

FLOOD CONTROL POLICY IN INDIA: THE STUDY OF
THE BRAHMAPUTRA BOARD

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DECLARATION

I declare that the dissertation entitled "Flood Control Policy in India: The Study of The Brahmaputra Board" submitted by me in partial fulfillment of the requirements for the award of the degree of Master of Philosophy of Jawaharlal Nehru University is my own work. This dissertation has not been submitted for the award of any other degree in this University or any other University.

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IN LOVING MEMORY OF MY GRAND PARENTS

SOMNATH NATH AND DHAMESWARI NATH

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ABBREVIATIONS

AEC	Assam Engineering College
BADA	Bengal Alluvium And Diluvium Act
BFCC	Brahmaputra Flood Control Commission
BFCD	Brahmaputra Flood Control Board
BJP	BharatiyaJanta Party
CWC	Central Water Commission
CWINC	Central Water Irrigation And Navigation Commission
DPR	Detailed Project Report
GOI	Government Of India
GSI	Geological Survey Of India
ILR	Inter Linking Of Rivers
IMD	Indian Meteorological Department
LPG	Liquefied Petroleum Gas
MoWR	Ministry Of Water Resources
MPRVD	Multipurpose River Valley Development
NCIWRD	National Commission For Integrated Water Resource Development
NDA	National democratic alliance
NDMA	National Disaster Management Authority
NHPC	National Hydroelectric Power Corporation
NWBA	National Water Development Agency
PWD	Public Works Department
RBA	Rashtriya Barh Ayog
RMW	River Management Wing
SAC	Space Application Centre
TVA	Tennessee Valley Association
UPA	United Progressive Alliance

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CHAPTER-1

The animal merely uses its environment, and brings about changes in it simply by its presence; a man by its changes makes it serve his ends, masters it. It is the final, essential distinction between man and other animals, and once again it is labor that brings about this distinction... let us not, however, flatter ourselves overmuch on account of our human victories over nature. For each such victory nature takes its revenge on us. Each victory, it is true, in the first place brings about the results we expected, but in the second and third places, it has quite different, unforeseen effects which only too often cancel the first...

Frederick Engels, Dialectic of Nature¹

1.1: BACKGROUND

Being a country surrounded by the Indian Ocean, the Bay of Bengal and Arabian Sea, India is quite prone to flood. As per the Geological Survey of India (GSI), almost 12.5% area of the country is susceptible to major flood.² Floods being the very common disaster in India cause enormous loss of the country's lives and property every year. The states that are falling within the edge of "India Flood Prone Areas" are Assam, Orissa, West Bengal, Andhra Pradesh, Gujarat, Kerala, Uttar Pradesh, Bihar, Punjab and Haryana. The extreme monsoon rains experiencing from the rivers like Brahmaputra, Yamuna Ganga, etc... force them to swell their banks that in turn overflows the adjacent areas. Over the last few decades, states of central India have become acquainted with precipitation events like severe rains and flash floods. The river banks and deltas of Ganga, Ghaggar, Yamuna-Sahibi, Rabi, Gandak, Brahmaputra, Mahanadi, Kosi, Sutlej, Teesta, Godavari, Mayurakshi, Sabarmati, Mahananda,

¹GoswamiRituporn, "Rivers And History: Brahmaputra Valley In The Last Two Centuries", Thesis submitted to Jawaharlal Nehru University. Pp-196

² Geological Survey of India Report, "Top ten flood prone areas in India", <http://www.mapsofindia.com/top-ten/geography/india-flood.html>

Damodar and their tributaries frequently come into notice due to its inundation scenario. According to the report by GSI, during the period 1953-1999, average annual flood damage has been calculated to be 13,400 million hectare within which 8.11 million hectare is settled and 3.57 million hectare is crop area. The number of human lives lost is around 1579 and approximated 95,000 nos. of cattle have lost every year on average due to flood.³

In the context of Assam, the mighty river Brahmaputra has a presence in every person's life on its bank. With its imposing presence which has evoked songs, poems and stories in the oral literature, the people inhabited on the bank of the river Brahmaputra, have almost given it the status of a living being, bestowed with a life of its own.⁴ Thus when one is to talk about the history of the river Brahmaputra in the last centuries, the social history of the river is being given the prime importance rather than the natural history of the river. But this river like other rivers of the world brings happiness as well as sorrow to the people inhabiting in the valley in the form of flood and river-borne erosion. Similar with monsoon, summer and winter, inundation by the Brahmaputra is an annual phenomenon in Assam. The two earthquakes of 1987 and 1950 had brought a drastic change to the river ecology for which flood problem has become more critical in the region.⁵ As such an urgent solution to this problem has given utmost importance by the state.

The Indian sub-continent is governed by a large number of monarchs of diverse origin and civilizational background. To name a few, Maurya empire, Gupta empire, the Khilji Dynasty, Vijaynagar empire, Ahom kingdom, Mughal empire and more significantly the migration of the European traders had resulted in the establishment of the British Empire in India.⁶ With the coming and ruling these diverse rulers, a gradual civilizational change has taken place which in a way resulted in the transformation of human-nature relationship in the

³ Ibid,

⁴ GoswamiRituporn, "Rivers And History: Brahmaputra Valley In The Last Two Centuries", Thesis submitted to Jawaharlal Nehru University.

⁵ Due to the earthquake of 1987 and 1950, the river bed of the Brahmaputra has raised around 3 meters in Dibrugarh town that increased the intensity of flood and also erosion in the river.

⁶ The relation that existed between the dynasties and the rivers is not clearly found in the literature. So, a special analysis is made on the kingdoms like Mughal kingdom, Vijaynagar empire, Ahom kingdom, British empire etc...

country. Notably, all the rulers who governed India used the rivers enormously either for transportation or for settling their kingdom in the river bank. But earlier the idea was not to control or subjugate the rivers but make use of the water resources for their survival. They constructed various canals or ponds in order to make their territory irrigated. These kings, like common people, relied on the primitive knowledge while dealing with the rivers. But the coming of the British has changed the scenario to a great extent.

The colonial wisdom of flood control was primarily based on the engineering solution that was motivated by the enlightened thinking. It is worthwhile to mention here that nearly all the advancement of the sciences in Europe in the course of its shift from feudalism to capitalism was offered by the colonialism yet this advancement was also a part of the evolution of industrial revolution and world capitalist system. So the river engineering process of the British has always been motivated by a capitalist profit motive to be made by utilizing the river. The Britishers when came to India, developed an official perception based on so called superior scientific knowledge where the traditional knowledge of the people living on the bank of the river is relegated to be primitive. The colonial government made their hydraulic interventions mainly in the Bengal delta which was based on an agrarian economy. Till the time of this intervention, some sort of criticisms against the engineering solution (embankments, hydroelectric project and so on) for flood control has come up. In spite of knowing these, the colonial government pursued it because of two reasons as mentioned by Rohan D'souza⁷-

“First was that the Company needed a public works infrastructure for its own survival and to enforce its government. Since they had to face a lot of resistance from the native rulers, they desperately needed roads, bridges, canals, embankments, barracks, and cantonments to facilitate the movement of their troops. Constructing embankments helped them in transportation and communication. The second reason behind this extensive river engineering is motivated by an economic reason. The colonial government especially the revenue department was always in an intention to increase

⁷D'souza Rohan, “The Deltaic Rivers of The Bengal Presidency: The Political Economy Of Flood Control in Colonial Orissa”, PhD thesis submitted to Jawaharlal Nehru University.

the land revenue but did not succeed due to hydraulic instability. Thus, for the company, the need to enforce a standardized rental installment, based ideally on an assumed average output of the season's crop, required land to be decisively insulated from the inevitable variability brought on by recurring hydraulic action. As such, the ecological context for the existence of capitalist property in land was that of structuring it to relate to deltaic inundation as natural calamity rather than as a hydraulic process."

Thus, the Britishers had initiated a new era of understanding the rivers and their water resources. Their flood control policies can be categorized in three distinct phases. The first is called the era of modern irrigation in which canals were constructed in the rivers like Ganga, Krishna, Godavari in the mid of 19th century. The second phase was characterized by the extensive embankment construction work by the Britishers in all over the country. The third stage was a foundation for multi-purpose river valley projects in India by laying down the framework for the construction of three dams. The construction of Damodar Valley Project, the multi-purpose river valley project in Mahanadi and the same in the Sone River was the result of that rational.⁸

However, there was an initial difference in the dealing of the Brahmaputra by the British. In the first several decades of their rule, the Britishers did not put any attention towards the flood problem in the valley. But by that time they discovered the jute cultivation to be highly productive in the riverine tracts of the Brahmaputra valley due to which they started emphasizing on the issue. After that, the same policies were adopted for the Brahmaputra valley. It should be noted that while the provincial government under British was to take care of the short-term measures of flood control by primarily building embankments, the Government of India was to take steps for the long term solution - the complete 'stabilization' of the river through multi-purpose reservoirs across the major tributaries of the river. This was the building blocks that prepared the foundations of a complete metamorphosis of the Brahmaputra - from a free-flowing river to a tamed and

⁸ Ibid

controlled one.⁹The adverse impacts of this river engineering process on the people who have been living on the bank of the river Brahmaputra and its tributaries, the displacement and devastation which it had brought to people's lives, the degradation of the river ecology, the risks of mega-structures in a region with high seismicity, all these issues were downgraded to a background. In this demotion, the Brahmaputra Board has taken the active part through planning and implementing the policies for flood control in the valley. So in the modern India, all the flood control mechanisms including The Brahmaputra Board has transformed its aim from flood mitigation to hydropower generation emphasizing the role of private capital to convert river water as productive national resources.¹⁰

Thus, defining the issue as a serious matter within the arena of political ecology, the dissertation theorize the political economy of the flood control policy of India that has transformed to hydropower generation from flood protection within the broader framework of the modern state system. It takes a critical look at the flood control policies through the point of view of third world political ecology. The study is focused on the policies for flood control; hence very less scientific study has been made on the geology, geomorphology, hydrology or geography of the river system in India. Some sort of scientific analysis has been made for the Brahmaputra River studying the science research journals in order to understand the peculiarities of the said river.

1.2: RESEARCH QUESTION

1. What is the status of political ecology in the modern state system? How the transformation of political ecology has happened in the modern state of Europe and how has it affected the human-nature relationship in the post-colonial states?

⁹GoswamiRituporn, "Rivers And History: Brahmaputra Valley In The Last Two Centuries", Thesis submitted to Jawaharlal Nehru University, pp- 29

¹⁰ Saikia Arupjyoti, "Ecology, Floods and the Political Economy of Hydropower: The River Brahmaputra in the 20th century", NMML Occasional paper, "Perspectives in Indian Development", Nehru Memorial Museum and Library.

2. How has flood been affecting the lives of the people in India? How does the Indian state accomplish the duty of regulating the rivers and floods occurred by them?
3. What programs and policies are adopted by the Brahmaputra Board to solve the flood problem and river-borne erosion in Assam? Why has the Brahmaputra Board failed to solve the problem?
4. What colonial legacies affect the flood control policy of the government of India and also the functioning of the Brahmaputra Board?
5. What is the impact the flood control policy adopted by the Brahmaputra Board on the greater Assamese society?

1.3: HYPOTHESIS:-

1. With the emergence of the modern state system, a significant change has happened in the relationship between human being and nature. The enlightenment thinking has represented a specific western modernity where nature is subjugated to the rational human being. The belief was that the enlightened human being can harness nature with the power of science and technology. With the colonial conquest, this enlightenment thinking also moved to the colonies and it still continues as a colonial legacy in the post-colonial states.
2. The flood control policies adopted by the modern state of India are characterized by the colonial capitalism for which the policies and programs adopted by them are proved to be inadequate to solve the problem. The institution has become techno-fetish losing its imaginary capacity owing to colonial legacies, thinking engineering solution such as embankment construction, dam construction as the only viable solution to solve the problem.
3. The Brahmaputra Board, being an organization under the central government is having the same characteristics due to which controlling flood in the Brahmaputra valley has remained impossible.

1.4: OBJECTIVES

- To make a detailed analysis of the relationship between Politics and Ecology.
- To examine the status political ecology in the Modern State System.
- To study the problems associated with the natural disasters.
- To analyze the response of the state towards natural calamities with special emphasis on the flood problem.
- To analyze the role of the Indian state in their approach to control flood problem.
- To examine the functions of the Brahmaputra Board in solving the flood problem in Assam.
- Lastly, to analyze the affectability of those works done by the Brahmaputra Board.

1.5: SCOPE OF THE STUDY:

The study deals with 'Political Ecology', an issue of greater importance in the present times. Having a global significance, the ecological issues always require a more precise and politically aware approach to deal with it. This work will re-evaluate the issue analyzing the intrinsic ways in which politics and ecology are mutually related. It is believed that identifying the relation between politics and ecology, the gradual transformation of political ecology with the development of modern state system will be helpful in understanding critically the issues likemodern state making projects in Europe, the advancement of science and technology and their impact in the third world countries as well as human-nature relationship in West and post-colonial state. Further, with this theoretical framework, the dissertation will basically locate itself in the Indian scenario of flood control as well as the same in the context of Assam later. While discussing the flood control policies, it will make a critical analysis of the development paradigm that is going on in India. A more critical look will be made towards colonialism, capitalism, the dependency over science and technology that is the basic character of every modern state including India. So the study will help to relate theoretically the actual happenings in the name of policies and working of the various

flood control organizations in the country in general and some of the Brahmaputra Board in particular.

1.6: RESEARCH FRAMEWORK

As the research is concerned with an environmental issue i.e. rivers and the flooding problem associated with them, so it will engage with the approaches that deal with the issue of ecology in terms of the changing dynamics of political ecology historically over the period.

1. The discourse on ecology and modernization will be the prime research framework of the dissertation. This framework will take into account the tribulations of modernity concentrating on the impact of the same on the ecology. Within this discourse, the tussle between indigenous knowledge and modern scientific development in flood management will be discussed.
2. The discourse on the post-colonial nation state which will provide a base to understand how the post-colonial states even after decolonization have been being influenced by the ideas that were the brainchild of the imperial world. This framework will help in understanding specifically the transformation of human-nature relationship in the western countries and its migration to the colonies.
3. The Gandhian Framework as articulated by Mohandas Karamchand Gandhi. Within this framework, it will take into account the Gandhian perspective on modernity represented by the west, his idea of development, human progress, morality, capitalism as well as in science and technology. Since the former research frameworks are dealing with much wider areas emphasizing on the inter-connection between the modern western world and the post-colonial third world also between traditionalism and modernity, so the Gandhian framework will provide a philosophical understanding to the dissertation.

1.7: CHAPTERISATION

CHAPTER 1- INTRODUCTION-

This chapter will introduce the study elaborating the methodology. An overall understanding of the notion of political ecology and its transition with the changing time will be made here. The issue of flood and problems related with it will be summarized along with which some specific analysis on control of those problems. It will again evaluate the works of the prominent writers relating to the issues of political ecology, flood and flood control policy of the state and their perspectives in the context.

CHAPTER 2- POLITICAL ECOLOGY AND THE MODERN STATE SYSTEM-

This chapter will try to inter-relate ecology with the political aspects. In the first part of the chapter, a basic understanding of both the concepts of politics and ecology will be made along with various definitions of political ecology offered by the scholars and ecologists. In the next part, it will situate the political ecology in the modern state system and analyze how with the growth of the modern state system the ecological journey has been transformed from a dominant paradigm to a subordinate one. In this respect, the concepts like role of enlightenment in the thinking of nature to be dominated, science and technology favoritism of the modern state, role of capitalism in the materialization of nature will be seriously taken into the board. Another part of the chapter will emphasize on how rivers have been conceptualizing in the post-colonial states and the impact of the colonial bequest on this conceptualization.

CHAPTER 3- STATE POLICY FOR FLOOD CONTROL IN INDIA

Since the last few decades, India has been experiencing frequent precipitation events such as torrential rains along with flash floods. The areas that are susceptible to major floods are the river banks and deltas of Ravi, Yamuna-Sahibi, Ganga, Gandak, Sutlej, Ghaggar, Kosi, Mahanadi, Teesta, Brahmaputra, Mahananda, Damodar, Sabarmati, Godavari, Mayurakshi and their tributaries. Although the north-Indian plains are more prone to flood, the "India flood prone areas" can broadly be categorized into three parts:

- Ganga Basin
- Central India and Deccan Rivers Basins
- The Brahmaputra and Barak Basins

The newly independent state of India set up several institutions as well as agencies for flood control. For flood forecasting, the Central Water Commission has established 150 stations all over the country. During 1988, after flood forecasts were issued by these centers and 93.9 percent of them were accurate. Measures for flood plain zoning have been taken up. Detailed maps have been prepared for more than 50 per cent of the target areas. Besides these, it has been seen that the government has in the due course of time, adopted the multipurpose river valley projects as the long-term solution for flood control. As a result of this, a large numbers of Multipurpose river valley projects has come namely The Damodar Valley project on river Damodar (Jharkhand and West Bengal), Bhakra Nangal on river Sutlej (Punjab, Haryana and Rajasthan), Hirakud on the river Mahanadi (Orissa), Kosi in Kosi river on Bihar, Chambal valley on Chambal (in Madhya Pradesh and Rajasthan), Tungabhadra on Tungabhadra (Karnataka and Andhra Pradesh), Nagarjunasagar on Krishna (Andhra Pradesh), Narmada Valley on Narmada (Madhya Pradesh, Rajasthan and Gujarat), Indira Gandhi canal on Beas, Sutlej (Punjab Haryana and Rajasthan) and so on.

