.90	4788.00	62628.63	18.18	3517.67
Aug	3805.84	2514.45	4074.29	4755.45	3620.70	4796.70	4741.93	54032.34	15.09	3170.68
Sep		3341.97	3156.03	5211.00	5162.27	4194.00	3889.00	47852.72	14.04	2945.97
Oct		2197.81	2246.90	3293.097	3414.30	2659.79		27569.79	9.59	2014.77
Nov		802.70	942.37	1032.033	1130.87	844.43		11109.13	3.91	870.00
Dec		525.29	603.21	551.4839	539.84	566.97		6424.65	2.51	525.00
								100		2100.00

LAND USE AND LAND COVER MAPPING

5.1 Introduction

Land use and land cover (LU/LC) maps of the downstream area in the Subansiri river valley have been prepared using IRS 1C/1D LISS-III (multispectral) data for the months November, December, January of 2007, 2008 and LISS-IV (PAN) merged data with a resolution of 5.8 meter. Two LU/LC maps have been prepared, one for a large area surrounding the downstream area of the Subansiri river including northern part of the Brahmaputra and Majuli. The second, in the flood vulnerable zone, as defined in Chapter VII (Figs.7.1 and 7.2) has been prepared. The land use maps of the study area are given in Figs.5.1 and 5.2. Large scale maps of the same are given separately (Map-5.1, Map-5.2). The total area covered under all the categories of flood vulnerable zones including the Subansiri river is 227996.69 hectares (Table-5.1). The zone total excluding the Subansiri river is 210420.60 hectare (Table-5.2). The land use statistics are represented in pie diagram for easy visualization (Fig.5.3).

5.2 Methodology

Land use/land cover classes were visually interpreted and digitized in remote sensing and GIS software, since the automatic classification algorithms do not yield satisfactory results in the Brahmaputra valley basically due to high chlorophyll density. Field verification of interpreted data has been carried out. The LU/LC statistics have been determined (Table-5.1 and 5.2). Error matrix of the interpreted data has been carried out taking 250 computer generated random points in Arc GIS 9.3 (Table-5.3).

5.3 Identified land use classes

- 5.3.1 Agricultural land (current fallow):** The agricultural lands are identified as barren patches in the satellite images of November, December and

January. These lands are flat lying and mainly used for paddy cultivation in Assam.

- 5.3.2 Homestead plantation:** In the standard False Colour Composite (FCC) of satellite images, the villages in the Brahmaputra valley appear as linear red coloured tracts with rough texture. The reason for this is that every household in the Brahmaputra valley maintains a homestead garden (locally known as *bari*) around the house to meet family requirements of seasonal fruits, vegetable, medicinal and other necessary plants, which give the red colour tone of vegetation. The villages are found in linear tracts because they are located on the natural levee deposits forming elevated banks of paleo-rivers in the floodplain of the Brahmaputra river system. Therefore, this land use class includes rural settlements along with surrounding homestead plantations.
- 5.3.3 Agricultural plantation (tea garden):** These land tracts are used for tea plantation. The gardens appear mostly in red tone of vegetation in rectangular geometrical shape.
- 5.3.4 Agricultural fallow:** These are agricultural land, but due to flood inundation for long time contiguously for several years are included as agricultural fallow.
- 5.3.5 Sand infested area:** Sand covered areas with white tone, normally found near the river bank as over bank deposit. Some patches of large spread have been observed and the sand casting appears to be derived from large flood waves.
- 5.3.6 Scrub land :** These are dry land with bushes and without big trees.
- 5.3.7 Dense forest:** These are dense primary forest tracts identified by fine texture and deep red near homogeneous tone.
- 5.3.8 River channel:** Water channels of the Subansiri river and its tributaries.

- 5.3.9 Dry river channel:** The channels of the upstream tributaries of the piedmont zone and dry up channels during winter are found as white linear areas marked as dry river channel.
- 5.3.10 Sand bar:** These are bars of the Subansiri river which do not support vegetation.
- 5.3.11 Vegetated sand bar:** These are bars of the Subansiri river which support vegetation.
- 5.3.12 Swampy / Marshy land:** Swampy/marshy lands that occupy the shallow depressions formed by the abandoned meander loops of the Subansiri river system. They support aquatic vegetation and show a light red tone.
- 5.3.13 Water body:** These are also shallow depressions in the floodplain of the Subansiri river mostly formed by cut-off meanders and possess accumulated water but do not have aquatic vegetation.
- 5.3.14 Built-up land:** Urbanized areas with lots of concrete built up and are identified by their grey tone with road networks in the image.
- 5.3.15 Pabha Wildlife Sanctuary:** The downstream of Subansiri near the Brahmaputra has a rainforest area named Pabha Wildlife Sanctuary with wild buffalo. As demarcated from 1969-70 surveyed toposheet it had an area of 50 sq.km., but now encroached largely for agricultural and homestead plantation purposes. The remaining areas fall under swampy / marshy land.

Chapter-VI

ECOLOGY OF THE SUBANSIRI BASIN

1 Riverine fauna - fishes and dolphin

For the purpose of study on fishes and river dolphin, the entire survey area in the Subansiri river has been divided into 4 (four) sectors:

- | | | |
|------------|---|---|
| Sector I | : | Dam Site to Chauldhuwaghat Bridge; |
| Sector II | : | Chauldhuwaghat Bridge to Khabuli Aalisiga Ghat; |
| Sector III | : | Khabuli Aalisiga Ghat to Dhunagurighat; |
| Sector IV | : | Dhunagurighat to the confluence of the Brahmaputra. |

During the survey certain physico-chemical parameters of the water as well as recording of fish and other aquatic mega fauna was made (Tables-6.1, 6.2 and 6.3). The confluence areas of the rivers – Dikrong, Luhitmukh, Ronganodi, Kherkotia Suti, and Boginodi are also studied.

The riparian zone of the river was widely varied – from waste barren land to woody-forested area. The width of the river is also highly variable from Sector-I to Sector-IV and from upstream to downstream more sand bars and braiding of the channel have been noticed.

The riverbed was found almost exclusively sandy from Sector-II downwards. The riverbank on both sides is alluvial, mostly sandy and heavy bank erosion was noticed in many places. Human habitation near the bank side is rather sparse, mostly inhabited by the *Mising* Tribe. Along with this a few wetlands have feeding channels with the river.

Among the aquatic mega fauna, the Gangetic River Dolphin is the most prominent one in the river confluences. The fisherman in all the sectors used mostly gill nets. Other common fishing gears observed were seine net, cast net, deep net etc. In sector-IV harpoons were most frequently used to catch the giant catfishes. Fresh water turtles were also frequently fished out in this sector.

Table-6.1: Average physico-chemical parameters of the Subansiri river.

Parameters	Wet Months	Dry Months
Water temp. (°C)	31.6	23.4
Current flow (m/sec)	1.25	0.35
Transparency (cm)	19.5	77.5
pH	7.0	7.35
DO (ppm)	10.55	10.55
Free CO ₂ (ppm)	7.75	5.7
Conductivity (Ω)	96.45	104.3
Alkalinity (ppm)	106	81.5

Table-6.2: Fish types and major dolphin sighted area in the Subansiri river.

Sector	Major fish types	Dolphin sighted area
I	<i>Garra, Lepidocephalus, Botia, Barilius, Danio, Tor, Labeo, Aspidoparia, Mystus</i>	Nil
II	<i>Aspidoparia, Labeo, Cirrhinus, Clupisoma, Mystus, Puntius, Chela, Salmostoma</i>	N 27°19' E 094°11' N 27°18' E 094°12' N 27°05' E 094°09'
III	<i>Aspidoparia, Puntius, Chela, Labeo, Cirrhinus, Mystus</i>	N 27°02' E 094°03' N 27°01' E 094°03'
IV	<i>Aspidoparia, Chela, Wallago, Aorichthys, Catla, Labeo, Bagarius, Mystus</i>	N 27°00' E 094°01' N 26°59' E 094°01' N 26°50' E 093°51'

Table-6.3: Fishes of the Subansiri river in Assam.

SL	Name of the Fishes	Conservation status	Habitat	Local name
Family: Notopteridae				
1	<i>Notopterus notopterus</i> (Pallas)	LR-nt	R, W	Kanduli
2	<i>Chitala chitala</i> (Ham-Buch)	EN	R	Chital
Family: Clupeidae				
3	<i>Gudusia chapra</i> (Ham-Buch)	LR-lc	R, W	Koroti
Family: Cyprinidae				
4	<i>Amblypharyngodon mola</i> (Ham-Buch)	LR-lc	R, W	Mowa
5	<i>Aspidoparia jaya</i> (Ham-Buch)	LR-lc	R, W	Boriola
6	<i>A. morar</i> (Ham-Buch)	LR-nt	R, W	Boriola
7	<i>Barilius barila</i> (Ham-Buch)	LR-nt	R, W	Boriola
8	<i>B. barna</i> (Ham-Buch)	LR-nt	R, W	Ozola

9	<i>B. bendelisis</i> (Ham-Buch)	NE	R, W	Korang
10	<i>B. tileo</i> (Ham-Buch)	LR-nt	R, W	Bola
11	<i>Bengala elanga</i> (Ham-Buch)	NE	R, W	Aleng
12	<i>Brachydanio aciticephala</i> (Hora)	LR-nt	R	Darikona
13	<i>Chela cachus</i> (Ham-Buch)	NE	R, W	Harbhagi
14	<i>C. laubuca</i> (Ham-Buch)	Vu	R, W	Laupota
15	<i>Cirrhinus mrigala</i> (Ham-Buch)	LR-nt	R, W	Mirika
16	<i>C. reba</i> (Ham-Buch)	Vu	R, W	Lasim
17	<i>Chagunius chagunio</i> (Ham-Buch)	NE	R	
18	<i>Crosochielus latius latius</i> (Ham-Buch)	LR-nt	R	
19	<i>Danio acquipinnatus</i> (McClelland)	Vu	R, W	Danikona
20	<i>D. dangila</i> (Ham-Buch)	LR-nt	R, W	Darikona
21	<i>Devario Devario</i> (Ham-Buch)	LR-nt	R, W	Lauputhi
22	<i>D. rerio</i> (Ham-Buch)	LR-nt	R, W	Darikona
23	<i>Esomus danricus</i> (Ham-Buch)	LR-lc	R, W	Danikona
24	<i>Gara gotyla gotyla</i> (Gray)	Vu	R	
25	<i>G. kempi</i> (Hora)	Vu	R	
26	<i>G. lamta</i> (Ham-Buch)	Vu	R	
27	<i>G. nasuta</i> (McClelland)	Vu	R	
28	<i>Labeo bata</i> (Ham-Buch)	LR-lc	R	Bhangon
29	<i>L. boga</i> (Ham-Buch)	LR-nt	R	
30	<i>L. calbasu</i> (Ham-Buch)	LR-nt	R	Mali
31	<i>L. gonius</i> (Ham-Buch)	LR-nt	R	Kuri
32	<i>L. (Bangana) dero</i> (Ham-Buch)	LR-nt	R	
33	<i>L. pangusia</i> (Ham-Buch)	LR-nt	R	Silghoria
34	<i>L. rohita</i> (Ham-Buch)	LR-nt	R	Rohu
35	<i>Neolisochielus hexagonolepis</i> (McClelland)	NE	R	
36	<i>Oreochthys cosuatis</i> (Ham-Buch)	LR-nt	R	
37	<i>Osteobrama cotio cotio</i> (Ham-Buch)	LR-nt	R	Haffo
38	<i>Parluciosoma daniconius</i> (Ham-Buch)	LR-lc	R, W	Darikona
39	<i>Puntius chola</i> (Ham-Buch)	LR-nt	R, W	Puthi
40	<i>P. sophore</i> (Ham-Buch)	LR-nt	R, W	Puthi
41	<i>P. ticto ticto</i> (Ham-Buch)	LR-lc	R, W	Kani puthri
42	<i>P. conchoniis</i> (Ham-Buch)	LR-lc	R, W	Puthi
43	<i>P. sarana sarana</i> (Ham-Buch)	NE	R, W	Seni puthi
44	<i>P. gelius</i> (Ham-Buch)	LR-nt	R, W	puthi
45	<i>Rasbora rasbora</i> (Ham-Buch)	LR-nt	R, W	Danikona
46	<i>Raimas bola</i> (Ham-Buch)	Vu	R, W	Korang
47	<i>Salmphasia (Salmostoma) bacaila</i>	LR-nt	R, W	Selekona
48	<i>Semipolotus semiplotus</i> (McClennand)	Vu	R	
49	<i>Schizothorax stoliczkaei</i> Steindachner	LR-nt	R	
50	<i>S. progestus</i> (McClelland)	LR-nt	R	
51	<i>S. richardsonii</i> (Gray)	NE	R	

Chapter-VII

Socio-Economic Status of the People in the Downstream of Lower Subansiri Dam

7.1 INTRODUCING THE STUDY

7.1.1 Introduction

A river signifies a natural flow of water from a source to a destination following certain norms. Any human interference in its flow means some degree of change in its fluvial regime. Erection of a dam in the river course to control its flow for certain human purposes may have far reaching consequences on the natural and human environment of the concerned areas. Dams have a whole series of environmental and socio-economic consequences which, in some cases, may not have been anticipated. They trap sediments and thus reduce the amount of flood-deposited nutrients on the fields in downstream part (Goudie, 2001). Dam construction can have important effects on the viability of the traditional floodplain livelihoods and may bring considerable losses of agricultural and fishery production downstream (Adams, 1985). In the river valleys where farmers rely on annual flood to irrigate their crops and to bring nutrient- rich silt to fertilize their lands, dams can have disastrous impact. Neither flood water nor silt reaches the floodplains downstream, threatening the livelihoods of thousands of farmers (Goldsmith, *et al.*, 2003). In view of all these, some go as far as to say that the process of dam building needs to be far more democratized with full participation of affected people in the decision making process right from the planning stage (Dharmadhikary, www.panossouthasia.org, 2009).