Thus this chapter will analyze the basic features of the flood control policies adopted by the government of India in the post-independence era. It will further analyze the effectiveness of those policies.

CHAPTER 4- FLOOD SITUATION IN INDIA THE WORKING OF THE BRAHMAPUTRA BOARD

The Surplus water found in the Brahmaputra basin and the Barak basin inundates both the Brahmaputra and Barak valley every year. These rivers along with their tributaries overflow the northeastern states like Assam, West Bengal and Sikkim. With the primary objective of management of flood and river-borne erosion in the region, the institution of Brahmaputra Board was established in 1980 and it has been functioning since 1982. Unlike the other central and state level organizations for flood control, no significant multipurpose river valley projects have been adopted by the Brahmaputra Board in the region. Rather this institution has relied primarily on constructing embankments for controlling flood and river borne erosion in Assam. So the main argument supposed to be made in this chapter is that the reason behind the Brahmaputra Board's undue emphasis on Embankment is nothing but the colonial legacy. Before independence, the British have burnt their fingers in embankment construction and the post-colonial government maintained it.

This chapter will first contextualize Assam in the greater Indian set-up and its uniqueness as a natural hub of the country. Then it will situate the River Brahmaputra in the larger Assamese society. For this, the chapter will first give a detailed evidence of the River- its geology, origin, areas getting connected with it and also the pros and cons of the river. Further in the chapter, flood problem in the Brahmaputra Valley will be taken into account. After that, it will look into the policies and programs adopted by the Brahmaputra Board since 1982. It would further analyze how the notion of colonial legacy is involved in it.

CHAPTER 5- CONCLUSION

This chapter will conclude the dissertation by summarizing all the chapters with highlighting the main points of those chapters. This chapter will make certain general conclusions on the research problem linking up the field issue with the theoretical framework.

1.8: METHODOLOGY

The proposed research shall be descriptive, exploratory and explanatory in nature. The study will explore both primary and secondary sources by using deductive and inductive methods of research. The primary sources will be based on reports, press release and joint statements published by various authentic organizations and the Government of India as well as Assam. The secondary sources will include books, news reports, journals, articles, archives, newspaper clippings and various academic papers and essays. As far as Assam is concerned, in order to find out the reasons behind the failure of the Brahmaputra Board, the policies and programs adopted by the Board will be analyzed. Annual Reports of the Brahmaputra Board will be carefully analyzed. Various local literature on the issue of flood and erosion would be carefully analyzed to see how the river Brahmaputra and flood and erosion made by it has affected the day to day lives of the Assamese people. Besides these, there are numbers of Non- Governmental Organizations such as Krishak Mukti Sangram Sammitte (KMSS), Aranyak, Kalpavriks, and Jana Jagriti etc... that has made significant study on these issues. The survey reports of these Non-Governmental Organizations on the river Brahmaputra would be studied. Moreover, the Assembly Debates on the issue of flood in Assam will also be taken into account.

1.9: A REVIEW OF EXISTING LITERATURE

Political ecology is an issue that is having the greatest importance for humankind due its overwhelming impact on the society. Political ecology as an analytical framework is a very recent one originated only in the 1970s. But when discussing the meaning of political ecology, there is very difficult to figure it out as the meaning of ecology when it is brought within the concept of political ecology becomes multifaceted. However, according to *Blaikie and Brookfield* (1987), “Political ecology denotes the political and social conditions surrounding the reasons, experiences, and management of environmental problems. The phrase “political ecology” thus refers to the combination of the concerns of ecology and a broadly defined political economy. Together this, political ecology encompasses the persistently shifting dialectic between society and land-based resources, and also within classes and groups within society itself.”¹¹ Again *Greenburg and Park* define political ecology as “a synthesis of political economy with its insistence on the need to link the distribution of power with productive activity and ecological analysis, with its broader vision of bio-environmental relationship”.¹² So, political ecology has a very deep connection with the political economy which is a primary feature of the modern state system.

Although there is a close link between modern state and political ecology, yet there is always seen a dearth of literature on that subject. A study of the modern state is found in the *Vaccaro’s book “Political Ecology and Conservation Policies: Some theoretical Genealogies”* where he cited the argument of Weber and Gellner. For Weber and Gellner, “the emergence of the modern nation-state was based on the consolidation of an impersonal bureaucratic machine that claims, on behalf of the citizenry, a monopoly over key collective

¹¹Blaikie P and Brookfield H, “Land degradation and society”, Methuen and Co. Limited, London and New york, 1987,

¹²Robbins Paul, “Political Ecology: A Critical Introduction”, Blackwell Publishing, 350 Main Street, Malden, MA 02148-5020, USA, pp-6

jurisdictions (law, violence, education, amongst others). This monopolistic claim by the emerging modern nation state to the control of territory and natural resources translates into the imposition of a specific form of governmentality based on national territoriality.”¹³ So the modern state has certain specificity as *Anil Misra*, in his book “*Reading Gandhi*” has pointed that modern state is associated with industrialization, scientific and technological discoveries and capitalism, hence considering religion, faith or any other traditional things as irrational and thereafter unscientific.¹⁴ Thus in such a modern state where science was regarded to be the superior, ecology has definitely to be subjugated under it.

It is mention worthy that the modern state is influenced by the enlightenment thinking developed in the 17th and 18th century because of which nature is supposed to be harnessed for human welfare. As *John Stuart Mill* observes that “The doctrine that man ought to follow nature... is equally irrational and immoral. Irrational because all useful... human action, consists in improving the spontaneous course of nature. Immoral, because the course of natural phenomena being replete with everything which when committed by human beings is most worthy of abhorrence, anyone who endeavored... to imitate [nature] would be universally seen and acknowledged to be the wickedest of men.” So under such an intellectual umbrella the domination of nature has happened in such a way that both the state and its citizens have found it quite logical as well as justifiable. The post-colonial states are also on the same path of dominating and subjugating the nature. The post-colonial states like India where the earth is considered to “Mother Earth”, rivers were compared with deities, nature was connected with spirituality, and this domination has taken place. Along with the colonial rule, the ideas carried by enlightenment also came to India and has clearly seen in the river control policies of the Indian state.

As far as the river and flood control in India is concerned, Rohan D’souza has made an immense contribution to understand the political rhetoric flood control in the country. He has mainly two seminal works on this. *D’souza* in his book, “*The British and the Natural World*”

¹³Vaccaro I, “Political Ecology and Conservation policies: some theoretical Geneologies”, McGill University, Canada, Universitat de Barcelona, Spain

¹⁴ Misra Anil, “Reading Gandhi”, Pearson Education India.

has examined how the British had placed the environmental history and ecological knowledge into a global framework. This book also analyzes the empire-wide connection through which the environmental history in South Asia has been shaped from the 18th century onwards.¹⁵ Another book which has the principal contribution to the dissertation, named “*Drowned and Dammed: Colonial Capitalism and Flood Control in Eastern India*” is written by Rohan D’souza. He, in this book, has made an important point that the coming of the British had transformed the flood-dependent agrarian land of the country into a flood-vulnerable landscape. The colonial government according to him was always intended to increase land revenue, but they were unable to succeed because of the hydraulic instability caused by the river. So, the government had considered the deltaic flooding process as a calamitous event which needed to be solved very urgently. D’souza, in his book, made the case study of Bengal delta and argued that in order to protect the revenue generating land from flood; the colonial government adopted the construction of embankment as the first structural measure for flood control.¹⁶

This notion of flood control was carried by the makers of modern independent India such as BR Ambedkar. The contribution of Ambedkar in the articulation of water policy can be found in the book “*Ambedkar’s Role in Economic Development and Water Policy*” written by Sukhdeo Thorat. Thorat argued that Ambedkar was very keen to establish an independent authority for managing the water resources where the central government is to be given the leading role. It was under his contribution as Thorat has explained three river valley projects have been inaugurated and the journey of modern India has started with an attraction towards flood control with embankments and big dams.¹⁷ But gradually it is observed that dams and embankments have certain negative implications. These implications especially the negative impacts of the large dam can be found in the book “*The Silenced Rivers: The Ecology and Politics of Large Dams*” written by Patrick McCully. This book shows why the big dams have

¹⁵ D’souza Rohan, “the British Empire and the Natural World: Environmental Encounters in South Asia”, Oxford University Press, New Delhi- 110001

¹⁶ D’souza Rohan, “Drowned and Dammed: Colonial Capitalism and Flood Control in Eastern India”, Oxford University Press, 2011, New Delhi

¹⁷ Thorat Sukhdeo, “Ambedkar’s role in Economic Development and Water Policy”, Shipra Publication, Delhi, 1998

been the center of controversy due to the various technical, economic as well as safety issue associated with it.¹⁸In the Indian context, *Amita Baviskar* in her book “*In the Belly of the River: Tribal Conflicts over Developments in Narmada Valley*” has analyzed the environmental movements and natural resource struggles in India. A case study has been made by the author about the Bhilala Adivasis inhabiting in the Narmada valley and their struggles for resettlement and rehabilitation as many of them have been displaced due to the construction of the Sardar Sarovar Dam. This book portrays a clear picture of the anti-dam movement in India.¹⁹

In the context of Assam, the dependency of the Assamese lives upon the Brahmaputra river has been notified by Pallabi Deka Buzarboruah in her article, “*Rivers And The Assamese Folk Life: A Right Relationship Of Man And Nature*”. According to her, Assamese Life and culture have been sustained by the huge number of rivers from the time immemorial. The natural environment of Assam is favorable for the origin of rivers and rivulets, their flow and erosion, deposition and such other activities. Due to hilly areas on all sides of the state and also for the high average rate of rainfall the number of rivers and tributaries is naturally more. So, due to existence of innumerable big and small rivers, the natural environment of Assam which is related with human culture is river centric.²⁰ In this river-centric Assamese life, flood often causes severe damage to human being, crops and properties. In order to solve this problem, the Brahmaputra Board has been established in 1980. But, this institution was unable to solve the problem due to the techno-fetishism and bureaucratic nature as mentioned by *Ankur Tamuli Phukon*²¹. The flood control measure adopted by the board is mainly the construction of embankment. As *Patricia Mukhim* says, “on visiting the flooded areas of

¹⁸McCully Patrick, “Silenced Rivers: The Ecology and Politics of Large Dams”, Zed Books Limited, London & New York.

¹⁹Baviskar Amita, “In the Belly of The River: Tribal Conflicts Over Developments In Narmada Valley” Oxford University Press, YMCA Library Building, 1 Jai Singh Road, New Delhi 110001, India.

²⁰BuzarboruahPallaviDeka, “Rivers And The Assamese Folk Life: A Right Relationship Of Man And Nature”, International Journal of Social Sciences, Arts and Humanities, Vol. 2, No. 2, 2014, ISSN 2311-3782

²¹Phukon Ankur Tamuli, “A Tale of River Borne Erosion in Assam”, Deeper Water: Himal South Asia, September 24, 2013.

Assam in North Lakhimpur in 2008, one will see earth embankments that at best are temporary flood management measures. Till date, over 4,000 km of earth embankments have been raised. But when the Brahmaputra breaks its banks, these embankments come down like a house of cards. The same embankment costing several crores of rupees is raised again the next year.²²

So it is finally argued that the policies adopted by the Brahmaputra Board are not at all satisfactory. As *Arupjyoti Saikia* comments in his article “*Ecology, Flood and the Political Economy of Hydropower: The River Brahmaputra in the 20th century*” that the Brahmaputra Board being an institution under the central government has also been following the same route of transforming the river water of the Brahmaputra to an energy generating commodity.²³

²²Mukhim Patricia, “Floods in the North east: Lack of Planning and red Tape”, *Economic and political Weekly*, October 18 2014, Vol-XLIX, No-42, pp.21-23

²³Saikia Arupjyoti, “Ecology, Floods and the Political Economy of Hydropower: The River Brahmaputra in the 20th century”, NMML Occasional paper, Perspectives in Indian Development, Nehru Memorial Museum and Library,

CHAPTER 2

2.1: POLITICS AND ECOLOGY: INTRODUCING THE LINKAGE

In the present times, it is difficult to recognize an issue of greater prominence for humankind than its relationship with the environment. It is quite evident from the fact that human actions are affecting the environment in such a way that it has both unprecedented and unsustainable effect.²⁴ As a result of their actions certain, problems emerge in the global scenario including global warming, ozone depletion, loss of topsoil, species extinction, desertification, global population growth, depletion of global fisheries, disposal of nuclear waste, acid rain, environmentally-related illness, and decline in air and water quality. In view of the enormity, intricacy and global nature of these ecological problems, the necessity of a political approach to response them has gained wider recognition. Political ecology, as a theme of serious discussion, is nothing but the discovery emerged from that recognition.

Political ecology simply refers to the inter-connections between political, social and economic factors with environmental issues and changes. It is different from apolitical ecological studies as it has a basic feature of politicizing environmental issues and phenomena. Political ecology takes into account the social forms and human organization which interacts with the environment. It is the interconnection between the principles of political economy and ecologically rooted social science. Political ecology highlights the relations between ecology and social context by matching socio-ecological chronologies that contributed to the better understanding of their interactions and the social production of landscapes.

²⁴Bonnett Michael, "Retrieving Nature: Education for a Post humanist Age", Blackwell publishing, 350 main Street, Malden, MA 02148-5020 USA. Pp- 1

It is commonly accepted that debates regarding “political ecology” refer to the political and social conditions surrounding the causes, experiences, and management of environmental problems.²⁵ Remarkably, much scholarly writing on political ecology does not clearly define the meaning of “ecology.” However, variety of authors over the years has different approaches to the meaning of “ecology” when it is discussed in the concept of “political ecology.” The term ecology comes from “the Greek word oikos (house) and, significantly, has the same Greek root as the word economics from aikonomous (household) manager”. Earnest Hackel, the German biologist coined the word ecology in 1868. According to him, “Ecology is a body of knowledge concerning the economy of nature, highlighting its roots in economics and evolutionary theory”.²⁶ Ecology has different connotations in different field. For the social scientists, ecology means the harmonious interrelationship of all kind of living beings and non-living matters. For them, it refers to the misbalance of one particular factor resulted in its negative consequential impact upon other, hence lead to instability, crisis and disorder. On the other hand, according to the sociologists, the most significant ecological concepts are competition and cooperation, diversity and dominance, succession and adaptation, evolution and expansion and carrying capacity and the balance of nature.²⁷

Although the concept of ‘ecology’ was developed in the 19th century, the first debates on ecology as a science with a political content appeared in the 1960s as a result of the growing apprehension about human influences on the biophysical environment. “Ecology” has not only been seen as the study of those influences, but also as the new philosophical approach of looking at human-nature relations as a whole. Indeed, the mood was well represented by Aldous Huxley’s paper, “The politics of ecology: the question of survival” (1963).²⁸

However, while defining the term political ecology, it is seen that it embraces a range of definitions. While some definitions lay emphasis on political economy, the others stress more

²⁵Bryant Raymond L and Bailey Sinead, “Third World Political Ecology”, Routledge 11 New Fetter Lane, London EC4P 4EE.

²⁶Shiva Vandana, “The Violence of Green Revolution: Ecological Degradation and Political Conflict in Punjab Research Foundation for Science and Ecology, Dehra Dun.

²⁷ Ibid.

²⁸ Huxley Aldous, “The Politics of Ecology: The question of Survival”, Santa Barbara, Calif, Centre for Studies of Democratic Institutions, 1963.

on formal political institutions; some identify environmental change as most important whereas others emphasize narratives or stories about that change. Even so, there seem to be some common elements in those definitions. According to Blaikie and Brookfield, “Political Ecology combines the concerns of ecology and a broadly defined political economy. Together this encompasses the constantly shifting dialectic between society and land based resources, and also within classes and groups within society itself”.²⁹ Again Greenburg and Park define political ecology as “a synthesis of political economy with its insistence on the need to link the distribution of power with productive activity and ecological analysis, with its broader vision of bio-environmental relationship.”³⁰ For Scott and Sullivan, “Political ecology identifies the political circumstances that forced people into activities which caused environmental degradation in the absence of alternative possibilities...involves the query and reframing of accepted environmental narratives, particularly those directed via international and developmental discourses”.³¹ So, from these definitions, it is cleared that political ecology is an explicit alternative to “apolitical” ecology. Thus, political ecology tries to provide critiques as well as alternatives in the interplay of the environment and political, social and economic factors. Summarizing Political Ecology, hence, Robbins (2005) asserts that

“The discipline has a normative understanding that there are very likely better, less coercive, less exploitative, and more sustainable ways of doing things. From these assumptions, political ecology can be used to (a) Inform policymakers and organizations of the complexities surrounding environment and development in order to contribute to better environmental governance; (b) Understand the decisions that communities make about the natural environment in the context of their political environment, economic pressure, and societal regulations; (c) Look at how unequal

²⁹ Blaikie P and Brookfield H, “Land degradation and society”, Methuen and Co. Limited, London and New york, 1987, pp-17

³⁰ Robbins Paul, “Political Ecology: A Critical Introduction”, Blackwell Publishing, 350 Main Street, Malden, MA 02148-5020, USA, pp-6

³¹ Ibid, pp-7

relations in and among societies affect the natural environment, especially in context of government policy.”³²

2.2: POLITICAL ECOLOGY AND THE MODERN STATE

The state is an actor which is supposed to be devoted itself to the advancement of collective goods, a leading example of which is the environment. The environment is a collective issue that has to be tackled with co-operation between state and its citizens. Although theoretically the state is made up to confirm the general necessity of all sections of the society, in reality, state behavior in dealing with the environment has seen to be disappointing, to some extent disastrous also. Rather than being a pro-actor in configuring possible solutions to environmental issues, the state has seen to be typically contributed to intensifying those problems. As such, states have so often failed in their ambitious projects to engineer the natural environment or society leading to several counterproductive outcomes.