Generally, the impact of dam construction on the local environment, especially in its immediate upstream, is assessed so that necessary measures for protecting the dam area and the environment around can be undertaken. In all cases of dam construction, environmental effects of dam and impoundments have received considerable attention. However, although its effects on the downstream areas are known to exist, they are still little studied or understood. Despite the importance of the downstream effects,

particularly of the tropical dams, relatively little research has been done in this regard (Adams, 1985). Some of the impacts like bank erosion, loss of nutrients and reduction in fish population below the high dams, the Aswan for instance, are unwelcome and costly (Park, 1997). If proper attention is paid well ahead to the probable effects in the downstream from ecological and socio-economic perspectives, the intensity and extent of loss may be substantially minimised.

In the case of the rivers that cut across more than one state/ region, the question of interregional co-operation appears to be crucial. For the huge rivers, which cut across several states, the management and development could generate the greatest impact at the regional level through reduced erosion, flood mitigation and hydropower generation. Proper efforts should be made in such cases to ensure long-term interstate or intercommunity development based on mutually beneficial interdependencies (*Strategy Report*, The World Bank, 2007). This indicates the relevance and importance of the studies on the impact of power projects on the people, land and economy in the downstream parts of a basin.

7.1.2 The Case of Subansiri Downstream Area

The Subansiri Lower Hydroelectric Power Project is an ambitious single purpose scheme for generating power with a capacity of 2000 MW. As envisaged, the project will not provide any direct benefit to the downstream dwellers in the form of irrigation, pisciculture, development water ways, tourism and other water-related activities. It is, therefore, very important to assess the probable effects of this kind of projects in the downstream areas where the people have a long history of adaptation to riverine environment.

The length of the Subansiri from the dam site to the confluence with the Brahmaputra is 126 km with a downstream basin area of 9598 sq km. For the present study based on geomorphological expression of floodplains, valley depression ascertained from digital elevation model of Cartosat-2 and SRTM data have been used to reduce the downstream

study area to 2280 sq.km. surrounding the Subansiri river. The area has 968 Revenue Villages of Lakhimpur and Dhemaji districts of Assam as per 2001 Census. The mainstay of the economy of the people living in these villages is agriculture including livestock rearing. The support of the household industry and service sector on the other hand continues to remain weak. Fishing is still important as an off-farm economic activity. During summer, when the river remains in spate, collection of logs from the river constitutes an auxiliary, but significant activity of the village people.

All the above mentioned activities are closely connected with the livelihoods of the people living in the downstream. For some people, particularly the Mising community, the river and the nearby wetlands form an integral part of their economy and culture. Under such circumstances, regulation of flow of a perennial river like the Subansiri, will definitely have some impacts, may be adverse in some cases, which call for a thorough study for their understanding and sustainable management.

An attempt has, therefore, been made in this section to study (i) the socio-economic characteristics of the people in the downstream area, (ii) the probable impact of the project on the life and living of the people, (iii) the dwellers' view on the effects of the project and (iv) measures that can be adopted to protect the interest of the people in the downstream and their future development.

7.1.3 Village map preparation

Village maps are prepared using the revenue village maps of the Government of Assam. As many people are not aware of their revenue villages, we had to face the problem in identifying the villages in certain cases during our fieldwork. Initially we have scanned the circle maps and georeferenced. All the maps have been georeferenced to UTM projection using WGS84 datum, since a large number of collected data are in that projection parameters. Another reason of choosing this projection parameters is the use of GPS which gives the positional data in WGS84 datum. Compilation of the village maps is a very difficult task, since proper projection, and as such the shape of the villages, are not maintained. This is an inherent problem associated with almost all cadastral maps in

Chapter – VIII

TECTONICS AND SEISMICITY

1 Tectonic Setting

The complex tectonic setting of the northeastern region due to northeastward movement of India along the Himalayan arc and east-west convergence along the Indo-Myanmar folded and thrust schuppen belt (Fig.8.1). In the Himalayas the Tsangpo Suture (TS), Main Central Thrust (MCT), Main Boundary Fault (MBT), Foothill Thrust (FHT) are the main tectonic discontinuities. In the Mishmi Hills to the east, Mishmi Thrust and Lohit Thrust are the major discontinuities. Like the Tsangpo Suture in the Himalayas, in the Mishmi region a suture zone exist which is known as Tidding Suture. The trend of all the major tectonic features is NW-SE. To the southeast, the Indo-Myanmar, Arakan Yoma trends in the NE-SW direction to its eastern part and takes southern trend in the western part forming an arcuate belt. As the thrust sheets are piling up from the north in the Himalayas and from the southeast in the Indo-Myanmar range the rocks of the Himalayas dips towards the north and that of the Indo-Myanmar range dips towards the southeast (Fig.8.2).

Deep rise of the Himalaya has been related to Himalayan Orogenic Movement-3 (HOM-3). The sedimentation of the Siwalik terminated in Late Lower Pleistocene or Early Middle Pleistocene due to strong compressional forces of the last phase of Himalayan orogeny (HOM-4). The Siwalik sediments were folded (F₅) and uplifted to give rise to sub-Himalayan ranges. It is during this orogeny that the Foot Hill fault (MBT-3 / HFT, Sengupta and Sengupta, 1997, page-41) forming the outer limit of the sub-Himalaya also developed. The folds developed in the Siwalik Group having trend parallel to MBT are related to deformation (D₆). These post-date Kimin Formation but are pre-Older Pleistocene, are thus related to early Middle Pleistocene HOM-4. During this deformational event, doubly plunging folds trending ENE-WSW to NE-SW are developed. According to Kunte et al (1983), the Dafla Formation is tightly folded into many synclines and

anticlines. The Subansiri and Kimin formations are folded into plunging Simna Parbat Anticline, and Papum and Lao synclines in Bargang-Pachin river section. The development of Tipi Thrust Fault and the FTH may also be related to this deformation (in Gupendra Kumar, 1997, page-117).

Important tectonic feature of neotectonic significance, subparallel to the Himalayan trend, is the FHT which delimits the Indo-Gangetic foredeep. It is significant that though homoclinally northward dipping Siwalik rocks have been encountered below the Indo-Gangetic alluvium but the shortening structures in the Siwalik Group of rocks have only been recorded north of the FHT (Narula et al., 1989). Tectonic features subparallel to the Himalayan trend are present as *Schuppen belt* (Kumar, et.al., 1989) between the MBT and the HFT which display evidences of neotectonism. These thrust type of faults merge along the strike with the MBT and could thus the splays of the MBT Narula et al., 1989).

Evidences of overriding of Siwalik rocks over the gravel beds have been recorded near Mohand (Nakata, 1972), near Kalagarh (Verma, 1960) and near the Subansiri Project (Ashraf, 1983) (in Narula et al., 1989, p.129).

In addition to the above structural elements, there are several other important tectonic features. The Dauki Fault is bounding the southern part of the Shillong Plateau in east-west direction and near Haflong, meets with the schuppen belt. The NW-SE trending Kopili Fault / Kopili graben (Bansal, 2004) separates the Mikir Hills from the Shillong Plateau. It might extend to the Himalayas. The Brahmaputra Lineament is running along the Brahmaputra course north of the Shillong Plateau and might extend further east to upper Assam. The Dhubri / Jamuna Fault bounds the Shillong Plateau to the west. There are two more important faults, the Dudhnai and the Kulsu in the central part of the plateau trending NS do exist and they bear indication of recent tectonic activities (Rajendran, 2004; Sukhija et al, 1999) along with Chidrang Fault and Dapsi Thrust in the Garo Hills.

In the Barak Valley the folded structures dominate over the thrusts due to adjustment of the Tertiary sediments due to lesser amount of plate convergence. The folds become low

and wide towards the Bengal Basin and dies down in the west; the entire area possesses anticlines and synclines almost all being doubly plunging. The western part of these folded structures is covered by the Quaternary alluvial deposits of the Surma and the Jamuna rivers.

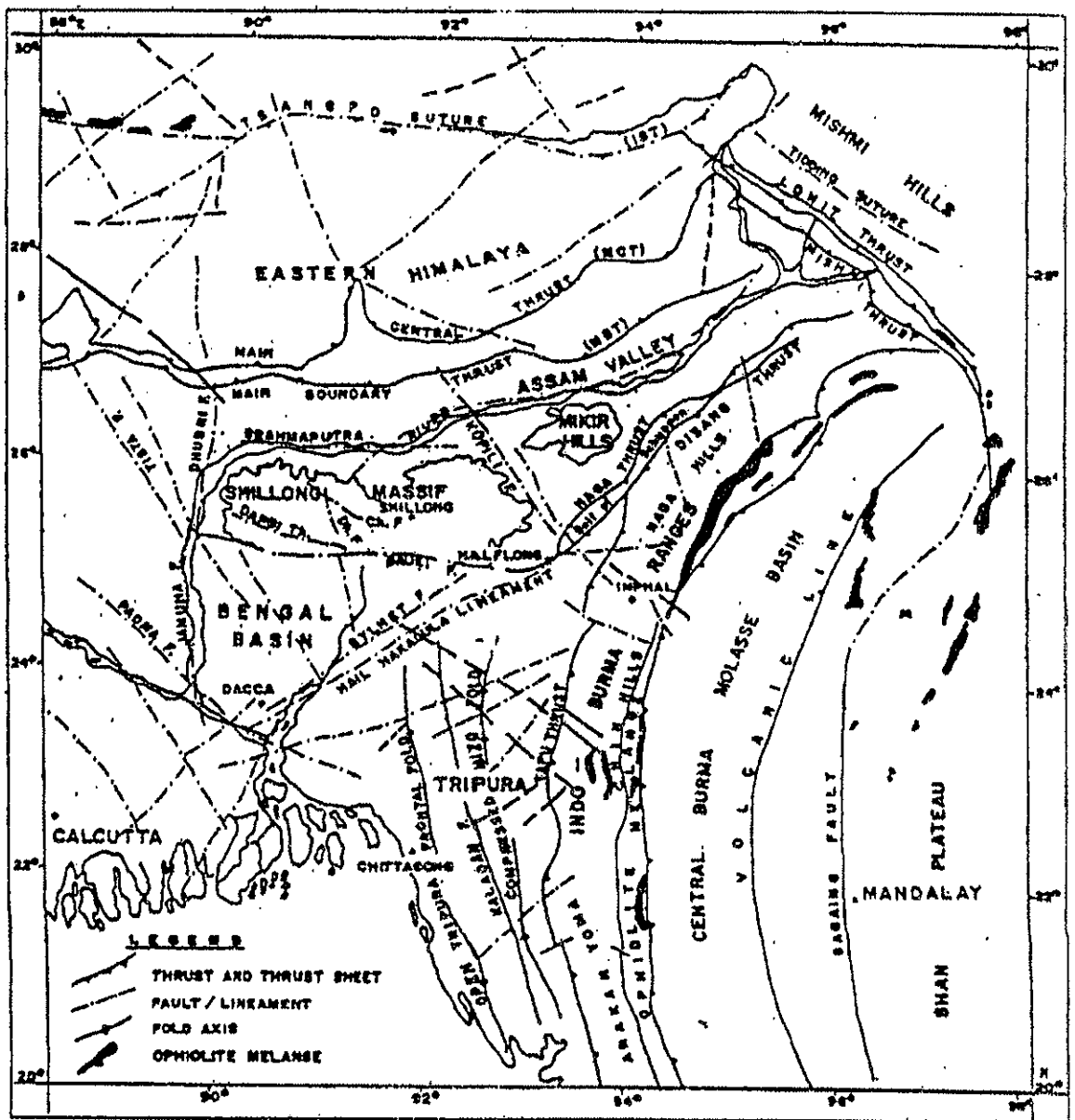


Fig.8.1: Tectonic setting of northeast India and surroundings (after Evans, 1964 and Krishnan, 1960. Source : Kayal, 1998).

Chapter-IX

DAMBREAK ANALYSIS AND RESERVOIR SIMULATION STUDY

Introduction

alter the timing and magnitude of downstream fluxes of water, sediment and temperature of water. Due to augmentation of flow by the dam operation, quality and quantity of water at the downstream may get changes affecting settlement or township and downstream of the dam. Generally large volume of water is released to the downstream during peak hours of power generation and flow in the river become quite less than its normal flow during the remaining hours of the day, particularly during lean period. Sort of diurnal variation may have various adverse impacts such as, disturbances in the mood of riparian people, problem to aquatic life, bank and bed erosion, channel degradation in the lower channel reach, siltation and deterioration of water quality (Adams, Graf, 2006).

To have an assessment of all such possible impacts, knowledge of the changes in flow of water in the river due to dam operation is a pre-requisite. This can be achieved through reservoir simulation.

Another rare possible event that may have devastating effect at the downstream is the failure of dam and the resulting flooding situation. This can be analyzed with the help of dam-break analysis using simulation model.

When a dam is breached, catastrophic flash flooding occurs as the impounded water escapes through the gap into the downstream channel. Usually, the response time available for warning is much shorter than that for precipitation-runoff floods, so the potential for loss of life and property damage is much greater.

Hazard evaluation is the basis for selecting the performance standards to be used in dam design or in evaluating existing dams. When flooding could cause significant hazards to life

major property damage, the design flood selected should have virtually no chance of being exceeded. This needs to provide dam safety standards with respect to the appropriate selection of an inflow design flood. If human life is at risk, the general requirement is to compute the flood using probable maximum precipitation (PMP). If lesser hazards are involved, a smaller flood may be selected for design. However, all dams should be designed to withstand a relatively large flood without failure even when there is apparently no downstream hazard involved under present condition of development.

In some cases in Hydrology, it is necessary to estimate flood quantiles of a high return period. Even the biggest flood physically possible in a specific catchment, called Probable Maximum Flood (PMF). The PMF has a physical meaning and it provides an upper limit of an interval within which the engineer must operate and design. The PMF is generated by the Probable Maximum Precipitation (PMP). There are in the literature basically two ways to estimate the PMF. The first one is to use the PMP estimate using rainfall-runoff models, which involves many assumptions about the PMP, about the conditions of the catchment and its physical features for its upper bound. The other way to estimate the PMF is empirical, such as the method developed by *Francois and Rodier* (1969).