It is clearly observed that there is a basic difference between the human-nature relation in pre-modern and modern states. Modernity being the driving force of the modern state has affected this relation. A whole range of changes much more broadly associated with modernity – “transformation of the mode of production, changing relations between the city and countryside, the differentiation of the economic and the political, new technologies of communication and surveillance, etc. – had an impact upon the generation of distinctively modern state forms”.³³ As the modern nation-states try to proclaim control over its natural resources through the process of homogenization, the cultural landscapes as well as natural marvels are incorporated into changing or emerging national identities by the different nationalist romanticisms. It creates a literary and also ideological foundation for the assimilation of the cultural and environmental past of the nation. What sustains is the idea of collective heritage and best available science that legitimizes the state's entitlement to a monopoly on the conservation of nature. Weber [1904]) and Gellner (1983) describe the

³² *ibid*, pp-10

³³ *ibid*.

emergence of the modern nation-state “as the consolidation of an impersonal bureaucratic machine that claims, on behalf of the citizenry, a monopoly over key collective jurisdictions (law, violence, education, amongst others).”³⁴ Hence, this monopolistic claim by the evolving modern nation state to control territory and natural resources transforms into the imposition of a precise form of governmentality based on national territoriality.³⁵

As it is evident from the above discussion that the emergence of the modern state has a significant implication in the understanding and imagination of the natural world both in the state project and popular domain, so it is quite necessary to analyze how the modern nation state can be seen as the pro-actor in advocating the notion that nature can and should be dominated. However before going to understand the dilemma between modern nation state and nature it is necessary to know what modern nation state is. The idea of Modern Nation state was developed in west in the 16th century as a result of various revolutionary ideas developed by the political and social scientists of that time. Treaty of Westphalia³⁶ was the main motivating factor behind this new uprising. According to Max Weber, “the modern nation state is ‘a human community that (successfully) claims the monopoly of the legitimate use of physical force within a given territory.’”³⁷ There are various characteristics of the modern state system on behalf of which the notion of dominating nature was developed. The features that mainly characterized the modern state are mentioned below-

1. Industrialization: the transition from agrarian to industrial society;
2. Demographic transition: transformation in the size and distribution of population;
3. The commercialization and subsequent commodification of economic relationships that become more clearly differentiated from other aspects of social life;
4. The rise of capitalism: the transition from a feudal to a capitalist economy or, more broadly, mode of production;

³⁴Vaccaro I, “Political ecology and conservation policies: some theoretical genealogies”, McGill University, Canada, Universitat de Barcelona, Spain

³⁵ Ibid.

³⁶ Treaty of Westphalia was signed in October 24th, 1648 making the end of the thirty Years’ war. It gave birth to the modern state in Europe.

³⁷Geping NIU, “An Exploration of the Concept of the Modern Nation State: The Case of China”, Core Ethics Vol. 4, (2008, pp-1

5. The growing social division of labor, growing social and economic specialization (including the differentiation of economic and political functions);
6. The rise of scientific modes of thought as well as their application to industrialized production and hence to social life more generally;
7. Transformation in conceptions of rationality (including secularization) and in beliefs about the plasticity of the physical and social world;
8. The transformation of modes of communication for persons, goods and information;
9. Urbanization: the growth of characteristically industrial cities and a changed relationship between city and countryside;
10. Democratization: the expansion of political participation, with new political institutions and new forms of political legitimation (including appeals to socialism and nationalism).

So the basic characteristics of the modern state include its impetus on science, technology, rationality, undue importance on reason of human being upon other living and non-living organism, a favor for the capitalist mode of production and so on. It has a tendency to homogenize all the diverse actors of the society under dominating state machinery. As such, the modern state has always seemed to be the enemy of people who move around. Hence an effort has always been made to permanently settle these mobile people. As according to James Scott,

“A sign of this statecraft, four elements have come up as the main characteristics of modern state system. 1. The administrative ordering of nature and society. 2. A high-modernist technology as a bi-product of unprecedented progress in science and industry 3. The existence of an authoritarian state that is willing and able to use the full weight of its coercive power to bring these high modernist powers into being 4. A pro-state civil society that lacks the capacity to resist these plans. As a result, the legibility of a society provides the capacity for large scale social engineering, high modernist ideology provides the desire, the authoritarian state provides the

determination to act on that desire and an incapacitate civil society provides the leveled social terrain which to build.”³⁸

Thus, it is quite evident that the modern states by their nature always wanted to make everything within its territory “legible” —to control society. While creating this legibility, the modern nation states gave birth to the concept of “Modern environmentalism” as the mainstream ideological features of Western societies. With the main creeds of modernity such as state, market, monetization, consumption and mass production, nature has transformed into a fetishized commodity in the modern state. Thus, it can be said that the modernization in Western societies have unfolded the capitalist mass market and the nation state where nature was merely confined as a product to serve the human need. This process has culminated in the institutionalization having political implication, commoditization with economic implication, and homogenization affecting the cultural relationship between nature and society.

2.3: ENLIGHTENMENT AND DOMINATION OF NATURE

Another significant theme which triggers much debate in the field of political ecology is the concern related to the “domination of nature”. Along with the “domination of nature” a debate on the evils of capitalism also takes place in parallel as this strand of thought considers capitalism as a principal reason behind environmental degradation. Marcuse and Habermas, the leading thinkers of the Frankfurt School of critical theory are the chief architects of this understanding. According to them, “human nature was dominated by the instrumental rationality and exploitation of modern industrial society. Furthermore, it questions how far environmental degradation per se may be attributed simply to capitalism, or the exploitation of industry and the state. By questioning the essentialist link between capitalism and environmental degradation, this school of thought challenges virtually all historical approaches to political ecology that has focused on political economy and environment.”

³⁸Scott James C, “Seeing Like a State: How Schemes to Improve Human condition have Failed”, Yale University Press, New Haven and London, 1998, pp-4-5

The main reason behind the idea of dominating nature, according to scholars, is the enlightenment thinking developed in the European world. Enlightenment refers to the ‘philosophical movement that began in the 17th century and ended (and this is disputed) roughly around the time of the French Revolution in 1789’. According to Immanuel Kant, the eminent enlightenment thinker, “The spirit that had steered this period was ‘Dare to know’; it was about challenging all accepted truths, freeing the mind and the emergence of rationality and science as guiding principles by which people could live. The ideas of both the scientific and philosophical enlightenment are partly responsible for much of the fantastic progress of humanity in the past three centuries but the enlightenment has had a negative effect on the environment”.³⁹

In the period prior to enlightenment, nature was largely conceptualized as all powerful. It was regarded as a force to which human being was merely a servant. However, in the era of enlightenment, these ideas have been changed into a counter master-servant relationship. As a result, for the first time in Western history, land has become a private property and is viewed as a fundamental right of human being. A clear example of this evolution has been seen in John Locke’s statement where he argued that nature without man is futile and hence if any human being who wanted to use his labor to yield land it should belong to him. It is with this thinking, the idea of nature as something which belongs to man or which can be possessed and traded by all or as something that is to be subjugated has come up. During the 18th and 19th century, a kind of intensification has taken place in the way the nature has been viewed as urbanization progressively led to nature being regarded as something dark, alien and scary. This idea is quite cleared in the attitudes of John Stuart Mill, a 19th century philosopher, to nature. According to him, “The doctrine that man ought to follow nature... is equally irrational and immoral. Irrational because all useful... human action, consists in improving the spontaneous course of nature. Immoral, because the course of natural phenomena being replete with everything which when committed by human beings is most worthy of abhorrence, anyone who endeavored... to imitate [nature] would be universally seen and

³⁹ Dyke Joe, “The Environment and enlightenment”, Gaps in the Diolouge, October 26, 2009, <http://gapsinthe diolouge.wordpress.com/2009/10/26/the-environment-and-enlightenment/>

acknowledged to be the wickedest of men.” Hence in Mill’s writing also, a clear expansion of the logic of enlightenment attitudes has been seen where nature is regarded as something to be controlled; nature as undermining the scientific rationalism of the age.

So, with the development of this enlightened philosophy, domination of nature has taken place through the progress of the modern natural sciences. It has become the ‘dialectic of modernity’ where in order to know how nature works, hence to control its powers for their advantage; human beings detach themselves from nature with an aim to organize it in such a way that it can be regulated. This disenchantment with the nature has a certain implication in the social engineering happening in the modern state which has resulted in the declining of the respect for nature and the dominant social paradigm was to treat nature as externality or as a set of infinitely exploitable resources. As Peter Singer argues, “According to the dominant western tradition, the natural world exists for the benefit of human beings. God gave human beings dominion over the natural world and god does not care how we treat it. Human beings are only morally important members of this world. Nature itself is of no intrinsic value, and the destruction of plants and animals cannot be sinful unless by this destruction we harm human beings.”⁴⁰ Thus throughout the modernist age of western civilization a fundamental intention to suppress and exploit nature has continued. This is replicated both in ascendant forms of knowledge and actions, such as science and technology. The characterization of modern empirical science by Francis Bacon at its inception provides stark illustration of this. According to him, “Nature had to be ‘hounded in her wanderings’, ‘bound into service’, and made a ‘slave’. She was to be put in constraint and the aim of the scientist was to torture nature’s secret from her.”⁴¹

So, it is cleared that Francis Bacon, the most pivotal Enlightenment thinker of the contemporary age, developed the most straightforward and clearest notion of 'domination over nature' and its connection to the new sciences of nature. In sort, he placed the idea in the form of a paradox, according to which: “Achieving command over nature can only be gained by

⁴⁰Bonnett Michael, “Retrieving Nature: Education for a Post humanist Age”, Blackwell publishing, 350 main Street, Malden, MA 02148-5020 USA. Pp-19

⁴¹ Ibid, pp-20

following nature.” Remarkably, Bacon had well-defined the internal tension in the era of modernity. This tension may be defined as the two-pronged significance of science as well as technology for society, which can be labeled as “inventive science and transformative science”:

1. By the term inventive science it refers to the promise of 'the conquest of nature,' the vision of an endless stream of new products and technologies to enhance the material conditions of life and human well-being.

2. The term transformative science means the penetration of the 'ethos' of the modern scientific method throughout all of society and its institutions. This ethos includes the experimental method, with its emphasis on the objective demonstration of results, confirmed in a peer-review process; a thoroughly skeptical attitude to all received wisdom and traditional belief; the search for the 'laws of nature' existing independently of human thought and interests; and what we would now call an 'evidence-based' approach to the analysis of the causes of human misery, ignorance, and backwardness.⁴²

So, it is the two forms of science together as well as the tension between them which constitutes the dialectic of modernity. With this dialectic of modernity, the enlightenment thinking instructs to acknowledge only the verified truths and to distinguish these truths from all their counterparts which are remained uncertain and doubtful. The main problem starts with this. Modern state with this dialectic of modernity develops a belief that science and technology is superior substitute for nature. Science that is promoted by the modern state offers various technological resolutions for political and social problems, but at the same time, it disassociates itself from the newly emerging political and social problems it produces. Reflecting the priorities and perceptions of particular class, gender or cultural interests, scientific thought organizes and transforms the natural and social order. However, since nature and society have their own organization operating under a socio-ecological symmetry,

⁴²Leiss William, “The Dual Role of Science in the Modern Society”, prepared for the Canada-United Kingdom Collquium “Science and Public Policy”, November 20-23, 2003, Tortworth, South Gloucestershire, England,pp-4 &5

the superimposition of a new directive does not inevitably take place effortlessly and perfectly. It results in an ‘unanticipated side effects’ in the form of resistance from people and nature.⁴³

To conclude, it can be said that the project of the modern natural sciences to achieve a complete technological mastery over natural processes has disturbed the eco-system and ecological balance which may prove disastrous to the future generation.

2.4: INDIAN ENVIRONMENTAL PHILOSOPHY AND POLITICAL THEORY

Modernity that is the foundation of modern state system in Europe has certain different connotation while it is applied in the social or political or ecological theory in India. It is obvious that modernity, like other concepts is also a borrowed concept from the west to India. As a product of colonial legacy, the ideals of modernity such as rationality, autonomy, freedom and reason, all are implemented in Indian context initially for prompting Indian nationalism and later for industrialization, secularism, democracy, capitalism and many others in the independent India. But the peculiarity that existed in the Indian context is that the modernity that is inherited from west has always co-existed with pre-modernity in India constructing the most unique social fact about India. However within this co-existence between pre-modernity and modernity, certain clashes have come up in the Indian philosophical understanding. To point a few are discussed below.

The first important idea that has arrived India was the idea of nation as a territory where people share a common culture, history, decent aimed to homogenize all the resources whether it is human or material. But India as John Strachey argues, can serve as a “pluralistic society” as all the tenants of nation such as common language, a proudly shared historical experience, common religious tradition, cultural as well as racial homogeneity all these were conspicuously lacking in India.⁴⁴ Due to this absence, the idea of nation has become a

⁴³Shiva Vandana, “The Violence of Green Revolution: Ecological Degradation and Political Conflict in Punjab” Research Foundation for Science and Ecology, Dehra Dun.

⁴⁴Embree Ainslie, “India- A Plural society”, The University of North Carolina Press, Vol-56, No-1, 1972. Pp-1

repressive cultural import attempting to make uniform the plural society of India through domination. Under this domination, the diverse individuals of the country have become ready to be one single entity but they could not internalize the same. The adverse result was seen in the subsequent years in the V D Savarkar's idea of Hindu unity, two nation theory of Muhammad Ali Jinnah and so on. Another idea that has ill-effect in Indian society was the notion of individualism. In pre-modern understanding, the conception of self was communitarian whereas it is conceived in modern times more drastically. It sometimes led to a tussle between the ideas about self-identity. Raghuramaraju defines this combination of individuals with communities as 'hybridity' that refers to the problem of negotiating between 'what is left and what is yet to be arrived at' that has flared up into communal violence in certain instances. The condition in India is branded by the existence of both in relation to each other.⁴⁵

So, the ideas that are brought by the modernity into the Indian context have challenged India's self-conception. This dilemma has been seen in terms of the relation between human being and nature in India. India, from time immemorial has been depending upon the indigenous knowledge which was characterized by subjectivity, spirituality passed orally from the one generation to other. On the other hand, the modern scientific knowledge while dealing with emphasized more on objectivity, positivity where science and technology was thought to be superior to the nature. In such a situation, the ideas of mother earth, river deities, all are relegated to a background considering nature as a commodity. The result of this relegation has been seen in the recent ecological degradation in the country.

Considering these inadequacies, Gandhi has developed a critique to the epoch of modernity, which has made major foundational framework for the present day philosophy on ecology in the World in general and India in particular. Gandhi lived in a world, called modern where the European enlightenment represents the authority of reason and natural sciences and the rejection of tradition. Gandhi challenged the popular notion of modernity on various grounds. As Anil Misra writes,

⁴⁵ Raghuramaraju A, "Modernity in Indian social Theory", Oxford University Press, 2011

“Gandhi did not subscribe to the dualism of man and nature; man is an indispensable part of the nature. According to him, human progress is not the same thing as material progress. It means moral progress, leading human to the higher levels of consciousness. Material progress is essential only so long as it enhances moral progress. And hence the concept of progress or development centering on material and technological developments as has evolved in the west cannot be considered to be a goal towards which humanity must move. At best it is a means and hence it must be moderated and tempered by the goal of real progress. So he called the modern civilization retrogressive as it empowered man to subjugate both nature and man and to deprive other of dignity, life support and basic human rights. So Gandhi demonstrated that both faith and reason must co-exist. His criticism of modern civilization was directed at its consumerism, competitiveness and subjugation to technology.”⁴⁶

Gandhi’s attitude towards nature was adopted by various thinkers of world in examining the inadequacies of the modern world. E F Schumpeter is a significant one among them. He differentiated, using Gandhi’s views, “between mass production and production by the masses. The system of mass production is highly capital intensive, consumes high energy and is violent, ecologically damaging. On the other hand production by masses encourages production activities that are compatible with local resources, is eco-friendly and frees the human beings from the servitude of machines.”⁴⁷

The Indian ecological philosophy is motivated by this Gandhian philosophy. However, in the independent India, the environmentalism has emerged adding some new connotations. Ramachandra Guha in this regard has made a significant contribution. He identifies three strands in the environmental movements in India- (1) Crusading Gandhian (2) Ecological Marxists and (3) Appropriate Technology. The Crusading Gandhian according to Guha propagated a non-modern, alternative philosophy that is based on Indian tradition whereas the Appropriate Technology tried to develop a technological and social alternative approach to the

⁴⁶ Misra Anil, “Reading Gandhi”, Pearson education India

⁴⁷ Ibid,

modern form of development. Finally, the last trend, the ecological Marxists came into domain with an origin of Marxism dealing with the adivasis as well as Dalits, the most exploited section of the society. Although these trends are originated from different sources, however these have influence on each other. A clear example of the inter-connectivity of the Indian Environmental Approaches can be seen in the Chipko Movement that taken place in the foothills of Himalayas. This movement was led both by the Gandhian as well as left wing ecologists of the country.

If the ecological movements of India is analyzed it is seen that two waves of environmentalism existed in India. The first one was before independence mainly concentrating more on the nationalist movement whether the second wave started in the early seventies emphasizing on the prospects and conditions of sustainable development. According to Guha, the two decades after independence, was an era of Ecological Innocence, as the air was full suffused with technological optimism driving towards modern development.⁴⁸ This period lasted till 1962 after which an acknowledgement for environmental concern has been taken place in Indian scenario. Having a different background, Indian environmentalism is having some basic differences with that of the Western. First was that the environmentalism in the west was developed by the scientists while it was the local community that started the same in India. As a result of this, whereas the western environmentalism is based on 'protectionist conservation' aiming to protect the endangered natural habitats and animal species, the Indian environmentalist paradigm was built on 'utilitarian conservationism' for ensuring human survival. The basic philosophy of the Indian environmentalism hence was to promote sustainability and social justice.⁴⁹

⁴⁸ Guha Ramachandra, "Environmentalism: A Global history", Oxford University Press, Delhi, 2000.

⁴⁹ Ibid.

2.5: River Ecology and the Post-colonial State

Being an integral part of the earth, Rivers in many places are regarded as appropriate as it would be of landscapes. A river means much more than aquatic portion of the earth flowing to the sea. Its banks and fluctuating bed and the groundwater below, are all essential parts of the river. A river is “A natural watercourse, usually freshwater, flowing towards an ocean, a lake, a sea, or another river. In a few cases, a river simply flows into the ground or dries up completely at the end of its course, and does not reach another body of water.” Usually, the melting snow and pouring rain emerge on tops of mountains and hills forming beautiful mountain streams that flow in the high grounds. As the streams power down, with the groundwater and tributaries they gain their volume, hence become a river. As the mountains and the high grounds are left, rivers slow down and begin to meander, seeking the route of least confrontation, through wide valleys. Finally, the river will flow into a lake or ocean.

The role of the river, being as the cradle of life as well as fertility is replicated in the mythologies along with the popular beliefs of multitude of cultures. Notably, in various parts of the world, rivers are called “mothers”, as for example, river Narmadai, as “Mother Narmada”; Volga as Mat Rodnaya, “Mother Earth” and so on. The Thai word for river, ‘mae nan’, is literally referred to “water mother”. Rivers have often been associated with deities, especially female ones. In ancient Egypt, the Nile floods were considered tears of the goddess Isis.⁵⁰

There is neither enough space nor words that are sufficient enough to define the spiritual connection between the river and the human being. As far as India is concerned, the rivers of India are possibly covered more in myths, religious significance and epic stories than those of other nations. Most of the rivers in India are considered female goddesses having stories or myths revolving around them. Vijay Paranjpye, an eminent environmentalist in India describes a sacred transcript which holds that "all sins are washed away by bathing thrice in the Saraswati, seven times in the Yamuna, once in the Ganges, but the mere sight of

⁵⁰McCully Patrick, “Silenced Rivers: The Ecology and Politics of Large Dams”, Zed Books Ltd,7 Cynthia Street, London N1 9JF, UK.

the Narmada is enough to absolve one of all sins!" Another ancient text describes the Narmada River as "giver of merriment", "flavorful", "of graceful attitude", and "one who radiates happiness".⁵¹ These examples clearly define how rivers are connected with human life. Due to this inter-connectivity, the rise of many civilizations has always been taken place on the bank of the rivers. The first civilization has emerged in the third millennium BC along the rivers such as Nile, Euphrates, Tigris and Indus, and later along the Yellow River. Important revolutions that have contributed to the early development of the industry happened along rivers and streams of northern England.⁵²

It is evident that for centuries, rivers have been very significant to human society. Apart from soil, no other feature on Earth than water is as closely bound to the development of human civilization. However, along with the development of science and technology, continuous efforts have been made to control rivers, as like as the other natural organisms. Starting from enlightenment, modern science had envisioned and begun to sustain a discipline of hydrology where the foremost transformation had taken place in the form of continued use of rivers for transformation. Several European countries and the United States also engaged in a passion of canal building. As for example- the 240 kilometer Canal du Midi extended the Atlantic rivers of France to the Mediterranean by 1681; the canal craze in Great Britain transformed the English landscape during the second half of the eighteenth century; and in the United States some 4,400 miles of artificial waterways had been built by 1830. As canals were regarded to be the best means of transporting goods, rivers were gradually engineered to resemble these artificial waterways.⁵³ Thus with this kind of initial intervention, natural rivers came under the threat. In order to escape from natural flooding as well as to take benefit that flood plains offer to agriculture, various steps were taken by the civil engineering of the modern state. Additionally, regulating rivers can also fulfill human desires to store water for times of drought. Thus, civil engineers have tried to conserve water flow for discharge at

⁵¹ Ibid.

⁵² O Sonja, "Rivers as source of Life", Published on- 02/Feb/2015, Accessed- <https://raftrek.com/blog/rivers-the-source-of-life/>.

⁵³ MauchChristof and Zeller Thomas, "Rivers in History and Historiography: An Introduction", pp-3

times when the necessity is felt by human being. They had tried to keep water value above suitable levels and to restrain flood flows to designated channels or to prearranged flood storage areas. As a result of this intervention, rivers are embanked, straightened and impounded all over the world. This might be reason why varied river systems have become uniform, wetlands have disappeared amphibians, water birds, fish and other water depending organisms become rarer or even get extinct.

Thus, In the modern state system, river has been conceptualized in such a way that modernization and development agenda of the government has created twofold oppositions such as “traditional vs. developmentalist, anti-dam vs. pro-dam, local vs. global, bio centric vs. anthropocentric and small vs. large”.⁵⁴ In this regard, Ram Swarup has made a detailed analysis.

*“According to him, in the earlier times, the ecological and environmental effects of the developmental activities were not taken seriously, which gave the chance to science and technology to be thought as a superior one over other things. As a result of this, the water flowing through the river turned into a resource and was to be treated as a figure in the landscape, rather than an image related to time and place. This is a kind of Newtonian space based on the predictable and orderly movements of objects over an un-differentiated space made visible for the first time. In this space, the river is just like a thing that can be modified, controlled and given a desired shape as per human wish through the use of superior scientific knowledge and techniques.”*⁵⁵

No doubt, the belief that modern science on its own can provide a systematic and consistent interpretation of all the phenomena that one can see around originated in the modern western countries. However, with the colonization this idea has been spread all over the world. In fact, even after decolonization, these ideas have remained intact in these post-colonial countries in the form of colonial legacy. Thus as like as the western imperial states,

⁵⁴Lahiri-DuttKuntala, “Imagining Rivers”, Economic and Political Weekly, Vol. 35, No. 27 (Jul. 1-7, 2000), pp. 2395-2397+2399-2400

⁵⁵Sarup Ram, “Problem of canal excavation in Damodar Valley Corporation”, Indian Journal Power and River Valley Development”, 1959

through the symbolization of rivers in a specific way, these post-colonial states also generate an illustration of itself as a regulator of all components of natural environment, hence bestows itself with the performative power with regard to river control.

Under such post-colonial state, flood has been viewed as a hazard, and it is supposed that the state will bear the responsibility of resolving it. Under this responsibility, the state machinery has come up on a consensus for the need of some measures for river control. There has been seen frequent use of terms such as ‘taming’ and ‘harnessing’ the river in the literature on water resource development. It is mention worthy that in the post-colonial states, the subjugation of a wild river by taming it or the use of other scientific measures to control it were completed in the similar fashion that is adopted in the western developed countries. Like all other post-colonial state, India also accomplished a mechanical or structural model of river control developed in the United States on the Eastern Indian Rivers, which depicted their belief in the application of the universal principles and denial of the uniqueness of the rivers of India.

Above all, the technical resolutions adopted to regulate rivers have curtailed the rights of the river to move over space. This has given birth to both political and technical problems. In the context of river development, as Kuntala Lahiri Dutt mentions, “This knowledge was seen as automatic and objective, values such as reason and rationality had been constructed as good and co-terminus with development. This world view reveals an intoxicated arrogance of human armed with scientific knowledge and technology, borrowed from the colonial rulers. The fundamental characteristics of this knowledge include its universalism, its image of nature as an adversary, its assumption of replicability, and its agenda of March of its progress”.⁵⁶ In sort, the strong belief was that what is appropriate to all over the world would definitely work in India or anywhere else for that matter. As a result water resource planners did not favor the difference between European Rivers or American Rivers and those of India, ignoring particularly the distinctiveness of the socio-ecological circumstances of the latter. To be pointed out, these rivers have substantial seasonal disparities in flow, they drain heavily

⁵⁶Lahiri-DuttKuntala, “Imagining Rivers”, *Economic and Political Weekly*, Vol. 35, No. 27 (Jul. 1-7, 2000), pp. 2395-2397+2399-2400

populated and intensively cultivated areas, they are having very unstable courses and above all they carry a huge amount of solids with their waters in the monsoon season. In such a situation, the idea to mitigate flood have become the motivation in fulfillment of fantastic dream of 'multipurpose river valley projects in India'. Gradually, this dream has become a simplified myth that is now confronting severe criticism after experiencing the drawbacks of these projects in the last few decades.⁵⁷

In these present days, people have realized that inundations that were made by the rivers were much more productive in the earlier times and are more damaging now. This transformation specifies the changing nature of flooding. It may mean that floods have become more “intense (discharge, flood level, area of inundation, and increased period of inundation), more frequent (more flood waves in a season), and more damaging (more adverse impacts on crops, land, houses, livestock, human life, and the environment)”. Furthermore, it is also found that high embankments and big dams were nothing but the product of objectification of rivers. It deprives the rivers of their right to meander over space, and establishes the dominance of humans on them. This replaced such types of views in which rivers were supposed to be living beings and each river had its own, unique characteristic. The sense of oneness with rivers and attachment to them was replaced with the sense that a river, like a wild horse, needs to be 'harnessed', 'tamed' and 'controlled'. In order to solve it, the flood management machinery has to come out of “Hydrocracy or Water Bureaucracy” that has dominated official decision. It should come out of that Hydrocracy that sees a river as “a water pipe”, whereas it is actually so much more, a complete living ecosystem. It should also come out of that Hydrocracy that considers river as a commodity and try to control it without making a proper study.⁵⁸

⁵⁷Lahiri-DuttKuntala, “Imagining Rivers”, *Economic and Political Weekly*, Vol. 35, No. 27 (Jul. 1-7, 2000), pp. 2395-2397+2399-2400.

⁵⁸ D’souza Rohan, “Drowned and Dammed: Colonial Capitalism and Flood Control in Eastern India”, Oxford University press, New Delhi-110001.

2.6: SUMMING UP

Political ecology is thus having a great importance in present times. Although it is an issue related mainly to the environmental degradation, the collective responsibility associated with it has made political ecology inter-twined with political, economic, cultural as well as social factors. However, with the emergence of the modern state system the theories connected with political ecology is seen to be influenced by the political economy the environmental issues have become more acute due to the tenants of modern state such as industrialization, capitalism, urbanization and so on. The undue emphasis of the developed west on science and technology is another factor behind this. All these have migrated into the developing countries with imperialism laying down some serious implications.

In the Indian scenario, the state had also welcomed the enlightened thinking along with the British invaders. Due to the internalization of the idea that science and technology is superior to all, the elite class of the country immensely followed it even when they were fighting against the British. It has in a way continued till date in India.

CHAPTER 3

3.1: INTRODUCTION

Flood hazards have long been recognized as one of the most disastrous and recurring natural hazards affecting several densely populated regions of India. It causes huge damages to lives, livelihood systems, properties, infrastructure as well as public utilities. The high risk and vulnerability that is faced by India is highlighted by the fact that “40 million hectares out of a geographical area of 3290 lakh hectares is prone to floods”.⁵⁹ On an average every year, 75 lakh hectares of land is affected, 1600 lives are lost and the damage caused to crops, houses and public utilities is Rs. 1805 crores due to floods.⁶⁰ In India, twenty-two states and one union territory are susceptible to regular inundation made by the rivers. However, the most flood affecting states of India are Assam, Uttar Pradesh, Bihar, West Bengal, Gujarat, Madhya Pradesh, Orissa, Andhra Pradesh, Punjab, Maharashtra and Jammu & Kashmir.

India is drained by major river systems such as the Himalayan Indus-Gang-Brahmaputra systems and the peninsular Godavari, Mahanadi, Krishna, Cauvery on the east coast and the Narmada and Tapti on the west coast. The country is also dependent on the south western monsoons which bring rainfall to the country in the month from June to September. However, the high Himalayan Mountains form an effective barrier to the south west monsoon. This is responsible for intense and massive precipitation in the catchment areas of the rivers of the Himalayan region, such as the Ganga and Brahmaputra and their tributaries. Often, therefore, the river channels carrying capacity is exceeded and the rivers overflow their banks causing inundation, bank erosion and extensive damages to crops and structures on the flood plains. In comparison, the rivers of the Indian peninsula have adequate channel carrying capacity. Therefore these rivers experience floods less frequent.

⁵⁹RastriyaBarhAyog.

⁶⁰National Disaster Management Guidelines, “Management of Floods”, published by National Disaster Management Authority, Government of India.

3.2: FLOOD SCENARIO IN INDIA

Although floods are an integral feature of the Indian rivers, available data indicates that some rivers experience floods more frequently than the others. As far as the Ganga River region is concerned, in Bihar and Uttar Pradesh, the river Ganga has a huge numbers of tributaries like the Ghaghra, the Gomti, the Gandak and Kosi from the left as well as the Son and the Yamuna from the right. This brings large quantities of water to these areas both from the peninsular India and from the Himalayan region resulting in devastating floods. The Kosi River often changes its course resulting in inundation of new areas. The Yamuna is another significant right bank tributary of the river Ganga and it swamps large areas in Haryana and Uttar Pradesh. The Betwa and Chambal meet the Yamuna which intensify the flooding capacity of the Yamuna.

Along with flood, the erosion is also experienced in some places on the left bank of the Ganga and on the right bank of the Ghaghra and the Gandak. In West Bengal, the southern and central parts are engulfed by the rivers like the Bhagirathi, Mahanadi and the Damodar and so on because of the insufficient capacity of river channels. There are sporadic floods caused by the River Damodar even after the construction of four dams and a barrage under the 'Damodar Valley Project'. About 25,000 sq. km of area was drowned in southern districts of west Bengal by this river in the year 1956.

In the Brahmaputra river valley, torrential floods are almost a yearly story. The main reason behind the heavy inundation in the Brahmaputra valley is substantial rainfall amounting over 250 cm during the monsoon season. Huge amount of silt is deposited in the river banks by the Brahmaputra and its tributaries due to which the river channel becomes shallow and its capacity to carry large amount of water is reduced. This culminates in overflowing of the vast areas in and around the valley. As the region is located in a seismic zone, earthquakes take place at frequent intermissions, create variation in the level of river course and the flow of water in the river is obstructed. This leads to flood of large areas in the region. Another very usual phenomenon here is landslides. As a result of landslides, huge rock material falling acts as an impermanent barrier across the river and massive area is submerged

under water. Later it disintegrates due to the pressure of water resulting in flooding of large area downstream.

According to the reports of the Assam Government, “all the districts of the Brahmaputra valley are inundated almost every year. Though most of the flood affected area in the valley are rural in character, yet some urban areas also affected by flood each year. The worst flood affected area in the Brahmaputra valley is the world’s largest river island, Majuli.”

In the north-west River region, the inundation problem is not that serious as compared to the flood problem that prevails in the Brahmaputra or the Ganga River regions. The main difficulty here is that of insufficient surface drainage which causes inundation and water logging over vast areas. In the Punjab-Haryana plain, large areas are inundated as rain water in the waterlogged and poorly drained areas. Major and minor rivers like the Beas, the Sutlej and the Ghaggar bring flood disaster to huge areas in monsoon seasons. In Punjab floods are a yearly feature though extreme floods are experienced at an interval of 4-5 years. Poor natural drainage by manmade features creates obstruction in the natural flowing of the river which is the main reason of floods in Punjab. As for example, some of the most important canals (the Bhakra System) do not follow the natural flow and create hindrances. Secondly, National Highway No. 1 and the main railway line run almost perpendicular to the natural flow. Cultivation of area near river banks and construction activities in low lying areas, especially in cities like Ludhiana, Patiala, etc. together have created obstacles in the natural flow of water.

Sometimes, floods are also caused by the Ghaggar River. This river disappears in the sands of Rajasthan after flowing through Punjab and Haryana. In recent years, besides flooding areas of Punjab and Haryana, it has become active in Rajasthan territory also, occasionally submerging large areas. In the north-western river basin covering Jammu and Kashmir and Himachal Pradesh, the Sutlej, the Beas, the Ravi and the Chenab often flood large areas. Floods occur periodically in Jhelum and its tributaries in the Kashmir Valley causing a rise in level of the Wullar Lake thereby submerging marginal areas of the lakes and sometimes threatening Srinagar and other areas along the river banks. Floods do not pose a

serious problem in the southern states of Andhra Pradesh, Karnataka, Tamilnadu, Orissa, Jharkhand, and Maharashtra. However, the deltas of the Mahanadi, the Godavari, the Krishna and the Cauvery suffer from occasional floods owing to the large scale silting and the consequent change in river courses. In Orissa, floods are caused by the Mahanadi, the Bahmani and the Baitarni (which have a common delta). The silt deposited by these rivers in their delta region raises the river bed and the rivers often overflow their banks or break through new channels causing heavy damage.⁶¹

So the above description of the flood prone areas clearly shows that one and every part of the country is severely affected by floods caused by the above mentioned rivers. In spite of these huge destruction made by the rivers for an extended period of time, no significant solution is there to solve this problem. However in the last few decades, some serious attempts have been made in order to improve the effects of floods and also for better control and management of the rivers. But, examining those policies and initiatives adopted by the government of India for flood control is quite necessary for better understanding of the flood problem in the country.