From the PMF point of view, traditional flood frequency analysis has two main drawbacks. First, the lack of information about large events in the systematic record, which involves extrapolating to quantiles of very large returns periods from runs of data which rarely exceed 100 years. And second, most of the extreme distribution functions used in hydrology, don't provide an upper limit (*Thorndycraft et al., 2003*).

In recent decades, as a way to solve the problem of lack of information, non-systematic data have been included in flood frequency analysis, with good results. Non-systematic information is the censored information registered previously to the systematic record. There are two sources of information: historical (*Glade et al., 2001*) and palaeoflood reconstructions (*Griggs et al., 2002*). From the statistical point of view, both sources can be treated equally (*Griggs et al., 1994*).

Probability distribution functions with an upper limit have been recently applied to the extreme frequency analysis of annual maximum daily precipitation by *Takara and Tosu* (1999), *Takara and Loebis* (1996) and *Ellasson* (1994 and 1997). All these authors assume a previously known value of the upper limit PMP with the objective of improving the quantile estimates with high return period.

Dam failures can be caused by overtopping a dam due to insufficient spillway capacity during large inflows to the reservoir, by seepage or piping through the dam or along internal conduits, slope embankment slides, earthquake damage and liquefaction of earthen dams from earthquakes, or landslide-generated waves within the reservoir. Hydraulics, hydrodynamics, hydrology, sediment transport mechanics, and geotechnical aspects are all involved in breach formation and eventual dam failure. HEC Research Document 13 (HEC 30) lists the prominent causes as follows:

- (1) Earthquake
- (2) Landslide
- (3) Extreme storm
- (4) Piping
- (5) Equipment malfunction
- (6) Structural damage
- (7) Foundation failure
- (8) Sabotage

The breach is the opening formed in the dam when it fails. Despite the fact that the main modes of failure have been identified as piping or overtopping, the actual failure mechanics are not well understood for either earthen or concrete dams.

The parameters of failure depend on the dam and the mode of failure. For flood hydrograph estimation, the breach is modeled assuming weir conditions, and the breach size, shape, and timing are the important parameters. The larger the breach opening and the shorter the time to failure, the larger the peak outflow.

Chapter – X

OBSERVATIONS AND RECOMMENDATIONS

10.1 Observations

The Lower Subansiri Basin in Assam, an extensive alluvial landscape with exceptionally rich natural resource base, supports an ethnically diverse population that sustains primarily on traditional agriculture, fishery and allied activities. The area represents an example of spontaneous human response to a physically unique and biologically diverse riparian environment. The proposed Lower Subansiri hydroelectric project in the foothills apprehended to have a cumulative impact of different dimensions and magnitudes right from the immediate downstream to the confluence with the Brahmaputra, once completed. The following are the observations derived from the study addressing various issues and problems associated with the project, and its likely impacts on the downstream environment in Assam in general, and in Dhemaji, Lakhimpur and Jorhat (Majuli subdivision) districts in particular.

1. Geomorphology

The Subansiri river basin is broadly a crescent-shaped basin with its convex side pointing towards E-SE direction with gentle inwards slope. The W-SW part of the basin has relatively steeper slope. The river is migratory in nature. The estimated channel migration during a period of 96 years (between the year 1911 and 2007) is about 16.60 km in east-west direction. The river is migrating towards west against the natural slope of the basin. This is due to neotectonic activities within the basin. The downstream catchment of the Subansiri continues as a linear depression, though the river carries and deposited huge sediment flux into the basin. It can only be attributed to the sinking nature of the river basin. The Seismotectonic Atlas of GSI (2000) indicates that the basin forms a semicircular trough, the deepest centre of which is located near the debouching point of the Subansiri near Gerukamukh. The depth of the basement near the foothills is found to be more than 6.0 km which is also supported by the gravity contours (Bouguer anomaly) of the same map indicating a value of less than -260 m Gal. The -ve anomaly indicates the existence of low density sediments in the trough. The sharp contact of the foothill rocks with the alluvium and sediment cover, supplemented by field evidence of boulder beds overlain by the Siwaliks in the area, gives clear indication that the Siwalik rocks are largely thrust upon the Brahmaputra alluvium. The extent of this thrusting can be established only through 2D seismic profile studies. The seismic profile will also give additional vital information regarding the attitude of the Foothill Thrust (FHT). The

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results of the NHPC's 2D seismic study are not made available to the Expert Group so far and this still remains a serious gap in the geological understanding of the site.

2. Lithology

Petrographic study of the Subansiri sandstones indicates that the sandstones on which the dam is being constructed are poorly cemented, iron being the dominant cementing material followed by silica. The heavy mineral study of the Siwalik sandstones and the Subansiri river sediments shows marked differences in composition indicating that the present river sediments are derived from the Subansiri Formation as well as from upper catchment beyond the Subansiri Formation.

As the lithology of the foundation is composed of poorly cemented sandstones, even if the constructed dam can withstand long duration severe shaking during major earthquake, the rocks probably will not. Landslides/rockslides occur in the dam site along the shear planes as observed by the Expert Group during fieldwork in the cliff surface area above the power house. During sliding, the rocks disintegrated forming a mass of debris (Fig.10.1). NHPC use shotcrete to stabilize the slope in soft rocks (Fig.10.2). Though the rock-faces have been covered with shotcrete using long tensile tendons, stabilization of semi-consolidated rocks is in serious doubt.

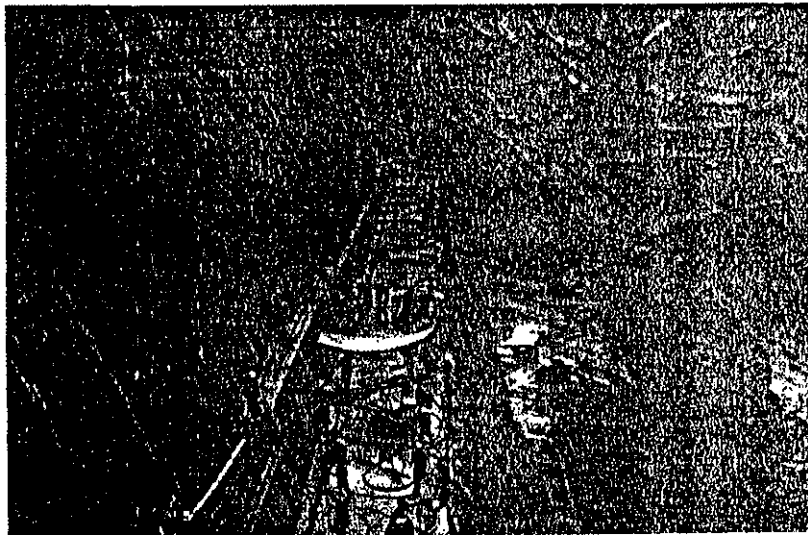


Fig.10.1: Rock slides along shear planes.

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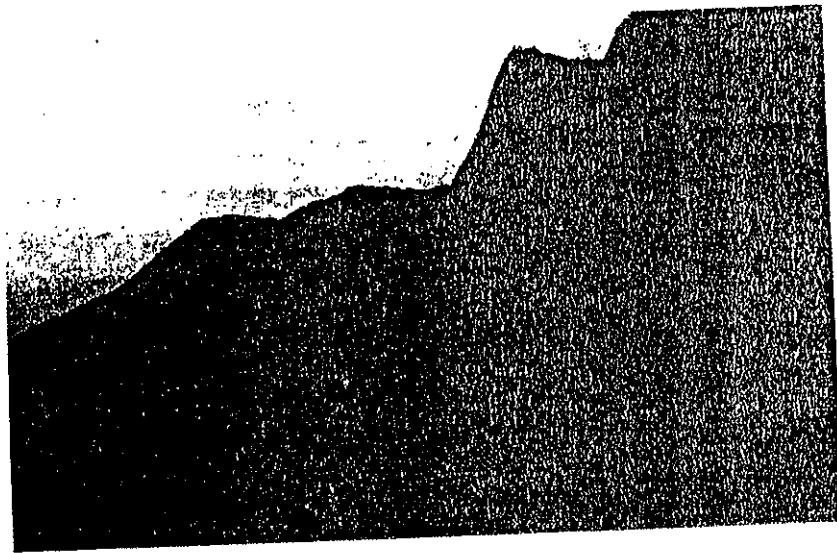


Fig.10.2: Debris at the top of the hills treated by shotcrete for stabilization.

3. Tectonic Setup

The entire dam site area exhibits many shear planes from upstream of the dam site to Gerukanala in the downstream of the dam site, through which the FHT passes. This indicates that the entire area from the FHT to upstream of the dam site falls within the FHT zone. Further, GSI has inferred a fault along the Subansiri at about one kilometer downstream of the dam site (as in GSI map supplied by NHPC). During field work at the dam site, it has also been observed that in the right bank of the Subansiri, a boulder bed is located at about 200 m above m. s. l., whereas the same is missing in the left bank at that level. In the left bank, the boulder bed is located in Gerukanala at about 110 m and appears conforming to the faulted structure as inferred by GSI. The geological map prepared on the basis of GSI's map supplied by NHPC and the later geological mapping of NHPC, both indicate the existence of anticlines and synclines in the area, the dam being located on the southern limb of one such anticline. The map prepared by NHPC also indicates the shifting of FHT in north-south direction by 3.5 km along a cross fault of about 8 km in length. This fault is located about 5.5 km west of the dam site and brings the Siwaliks overlain by Older Alluvium directly in contact with the Newer Alluvium, a clear indication of recent tectonics in the area. Satellite image interpretation of the area also shows compressional dynamics in the terrain and the FHT is as close as 1.5 km to the dam site.

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4. Seismic Design Parameter

The seismic design parameter considered for the project as 0.38 pga value for an 8.0M earthquake at 10 km focal depth is largely inadequate. Consideration of MBT as source of such high magnitude earthquake which is about 15km away from the dam site and not giving due consideration to the FHT, which is within a range of 3km can largely be considered as a serious drawback. It has been reported that Assam earthquakes of 1897 and 1950 had peak ground acceleration (pga) values that exceeded 1.0g. The probabilistic approach of pga value as determined by Sharma and Malik (2006) is 0.42g in and around the dam site of the Lower Subansiri Project, while NHPC adopted a pga value of 0.38g at present. Many other workers estimated the pga value of about 0.4g or more for the area.

The geological disposition – near the foothills, poorly cemented sandstones on which the dam is seated, the foot-hill thrust (FHT) with clear evidences of shear-planes near the dam site, all indicate that the area is not a stable site to resist destruction even if we consider a pga value of 0.38g. The designed structure may withstand such a pga value but the surrounding ground will certainly not. The mega-landslide which was triggered by the 1950 earthquake at Sipumukh (confluence of Sipu river with the Subansiri) that blocked the flow of Subansiri completely for three days eventually leading to devastating outburst flood, had the influence of pga value of less than 0.05g.

The Minutes of the XIVth meeting of the National Committee on Seismic Design Parameters (NCSDP) for River Valley Projects, dated 29-04-2004 in Item No.14.3.3 states “The Committee in the XIIIth meeting had suggested to revise the site specific seismic study report by considering earthquake magnitude of 8.0 at the detachment and 0.75 (7.5?) at MBT”. Two important observations arise in this context. First, there has been recorded history of seismic events of magnitude 8.5 and above around the site. As such, the site specific seismic design as adopted for an earthquake of magnitude 8.0 alone was grossly inadequate and should have been for at least 8.5M or even more. Secondly, the depth of the detachment plane below the FHT/MFT is found to be around 6.5km (Kayal, 2010, GSI, 2000) where the earthquake source should be considered, instead of the adopted 10km depth for then same. Considering the depth of detachment plane 6.5km below MFT near the Subansiri dam site for credible earthquakes of 8.0M and 8.5M (the later magnitude earthquake occurred twice in instrumental recording period in the northeastern part of India), the pga values calculated at the detachment plane following the horizontal acceleration attenuation relation given by Abrahamson and Litehiser (1980) are 0.54 and 0.617 respectively. Even if, the depth is considered at 10 km it gives the pga values 0.45 and 0.517 for 8.0 and 8.5 magnitude earthquakes respectively.



5. Flow regulation

It is observed from the study that there will be an abrupt diurnal fluctuation of flow discharge from 6 cumec to 2560 cumec, especially in the winter season. Minimum discharge will, however, be high during summer season with subsequent enhancement of maximum discharge. The minimum discharge (6 cumec for about 18 hours in a day) during winter will definitely affect the river ecosystem as well as the ecology of the connecting wetlands. Aquatic fauna and flora, and dolphin population of the Subansiri will be destroyed by the project with its existing design and operational parameters. On the other hand the ground water table will be lowered substantially due to inadequate water in the river for groundwater recharge, since groundwater recharging is related to infiltration rate to which time is an important factor. The fluctuation of discharge during the day with running all the eight units in the evening peak hour generation time will lead to rapid fluctuation of pore pressure in the river bank leading to bank failure and bank erosion.

Devastating flood associated with intense rainfall in the upper catchment of Subansiri is a common phenomenon. Flood water may breach the embankments. Since most of the embankments are barren areas devoid of plantation, and also constructed mostly by sandy / loamy soil, they are susceptible to erosion. The present spillway design is based on the recorded maximum discharge of 12024 cumec, whereas the recorded maximum discharge is 21,230 cumec at the dam site (Recorded on 11 July, 1971; GSI, 1977).

Paleohydrological study of the Subansiri shows that in the event of any accidental total collapse of the dam will repeat the disaster of 1950 Subansiri flood.

If the proposed 116m high dam fails completely, extensive area will be inundated (Chapter - IX) and the three flood vulnerable zones (Chapter- VI) will have major destruction.