3.3: HISTORY OF FLOOD CONTROL IN INDIA

3.3.1: PRE-COLONIAL PHASE OF FLOOD CONTROL IN INDIA

With the first human settlements about 7,000 years ago, a two-fold struggle with water also began, where on one place people had to protect themselves against floods while in the other side of the picture, they had to ensure a safe water supply for irrigation and their domestic use. Like other places, the human civilization in India is also developed in the flood-plains. In fact, the riverbed itself is time and again a place for habitation and settlement throughout India. However, the practice of flood protection embankments along rivers was an

⁶¹ www.cwc.nic.in website of the Central Water Commission of India, (CWC) of India,
<http://wrmin.nic.in> website of the Ministry of Water Resources, Gol,
Report on Development of chronically flood affected areas, Planning Commission, Government of India, New Delhi, November 1981.

ancient one in the peninsular India and Indo-Gangetic plains. The various kings especially in peninsular India had built tanks to store water for irrigation. So structures were present to control water. However, notably, the approach of communities in the past was driven and dictated by the moral principles of “living with floods rather than mastering the flows”. There are presences of myths which prove that the idea of living with floods had always existed. Origin of human life on this earth is attributed to the famous flood legend and Hindu scriptures are full of praises for the rivers, being mentioned as the "Mother of the world." Along with rivers, floods also find their mention and the 'Naradiya Purana' has given one of the first lessons in flood plain zoning. It says that a river does not spill beyond its known boundaries which it defines as the river bed. Around 70 metres beyond the river bed is the river bank and up to five km (one yojan) beyond the river bank is the river belt. 'Naradiya Purana' prohibits people from residing within the riverbed and river bank and recommends dwelling only in the river belts and beyond.⁶² These verses, obviously, hint about the shifting courses of the rivers and the precaution to be taken in the event.

According to Niranjana Pant, in Arthashastra, Kautilya clearly observed that kings dug tanks at locations where water for irrigation was plentiful. He further observed, “The king should arrange for permanent sources of irrigation for agriculture such as tanks and dams.” Kautilya mentions two types of embankments- the *sahodaka* where there is a natural flow of water and *aharyodaka*, which is a sort of storage tank with water brought in through channels specially dug for this purposes.⁶³ Again in Vijaynagar, during 14th to 16th century, under the dominion of “Krishna Devaraya”, several diversion works across the Tungabhadra River were built with a number of irrigation canals in order to provide widespread irrigation for agriculture and also for domestic water supply for the capital.⁶⁴ Many embankments were constructed along these streams to create different size of reservoirs. According to Historians, the Hiriya canal was one of the most prominent waterworks done in Vijaynagar. This canal

⁶²Chaturvedi B K, “Narada Purana”, Diamond Books-Paperback_Edition-01,

⁶³ Pant Niranjana, Verma R K, “Tanks in Eastern India: A Study in Exploration”, Dhruvi Design, 2010. Hyderabad.

⁶⁴Bhavanishankar B S, “Irrigation Systems in Vijaynagar Times and Irrigation Structures in the Old Mysore state”, International history Seminar On Irrigation and Drainage, Tehran-Iran, May2-5 2007

drew water from a dam built across the Tungabhadra and irrigated the cultivated fields that separated the sacred center from the urban core.

Another significant development has been made during the reign of Firoz Shah Tughlaq. He was a remarkable builder and founder of many cities in Harayna and Delhi. He founded the city named “Hissar-E-Firoza” in Haryana. In order to maintain this newly established city of “Hissar-E-Firoza”, in 1355 he had constructed the “double system of canals” from Yamuna to Sutlej. They are mentioned as “Rajwahas” in the Indo-Persian historical text.⁶⁵ Again, some notable steps were also adopted during the Mughal rule.

During the Mughal rule, in cases where a river rises and inundates the fields seasonally every year, both the irrigation system and fertilisation were considered to be natural. The seasonal inundations of the rivers were almost uncontrolled; And nothing reveals their range more clearly than the spectacular changes in the river courses which used to take place from time to time. These changes particularly affected cultivation in larger areas. It was in northern India where some large canals were excavated during Mughal period. The Haryana tract was not served by any perennial river. Thus, the common practice in the region was to build dams across the streams for creating artificial inundation or for continuous supply of water for cultivation. Further, in the Punjab province, a small system of canals was brought into existence in the Upper Bari Doab. The common practice had been to either cut artificial channels from the river or canals to lift the water from the river or its branches for supporting agriculture.

So from the above analysis, one can easily understand that in the pre-colonial phase, there was no such intensity to control rivers.

⁶⁵ “Firoz Shah Tughlaq, General Knowledge Today”, Published on-May 27 2011, accessed on- 3rd September,2015, URL- <http://www.gktoday.in/firozshahtughlaq/>

3.3.2: FLOOD CONTROL IN THE COLONIAL INDIA

With the coming of the British, the equation has changed and floods were viewed as a problem which needed to be tackled. People who lived in flood prone areas and their knowledge was considered to be ‘traditional’ and hence obsolete in the face of superior technical knowledge. The new practice of colonial revenue administration towards the last two three decades of 18th century developed by the “East India Company”, had shaped the official perception about floods through an endeavor to protect the rivers, mainly of the Bengal estuary.it drastically reordered the company’s codes of social administration.

In most of the thickly inhabited areas of the Bengal, agriculture is treated as a secondary occupation. As Kuntala Lahiri Dutt mentions, “In this water-based artisan economy, the countryside was dotted with dispersed local markets attesting to a highly commercialized economy that boasted impressive industries. The rivers were not just channels of water; they carried a thriving trade, transporting people and goods from one part of the delta to another.”⁶⁶ During the colonial period, this essential character of Bengal as a “fluid landscape” had changed because of the legal interventions which were designed to stabilizing land as well as waters. In a land where rivers shift its course so frequently, the colonial government had tried to create permanent boundaries between land and waters, expecting to privileging land above water. In order to fulfill the aim of isolating land from water, the first and foremost initiative adopted by the British in the form of a legal framework that gradually entered the popular vocabulary. As such, the colonial government passed a law called BADA “Bengal Alluvion and Diluvion Act”, in 1825 following the “Permanent Settlement of 1793” in order to legalize the creation of such formations.⁶⁷ But the rivers in Bengal have some unique characteristics because of which such regulation was not proved to be much helpful. This is cleared from the below mentioned features of the rivers in Bengal.

⁶⁶Lahiri-Dutt, Kuntala.“Commodified Land, Dangerous Water: Colonial Perceptions of Riverine Bengal.” In: “Asian Environments: Connections across Borders, Landscapes, and Times,” edited by Ursula Münster, Shiho Satsuka, and Gunnel Cederlöf, *RCC Perspectives* 2014, no. 3, 17–22.

⁶⁷ibid.

*Bengal's mighty rivers carry enormous amounts of silt and flow sluggishly over near perfect flat plains for most of the year, only to rise during the monsoons and metamorphose into devastating torrents. As the roaring rivers descend from the Himalayas during the monsoons, they almost choke with the enormous body of sand and other sediments carried in their waters, causing them to shift their courses frequently. The capricious rivers of Bengal, flowing only seasonally and through whimsical and fluctuating courses, seemed quite different to what the British colonialists thought "nature" should be. The problem with deltaic land is its non-permanent nature, as silt is stored by rivers: rivers do not always flow along a certain route, nor is the land fixed and permanent.*⁶⁸

However, two land-based laws, the "Permanent Settlement and BADA" approved by the British presented land as fixed and at the same time productive through intensive farming. So according to their views, if Bengal had to be made productive, the lands must be separated from water. It should be stabilized in such a way that a systematic revenue collection could be started. Hence, from 1760, the year when the East India Company began to rule Bengal, the land-based economy had been started which portrayed the rivers merely as instrumental as it didn't yield revenue.

The annual flooding in the Gangetic basin had been an age-old phenomenon, and historical documents indicate that attempts to control the devastation of the flooding have long been made through structural means like bunds and embankments. These structures acted as levees or artificial banks that were raised along the immediately surrounding land to prevent it from flooding. During the seventeenth and eighteenth century, the East India Company had expanded its rule from trade to governance as a result of which several military bases were emerged. Patna, Bankipur and Dinapur were among the major military bases for the colonial government. Patna also emerged as a major hub for global trade after the British East India Company established a factory for calico and silk there in 1620. Bankipore became the site of the houses and offices of the English officials, which were constructed on high platforms

⁶⁸ Ibid.

along the banks of the Ganges. The second neighboring township, Danapur, was built as a cantonment (military base) on the confluence of the banks of the Son and the Ganges rivers at Digha. In 1783 and 1787, there was major flooding of the Ganges, which had important implications for the future of state policy concerning the rivers under colonial rule. A general fear of the company's factory being washed away developed, and it was proposed to secure the bank of the Ganges near Patna with piles and fascines made with bundles of wood. The local officials and engineers proposed for discussion the idea that in order to save the buildings from the flood of the Ganges, it was essential to elevate the bank with sal timber or to construct a concrete wall from layers of kankar rocks so that the banks can be provided with sustainability and solidity to resist the furious running waters. The official correspondence of the late eighteenth and nineteenth century suggested that the prime attention of British East India Company at that time was mainly to protect and preserve the cantonment. A growing concern was there to monitor further intrusion and manage the rapidity and course of the river. Therefore, the bank that situated in the opposite of the cantonment had kept well sloped to reduce the pressure of the river current.

Before the East India Company rule, zamindars (big landholders) and local rulers used their own resources to try and control rivers locally, typically in the form of embankments. However, the colonial government believed that embankments on a heavily silt-laden river not only prevented river water from spilling over, but also, by trapping the silt and sand within, slowly raised the riverbed. Therefore, in the long run, this would require them to increase the height of the embankments accordingly. Despite knowing the evils of embankments on the river, they still gave preferences to construction of bunds and embankments. There may be two reasons for their undue importance to control floods in any way they can. First was the Company needed a public works infrastructure for its own survival and to enforce its government. Since they had to face a lot of resistance from the native rulers, they desperately needed roads, bridges, canals, embankments, barracks, and cantonments to facilitate the movement of their troops. In fact, a bill to promote the construction of lines of communication as feeders to railways, high roads, navigable rivers, and canals was presented in 1863. On account of this, the construction of a new railway line between Howrah and Mirzapur was

planned. But the tragedy was that it was designed parallel to the Ganges, which obstructed the regular flow of the flooding river. Correspondence related to the administration of the Ferry Funds of Bengal of the 1850s and 1860s indicates that the collected funds were used to make new embankments along the southern side of the Ganges. The idea was not only to protect the new settlement but also to provide “roads as feeders” in connection with the railways. At that time, the colonial government had ignored the very fact that all three rivers surrounding Patna—the Ganges, the Son, and the Punpun—had had a long history of shifts in their river channels.

The second reason behind this techno-fetishism of the British government to control rivers had an economic base which is clearly described by Professor Rohan D’souza as “Colonial Capitalism”. He in his book “Drowned and Dammed: Colonial Capitalism and Flood Control in Deltaic Orissa” argued that

“In order to institute it as a specific social form deployed a set of hydraulic interventions that transformed the deltaic Orissa from a flood-dependent agrarian regime into a flood vulnerable landscape. From the moment that the East India Company introduced the permanent settlement in the Bengal presidency which privatized and gifted all arable land to a new class of landlords, capitalism was the driving force behind flood control in Eastern India. In pre-colonial times, peasants in Orissa used various strategies to utilise silt laden floodwaters. But embankments created by the colonial state transformed the Mahanadi delta from a 'flood dependent' to a 'flood vulnerable' landscape.”⁶⁹

There was a basic difference, as D’Souza argues, between colonial revenue collection and those by the Maratha and Mughal rulers. The various local revenue officials who are in the service in the state of Bengal did not only ascertain the periodic differences in agrarian output but also assisted people in sustaining such situations for agricultural production and supported the peasantry at the time of distress and devastation. In contrast to this, the revenue

⁶⁹ D’souza Rohan, “Drowned and Dammed: Colonial Capitalism and Flood Control in Eastern India”, Oxford University Press, pp-51

administration under the British was intended towards accumulating a fixed rent for thirty years. In this materialistic process of their revenue collection, the flood or drought problem always brought a severe negative impact. The colonial government especially the revenue department was always in an intention to increase the land revenue but did not succeed due to hydraulic instability. Thus, the Britishers needed to enforce a “standardized rental installment”, based preferably on an expected average production of the season’s crop urging them to keep land decisively isolated from the devastating hydraulic action. As such, the ecological context for the existence of capitalist property in land was that of structuring it to relate to deltaic inundation as natural calamity rather than as hydraulic process. Consequently, an exceptionally inflexible strategy of revenue collection was adopted by the colonial government and in several ways caused a marked disconnect between the delta’s fluvial process and the landed property.

Thus, under the agenda of flood control, during the colonial recognition of flood as a calamity, the building of embankments was the first structural measure adopted. No doubt, the measure adopted was mainly to deal with the submerging revenue generating land. So the ideology was mainly economic rather than social or otherwise. By the middle of 19th century, large numbers of mechanical measures were built across Bihar, Orissa, Bengal and parts of rivers from south India.⁷⁰ With the believe that they could transcend the limitations of environment and climate through superior science and technology and also with a complete disenchantment with nature, the colonial government engineered, controlled, tamed the rivers and made them into a source of artificial canals. They embanked the rivers in order to prevent the interruptions in revenue flows, dug large numbers of canals with a view to harness water for irrigation and navigational development and lastly initiated many “Multi-Purpose River Valley Projects” in the last decades of their rule in order to facilitate power and energy for capitalist production. Being a political project, it had profoundly implicated in the economic, political and social calculations of capitalism in general and colonialism in particular. Under the umbrella of flood control, the British wanted to establish capitalist private property organizing a process of land revenue. In this process, they figured out the hydrology of the

⁷⁰ Ibid, pp-99

region with structural infrastructure like canal networks, embankments etc... So, historically technologies for hydraulic manipulation in India had moved through three distinct phases.

“From the earliest times, tanks, inundation canals, temporary bunds to trap drainage, wells and water-wheels made up the ensemble of water harvesting structures. These techniques were essentially directed towards impounding precipitation, tapping river inundations or retrieving groundwater recharge. However in the 19th century, the colonial government introduced the technique of cannal irrigation in order to divert the waters of the rivers. This phase, often referred to as the advent of the era of modern irrigation, witnessed the construction of several large canal irrigation schemes with permanent head-works such as the Ganges Canal (1854), the Godavery (1852) and the Krishna (1855). When this canal irrigation system had been flourishing, the third wave in hydraulic manipulation emerged in 1930’s in the form of multi- purpose river valley projects. In this period, the experience of the Tennessee Valley Association (TVA), under whose charge the Tennessee River and its tributaries were brought under MPRVD control, became an internationally celebrated model. This has in a way resulted in India between 1943-46, when the British colonial government approved plans to build MPRVD schemes on the Damodar, Mahanadi and Kosi rivers, besides setting up the Central Water, Irrigation and Navigation Commission (CWINC) as a professional water bureaucracy for formulating and implementing other MPRVD schemes.”⁷¹

So, when India became independent, around 5,280km of embankments out of which 3,500 km were in West Bengal and 1,209 km along the Mahanadi in Orissa had been completed by the British. Along with that, it was the colonial government who gave a foundation for multi-purpose river valley projects in the independent India. This colonial watershed and its hydraulic legacy have resulted in the enthusiasm for flood control in post-independent India.

⁷¹ D’souza Rohan, “Supply side Hydrology in India: The Last Gasp”, Economic and Political Weekly September 6, 2003, pp-3786

3.3.3: FLOOD CONTROL POLICIES IN THE POST-INDEPENDENT INDIA

Becoming independent from the colonial rule, the Indian state started its journey with full commitment to growth and social transformation; thereby a clearly politically directed development trajectory was visualized. Planned state led modernization envisaged pursuing with the assumption that social change can be orderly and predictably manipulated by a benevolent state. But it is mention worthy that freedom from the colonial rule need not necessarily imply freedom from colonial policies. The policies that were formulated by the colonial government, continued to be adhered to in the same vein even after independence. The fascination of the post-colonial state with policies as well as development had continued from the colonial past. As such, newly independent state of India fell into the routine of nation-building by undertaking the development activities. Policies were the prescriptions for development. Those are often formulated by the ‘experts’ who rarely have experiences at the grassroots. So almost all present day Indian policies whether in law, education, social welfare, legislative matters, conflict resolution or the environment, still carry a legacy of the colonial past. Present day flood policies are not very different.

The traditional strategy of adaptation to floods declined in India when river management was taken over by the irrigation departments of the ruling British government. In the governmental perception, floods in India slowly became a natural disaster that had to be controlled. This view continued till 1947. In independent India, rapid growth in population coupled with increased human activities in the lower areas of the flood plains, increasing economic aspirations of a newly independent nation and the knowledge of European engineering tradition provided the backdrop for keeping the floods away from most part of the floodplains through structural interventions as a political agenda. Hence, the idea to eliminate floods emerged as a central theme in the present day governmental agenda on water management. However, the evolution of economic and political framework of present day India can be traced back to the crucial period in Indian history from the early 1920’s to mid-1950. It is during this period the major part of struggle for freedom was fought and the

process of constitution making began, which ultimately led to 1935 act and the new constitution. At the same time, this period also brought forth a galaxy of eminent persons who tremendously contributed to this process. Dr. Bhimrao R. Ambedkar was one among them.