6. Problem of Erosion

Dam effects on flow and sediment supply alone is a complex processes. It is envisaged that the silt-free water after filtering by the dam will come out with high power of scouring and will erode the bed material. The bed scouring in the upper section of the downstream will make the channel deeper. The enhanced height of the river banks will lead to failure of bank through undercutting, gravity sliding and shear failure. The depth of the channel will increase until it reaches a graded condition. This lowering of the channel results the depletion of groundwater aquifers in the surrounding areas, which is caused by the suppression of the seasonal flood cycle (deGeorges and Reilly, 2006). As a result, a draught like dry condition with reduced groundwater level is visualized with poor capillary action of coarse-textured soil. Vegetation in such areas (piedmont zone)



will die, and if survived, will suffer from draught. In the middle reach, the river will have a meandering character with bank erosion. In the lower section of the downstream, the river will be a braided one with extensive bank erosion, widening of the channel, aggradation of the channel, levee deposits along river banks and removal of channel-floodplain interface thereby creating chronic water logging problems in the lower reach (Fig.10.3). The outcome will be the conversion of agricultural land into sand/silt infested wasteland along the Subansiri. Erosion during the initial years will be very prominent and may extend up to Majuli subdivision of Jorhat district.

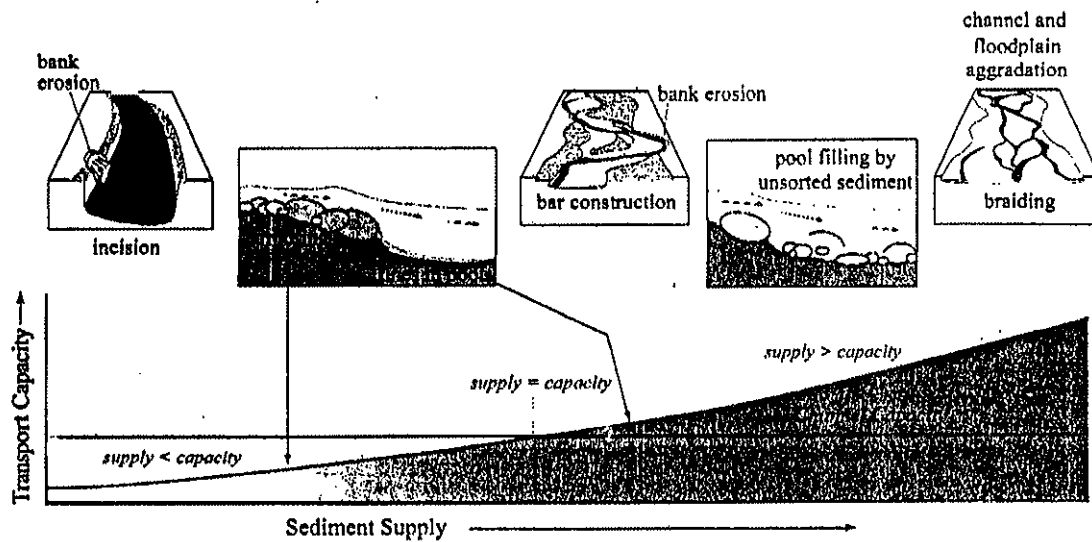


Fig.10.3: Expected textural, bedform, and planform adjustments of alluvial river in response to changing sediment supply in relation to transport capacity. (Source: Grant *et al.*, 2003).

7. Problem of Siltation

Siltation is one of the major environmental degradation problems especially in the downstream. The Subansiri carries on an average 21338 ton /day (based on the NHPC data for the period 2002-2007) of sediment which is equivalent to 8050 m³ per day (2938250 m³ per year) of sediment (considering specific gravity of the quartz-feldspar dominated sediment as 2.65) which will be trapped within the reservoir. As the linear extent of the full reservoir will be around 47km, due to drop in velocity far off the dam, the carried sediments will not be possible to pass out of the dam through spillways to the downstream during summer discharge as contended by NHPC during our discussion. To maintain live storage, frequent flushing of sediments is to be carried after certain period of time, and this finally will create heavy siltation/sand casting in the downstream areas similar to the situation exhibited by NEEPCO's 405MW Ranganadi Project.

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8. Microclimatic Change

The investigation reveals that there will be a change of local micro-climate due to the implementation of the Lower Subansiri Hydro-Electric Project, whatever may be the magnitude. The change may not have affective impact on higher order lives, but it may influence the microorganisms and vector borne diseases.

9. Impact on Ecology

Study showed that the downstream of the river harbours a rich fish diversity (138 species) with other aquatic animals in abundance depicting the example of a good ecosystem. Any alteration of river flow and physico-chemical characteristics of water due to regulation of the river will have an adverse impact on the whole ecosystem and especially, migratory fish like mahseer and other giant cat fishes.

The Subansiri river is an important habitat for the most endangered freshwater dolphin. The existence and maintenance of their population largely depend on this river as their preferred sustainable breeding ground. The interconnected wetlands of the river also have many fish species including few rare and endangered ones. These needs to be protected in the event of the coming dam project which will destroy the quality of their habitats. The riparian ecosystem being maintained along the river which harbours 230 species of plants, 308 birds, 19 mammals and other animals will be seriously affected due to artificial regulation of the river water.

10. Impact on Socioeconomic Condition

The Lower Subansiri basin is a flat terrain composed of alluvial flood plains and has considerably large spatial extent. The river valley within Assam is inhabited by agriculture-based rural communities with considerable density (256 persons per sq. km as per 2001 Census report, Govt. of India). Flood is a common phenomenon in the downstream area. The 1950 Assam Earthquake brought about extensive morphological changes in the Subansiri River.

Downstream people are invariably cultivators and agriculture-based economy is their backbone. Present road communication in the area is in dilapidated condition. In many areas the river channels including the Subansiri river are used as transportation and communication routes. The dam will result - (a) In the dry season, the river will have very low flow during the day time restricting the movement through the river routes with country boat. (b) During summer, sudden release of excess water from the reservoir when the rivers are in spate will disrupt the communication and transportation networks.

Floodplain households will face poverty (fish catchers and their dependents; loss of agricultural land of cultivators through erosion, sand casting and loss of fertility of land),

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reduced nutrition status especially for women, children and elderly and forced out-migration.

On the basis of the results and discussions of the household survey carried out in the three different "zones" identified considering the degree of vulnerability to the probable adverse effects of the dam within the downstream catchment, the following observations have been made on the downstream people. The inhabitants in the downstream are sceptical about the probable adverse impact of the project on their life and living. They are really in uncertainty about what will happen to them if the dam somehow fails. Moreover, they are so intimately associated with the river that a major and unwanted (for most of the downstream-dwellers) man-made change like the damming of the river has naturally confused them about the probability of being rootless in their own lands in near future under the impact of the project.

The study clearly shows the processes and patterns of people's close association with the river both psychologically and materially. Many of the people, especially belonging to the most vulnerable zone, depend remarkably on the resources made available by the river such as water, fish, wood, sands and pebbles and consider all these as parts of their survival strategy in the given situation.

The economy of the people in the downstream is primarily based on agriculture which remains traditional from the perspectives of both method of cultivation and the type of crops raised. The diversity as well as productivity of the crops cultivated in the area is found to be considerably low. Moreover, as crops are often damaged either by flood during summer or scarcity of water (drought-like condition) during winter, the farmers are seen to be not happy with the situation. Most of the farmers do not have the financial and technical ability to improve their conditions individually. All these urgently call for a major positive change in the agricultural practice including cropping intensity through introducing eco-friendly inputs, seeds and appropriate farm technology.

The agriculture in the area is basically rain-fed. During the *rabi* season, the natural soil moisture and manually carried river water in some cases support whatever few crops are raised in the season. As the soil is more or less sandy and water table goes down considerably during winter, cultivation without any provision of irrigation is unable to give the expected results. At present, there is no provision for irrigation in the downstream area.

Like any other floodplains, the Subansiri floodplain also endowed with a variety of grasses, both terrestrial and aquatic, provide enough scope for livestock rearing. As an allied activity to agriculture, livestock rearing is yet to take a minimum commercial turn although livestock continues to play an important role in the economy of people.

J. C. Das

Scientific management of livestock including introduction of improved breeds, particularly for fresh milk, milk products and meat, may go a long way in uplifting the rural economy in the entire catchment area. Interestingly, piggery is traditionally popular among the tribals, which may be easily made more extensive and productive by imparting training and providing necessary credit to the potential farmers.

The river provides facilities for water transport across and along its flow for the entire downstream part. Besides people, domesticated animals, crops, thatches, pottery articles, forest products are generally transported by both country and motor boats. The damming of river would definitely affect this type of eco-friendly and cheap means of transport and thereby deprive a considerably large number of people of the area of regular income that they generate from their water transport-related activities. Special livelihood packages particularly for these people will be urgently needed.

As has been seen from the discussion on household assets and facilities, around three-fourths of the households surveyed do not have electric connection. They use kerosene and fire woods for various purposes which are costly and at the same time harmful to the environment. Provision for electrification in all the villages in the downstream should be made with necessary negotiation with the concerned administration and the people regarding related terms and conditions.

Whatever may be the degree, fishing as a source of livelihood for some of the people in the area will definitely be affected with the commencement of the project. Necessary planning for sustainable development of pisciculture at both individual and collective levels and eco-friendly improvement of the wetlands, wherever feasible, shall have to be undertaken to safeguard the interest of those people whose livelihood is traditionally connected with fishing.

The secondary sector including household industries, which presently absorbs a negligible proportion of workers, is extremely weak in the area. Interestingly, there is tradition of weaving, pottery making, sericulture forestry (*somoni*, for instance), cane and bamboo works among the communities living in the downstream area. Strengthening of this sector through appropriate strategies and action plans may, among others, contribute remarkably in terms of income source.

So far the level of education among the people of the area is concerned, the situation is quite dismaying. Nowhere in the villages surveyed could be found persons with some level of technical education. Even in UG and PG levels, proportion of qualified persons is almost negligible. Poverty, remoteness, inaccessibility and lack of infrastructure are some of the causes for backwardness in education. Creation of relevant institutions, development of infrastructure and conducive environment for imparting proper education

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to the people in general and the ST and SC people in particular is a must to prepare the people to face the new and unfamiliar challenges under the emerging circumstances.

11. Overall Observation

Proper site selection, such as avoiding building dams on the main stem of a river system, and better dam design can play significant roles in minimizing adverse impacts on fish, wildlife as well as people living in the downstream. Provision of fish passes, use of hydrological data to improve the replication of natural stream flow, and also emphasis on appropriate temperature and oxygenation of water released downstream can significantly improve the operation of large dams. There is an urgent need to apply an integrated river basin management approach to balance the social, economical and environmental factors with the help of sociologist, economist and environmentalist. Such type of programme will definitely help in the sustainability of river dolphin in the Subansiri.

The large dam like the Lower Subansiri dam should aim to minimize adverse environmental impacts, and there should be a strong legal framework to facilitate the ecological security of the endangered and vulnerable species like river dolphin. The project appears to influence and modify the terrestrial ecology largely.

10.2 Recommendations

Based on the results of the study and the observations made above, the following recommendations are made for necessary action of the concerned authorities.

10.2.1 Part – I: Recommendations on the Feasibility and the Safety of the Dam

1. The present investigations carried out to examine the downstream impact of the Lower Subansiri Hydroelectric dam project reveal gross inadequacy in the relevant facts relating to construction of the dam at the present site by the concerned authorities. The selected site for the mega dam of the present dimension was not appropriate in such a geologically and seismologically sensitive location. The seismic design parameter is not properly chosen for the project. According to the investigation, the recommended seismic design parameter is at 0.5 or more. Therefore, it is recommended not to construct the mega dam in the present site.
2. Further, from geological, tectonic and seismological points of view the Expert Group suggests not to consider the Himalayan foothills, south of MBT, for any mega hydropower project.
3. It is recommended to redesign the project by sufficiently reducing the dam height and production capacity.



10.2.2 Part – II: Recommendations on Downstream Impact of the Redesigned Dam

Even after redesigning of the dam, its operation will have many environmental and socio-economic problems in the downstream. To minimize these impacts, the following recommendations are advised to be adopted by the concerned authorities.

1. The inevitable siltation problem and its management are not properly addressed by NHPC. To regulate the resulting siltation problem, frequent flushing of the sediments to the downstream and dredging of river bed to maintain the original bed level is to be carried out throughout the river course. Upstream catchment treatment with maintenance of slope and plantation needs to be carried out by identifying the erosion-prone areas to minimize soil erosion.
2. As Assam witnesses flood waves during the months from May to September, flood cushioning provision should sufficiently be kept for the period. To minimize the dam-induced flash flood (like in Ranganadi project of NEEPCO), proper and adequate flood cushioning be kept in the reservoir.
3. The spillway design is based on the recorded maximum discharge of 12024 cumec, whereas the maximum discharge recorded was more than 21230 cumec on 11 July, 1971. So, the Expert Group recommends reexamination and redesigning of spillway as per the recorded discharge data given above.
4. In this regard, it is also recommended that no river in the region be tapped to the maximum possible extent, giving attention to the riparian rights of the indigenous people and complex biodiversity in the region.
5. The minimum discharge of the natural river be maintained through the turbines by at least one unit running continuously for 24 hours a day with a discharge of 320 cumec. The minimum mean flow during the lean period is considered as the lower boundary of environmental flow in the present study which will help in maintaining river ecology and groundwater recharging. To cope with the rapidly changing pore pressure developed due to fluctuation, it is recommended to open and close the units in sequential order and not at a time. Elevated embankments with proper protection measures should be taken from the dam site to a distance of about 15km downstream to control the river discharge.
6. The embankments of the Subansiri river be suitably raised and strengthened properly.