Ambedkar has contributed a lot in the articulation of political and economic framework for India in the form of Indian constitution, re-organization of states, and reform of the Hindu social and religious order, social policy and so on. Although it was not known so much, but one of the greatest contribution of Ambedkar in the making of India was his leading role in the formulation of objective as well as strategy of economic planning and water and electric power policy as a cabinet member in charge of the “Labor, Irrigation and Power portfolio” during 1942-46. It was under his leadership, numbers of institutional framework has been developed and the base for present day water policy has been founded. Ambedkar recognized that water is the wealth of the nation and its development unlike many other sectors has certain distinct features. Water resource project is spread over a large area covering often inter-state rivers with varying socio-economic conditions and conflicting interests, requiring numerous decisions and agreements at various levels keeping in view the overall interest of the country. Ambedkar realised that this could be achieved only by adopting an integrated approach with the objective of optimal utilization of the water resources. The task entrusted to Ambedkar was difficult and complex because by the act of 1935, irrigation has brought fully under the jurisdiction of the state government in British India and the center can mediate only in the matters of inter-state dispute.

Ambedkar initiated a water resources policy visualizing greater participation of the central government than was permitted under the Government of the India Act of 1935. Ambedkar expanded the notion of the “New All-India Water Resources Policy” in January 1944 by stating that "there has been an absence of positive all-India policy for development of water resources and government of India wishes to take steps to evolve a policy to utilize the water resources for the purpose for which they are made to serve in other countries." Ambedkar considered river waters as a national heritage and a national policy is needed to use the water for multi-purpose by multi-states so that a larger section of the society could be

served. The policy initiatives based on the visionary taken by Ambedkar have been clearly reflected while framing the provisions in the Constitution. So, with the initiative of Dr. B R Ambedkar, the issue of water had been placed in a significant position in the constitution of India. The issue of water can be found in the following articles of the Indian constitution.

According to the article 246, "Notwithstanding anything in clauses (2) and (3), Parliament has exclusive power to make laws with respect to any of the matters enumerated in List I in the seventh Schedule (in this Constitution referred to as the "Union List"). Notwithstanding anything in clause (3), Parliament, and, subject to clause (1), the legislature of any State also, have power to make laws with respect to any of the matters enumerated in List III in the Seventh Schedule (in this Constitution referred to as the "Concurrent List"). Subject to clauses (1) and (2), the Legislature of any State has exclusive power to make laws for such State or any part thereof with respect to any of the matters enumerated in List II in the Seventh Schedule (in this Constitution referred to as the "State List"). Parliament has power to make laws with respect to any matter for any part of the territory of India not included in a State notwithstanding that such matter is a matter enumerated in the State List."⁷² Again, in the article 262, it is stated that Parliament may by law provide for the adjudication of any dispute or complaint with respect to the use, distribution or control of the waters of, or in, any inter-State river or river valley."⁷³

Entry 56 of List I of Seventh Schedule provides that "Regulation and development of inter-State rivers and river valleys to the extent to which such regulation and development under the control of the Union are declared by Parliament by law to be expedient in the public interest".⁷⁴ Lastly, Entry 17 of List II of Seventh Schedule provides that "Water, that is to say, water supplies, irrigation and canals, drainage and embankments, water storage and water power subject to the provisions of Entry 56 of List I. As such, the Central Government is

⁷² The constitution of India, Bare Act, Pioneer Printers, Agra, Law Publishers, Seth Gali, Agra. pp-135.

⁷³ Ibid, pp-140.

⁷⁴ Ibid, pp-243

conferred with powers to regulate and develop inter-State rivers under Entry 56 of List I of Seventh Schedule to the extent declared by the Parliament by law to be expedient in the public interest”.⁷⁵

In order to overcome the obstacles of inter-state disputes, Ambedkar suggested the establishment of Independent authorities, giving a leading role to the central government in the area of water resources development on inter-state rivers, for cohesive development of the entire river basins of the country. Multipurpose use of water resources had emerged as the key component of new water policy. Ambedkar so urged that there should be no objection for central intervention, if such an intervention is made in the interest of regional development extending beyond the boundaries of provinces. Ambedkar laid the foundation of all-India level water policy which had three components namely (a) a concept of “River Valley Authority” for the management and control of projects on inter-state rivers, (b) the concept of regional and multi-purpose development of river valleys as a whole, and (c) establishment of technical expert bodies at the Centre. Aiming at this goal, the Central Waterways, Irrigation and Navigation Commission (present day Central Water Commission) and the Central Technical Power Board (presently Central Electricity Authority) were established under the leadership of Ambedkar.⁷⁶ He wanted to form an institution in India in line with the Tennessee Valley Authority operating in United States. As a result of the untiring and concerted efforts of Ambedkar, an agreement between the governments of West Bengal and Bihar and the central government was finally reached to form an authority for the planning, implementation and management of Damodar Valley Project in Bihar and West Bengal. A legal force was given to this enacting the “Damodar Valley Corporation Act”. In July 1948, the “Damodar Valley Corporation” was created which has major dams and barrages at five locations and five thermal and three hydro projects expecting a capacity of 2,760 MW in the region having a total command area of seven lakh hectare and a catchment area 25,000 sq

⁷⁵ Ibid, pp- 246

⁷⁶ Thorat Sukhdeo, “Ambedkar’s Role in Economic Development and water policy, shipra Publication, Delhi, 1998.pp--71

kms. Along with the Damodar Valley Project, Ambedkar also initiated the scheme for Mahanadi, Sone River and the scheme for the rivers of Deccan.⁷⁷

It should be noted that with the inauguration of three river valley projects under the leadership of Ambedkar, the journey of independent India started with a fascination towards controlling floods with embankments and large dams. In July 1954, India's first Prime Minister Jawaharlal Nehru (1947–64), likened the large dam to a “modern temple.” With the charismatic leadership of Jawaharlal Nehru, the modern state of India fully insisted upon “the supreme belief in development which inculcated faith in modern technology and advocated an unwavering confidence in positivist science.”⁷⁸

However, the inadequacy of flood protection measures provided in the past came into sharp focus during the disastrous flood in 1954. The government of India therefore embarked upon a national flood control policy in the same year to be implemented in three phases- Immediate, short term, Long term. The immediate and short term phases of the programme were taken up in the first and second five year plans. These comprised collection of basic hydrological data, construction of embankments, improvements of river channels and raising of villages above flood level. Investigations required for the information of long term proposals were also carried out during the two plans. In the third plan, a start was made on long term measures which envisaged schemes such as construction of dams and storage reservoirs for flood protection and soil conservation in the catchment of various rivers. Short term measures consisted of improvement of suffrage drainage, establishment of proper flood warning system, shifting or raising of villages, above the flood level and construction of raised platforms to be used during time of flood emergencies. New embankments wherever necessary were also put up. As a result of the works of executed up to the end of the third plan, more than 40.5 lakh ha of land usually subject to flood damage has been given reasonable protection. The expenditure incurred on flood control works during the first three plans was Rs. 146.12 crores of which Rs

⁷⁷Kamble G S, “Dr. B R Ambedkar’s Contribution in Formulation of water Policy.” Research Directions, Vol- 2, Issue- 1, July 2014, pp-3-4.

⁷⁸ D’souza Rohan, “Framing India’s Hydraulic Crisis: The Politics of Large Dam.” pp-1

60 crores was spent during the first two plans.⁷⁹ Several schemes were taken up during the first three five year plans. Some among them are;

1. Budameru Diversion Scheme(Andhra Pradesh)
2. Dibrugarh Town Protection Assam)
3. Kosi Control Scheme (Bihar)
4. Bagmati Flood Control Embankments (Bihar)
5. Anti-Sea Erosion Works (Kerala)
6. Hirakud Dam (Orissa)
7. Dalaghei Protection (Orissa)
8. Anti-Waterlogging Measures (Punjab)
9. Ghaggar Diversion Scheme (Rajasthan)
10. Raising of Marooned Villages (UP)
11. Damodar Valley Corporation Dams (West Bengal).

(Source- Ministry of Information and Broadcasting, government of India)

From these, it can be observed that in the period from 1954 to 1966, sizable work has been done for providing flood protection. After this initiation, a number of steps were taken in the form of constitution of committees, commissions, task forces and formulation of policies etc. to study different aspects of inundation problems and also to evaluate Government policies and to recommend various tactics to deal with flood as well as erosion problems of various parts of the country. Amongst these steps, the Report of the “National Flood Commission (Rashtriya Barh Ayog)” is regarded as a path breaking. It was established in 1976 by the Government of India “to evolve a coordinated, integrated and scientific approach to the flood control problems in the country and to draw out a national plan fixing priorities for implementation in the future”. A total 204 recommendations were made by the Ayog but few had been followed up till date according to the reviews by the “Central Water Commission” in 1987 and the “National Commission for Integrated Water Resources Development

⁷⁹Irrigation and Power in the Three Plans (1951-66), publication Division, Ministry of Information and Broadcasting, Government of India.

(NCIWRD)” in 1999. The Ministry of Water Resources itself concedes that ‘no significant progress has been achieved in the implementation of its recommendations’.

The review report of the “National Commission for Integrated Water Resources Development (NCIWRD)” clearly observed that no worldwide solutions can be provided to solve the problem of flood completely. It therefore recommends “a shift in strategy from structural implements towards efficient management of flood plains, flood proofing, and disaster preparedness and response planning, flood forecasting and warning and other non-structural measures such as relief, flood fighting including health measures and flood insurance. The report further suggests that performance review of selected embankments may be carried out and based on the findings, planning, designs and management of embankments may be reviewed for obtaining better results. It also recognizes the importance of associating the beneficiaries in the upkeep and surveillance of embankments during the monsoon season for prevention of possible breaching.”

It is mentioned earlier that the capitalist motivations of the colonial government led to the embankment construction as well as the canal irrigation in Indian sub-continent. But when these measures were not proved to be enough for controlling the floods in the rivers, the same government, by the early 1940s, once again undertook an unprecedented level of hydraulic intervention by introducing Multi-Purpose River Valley Projects. With this, they began to conceptualize the inundation process as a natural resource for providing irrigation, navigation and hydro-electricity. This colonial legacy has culminated in the independent India in the form of below mentioned river valley projects,

TABLE 1- River Valley Projects in India

Bhakra Nangal Project	On Sutlej in Punjab. Highest in India.Ht. 226m. Reservoir is called GobindSagar Lake.
Mandi Project	On Beas in HP
Chambal Valley Project	On Chambal in MP & Rajasthan, 3 dams are there: Gandhi Sagar Dam, RanaPratapSagar Dam and JawaharSagar Dam
Damodar Valley Project	On Damodar in Bihar, Based on Tennessee Valley Project USA
Hirakud Project	On Mahanadi in Orrisa, World's Longest Dam: 4801m
Rihand Project	On Son in Mirzapur, Reservoir is called GobindVallabh Pant reservoir.
Kosi Project	On Kosi in N.Bihar
Mayurkashi Project	On Mayurkashi in West Bengal
Kakrapara Project	On Tapi in Gujrat
Nizamsagar Project	On Manjra in Andhra Pradesh
NagarjunaSagar Project	On Krishna in Andhra Pradesh
Tugabhadra Project	On Tugabhadra in Andhra Pradesh & Karnataka
Shivasamudram Project	On Cauvery in Karnataka. It is the older river valley project in India.
Tata Hydrel Scheme	On Bhima in Maharashtra
SharavathiHydel Project	On Jog Falls in Karnataka
Kundah&Periyar Project	In Tamil Nadu
Farakka Project	On Ganga in WB. Apart from power and irrigation it helps to remove silt for easy navigation.
Ukai Project	On Tapti in Gujarat

Mahi Project	On Mahi in Gujarat
Salal Project	On Chenab in J&K
Mata Tila Multipurpose Project	On Betwa in Uttar Pradesh and Madhya Pradesh
Thein Project	On Ravi, Punjab.
Pong Dam	On Beas, Punjab
Tehri Dam	On Bhagirathi, Uttarakhand
Sardar Sarovar Project	On Narmada, Gujarat/MP.

Source- Ministry of Water Resources, wrmin.nic.in/forms/list.aspx?lid=249

Along with these “multi-purpose river valley projects”, several organizations were established under the “Ministry of Water Resources”. Significant among those are- Central Water Commission (1945), Tungabhadra Board (1953), Farrakka Barrage Project (1961), Ganga Flood Control Commission (1972), Bansagar Control Board (1976), Betwa River Board (1976), Sardar Sarovar Construction Advisory Committee (1980), Brahmaputra Board (1982), North-Eastern Regional Institute of Water and Land Management (1989), Upper Yamuna Board (1994) etc...⁸⁰ So it is mention worthy that in spite of having these large numbers of institutions and initiation of various projects under the direction of the same, no significant improvements have been seen in the flood scenario of the country.

Although the independent state of India turned the dammed rivers into the synonym for nation building, in retrospect, the ground level reality of these projects has been something very different. However, the first discontent against big dams was voiced over the problem of displacement. The multipurpose reservoir requires an artificial lake due to which a large area of forests and habitations goes under river water. As a result, a substantial number families and villages are forcibly displaced who formerly inhabited within the bed of the reservoir.

⁸⁰ Ministry of Water Resources, River Development and Ganga Rejuvenation, (<http://wrmin.nic.in/forms/list.aspx?lid=322#>)

According to a report, “the number of people displaced by large dams in India since 1947 is placed at 40 million; with possibly a mere tiny fraction of this huge number of ousters having managed anywhere near meaningful resettlement.” These Dam displaced people were doubly displaced. On the one side, submergence due to the dam construction destroys all their probable means of livelihood, while on the other side of the picture; they were not provided with any meaningful rehabilitation or resettlement. Such injustice made by the post-colonial Capitalist state machinery of India had been culminated in the popular protest named Narmada Bachao Andolan against the Sardar Sarovar Projects in 1984. With the leadership of Medha Patekar and Arundhati Roy, this movement completely stood against the construction of the dam.

Although protests against large dams are increasing day by day, their voices are simply ignores by the state machinery. On the contrary, they are inaugurating huge numbers of new river valley projects on each river aiming mainly to control floods as well as produce electricity. Not having satisfied with these projects, the government of India has now come up with its ultimate hydraulic intervention in the form of “Inter-linking of Rivers”. This project according to the Government officials will be an adequate answer to the problem of flood and drought in the country.

Almost a decade ago when the country was under the rule of Bharatiya Janata Party (BJP), the prime Minister Atal Bihari Vajpayee for the first time proposed the idea to interlink India’s rivers. It is however become a determined policy in the Narendra Modi-led government. The proposed project of interlinking of rivers comprises a comprehensive engineering involvement to shift water from the lower Ganga and Brahmaputra basins in eastern India to water scarce regions of central and western India through the construction of dams, reservoirs and over 14,000 kilometers of canals. The claim is that the Inter-Linking of Rivers will generate 30,000 megawatts of cheap hydro power. Along with it, this will supply drinking water to 101 districts, 5 metros and irrigate 34 million hectares. The BJP government regarded it as a remedy for the hazard of floods and droughts that plague India every year. Although, the said project is brought into light only in the last decade, yet it has its root in the colonial past. In

the 19th century, Arthur Cotton had proposed the linking of some rivers which later revived in 1972 by K L Rao. It was to transfer water for irrigation in south India, which resulted in the idea of the 'Ganga-Cauvery Link Canal'. In 1977, Captain Dastur offered an impressive plan for the building of a couple of canals which is known as 'the garland canal' scheme. It envisioned the building of a 4,200 km long Himalayan canal and 9,300 km long southern garland canal and the connection between the two systems through two pipelines passing by Delhi and Patna.⁸¹ However, according to the reports of the various expert bodies like Central Water Commission (CWC), these proposals had not proved to be worthy. In August 1980, the "Ministry of Water Resources" outlined a national policy for water development, and the National Water Development Agency (NWDA) was established in 1982. As such, the National Democratic Alliance or NDA Government announced the proposal in 2002. However, followed by the Vajpayee rule, the United Progressive Alliance (UPA) government while coming to power in the year 2004 had suspended the proposal. Again with the coming of BJP into power in 2004, the project has again been given utmost importance. Water Resources Minister Uma Bharti has called for fast-tracking the project. According to her statement, "All 30 interlinking rivers projects can be completed within seven to 10 years, provided states agree,"

The ILR comprises two components: Projects in the Himalayan component and peninsular component.

Under Himalayan Component, 14 links is identified aiming to build storage reservoirs on the Brahmaputra and Ganga rivers, as well as their tributaries in India and Nepal. The aim is to conserve monsoon flows for hydropower generation and irrigation, along with flood control. The linkage will shift surplus water of the Gandak, Kosi and Ghagra to western parts of the country. Between the Ganga and Yamuna, a link is also planned to transfer the surplus flows to drought-prone areas of Rajasthan, Haryana and Gujarat. On the other hand, the Peninsular Component or the Southern Water Grid includes 16 links that connect the rivers of South India. It

⁸¹BandyapadhyayJayanta, PerveenShama, "Interlinking of Rivers in India: Assessing the justification", Economic and Political Weekly, Vol - XXXIX No. 50, December 11, 2004, pp-5308

*envisages linking the Godavari and Mahanadi to nourish the Pennar, Cauvery, Krishna and Vaigai rivers. According to the plan, this linkage will require a number of big dams and major canals to be built. Besides this, the Ken river will also be linked to the Betwa, Parbati, Kalisindh, and Chambal rivers.*⁸²

It is mention worthy that beyond some lines drawn on the map, no scientific and technical details of the proposed interlinking of rivers is available in the public domain. Technical information on the flows, storages, link canals, barrages and associated engineering structures, the ecological impacts on downstream areas of the basins, extent of involuntary displacement, and likely costs and benefits of the proposal have not been made available for open professional assessment by the ministry of water resources. Only a part of the Ken-Betwa link is being published in the public domain. It involves Uttar Pradesh and Madhya Pradesh in the Bundelkhand region. Near Daudhan village, on the border of Chattarpur- Panna districts in Madhya Pradesh, a 73.8 meters high Greater Gangau Dam is proposed on Ken 2.5 kilometers upstream from the GangauWair. The water is to be transferred to the Betwa River through a 231.45km long concrete lined link canal which is to drop water upstream of the existing Barwasagar reservoir in Jhanshi district in UP.⁸³ However many environmentalist and social activists are quite skeptical regarding the fruitfulness of the proposed project, hence question it.