7. Hydrological monitoring especially during flood seasons – (i) Proper monitoring of discharge upstream of the reservoir for abnormal variation which may be related to the formation of landslide dam.
8. Installation of warning system along both banks downstream of the dam site up to confluence of the Subansiri river with the Brahmaputra river for timely evacuation of downstream population in event of catastrophic flood.
9. The reservoir level must be monitored closely by at least by two independent observatories at regular interval (hourly) so that human error can be eliminated (especially during flood) and any abnormal variation can be detected timely for taking necessary precaution.
10. Proper volume of storage water in the reservoir during flood season be maintained taking meteorological forecast of the region as well as of the catchment area. Proper network of meteorological stations be maintained by the project authority within the catchment area of the reservoir.
11. A thick vegetation cover or green belt should be developed and maintained all along the river banks so that the velocity of accidental flood water can be checked by it and resulting in less erosion, and in turn deposition of the sand fraction within the belt. This will reduce the loss of land from sand casting by high floods.
12. In order to monitor the morphological changes in due course of time it is essential to use periodic satellite data, and based on the derived information proper protection measures in the erosive area be taken.
13. Flood Shelters - Suitable raised structures are to be constructed along the bank of the Subansiri as Flood Shelters for the flood victims. These structures can be used for community welfare purpose during normal period.
14. All efforts should be made by the dam authority to convince the people about the hydroelectric power project and its outcomes so that they can gain necessary confidence over the issue. The need of people's participation in alternative developmental activities to be adopted may also be focused.
15. It is doubted that the project will have negative impact on the easy availability of locally very important river related resources and as such they need to be supported by providing some better and acceptable alternative means for survival.
16. Creation of irrigation potential in all the three "zones" by suitably routing through cannels from near the outflow of the turbine will improve the present pattern of yield and output of crops in the area. This will also restore the groundwater

J. Das

condition and surface water availability in the wetlands of the downstream catchment of the Subansiri.

17. The entire downstream catchment is lagging behind, particularly in terms of transport, communication and marketing. The north-south linkage from the dam site to the Subansiri- Brahmaputra confluence has been too weak to promote effective interaction among the villages and outside for trade as well as other productive purposes. The river continues to play a significant role in this regard. There is, therefore, an immediate need to improve the road communication network, especially along both the banks of the Subansiri down to the confluence with the Brahmaputra as far as feasible. Feeder roads to Zone II and III from the major bank roads will substantially improve the condition of road transport and marketing of the local products in the area.
18. Monitoring and precautionary measures should be considered for vector borne disease, especially for malaria since malaria vectors are available in the project area. Moreover, volume of precipitation in the catchment area of the reservoir may be monitored during the monsoon season by establishing suitable telemetry rain-gauge network so that precautionary measures may be taken ahead of time for the smooth release of flood water to protect the dam and to reduce the flood intensity in the downstream area of the project.
19. A minimum of 3 (three) meter water depth is essential for the survival of river dolphin. Hence, this minimum depth should be maintained in the dolphin habitat area (identified as sectors-II to IV in Chapter-VI) round the year for their survival and breeding in the Subansiri river. Reduction of adequate water cover will shrink the breeding ground of river dolphin and it is feared that they will be compelled to migrate to the Brahmaputra which is not evidenced as breeding ground in recent years.
20. Long term conservation strategies like establishment of dolphin park, awareness programme etc. should be adopted by concerned authority for conservation and sustainable development of the critically endangered aquatic mammal.
21. Proper operational rules for maintenance of the river discharge to sustain the basic requirements of fish, wildlife (including the river dolphin) and local people should be framed.
22. It is suggested to keep provision for ecohatchery and other conservatory measures for the threatened upland species like mahseer (*Tor spp*), and other cyprinids.
23. Establishment of a live fish gene-bank for conservation of indigenous fish species.

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24. Provision for training of local youths for fish culture including the ornamental fish in seasonal water bodies.
25. To mitigate problems and maintaining a sound and sustainable terrestrial ecosystem and to protect all the Schedule-1 species available in the area and their habitats, maintaining a minimum level of river water which is known as the "environmental flow" must be maintained.
26. For restoring the ecosystems and habitats for birds and other animals, plantations of existing plants should be taken up in the affected sites.
27. Human activities within the migratory routes of Asiatic elephants will have to be stopped by protecting the areas.
28. Developing communication network including telephone, wireless system, computer network etc. to transmit the information of probable dam failure or dam breach. The systems are also useful in the event of release of excess flood water from the reservoir.
29. The officials of NHPC, social groups and selected individuals of the downstream be trained regularly so that they can perform responsibly during disaster.
30. As risk of dam failure will be there at downstream, benefit in terms of power and all round development of the downstream also should come to the people residing at the downstream. Development of better education and health facility are some of such benefits that the government should provide in that locality by utilizing the fund received from the concerned authority in terms of power benefit.
31. A disaster management cell dedicated for the area is required to be formed involving the following –
 - (i) Subansiri Dam Authority, (ii) District Administration, (iii) Police, (iv) Public Works Department, (v) Water Resources Department, (vi) Agriculture Department, (vii) Departments related to Rural Development, (viii) Departments related to Forestry and Wildlife, (ix) Department of Health, (x) Local people and NGOs of the locality, (xi) Experts in the field

Additionally, the cumulative impacts of the cascading dams in a single river is to be studied thoroughly, and a reservoir operation regulations for all the cascading dams for each of the rivers should be developed and applied so that the downstream riparian people are protected from any eventualities.



on 'Comments on 'Report on Downstream Impact Study for Subansiri Lower Project' executed by NHPC

Response to NHPC's clarification Ref. No.: NH/SLP/Env.31 (iii)/10-338, dt. 27.08.10)

GENERAL REPLY

LSHEP design aiming at hydropower generation only, deviating from its original multipurpose design will adversely affect the downstream ecology and environment. The impact of sand casting, unseasoned flood, increased intensity of flood is envisaged from the project. Siltation is a greatest challenge and to assess the same in detail NHPC has no sufficient data. The project will impact the river island Majuli – a place of great Assamese culture and is being tried by the Government to declare it as World Heritage site.

LSHEP is frequently compared by NHPC with the Bhakra project located in the western Himalayas, trying to convince the people at highest level that they are of the same type. In Bhakra foundation is 58m whereas in Subansiri it is 9m (deviating from the original depth design of 17m). Since LSHEP is a pondage project and not a storage project like the Bhakra which has capacity to hold silts for 75 years or so and that is designed for silt trapping for 140 years, the Subansiri reservoir will be empty within a couple of years and to maintain live storage the project authority will have to practice desilting within a period of two to three years after commencement and continue to do so regularly. Bhakra is about 30km north of Foothills Thrust (FHT) and in hard consolidated sandstones unlike in Subansiri's project which is closest to the FHT and in very soft, near unconsolidated sandstones.

There has been lots of debate, and people now convinced that hydropower projects are not environment friendly in general. Multipurpose projects have various components, like navigation, irrigation, flood control, fisheries in addition to power and the benefit received are more than loss incurred and are worth for execution. NHPC's contention of showing Bhakra Dam is welcomed by a large group of people for its irrigation and flood control priority followed by electricity. The first two benefits will be achieved by the Lower Subansiri Hydroelectric Power Project (LSHEP).

It is felt that there are serious knowledge gaps in seismology, geology, hydrology, hydrometeorology for the highly acclaimed studied project since 1955 by referred many well known institutions of our country. We suggest filling up of these gaps before completion of the project.

Seismic survey, and paleoseismological study whatsoever NHPC will carry out now or afterwards during parallel construction work or after completion of the project have no meaning and will never be able to protect the downstream from the arising problems from the project.

It is felt that the NHPC paid little attention to understand the graveness of the report on the Subansiri flood of 1950. The study carried out on Paleoflood, analysis was aimed at revealing the effects of the flood of the Subansiri just after the Assam Earthquake of August 15, 1950. It was estimated that the possible volume of water impounded by the natural dam formed due to landslide was

5 M cu m. The sudden release of this much of water created a nearly 12 m high flood wave near the foot hills which decreased to 6 m about 20 km further downstream. There is official record that 20 ft (6 m) flood wave swept away villagers and caused 532 deaths even when the population of the area was thin. Several large villages along with a large part of Pathalipam Tea Garden situated particularly on the right bank in between Gogamukh and Dulongmukh were completely washed away. On an average the sand deposited over fertile land varied from 10 m near foothills up to 3 m at 30 km downstream along the river.

Central Inland Fisheries Research Institute (CIFRI), Kolkata not reporting about the presence of the River Dolphin in the EIA report as informed by NHPC indicates imperfect nature of their study. The large number of aquatic fauna nor reported in the EIA report of NHPC shows gross negligence and lack of sincerity in part of the organizations involved, including NHPC to bring the factual data.

Any single purpose hydropower project, especially projects of the present type and dimension bound to impact adversely to the downstream and all concerned should examine what best benefit can be given to the downstream people.

The project was wrongly designed at a wrong place by some over enthusiastic people and diverting the benefit to other parts of the country at the cost of deprived poor downstream people who will evidently become much poorer, except certain opportunists, might bring alienation to an already disturbed State.

Further and above, NHPC's attitude "might is right" knowing fully well their shortcomings is a shameful colonial attitude. We suggest them to submit their faults, and give sincere promise to give required protection to the downstream to the best possible level. Justification and contention of giving the investigations to various reputed organization not necessarily mean completeness of their study. We advise NHPC to be transparent in the work and saying for the benefit of the Northeastern part of India, particularly to the downstream impacts in Assam. We also request the NHPC as well as the Government to examine the EIA /EMP reports of LSHEP first thoroughly, than to examine the report submitted by us to judge the strength of the decades long studied report of the said project. Simply, trying to find our mistakes and faults in our report to nullify it without going through the NHPC's DPR, EIA /EMP report convinced us to belief that the partial forces are acting to execute the project at any cost, denying the rights of the downstream people, and try to malign us by using derogatory remarks is a colonial attitude.

Assam will get a meager power only from this project being located in half of it in Assam and to other states.

In the course, we want to convey that the study of present dimension, that we have undertaken cannot be completed in all respects in a short period of one year given to us, which require several years of investigation and analysis. Our report shows inadequacies of the concerned parties during the investigation starting from 1955 till date and they are not able to give answers to some of our vital questions, a study claimed to be carried out for more than 55years!!!

NHPC's comments

CHAPTER- I-INTRODUCTION:

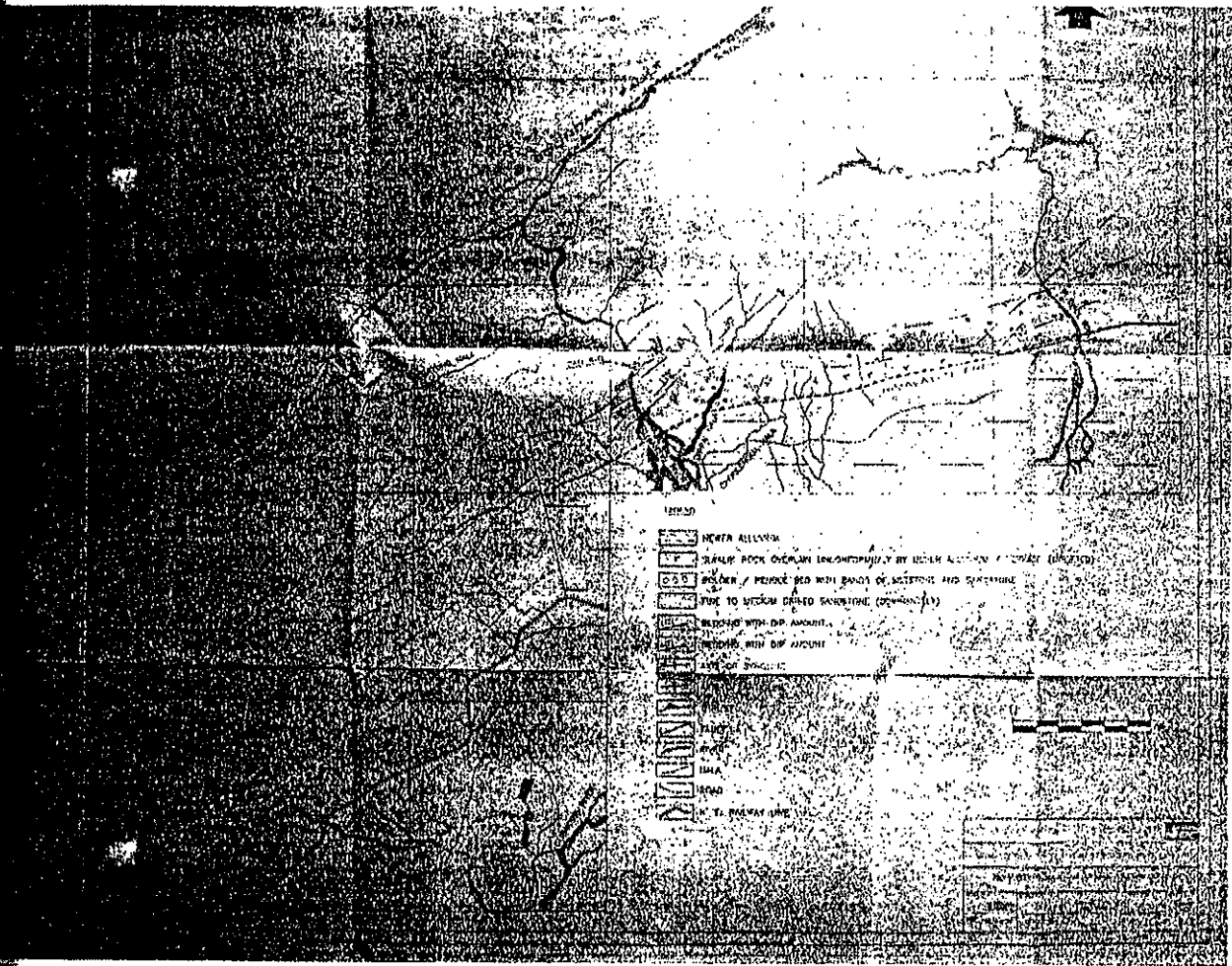
Para 1.2
Page 3

Experts Reply:

CHAPTER-I

Para-1.2, Page-3:

Our comments in this are clear and we strongly believe on the inadequacy of the data generated. Our comments in this para are based on the EIA report of NHPC. The folded structure in the area, near consolidated Siwaliks sediments, existence of Quaternary surfaces (Terraces), geological mapping of the area have not been carried out previously. Inadequacy in regards to geological mapping is clear from the comments of NHPC in Para 2.5, Page 8 clarification "Probably the NHPC's map under reference was a preliminary map prepared after reconnaissance survey of the area by our field geologists". The map on 1:50000 scale we consider was prepared after our joint visit on 20-21 March 2009 (Annexure-A) is submitted on 02/04/2009 to us (Fig.1.1). If it is a preliminary map, when will you prepare the Geological Map? After completion of the dam!! The report of our joint visit is also enclosed herewith. The geological report given by Dr. A.K. Jain, Roorkee University is a very preliminary general geological report at regional level in small scale, almost irrelevant to the project and can be inspected by any authority and is enclosed herewith (Annexure-B). Mis-reporting of the dam site as southern limb of fold before and confusing statement on the HFT are evidence for non-serious study in the project area. It is interesting to observe that Dr. Jain report is based on google images giving a mandate for non-requirement of Indian Remote Sensing satellite images and satellite data interpretation by standard techniques. The maps given are at regional scale depicting the structures of the project site without showing detail lithology, structure, measured attitude of beds, shears, faults etc. and full of inadequacies. It is also making no-sense in speaking about the position of the Foot Hills Thrust at 5 km in alluvial plains, using Cartosat or Google!!! ? This new technology developed by NHPC can be offered to OIL, ONGCL to relieve them from costly 2D and 3D seismic studies – a huge investigation!! Why 2D seismic survey has not been carried out so far? Why paleoseismological study has not been carried out so far? What objectives these studies will fulfill after completion of the project? This is the reason for dragging the issues!!!



1: Geological map we quoted from NHPC prepared on 02/04/2009 (the preliminary geological map of NHPC). Before this there was no geological map of the project site prepared for / by NHPC!!!

IPC's comments

**1.3
3 & 4 SALIENT FEATURES**

Salient features in the report

- Dam above deepest foundation level is 133m
- Spillway crest level is 150m
- Spillway openings are 11m x14.7m
- Power House is underground type .

NHPC's correction

- Dam above deepest foundation level is 125m and above river bed level is 116m.
- Spillway crest level is 145m
- Spillway openings are 11mx14m
- Presently, Power House is surface type

with cavern size 24m x 62.4m x 337m
Annual Power generation 7551.1 MU
Generation cost Rs. 2.59 per Kwh

with size 285m x 26m x 49m
Annual Power generation 7421.5 MU
Generation cost Rs. 1.98 per Kwh

Experts Reply

These figures quoted by us are given by NHPC in their EIA report which was made available to us. We have the same features in our Inception Report and have not been clarified than. The depth of foundation which was projected as 17m in the EIA report is now clarified as 9m, which is already executed. Under what circumstances this change has been made, which is definitely more risky, is not understood. We are also not aware of whether due permission for modification of the structure have been taken from the concern authorities. We were not informed about this serious change before.

In case of Bhakra dam the foundation depth is 58m with the dam height from foundation level 25m, ratio of foundation depth to total height being 1:3.88, whereas in case of Subansiri it is 13.89. This is a gross inadequacy. Probably this ratio is not used even in stable cratonic areas!! For example, in case of Sardar Sarovar dam, the maximum height of the dam is 163m and dam height above river bed is 146.50m with foundation depth of 16.5m; ratio of foundation depth to total height being 1: 9.88.

That the original underground Power House has been changed to surface type later on and quoting the same in the report is inadvertently dropped. However, this change is a serious matter, and in all probability has been executed due to unfavourable geological condition, namely, the rock conditions.

NHPC's comments

Para-1.5, Page-10 : Hydropower dams: benefits and concerns:
Para-2): *Despite their obvious benefits produced by coal fired power plants (F earns Ide, 199 7):*

Experts Reply

One of the Projects being developed or going to be developed in Arunachal Pradesh an ROR (Run-of-river type). With drastic diurnal variation and near dry condition of almost all the rivers for more than half-of-the day will not bring any benefit to the state, only help rapid wiping out of the entire ecosystem. The projects will no-way help Assam in its development, since no benefit for Assam have been taken into consideration in any of these projects. Assam will have to take all the burdens of devastation – flood, siltation, displacement, food scarcity, waterborne diseases, draught in certain areas, biological imbalance and finally the threat of dam collapse.

NHPC's comments

Para-1.5.2

Para 1.7

Para 4.1(4)

Para 6.1.7

Para 10.1(7): *Reservoir sedimentation:*

Experts Reply

Drawdown sluicing, flushing etc. are related to reservoir maintenance methods and are not the answers / solutions for the downstream siltation problems. Moreover, the velocity will drop drastically at the reservoir entry point 47km away from the reservoir and sediments accumulated there from reducing the storage capacity of the ROR project. This will invite frequent flushing of the sediments in due course of time to the downstream, resulting sand casting similar to Ranga Nadi project of NEEPCO, and expected to be at greater dimension.

NHPC's comments

Para-1.6

Page 21 (Para2)

Experts Reply

It is agreed that there is slope instability. What is the time of stabilization for the slopes? All the Himalayan terrain is not the same with contrasting lithology, structure and climatic activity. With the claimed technology, do you have any explanation why the vital National Highway from Shillong to Jhar at Sonapahar cannot be stabilized with decades long efforts. The near unconsolidated sediments are not possible to be stabilized by anchors, wire mesh and shotcrete!!

NHPC's comments

Para-1.6.2.3

Page 21 (Para2)

Experts Reply

Para-1.6.2.3

Page 21 (Para2)

The report is very clear about it. Also read our clarification given for Para-1.2, Page-3. NHPC did not carry out geological mapping before undertaking the project!!! Our suggestions for 2D seismic survey have not been carried out. Unrealistic argument on visualization of Foot Hills Thrust in alluvial plain is not called for. Once 6.0km, once 3.5km, once 5km means there is no-science in NHPC's sayings.

NHPC's comments

Para-1.6.3

Page 23

Experts Reply

detail geological mapping of the area has been carried out till date. The Jain's report, Figure-2 indicates the Foothills Thrust (HFT) is just at the contact of alluvium and the Siwaliks. This is also mentioned in the comments by NHPC (Page 2 of 6) on our Preliminary Report. Our joint survey on 20-21 March, 2009 (Annexure-A) shows complex structural alignment and shears in the dam site and its surroundings and strong relief of the semi-consolidated sandstone hills with abrupt slope break with alluvium. This convinced us profoundly that HFT is very close to the dam site. NHPC have given us a geological map as per our suggestion during the visit which have a recorded date on 2nd April, 2009 indicating the FHT at 3 km distance. They previously mention it at a distance of 6km from the hill and within the alluvium. After submission of our detail report now NHPC is telling that it is about 5 km away from the dam site as have been observed in Cartosat data / google earth etc.!!!

The seismic profile of ONGC passing along the western area of the catchment (Figure-1) clearly indicates fold and fault structure closely associated to call it a schuppen belt to which Fault inversion theory is valid and very much applicable to Subansiri dam site.

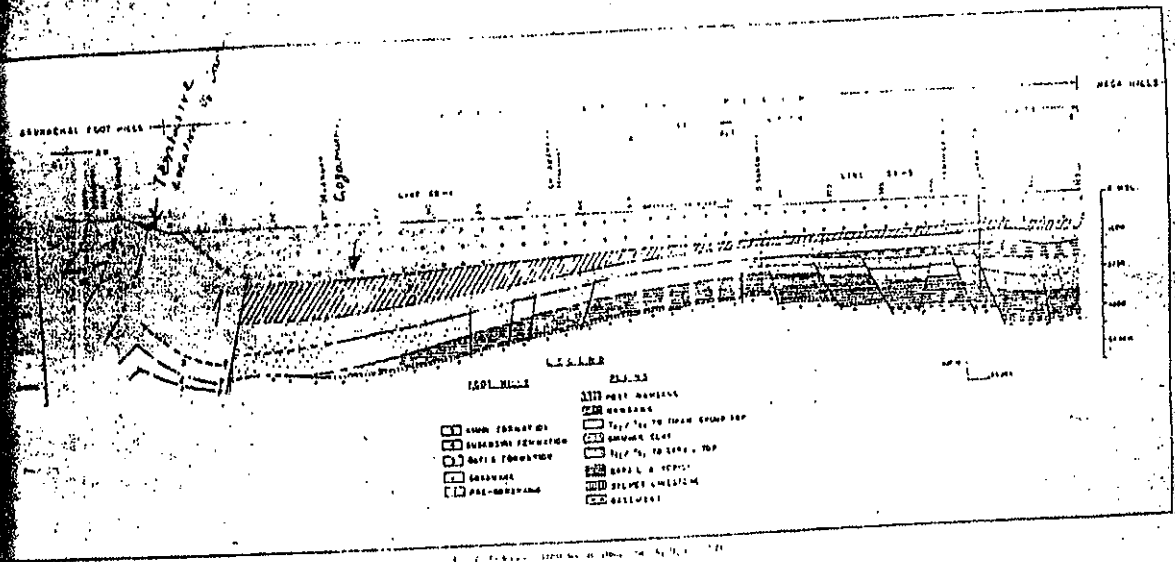
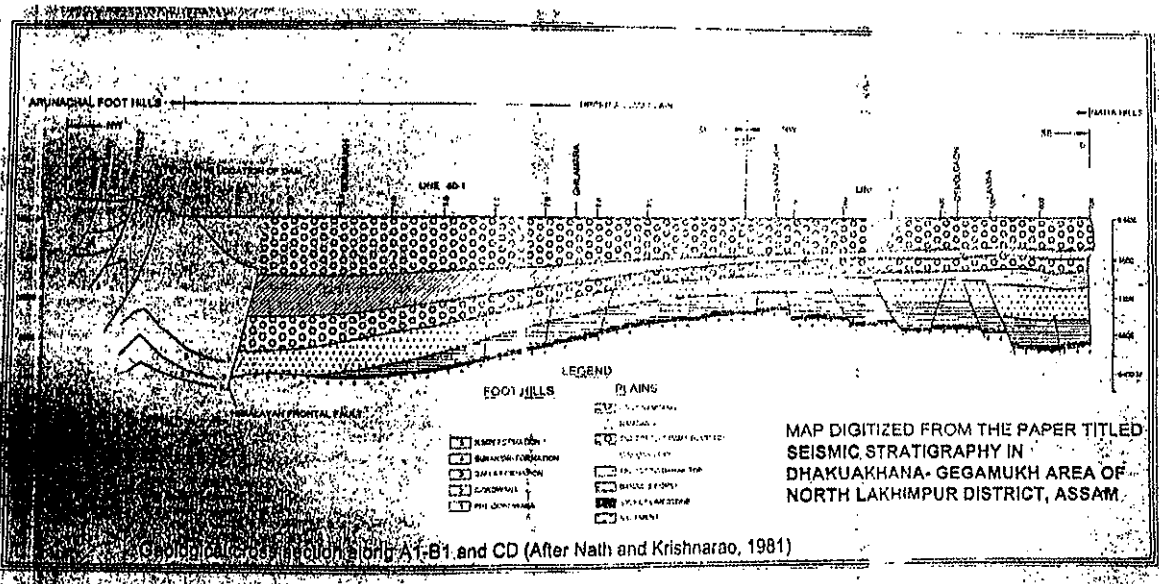


Figure-1 Seismic stratigraphy in Dhakuakhana-Gogamukh area of North Lakhimpur District Assam by [Name] and Krishnarao and Supplied by NHPC). Below is the redrawn figure of the same by NHPC.



The persons involved in the project are treating a fault as a theoretical planar surface, and that it represents a zone is undermined. The faults may have a remarkably wide zone of disturbance extending several kilometers. Below is the Jorhat Fault (Subsurface Fault) with a fault zone exceeding 5km at places (Figure-2). In case of Subansiri, the extent of the FHT zone to the dam site is obvious.

Structural Interpretation of Jorhat Area, Upper Assam Valley

Debhrata Ray

... study epitomizes the results of interpretation of geophysical data across the Jorhat fault zone. The study clearly brings out a unique structural feature. The fault zone is a narrow well defined graben located over a high. The graben came into existence during the Paleogene. The broad high was subsequent to the graben.

... in thinning of the stratigraphic units and growth of the fault zone are favourable for the entrapment of hydrocarbons. Hydrocarbon prospects in the block appear good.

INTRODUCTION

Contributions to the geology of Assam, in general, and petroleum geology in particular, have been made by a number of geologists among others by Mallet (1876), Evans (1932), Bhattacharya (1950), Mather and Evans (1964), Mette (1968), Ray et al. (1973), Bhattacharya et al. (1973), Ghosh et al. (1974) and Dasgupta (1977).

With the advent of the CDP seismic surveys over the alluvial tract of Upper Assam, the complexities of subsurface geology are being brought out more clearly and hence the interpretation is becoming more accurate. Use of these seismic data has led to the discovery of many new concepts and important features. An example of that is the Jorhat fault zone which has not been described as the Jorhat fault but as the Jorhat ridge and Jorhat all within the fault zone was considered located over a high.

The present paper discusses the structural configuration of the Jorhat fault zone (Fig. 1) as interpreted from the latest CDP data and its importance in the entrapment of hydrocarbons.

1. Published with the permission of the Director, I.P.H., Dehra Dun.
2. Main Studies Division, Institute of Petroleum Exploration, ONGC, Dehra Dun.