Apart from the project of “interlinking of rivers”, what the Ministry of Water resources has initiated is the issue of 4772 flood/inflow forecasts during the flood season 2014 out of which 4667 forecasts were found to be within permissible limit of accuracy. Again, formation of another landslide dam in north-western region was rapidly simulated and various measures needed for safely handling the situation in the event of any breach in the dam were suggested.

⁸² Ministry of Water Resources, River Development and Ganga Rejuvenation, <http://wrmin.nic.in/forms/list.aspx?lid=1279&Id=4>

⁸³ AlaghYogindar K, Pangare Ganesh and GujjaBiksham, “Interlinking of Rivers in India: Overview and Ken-betwa Link”, Academic Foundation, New Delhi, PP-119

Lastly the preliminary report for diverting flow of the river Ganga towards right bank along Patna city has been prepared.⁸⁴

So, to conclude it can be said that unless the proposed project is debated providing information with all the shareholders, the insight to proceed with the proposal will remain dubious.

3.4: AN ANALYSIS

After examining the various phases of flood control in Indian sub-continent, some salient features of those programs can be noted down. Notable among those are as follows-

- Water has shaped the civilization from the beginning of the humankind. Their economy was mainly reliant on the inundation happened in the monsoon that would produce the crop for the coming year. In sort, almost all the ancient civilizations were water centric. They, while residing on the bank of the rivers harnessed the river water, but never tried to exploit it. But gradually, ancient civilization learned to bring water to them instead of moving towards it. This innovation in the form of irrigation and canal construction had changed the civilization forever. With this ability to move water in the form of irrigation has been both a blessing and curse for the modern civilization. On the one hand, it makes the lives of the people a bit easier and on the other, it unknowingly gives people a sense of domination over the natural resources like water, land and so on. This situation has intensified with the modern technological interventions in the form of embankments, reservoirs, dams etc... in recent times.
- Although the people of ancient India used the water resources more frequently, yet the kind of exploitation of rivers had become more visible only with the colonial intervention in India. Earlier the idea was to live with floods. They adopted their own ways and means to deal with floods. But the planned intervention and flood control in India began only with the coming of

⁸⁴ Ministry of Water Resources, River Development and Ganga rejuvenation, e-book, Government of India, www.wrmin.nic.in

the British in the scenario. The colonial government considered flood as a calamitous event rather than a normal and routine phenomenon. With their structural innovations, the whole perception of flood has got a negative connotation in the mindset of the common people also. They also instead of facing floods have tried to escape from it. This transformation of understanding has a severe impact on the policies adopted for flood control in India.

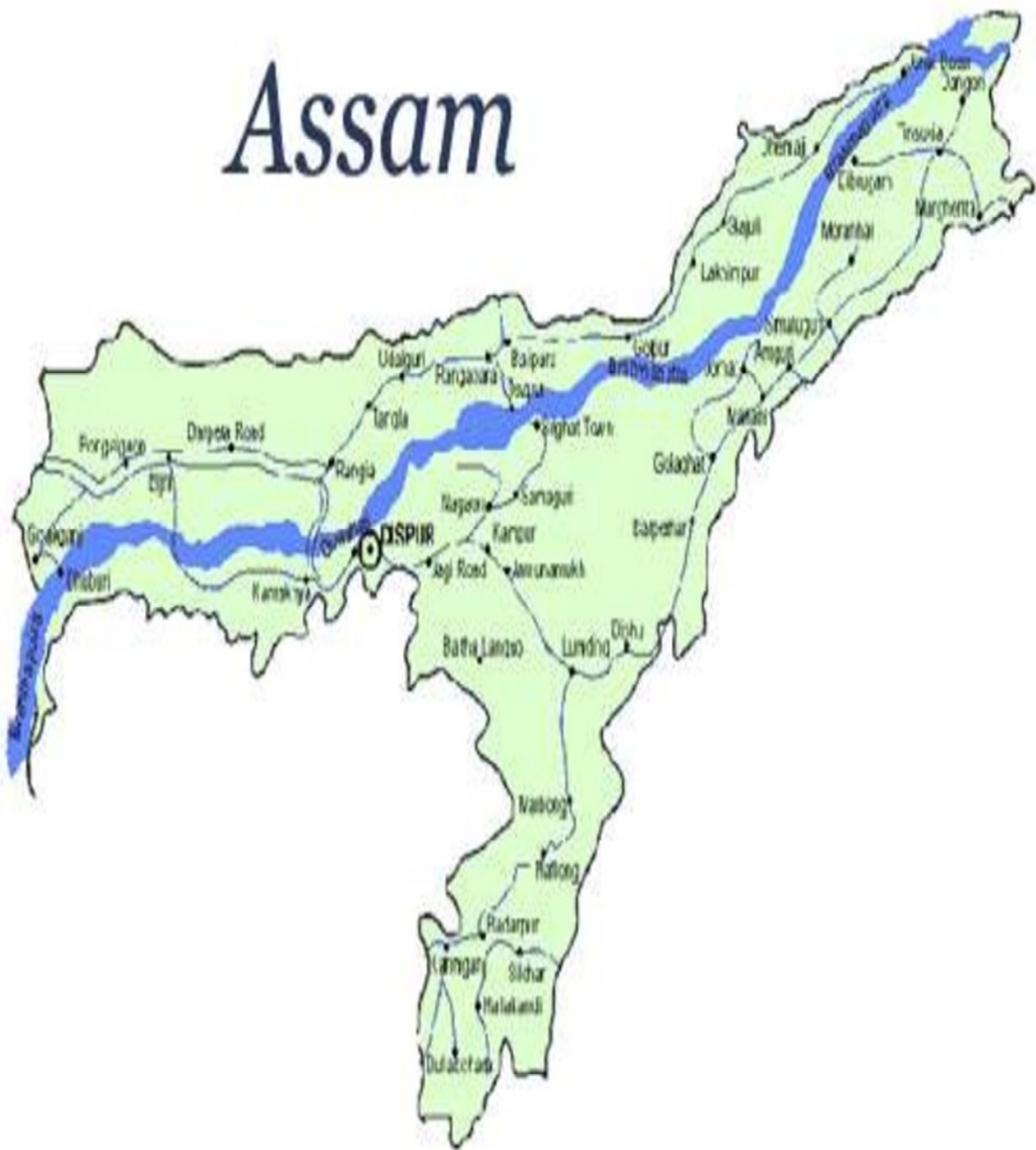
- The idea of the colonial government to control floods was motivated mainly by the economic factors. They, in order to protect their industries, transportation facilities and other administrative structures, tried to solve the problem of flood permanently, hence constructing embankment ignoring its discontents. With this colonial legacy, the independent state of India has followed the same path. As a result of this, in the present day, 34397.61 km of flood embankments and 51317.50 km of drainage channels have been built by the Indian Government.⁸⁵ Along with this, numbers of dams are being constructed, some with the multi-purpose of flood control, irrigation, and electricity generation and others with the sole aim of electricity production.
- No doubt, the construction of dams has provided the country the basic facilities for industrial development, but at the same time, it has also some serious effect on the survival of the people inhabiting on the bank of the river. Construction of dam and submersion often leads to major loss of forest and arable farmland. Water logging as well as increased salinity decreases agricultural productivity in the vicinity of the reservoir. Some vector-borne diseases, such as malaria, schistosomiasis, filariasis, and river blindness are increased due to large-scale impounding of water. Besides, the compensation policies of the Indian Government towards the people displaced due to dam construction are not satisfactory in many cases. Since the compensation is grounded on the amount of land possessed so neither the dispossessed households were compensated nor were they compensated for damage of earnings or subsistence resultant from collective holdings like forests and common grasslands. This has created a massive dissatisfaction among the stakeholders regarding the issue of whose development actually the state machinery is opting for.

⁸⁵ Ministry of Water Resources, 'achievement in Flood Manangement', <http://wrmin.nic.in/forms/list.aspx?lid=322#>

- Along with the social impact, these policies have a serious impact on the ecology of the rivers also. Due to the construction of the dam, there might be severe impact on the bio-diversity, ecology and the surrounding environment of the river. What has been seen in the policies of the Indian government is that there is little concern for these issues. The techno-fetish state of India has made these structural interventions on the rivers as a synonym for development as well as flood control and hence initiates more and more projects of this kind in these days.
- Another notable point that is needed to be emphasized is that the different rivers on the world have some special characteristics unique to the others. As for example- the river Brahmaputra has been well-known for its frequent channel shifting. So formulating policy without studying each river properly might have brought some negative impact to them. But, if someone studies the flood control policies of the Government of India, it is seen that the policies of the government are same for all the rivers. So, it can be said that there is a lack of imaginary capacity of the modern state of India due to which very less improvements have been happened to the problem.

Concluding the chapter, it can be summarized that, modern flood control measures adopted in India are neither very successful, nor are they people friendly. As such, these dominant engineering responses to floods have been guided by a perceived need for controlling flood rather than managing them. Hence, rather than recognizing the failures of European engineering and obstruction of riverine flows, the post-colonial State of India started constructing new structures, pre dominantly embankments and dams in an attempt to eliminate floods. As year after year, flood control became a more bureaucratic affair, the people who actually lived and experienced floods became far removed from the decisions that directly affected their lives. In order to solve the whole issue, the government machinery as Professor Rohan D'souza suggests, has to come out of "Hidrocracy or Water Bureaucracy" that has dominated official decision. It should come out of that Hidrocracy that sees "a river as a water pipe, whereas it is actually so much more, a complete living ecosystem".

CHAPTER 4



4.1: INTRODUCTION

Assam, “the land of blue hills and red river” is precious to nature. Located at the extreme North-East of India, Assam has always enjoyed a reputation for pristine natural beauty and substantial biodiversity. It is a land covered with dense jungle grass, intermingled with areas of rice fields and adjoining tea gardens. The state has green as a dominant colour with a remarkable 35% forest cover and thousands of hectares under tea cultivation. Assam is surrounded by Bhutan and Arunachal Pradesh on the North, Nagaland and Manipur on the East, Meghalaya and Mizoram on the South and Bangladesh, Tripura and West Bengal on the West.⁸⁶ Notably, the state is sacred with rich mineral, agricultural, forest, water and human resources having excessive worth and potential. It has an enormous possibility of becoming one of the frontline states of India.

As far as the natural resources are concerned, Assam is very rich in that. The state’s principal mineral resources include Petroleum, coal, natural gas and limestone. Among these the most important mineral is petroleum. Availability of natural gases also makes the state chief supplier of LPG (Liquefied Petroleum Gas) among the other North-Eastern states. Again with 25% of availability, the forests in Assam are very rich in valuable trees likesegun, Simalu, Saral, Bamboo, Cane, Bossum, Sal, medical herbs etc. With this vast forest cover the forest based tourism centers like Kaziranga National Park, Manas Bird Sanctuary, Dibru-Saikhuwa Reserved Forest provide a good source of income to the state. It is quite mention worthy that almost 55% of over-all output of tea in the India is produced by the state of Assam. Along with tea, there are various major agricultural produces like rice, wheat, pulses, potatoes, jute, tobaccos, sugarcane etc... Very importantly, nature has gifted Assam with plenteous of precipitation and many swift flowing rivers as well as streams due to the existence of which Fishing and fish rearing industries in the state have been boosted. Among them, the River Brahmaputra, termed as the moving Ocean, is always considered to be the lifeline of entire North Eastern states of India.

⁸⁶<http://www.joiaaiaxom.com/assam/about/beauty-and-nature-59>

4.2: THE BRAHMAPUTRA: IT'S GEOLOGY

Ranked among the largest rivers of the world in terms of discharge and sediment, the Brahmaputra is an intrinsic part of the socio-cultural life in Assam. The name Brahmaputra means the 'Son of Brahma', one of the Hindu Holy Trinity. According to Mythology, it is the only masculine river (Nada) in the pantheon of Indian River deities. The river is mentioned as "Lauhitya" in classical Indian literatures like the Mahabharata and Purana. It is so called because the river takes red colour during rainy season when it cuts through the red soil in the mountains. Mythology connects the origin of the river with the sins of the Parasuram. It is said at Parasuramkunda or Brahmakunda that the great saint washed off his bloody stains of matricide and regained his sainthood. The river crimson with his mother's blood hence came to be known as the Lauhitya.⁸⁷ However, the name Brahmaputra was mentioned in the Kalika Purana and Jogini Tantra for the first time. According to Padma Purana (Sristi Khanda), the Brahmaputra's birth is linked to Brahma, the creator of the world. The Brahmaputra remained an enigmatic river all through human history. As such, there have been persistent efforts to unravel its concealed mysteries by myriad monks, explorers and travellers from India, China and various western nations. The most significant ones among these early explorers were Swami Pravananda of India (1830's), Kintup of Sikkim and a Chinese Lama (1881), Sven Hedin (1905), Col. F.M. bailey and Capt. H. Morshead (1913), Frank kingdom ward and jack Cawdor (1924). However, the last major discovery with regard to the Tsangpo (Tibetan part of Brahmaputra) was made in 1998 when an expedition sponsored by the National Geographic Society, led by two Americans, Tibet-scholar Ian Baker and Tsangpo-expert Kenneth Storm Jr.

The Brahmaputra is a distinctive river system that drains such diverse environments as the cold dry plateau in Tibet, the steep rain-drenched slopes of the Himalayas, the landlocked alluvial plains of Assam and the vast deltaic flat in Bangladesh. Taking its rise in a great

⁸⁷KarManik, "The Brahmaputra: Floods and Preventive Measures", EBH Publishers India Limited, Guwahati, pp.63

glacier mass in the Kailash range of the Himalayas, south of the Gunkyud Lake in southwestern Tibet at an elevation of 5,300 meter, the river traverses a total distance of 2880km across international boundaries in China, India and Bangladesh before entering into the Bay of Bengal through a joint channel of Ganga. The Brahmaputra basin covers an area of 580,000 km² of which 50.5% lies in China, 33.6% in India, 7.8%in Bhutan and 8.1%in Bangladesh.⁸⁸ While traversing through India, in some places, the river is astonishingly wide. Due to this impressive distance covered by the river, the Brahmaputra is known as a moving Ocean. Originating in the Chemayungdung mountain ranges that located approximately sixty miles south-east of “Mansarovar lake” in the Mount Kailash range in Southern Tibet at an elevation of 5300 meter the river become the “Tsangpo”, the uppermost river in world. Notably, the River Brahmaputra is also known as“Yarlung Zangbo”⁸⁹ in Tibet. The river has a number of tributaries in Tibet. According to Encyclopedia Britannica, “Raka Zangbo (RakaTsangpo), Lhasa (Kyi) and NyangQu (Gyamda) are prominent north bank tributaries whereas NyangQu (Nyang Chu) is a tributary on the south bank.”⁹⁰

Before entering India, the river passes Pi (Pe) in Tibet and suddenly turns to the north and northeast and cuts a course through a succession of great narrow gorges between the mountain Gyala Peri and Namjabarwa (Namcha Barwa) in a series of rapids and cascades. The river then turns south and southwest and flows through a deep gorge across the eastern extremity of the Himalayas with canyon walls that extends upward for 16,500 feet (5,000 meters) and more on each side. This is the celebrated great bend where China has plans to build the world’s biggest hydropower project of 40 000 MW capacity and also divert water from here to the North China, though China is currently denying any such plans. The river enters Arunachal Pradesh near Gelling where it is known as the Siang or Dihang. The Siang River meets two other major tributaries of Brahmaputra, Dibang and Lohit in the west of Sadiya, at a place

⁸⁸ Goswami D C and Das Parthajyoti, “The Brahmaputra river, Assam: A Hydro geomorphological Appraisal”, Landforms Processes & Environment Management, Editor: S. Bandyopadhyay et al. ISBN 81-87500-58-1, ACB Publications, Kolkata, India, pp.121-144.

⁸⁹ It is the Chinese name of the River Brahmaputra.

⁹⁰“Brahmaputra – The Beautiful River or the Battleground?” Posted on July 17, 2013, Article Published by South Asia Network On Dams, River and People.

named Kobo. From this confluence point, the river is known as the Brahmaputra till it enters Bangladesh.⁹¹

In the course of journey through Assam from East to West, a large number of tributaries of the Brahmaputra River join the river. The names of the tributaries are given bellow...