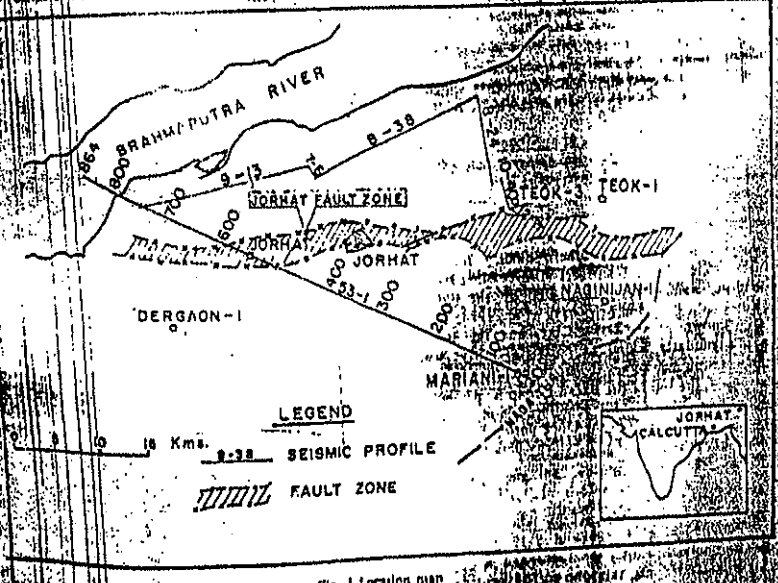


Figure-2: Width of fault zone.

The report on 'Background noise survey for Subansiri Lower HE Project' by IIT Roorkee states "The major tectonic features include the main Boundary Thrust (MBT) and the Himalayan Frontal Thrust (HFT)".

It is true that the rocks are dipping towards Brahmaputra Plains, the area is tectonically disturbed with several shears, abrupt variation of attitude of the beds (see our joint fieldwork report enclosed herewith).

high level terraces just near the foothills, steep hills with smooth mountain front of the Late Cenozoic mountain front indicates that the area has neotectonic activities.

NHPC's comments

Para-1.7 : Page 24&25

(Page 4 of 22 of NHPC's comments)

Experts Reply

Para-1.7 : Page 24&25

(Page 4 of 22 of NHPC's comments)

The comments of NHPC did not include the vital points given by the expert. Rather they gave their comments in very general manner in an unclear way as given below:

NHPC's comment (No. 1): Landslides along valley slope are a common feature in the Himalaya.

Expert's question/comment: Although landslides along valley slope are a common feature in the Himalaya, how far it is true that natural dam formed due to massive landslide and attendant dam failure and devastating flood are also very common? If it is common give examples of such dams created at least in Arunachal Himalayas in historic time.

The only major natural dam in the historical record of this region is the Subansiri dam formed due to the great earthquake of 1950.

NHPC's comment (No 2): After construction of dam across Subansiri at Gerukamukh, devastation due to such landslides in upstream will have lesser impact in the downstream area because the dam will regulate the discharge of water in a controlled way which may get released with natural blockage.

Expert's question/Comment: This comment is not tenable. When the dam itself is full, where is the place for storage of massive volume of water released due to failure of landslide dam? Rather the burst of the excess water will bring great threat to the very survival of the dam. If the dam breaks at this moment the damages will be just double or even more.

NHPC's comment (no. 3): If such a situation (natural dam) occurs in the upstream, after construction of dam, NHPC's endeavor will be to remove the blockage in a planned manner so that there is no impact in the downstream of dam.

Expert's question/comment: This is just an imagination only. If a landslide blocks the flows, where is the time for removal of the blockade in this difficult terrain? The water will get impounded till there is a break and concomitant devastation in the downstream.

Regarding the earthquakes, NHPC is trying to mislead and misinterpretation of seismic dataset. Did anybody can predict 1897 Great Assam Earthquake or 1950 Great Assam Earthquake? Is there anybody in the world to predict the next high magnitude earthquake's exact location? Do you try to make us

understand that earthquake can take place only in the same element? The precursor earthquakes of 1897 earthquake is estimated as 500 years, 1200 years and 3000 years by various workers, and 'great earthquake happened in 1950, of course along different tectonic element? Did Roorkee University have any foreseeable methodology to say that the FHT is inactive? Did they consider the neotectonic activities as evidenced by the terraces and structures in Late Cenozoic sediments in their considerations?

In the Himalayas Main Central Thrust (MCT), Main Boundary Thrust (MBT), and Himalayan Frontal Thrust (HFT) are associated with large seismicity, of which, the HFT is the most active among the three major Himalayan thrusts at present (Thakur, 2004). In special cases where seismogenic faults cannot be identified, secondary features like that of liquefaction and soft sediment deformational features caused by seismic shaking are used to obtain evidence of prehistoric seismic activity.

Did NHPC ever calculate the strain accumulation in the area? Here is the reference of the work by Bilham et al, 2001 for the Humalayas in the journal "Science" : --

In case of the Himalayas, though half of it, has ruptured since the year 1800 by major earthquakes, the surface ruptures have not been found for any of these events (Bilham et al., 2001). There are thus no geological constraints of recent ruptures, and geologists are concerned that palaeoseismic investigations across Himalayan surface faults may yield misleadingly long recurrence intervals. From the Fig.2 it is clear that their calculation based on 20mm/year subduction rate, a major earthquake is already in long due in the Central Arunachal Pradesh around Bomdila similar to Bihar earthquake. The strain accumulation is for about 1m slip potential in the easternmost Arunachal Pradesh. Considering the present GPS data of 55mm/year movement of the Indian plate the rate of strain accumulation appears to be more than the projected figures of Bilham et al., 2001.

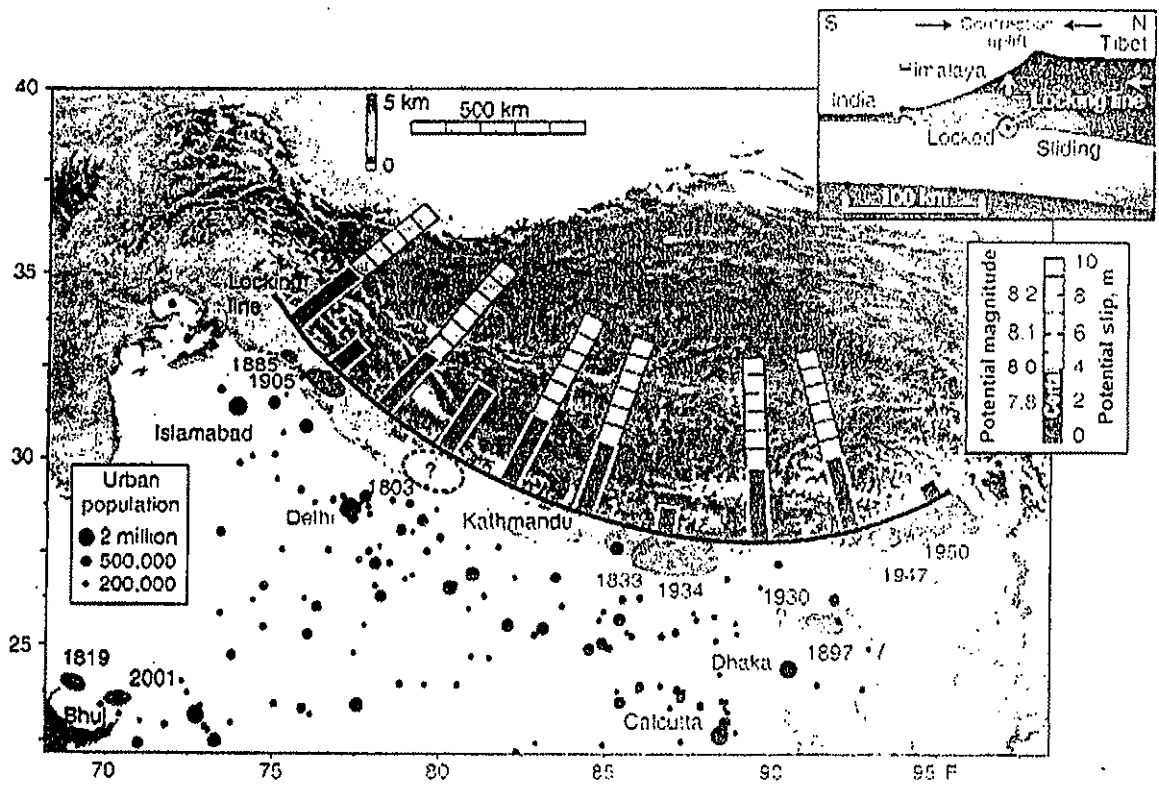


Fig.2: Strain accumulation in the Himalayas (Source: Bilham,R., Gaur,V.K. and Molnar,P. (2001), Himalayan seismic hazard; Science, Vo.;293; pp.1442-1444).

Earthquake magnitude scale is logarithmic and the pga attenuates with distance. NHPC should give the depth and distance figures for Uri, Salal as well as Kalpong projects. NHPC at all stages tries to mislead the factual data. Sumatra earthquake is about 1200km from Andaman. The Uri projects is about 58 km distance from the 7.6Mw (focal depth 26km) Kashmir earthquake of October 8, 2005 for which the calculated pga is 0.105g. The distance of Salal is further away. Naturally the pga value at the dam sites is quite low and there was no threat to these projects.

NHPC's comments

Para 1.8
Page 26

Experts Reply

The positive impact of the dam can be visualized, not to say about the lakhs of people residing downstream, even the Assam Government in term of power will not get benefited. Assam Government will have a setback in tackling flood, erosion displacement problems.

Chapter-II : Geomorphology and Geology

NHPC's comments

Para 2.5 Page 7

Experts Reply

It is understood that NHPC does not have the experience of map reading. We suggest to adopt a subsurface map interpreter (nor from IIT, Roorkee). We request NHPC to clarify the concerns with factual data and suggest them not to hide the factual data. The 2D profile of the ONGC is about 5 km west of the Subansiri river and is not a representative profile of the Complex Subansiri dam site. Also there emphasis was only in the Brahmaputra plains due to its hydrocarbon potential and not the Himalayas.

NHPC's comments

Para 2.5 Page 8

Experts Reply

You have submitted the preliminary geological map which was prepared after joint field work and subsequently prepared the map on 02/04/2009 and we clarified at **Para-1.2, Page-3** of this document. For your kind information Cartosat images are not suitable for the kind of investigation we discussed. So we use multispectral images with reasonable resolution. We suggest you to enhance your knowledge of image interpretation. The dam pit was covered with concrete before our joint visit for geological fieldwork.

NHPC's comments

Para 2.7.4.2 Page 33

Experts Reply

Already the natural river puts immense pressure and misery to the people in the lower catchment. The blockage and regulated (unregulated!!) flow with the design framework, it is envisaged, catastrophe is going to be invited by the project in the present form. So we recommended measures to be adopted for the project in our report.

Para 2.8.1.1 Page 34

Experts Reply

Chakra is a different situation. It is about 30km north of the Foot Hills Thrust, located in hard sandstones of course with minor clay beds and is distinctly different from the Siwaliks of Arunachal Pradesh.

Siwaliks has wide connotation, it is composed of facies with varied degree of diagenesis, compaction and lithification along the Himalayas and need to be understood before making such comments.

NHPC's comments on Chapter-III : Climate and Hydrometeorology

Experts Reply

The data, as required, are not available for the catchment, even with IMD, Govt. of India. We interpret whatever are available. Some of the data have been collected from the tea gardens of the area. Our question is wherefrom NHPC got these data? Why you have not supplied these data to us in spite of our repeated request? **Is it not enough to say that the required hydrometeorological data are absent and the project was formulated without required database?**

Most of the climatological parameters are highly variable with time. It has different kinds of variations, such as – diurnal, seasonal, cyclic and random etc. Therefore, generally, at least 35 years period (Brookner's Cycle) of observations are considered to get nearly stable averages of these parameters. However, in case of the scarcity of data, we may come down to a data period of 10 to 15 years.

In case of the climate and hydro-meteorological analysis, there is no point of data generation by the expert group. Meteorological data from the past 10 to 15 years should have with the NHPC which was used in the preparation of the DPR of the project. But, NHPC failed to supply us the required data. Probably, because of the non-availability of adequate meteorological data, NHPC was reluctant to supply the meteorological data to us. NHPC supplied only the rainfall data of Gerukamukh for the period 2004 – 2008. At this stage, we collected available meteorological data from the tea gardens which are located in the downstream of the project as well as from the IMD for their meteorological stations located in and around the lower Subansri basin.

A good data set of rainfall and other hydrological parameters have paramount importance in designing any kind of hydrological projects, specially in case of big dams. But it is clear from the letter of Mr. T. P. Singh, Assistant Meteorologist, IMD, New Delhi written to the General Manager (Design), NHPC (Letter No.H S- DS(SNR)30 1/VII dated 16.02.2001) that there was serious data gap. In the letter, Mr. Singh who studied the Design storm for Subansiri Basin wrote that *"there is no long term concurrent rainfall data in and around the catchments at different altitude. Rainfall data of China region within catchment is also not available in this office. With these constraints it is practically not feasible to get realistic assessment of rainstorm patterns in these catchments"*. This indicates the hydro-meteorological study made for the preparation of DPR was not adequate.

Because of the constraint of data, we could not cover all the aspects of the hydro-meteorological study. Moreover, we did not include the upstream portion of the catchment from the Lower Subansiri Dam site, because it was not in our scope of the work. So far the downstream of the dam site is concerned, the database was not partial as claimed by the NHPC. The region is a plain one and there is no any climatic divide which causes abrupt variation of the meteorological parameters. The variation of the meteorological parameters in the study area has a definite pattern as depicted by our analysis and we do not find any reason to agree that the database is partial. Moreover, no one can generate proper past meteorological data, if there is no any observations/records.

Chapter-IV : Runoff characteristics, sediment load and water quality

NHPC's comments

Para 4.2 Page 2 Hydrological Analysis

Experts Reply

The figure of 1971, 21230 cumec is referred in detail. It is the part of the NHPC to disprove it. If the data is a mistake, Government of India may be requested to take appropriate action on the Geological Survey of India. In fact these data are generated by State Government department which are handed over to CWC later on. Anyway, why NHPC is not giving us the hydrological data of the period that we are giving, and even of larger duration?? Only a small database of one station is not enough to estimate the design parameters. We opined, the database is grossly inadequate for the hydrological project. Also for dambreak analysis work the synthetic data you have supplied, are not elaborated viz., length of measured database used, methodology and reliability. Is it not enough to say the project has been carried out without the required data?

NHPC's comments

Para 4.4 Page 22 Sediment load characteristics

Experts Reply

This indicates that the project was designed with inadequate data. Heavy sediment load prior to initiation of the project is a clear indication that the anomalous upstream activities (natural and/or artificial) exist and may bring unpredictable complications to the project.

NHPC's comments

Para 4.5 Page 24

Experts Reply

Already clarified at Para-1.7 : Page 24&25 of this document.

Chapter-V : Land use and Land cover mapping

NHPC's comments

Experts Reply

As we prepared the map for 1:50000 scale, the Cartosat data is not used. It is helpful for largescale mapping such as 1:25,000 or 1:12,000. Also time is one of the major constrain. Moreover, there was no coverage of Cartosat-2 in the area. Even LISS-IV data in the eastern section are not available. The wet

Season satellite data are full of cloud coverage and could not be considered for the study. For terrain model we used the SRTM DEM which has full coverage and much reliable than the Cartosat-model. We test it against the topographic height taken from SOI toposheet and found conform well.

The difference in agriculture area is more in surveyed data since they excludes government land from their statistics.

NHPC's comments on Chapter-VI- Ecology of Subansiri basin

Experts Reply

Para 6.1 Riverine fauna:

The data generated from actual sampling conducted during 2008-09. There is reason to believe that fish species diversity in the down stream of Subansiri River should be close to 150 as proper documentation of fish fauna require at least two consecutive years. The shortfall of species number is obviously due to non adequate sampling of certain migratory forms during high flood. As such the list of fish species given in the report is not the complete list of ichthyofauna of the Subansiri River and adjoining wetlands.

The para 3 of page no. 9 is self-contradictory. The criteria for ascertaining the conservation status for individual species has been provided (Table 6.3).

Dolphins are not found upto 20 km below the down stream presumably due to presence of debris and waste water generated from the construction site.

Para 6.3 Aquatic Biology

All the species were indeed recorded during the present survey and not from any secondary source. In all probability there is more number of species in the downstream of Subansiri R. as well as in adjoining beels. As such the number of species given in the report is definitely not the entire list of fish species found in the river system. CAMP-BCCP (1997) was followed while assessing conservation status of individual species.

Diurnal variation in the water flow especially during dry months will have an adverse impact on the ecology of the river. Reduced flow during day time will have a negative impact on food chain in the down stream coupled with reduction of fish cover. In extreme cases dolphin may congregate at confluence with the Brahmaputra, thereby risking their survival.

Para 6.4 Beels (Wetland):

Out of the 112 beels present in the downstream at least 10 beels are open type i.e., directly connected with Subansiri R. These beels are fully dependent on the river for auto stocking and disposal of aquatic weeds. Reduced flow during dry months is sure to have an impact on the wetland system.

Primary data are collected during field survey.

NHPC's comments on Chapter-VII- Socio-Economic Status

Experts Reply

References cited in the chapter were not drawn to substantiate the negative impacts of dams. Such kind of apprehension on the part of an organization like NHPC is really unfortunate. Access to and availability of references depend on many factors including the time constraint, spirit and purpose of the study. One cannot satisfy all others in this respect. The main question is whether the source materials used are sufficient to construct a theoretical framework to carry out the study from right perspectives. If time and resources permit, it is true that the horizon and dimension of the study may be widened and deepened further.

Anomalies in village names are not unlikely. Some villages mentioned in the sources may be sometime uninhabited, deserted and even wrongly cited. Cases of shifting of villages may also be there. The villages brought under the study (46 in numbers) carry the correct names used by the villagers. The miss-matching is due to revenue village name included in the circle map of the Government of Assam, to which many of the villagers are not aware of. We give the name in the analysis, as given by the villagers, who otherwise will be confused about the study.

The vulnerability zones identified are mainly based on the present and probable pattern of inundation. It is also compared with the dam break inundation map. More emphasis is given to the most vulnerable zone (Zone-I) from which 30 villages were selected for primary survey, followed by 10 villages from Zone-II and 6 villages from Zone-III. Statistically speaking, there is no doubt that the accuracy level of the results would have been more, if the proportion of the villages and households surveyed could be measured. Practically, it was not possible to include more villages in the primary survey due to time constraints. However, the results of various aspects of socio-economic environment derived from the intensive survey covering as many as 46 villages sufficiently and accurately represent the ground reality of the area and the people. Moreover, sampling techniques are the standard statistical procedures accepted globally.

The study on people's perception about the situation arising out of the implementation of the project definitely stands closest to the reality.

A cursory but impartial visit to the area by anybody will be enough to understand the meaning and reliability of the results presented in section 7.2 of the Chapter. It is crystal clear that the project in its present form shall in no way improve the condition of the people along the river bank.

Most importantly, the comments made by NHPC against all the recommendations (Sl.No.14-17) directly related to Chapter-VII adequately prove the strength and validity of the recommendations made on the basis of the field study (Chapter-VII). All the four recommendations have been accepted by NHPC without any counter arguments (Annexure-1, Pages of 4 and 5 of 8). This proves that the study was logical and sufficient to satisfy the cause for which it was done.

5. But still, as the cultural and socio-economic dimensions are very wide and varied, and sometimes not that easy to quantify and at the same time highly sensitive and dynamic, no social scientist would deny the scope for further study. Moreover, the perspectives and paradigm followed in a study of this type may also lead to some degree of variation in the results and discussion. This is more obvious in a behavioural environment evolved through the long-continued interaction between nature and culture.
6. Further clarification on the matters, if any needed and sincerely wanted, may be made in detail in the discussion proposed to be held between the NHPC and the study group.

NHPC's comments on Chapter-VIII : Tectonics and seismicity

Para 8.2

Page 4& 5

Experts Reply

What is evident during 1897 earthquake, the person investigating the earthquake at that time, R.D. Oldham are dared by some to question as if after hundred years they can see the phenomena themselves. Ambraseys, N., and R. Bilham (2003) shifted the epicentre to Shillong from the identified epicentre in Dudhnoi to fit the great Oldham Fault, disrespecting the famous gentleman. Bringing such academic research in a project like Subansiri is unjustified. Moreover, what is the reality of the empirical relations used for PGA or PGV calculation. Why hundreds of such equations exist with large variability? Which one is correct? Which one is not? NHPC has attitude to win a game by any means and has no commitment to the society. Because the relation given by Abrahamson and Litchiser (1989) is used by IIT Roorkee, is it universal? No such relations work out afterwards? Or is the stagnancy in the science of earthquake? NHPC should use the magnitude scale properly to a single unit Ms, Mb, Mw.

In this para NHPC mention 240 km distance of the dam site from the 1950 Assam Earthquake epicentre is misleading and contradicts their own writing in their comments on Para 8.2, Page 8&9 (Page 16 of 22) where it is given as 160km and in fact is true.

NHPC's comments

Para 8.2

Page 6

Experts Reply

NHPC's clarification regarding HFT at 3km distance and detachment at 6.5km depth contended to generate maximum of 5.5 magnitude earthquake and calculate the corresponding PGA as 0.33g. We suppose, in their calculation, they being not the expert, take the services of their consultants of IIT Roorkee, who in their Tutorial Project Report of Mizoram assigns an earthquake of magnitude greater than 6 at depth of 3km to calculate the PGA as 0.36g (Part of the report given below). It appears that IIT Roorkee is moving around the magical value of Zone-V.

The horizontal acceleration attenuation relation is as follows:

$$A = 0.032(1.007)^{(0.274M)} + 0.132E - 0.0008R$$

where A is the horizontal acceleration, R is the distance in km to the closest approach of the rupture plane, M is the magnitude, F is dummy variable that is 1 for reverse fault and 0 otherwise, and E is a dummy variable that is 1 for interplate events and 0 otherwise. The distance to the closest approach of the zone of energy release is estimated by taking the depth to the top of the seismogenic rupture zone based on the size of the earthquake. The distance is computed by taking the depth as 2 km for the shallowest distance to the seismogenic source (Wells and Coppersmith, 1994) for the earthquakes with magnitude greater than 6. The maximum value of peak ground acceleration (PGA) is 0.26g (Table II).

The target spectra selected has a confidence level of mean plus one standard deviation, as per recommendations of ICOLD (1989, Appendix 2). Seed et al. (1976) have proposed such a shape based on 28 records for rock site and the same has been adopted for the present case.

The reverse spectra as evaluated from a time history is unique, the reverse

The above is quoted from the report, "Site Specific Earthquake Parameters for Turial Dam Project, Vizoram", Project No.P-9607 (April, 1997) by IIT Roorkee.

The same is true for the NHPC's Lower Subansiri HE project report of IIT Roorkee and is given below from their submitted report to NHPC.

The present study attenuation relationship proposed by Abrahamson and Litehiser (1989) has been used. The regression used a two-step procedure that is hybrid of the Joyner and Campbell (1981) and Campbell (1981) regression methods. The horizontal acceleration attenuation relation is as follows:

$$\log(a) = -0.62 + 0.177M - 0.982 \log(r + e^{0.294M}) + 0.132F - 0.0008Er$$

where a is peak horizontal acceleration, r is the distance in km to the closest approach of the zone of energy release, M is the magnitude (as adopted by Abrahamson and Litehiser (1989) magnitudes are directly from Campbell when available and otherwise are taken as either M_s (surface wave magnitude) or M_L (local magnitude) following Campbell, where M_s is used if it is greater than or equal to 6.) F is dummy variable that is 1 for reverse or reverse oblique fault otherwise 0, and E is a dummy variable that is 1 for interplate and 0 for intraplate events. The distance to the closest approach of the zone of energy release is estimated by taking the depth to the top of the seismogenic rupture zone based on the size of the earthquake. The distance is computed by taking the depth as 3 km for the closest distance to the seismogenic source (Wells and Coppersmith, 1994) for the earthquakes with magnitude greater than 6. The maximum value of peak ground acceleration (PGA) is obtained as 0.38g (Table II). The surface wave magnitude M_s is used for the estimation of PGA values.

5.2.2 Ground Motion Characteristics

Time history of ground motion is worked out from the shape of targetted acceleration response spectra which in turn depends on the parameters of the earthquake, dominant period of the ground motion and the amplification of ground acceleration at various periods. For the present situation the maximum amplification is taken as 3.0.

The above is a part of the report of IIT Roorkee on Subansiri Project of NHPC (Report No. EQ:2001-02; Site Specific Earthquake parameters for Subansiri Lower HI Project, Arunachal Pradesh, 2001).

The meeting held on 29/04/2004 of the XIVth meeting of the National Committee on Seismic Design Parameters (CSDP) for River Valley Projects at Omkareshwar Project Site, M.P. requested IIT Roorkee to consider earthquake of 8.0 ($M_s/M_b/M_w$?? not assigned!!) at the detachment and 7.5 at MBT Below is the attachment. The Committee undermines the occurrence of 1950 Assam Earthquake and also the M earthquake 29 June, 1947 in the Subansiri Catchment north of MBT which brought trails of destruction in the Subansiri catchment.

From

Mayashree Gharphalia , PHD RESEARCH SCHOLAR NLU, ASSAM

C/o Dr. Manas Das

Quarter No 56 A

Teacher's Residence Complex

Gauhati University

Guwahati

781014

Ph:7002825264

To

The Public Information Officer

Managing Director

NEEPCO

Laitumkrah, Shillong, Meghalaya 793003

Sub: Information regarding the capacity of the Ranganadi Hydro Electricity Project (Ranganadi Dam) and the rehabilitation and resettlement of the displaced people from the Ranganadi Hydro Electricity Project (Ranganadi Dam) site.

Dear

Public Information Officer

Under the Right to Information Act 2005, Section 6, I need some information. The details of the information are as follows:

1. Details of the applicant:

Mayashree Gharphalia

C/o Dr. Manas Das

Quarter No 56 A

Teacher's Residence Complex

Gauhati University

Guwahati

781014

Ph: 7002825264

2. Details of information:

- What is the capacity of the Ranganadi Hydro Electricity Project (Ranganadi Dam)?
- How many people have been displaced?
- What measures have been taken by the enterprise to rehabilitate and resettle the displaced people?



Yours Sincerely

Mayashree Gharphalia
Mayashree Gharphalia

Reply to RTI query of Ms Mayashree Gharphalia, Guwahati University

Inbox

Dipankar Baruah <dip_bar@rediffmail.com>

Tue, Dec 15, 2020,
6:58 PM

to me, bipuldass3769

To,
Ms Mayashree Gharphalia,
Research Scholar
C/O Dr Manas Das
Qr No. 56A, G.U
Guwahati University
Jalukbari, Guwahati
PIN 781014

Sub: Reply to your off-line RTI query to NEEPCO Dtd. NIL.

Dear Madam,

Please refer your off-line RTI Application to NEEPCO attached herewith.
The informations sought by you under point no. 2 of your application are provided as hereunder:

2. (a) Capacity of Ranganadi H.E.Project : 405 Mega Watts, Annual Energy 1509.66 Million Units.

(b) No. of people displaced: 27 Families.

(c) Measures taken for Rehabilitation:

An amount of Rs. 62 Crores was paid as compensation to the displaced people. 27 nos of families residing in Rub & Chun villages were shifted to newly created Potin village, which was developed with approach road, good water supply facility, School Building, Teachers Qtr etc. Another 7 nos. families of Rub village were given CGI sheets and drinking water facility. Construction of check dam, development of terrace cultivation were done in Potin. Construction of storage tank and water supply line in Rub village are under progress.

These informations are provided as received from the Project Authority of NEEPCO.

Thanking you,

Yours sincerely,

Dipankar Baruah

CPIO, NEEPCO, Hq

16/12/2020