North Bank Tributaries:

1. Dhemaji District: Dikari, Solengi, Semen Noi, Brahmajan, Kumatiya, Jiadhhal, Balijar, Sampara, Dihang, Dibang.
2. Lakhimpur District:- KarhaNoi, Subansiri, RangaNoi, Dikrong.
3. Sonitpur District:-Mornoi, BalijanNoi, BuroiNoi, BorgangNoi, BharaliNoi, Gabharu, Belsiri, sepia, Depota, Pasnoi, Jia-Bharalu.
4. Darrang District: - Dhansiri, Mora- Dhansiri, Mura Noi,, NoaNoi, MongoldoiNoi, Saktola, Nilapani, Barnadi.
5. Kamrup District: - Puthimari, Baralia.
6. Nalbari District: - Pagladiya, Mora-Pagladiya, TihuNoi, Nona Noi, Nalda.
7. Borpeta District: - Kaldia, Karakhowa, BhellengiNoi, saulkhowa, Pahumara, Beki, Nakhanada.
8. Bangaigaon District: - manas River, Aie River, KokilaNoi, Dulahi, Kanamahara, Champawati.
9. Dhubri District: -TarangNoi, ChalaiNoi, Saralbhanga, Gangadhar, Sonkosh.

South Bank Tributaries:

1. Tinsukia District:- DangariNoi, Tengapani, Lohit.
2. Dibrugarh District: - DibruNoi, SesaNoi, Burhidihing, Dehing, Noa-Dihing, Tipling, Dirak.
3. Sivasagar District: - DemowNoi, Desang, Darika, Dikhou, Namdang.
4. Jorhat District: - Jaji, Teok, Bhogdoi, Kakdonga
5. Golaghat District: - Dhansiri, diphalu.
6. Nagaon&MarigaonDostrict: - Kolong, Kapili, Sonai, jamuna, Nnaoi, Borpani.

⁹¹ Ibid.

7. Kamrup district: - Digaru, Borpani, kulsi, Sirang, bharalu, Barnadi.⁹²

There is a basic difference between the North bank and south bank tributaries of the river in terms of their hydro- geomorphology owed to diverse climatic as well as geological environment of the regions, they traverse. The Northern tributaries are flashy in character and flow in shallow braided channel having steep slopes, bring with them a heavy silt charge which can be attributed to the heavy rainfall in the hilly catchments of the north and easily erodible soil, resulting in extensive landslides and soil erosion. Compared to the northern rivers, the southern tributaries have flatter grades and deep meandering channels with beds and banks composed of fine alluvial soil and yield low sediment load.⁹³

With these huge numbers of tributaries, the Brahmaputra river basin, excluding the Tibetan plateau portion, forms an important part of the monsoonal regime of the South Asia. The basin, which receives an annual rainfall of 230 cm with a variability of 15-20 percent, exhibits marked spatial variation in the distribution of precipitation.⁹⁴ These rains that contribute to a large portion of the run-off in the Brahmaputra and its tributaries are primarily controlled by the shifting position of the monsoon trough, a belt of depression extending from northwest India to the head of the Bay of Bengal. In the course of its north-south oscillation in summer, when this axis moves to the foothills of the Himalayas, heavy precipitation is caused in Assam and adjoining highlands. The flow regime of the Brahmaputra is largely controlled by the seasonal rhythm of the monsoon and the freeze-thaw cycle of the Himalayan snow. With an average annual discharge of 19,830 cumecs at its mouth, the Brahmaputra ranks fourth among the large rivers of the world.⁹⁵

⁹²KarManik, "The Brahmaputra: Floods and Preventive Measures", EBH Publishers India Limited, Guwahati, pp.65-66

⁹³"Master plan of the Brahmaputra Basin", Brahmaputra Board, 1985.

⁹⁴ Ibid,

⁹⁵ Das Parthajyoti, Patwary B C, Kumar S R and Choudahury B, "The Brahmaputra River: A hydrological Appraisal", "River Brahmaputra: In The Culture and Vision of Assam", edited by H N Dutta&SujitSom, Vol. 1, Series 1, 2010.

4.3: FLOOD SITUATION IN THE BRAHMAPUTRA VALLEY

Assamese Life and culture have been sustained by the huge number of rivers from the time immemorial. The natural environment of Assam is favorable for origin of rivers and rivulets, their flow and erosion, deposition and such other activities. Due to hilly areas on all sides of the state and also for high average rate of rainfall the number of rivers and tributaries is naturally more. So, due to existence of innumerable big and small rivers, the natural environment of Assam which is inter-related with human culture is river centric.⁹⁶ The Brahmaputra is “a dynamic river whose dynamism is not only limited to its physical characters or features of the river, but immersed in social, political, economic and cultural aspects.” The valley has become a universe of assimilation for people who speak different languages and dialects and are from different races. It is to be noted that the North Eastern region is home for more than “166 separate tribes, 160 scheduled tribes and over 400 other tribal and sub-tribal communities and groups, speaking a wide range of languages. Locating at the epic of the northeastern region, the Brahmaputra has paved its way through Assam like the lifeline of the state.⁹⁷

The importance of the river Brahmaputra in the lives of the Assamese people can be understood from the writings of the various poets, novelists etc...In 1942, at the time of Indian Freedom struggle, Jyoti Prasad Agarwala, the celebrated cultural icon of Assam wrote “Luitor parore ami deka Lora, moriboloi bhoi nai (we are the youth from the banks of Luit⁹⁸ and we don't have any fear of death)”.According to Dr. Bhupen Hazarika another bard and cultural icon of the state, the destruction power of the river will wake up the people. In his famous song “Bistirno parore” he asked the river, “Sahasro barishar, unmadonar, avigyotare, pangu manobok sawal songrami aru agrogami kori nutula kiyo which means with your maddening experience of thousand monsoons, why don't you arouse the disabled human

⁹⁶BuzarboruahPallaviDeka, “Rivers And The Assamese Folk Life: A Right Relationship Of Man And Nature”, International Journal of Social Sciences, Arts and Humanities, Vol. 2, No. 2, 2014
ISSN 2311-3782, pp- 36

⁹⁷“Brahmaputra – The Beautiful River or the Battleground?” Posted on July 17, 2013, Article
Published by South Asia Network On Dams, River and People.

⁹⁸In Assam Brahmaputra River is also known by several other names i.e. ‘Luit’, ‘SiriLuit’, ‘BorLuit’
‘BorNoi’.

beings for struggle and progress”. Replications of the fact that all dimensions of socio-cultural life in the valley as well as the day to day life of the inhabitants are entirely river dependent, that complete river-dependent life is found in the novel ‘Noi Boi Jai’ of Lila Gogoi. Every event big or small including happiness and pain, joy and sorrow, smile and weep, love and tragedy, rise and fall of life that begins from early in the morning are intermixed in all phases being closely connected with the Dikhow river.⁹⁹

It is cleared that the mighty river Brahmaputra has a presence in every person’s life living on its bank. However, like other rivers, the river Brahmaputra is a river which at once inspires fear as well as admiration, happiness as well as sorrow. The river has sometimes very serious effect on the lives of the people in the forms of floods and river born erosion. The Brahmaputra Valley has an average width of approximately 80 kilometers and is circled by low hills. During the rains, the river’s swollen banks are more than five miles apart in Assam. A commonly cited description of the river is how it “flows between sandy banks, covered with dense jungle grass, the home of wild buffalo, rhinoceros, and other large game, and from the decks of the river steamers few signs of population or cultivation can be seen. A few miles inland, however, the appearance of the country changes, and rice fields or tea gardens takes the place of the riverine”.¹⁰⁰ Floods in the valley occur in a very destructive manner because of the fluvio-geomorphological and hydro-meteorological character of the river. The Brahmaputra River is the fourth largest river in terms of average discharge at mouth and the largest in respect of specific water yield.¹⁰¹ Due to this, the people of the Brahmaputra valley have to suffer from various hazards like inundations, river-bank erosion, flash floods and sand casting¹⁰². All of these hazards have deep impact in all aspects of lives and livelihoods of people inhabiting in the region. Because of this, people become displaced and homeless, damage crops, public property and harm development infrastructure making the victims to suffer from trauma and shock. Besides, yearly hazards cripple people’s resilience and poverty

⁹⁹ Gogoi Lila, “NoiBoi Jai”, Banalata, Dibrugargh; Banalata Edition, 2006

¹⁰⁰ Government of India, Census of India, 1901, Assam, Vol.3, Part 1.

¹⁰¹ Goswami D C and Das Parthajyoti, “The Brahmaputra river, Assam: A Hydro geomorphological Appraisal”, Landforms Processes & Environment Management, Editor: S. Bandyopadhyay et al. ISBN 81-87500-58-1, ACB Publications, Kolkata, India, pp.121-144.

¹⁰² Sand casting is a process where huge amount of sand is deposited by the flood water.

is intensified. Due to repetitive shifting in the course of the river and the erosion resulted from this, a huge amount of productive land in hundreds of villages with settlements, crops and infrastructures are lost to the river. Sand casting is another hazards resulting in damage of thousands of acres of fertile land and wetlands due to deposition of debris, mainly coarse sand particles, by flood waters.¹⁰³ Following table provides a summary of the flood damage in the Brahmaputra valley-

TABLE 2- Flood Damage Trends in Assam

Period	Average Annual Area Flooded (in Mha)		Flooded Crop area as % of Total Inundated area	Average Annual Population Affected	Average Annual Damage (Rs in lakh)	Value of Crop lost as %
	Total	Cropped				
1953 – 59	1.13	0.10	8.85	860,000	586	66%
1960 – 69	0.75	0.16	21.33	15,20,000	757	92%
1970 – 79	0.87	0.18	20.69	20,00,000	1,518	89%
1980 – 88	1.43	0.40	28.05	45,50,000	14,552	96%
1999 – 05	1.07	0.38	5.65	45,86,000	71,717	34%

Source: Water Resource Department, Assam

¹⁰³ Das Partha, Chutiya Dadul and Hazarikanirupam, "Adjusting to Floods on the Brahmaputra Plains", Project Report made by Aryanak, Guwahati, Assam

However, there are three main facets of the excruciating flood problem in the valley. Those are as follows-

- (1) *Flooding of riverine areas due to overtopping of banks by the main river and its tributaries.*
- (2) *Drainage congestion, especially near the outfall of the tributaries during high stages of rivers and*
- (3) *Bank erosion and channel instability caused due to excessive sedimentation of the rivers.*

Floods in the Brahmaputra valley are caused by both natural as well as anthropogenic factors. The extremely vigorous monsoonal activities vis-à-vis the exceptional physiographic setting of the region is the most dominant cause of the high frequency and magnitude of floods. Active seismicity of the region is another important factor that has considerably influenced the flood potential of the Brahmaputra valley by causing extensive changes in the channel morphology. The valley has experienced as many as 13 major flood episodes from 1954 to 1998 especially after the earthquake of 1950. These earthquakes had produced heavy siltation in the rivers which caused significant rise in the bed levels of the Brahmaputra and its tributaries. It reduced the conveyance capacity of the channels and enhanced the probability of frequent overtopping of banks by river flows. According to Manik Kar, the 1897 and 1950 earthquake, the scenario of flood in Assam is changed much in various dimensions. For these earthquakes, (a) the river beds uplifted (b) the principal river and their tributaries changed their courses in many places (c) land sliding and surface erosion increased in greater magnitude and intensity (d) pattern of rainfall in North East India is changed much and direction of rainfall Zones were shifted from Meghalaya to arunachal and China. Rainfall intensity has also increased in the valley, total annual rainfall in North-Eastern part of the Valley increased whereas in the western part it is reduced much.¹⁰⁴ As far as the anthropogenic causes are concerned, the short term and adhoc flood protection measures so far taken in the state are also responsible for aggravating the flood situation. The long stretches of earthen embankments, in particular, have caused harmful effect on the flood situation of the river, more specifically on its aggradational character thereby accentuating its flood hazard

¹⁰⁴KarManik, "The Brahmaputra: Floods and Preventive Measures", EBH Publishers India Limited, Guwahati, pp.64

potential. Encroachment of wetlands which works as natural reservoirs in the flood prone areas have resulted in reduction of retention capacity in the drainage system and consequent rise in flood levels. Unscientifically constructed roads, railway embankments and settlement areas together with intense land-use pressure on flood plain areas due to explosive growth in population are also important contributing factors towards intensification of the flood problem.

4.4: STATE MACHINERY AND FLOOD CONTROL IN ASSAM

The above mentioned peculiarities of the Brahmaputra over the centuries provided a floodplain agrarian ecology in the region. Floods had both its beneficial and damaging aspects which are well known to the people of the valley. Peasant communities have found out the ways to overcome the challenges of flood to agriculture. They usually divided the valley conforming to the flooding pattern and avoided the flood prone areas where there is a possibility of people, cattle or houses being swept away by the flood water. As such until the beginning of the 20th century, floods in the Brahmaputra valley was not regarded to be destructive, in fact very helpful for the production of agricultural crops.

Regular inundation was considered to be normal and useful to the fertility of the land. Flood waters left behind silt (palosh) in the fields. Silts replenish the hungry fields with nutrients. Farmers could get increased yield from inundated fields. When one crop is lost, it would be recompensed by the subsequent harvest in the winter.¹⁰⁵ Again, in the western part of the Valley, “The Brahmaputra and many of its tributaries occasionally overflow their banks, but the area subject to inundation is well known, and the villagers do not attempt to cultivate anything more than summer rice or cold weather crops in these flooded tracts.”¹⁰⁶ The Chaporis¹⁰⁷, covered by long grass were inundated regularly by the rivers. So, here Pam

¹⁰⁵ Saikia Arupjyoti, “Ecology, Floods and the Political Economy of Hydropower: The River Brahmaputra in the 20th century”, NMML Occasional paper, Perspectives in Indian Development, Nehru Memorial Museum and Library, pp-6

¹⁰⁶ Allen B C, Assam District Gazetteers, vol. 5, Darrang, Allahabaad Pioneer Press,1905

¹⁰⁷ Chapori means the riverine tracts which are highly productive tracts.

which means temporary cultivation was done by the peasants in the earlier times. Disappeared during monsoon, these lands were used heavily for the production of winter crops like mustard, opium or cereals etc...Apart from cultivation, the farmers used these riverine tracts of Brahmaputra as grazing fields. Here they produced and supplied dairy products to surrounding villages and towns. So no doubt, these lands were frequently used by the people for the purpose of grazing or cultivation but those habitations were almost temporary lasted for a season or for a few years.

However, a significant change had been happened to this habitation with coming of Ahom to this land.¹⁰⁸ When Ahom came to Assam, a well-established agrarian economy was there in the Brahmaputra valley, on the basis of which the Ahom state consolidated their political power. For further expansion of the agrarian frontier, a large area of Eastern Assam was transformed into settled agricultural fields from forests and low-lying land. To prepare the land for cultivation, fresh ground was broken by clearing jungle, the soil was ploughed and treated, arrangements were made to retain sufficient amount of water on the fields so that the seeds could be sown or seedlings transplanted. As most of the Valley was annually inundated by the Brahmaputra and its tributaries, the fields needed to be protected from it, and embankments were constructed as the primary means of flood protection. After the harvest, the grains had to be kept safe from the damage that could be caused by the river's waters, for which granaries needed to be designed in a particular way.¹⁰⁹ So taking into consideration all the aspects of flood problem in Assam, the Ahom rulers had appreciated the construction of embankments in the valley. This initiative was further motivated by two reasons, first they served as highways above the line of flood and second they performed as guards to control floods. The old roads like Dhudar Ali, Garh Ali were constructed as bund roads. Although these roads were built for protection against enemies, yet they could be used for communication as their tops were always above the flood level.

¹⁰⁸ The reign of Ahom was from 1228 to 1826 and it came to an end with the landaboo treaty.

¹⁰⁹ GoswamiRituporn, "Rivers And History:Brahmaputra Valley In The Last Two Centuries", Thesis submitted to Jawaharlal Nehru University, pp-32

As has been discussed above, the floodplains of the Brahmaputra Valley, particularly in eastern Assam, were converted into permanent settlements during the medieval times through the building up of a network of interconnected embankments, which not only worked as high roads that could be traversed at all seasons, but also as protective works safeguarding the urban centers, villages and the fields.¹¹⁰ The Britishers who took over political power from the Ahom were well-aware of the grand works carried out by their predecessor in the form of highways and embankments. But they hardly put any attention for taking up any schemes for construction or restoration of embankments in the nineteenth century. Initially they were agreed to spend very small amount of money for repair those embankments which showed urgency as well as of strategic importance. As for example, in 1938 Captain Rutherford undertook the restoration of the embankment on the south bank of the river Jamuna in the District of Nagaon with an expense of Rs. 300. Similarly, Francis Jenkins, the Commissioner of Assam inspected the great embanked road called the Borborua Ali in 1840 which ran “in line almost perfectly straight from Seebpore to Dibrugarh”, two important administrative towns of eastern Assam. He, very enthusiastically started the construction of the road with the expense of Rs. 2000, because once this road was opened, the distance will be reduced to a great extent which would be beneficial for the troop movement.¹¹¹

Under the Ahom rule, an embankment in the Bhogdoi River was built which was further renovated by the colonial government, but at that time the flood water was so strong that it inundated the country very repeatedly. So a comparatively huge amount of money was sanctioned to repair these embankments. The reason behind this allocation was the high productivity of these agricultural lands.

The colonial government admitted the necessity of repairing the old embankments for agrarian expansion. But in reality, what it had done towards ensuring this was very little. The

¹¹⁰Barua A, “Geographical Background and the Development of Communication in Medieval Assam”, Chow Nagen Hazarika ed., Tichow Fa: Souvenir of the Capital Me-Dam-Me-Fee, Dispur, Guwahati: Capital Me-Dam-Me-Fee Celebration Committee, 1997, Krishnakanta Handique Library (KKHL), Gauhati University.

¹¹¹Goswami Rituporn, “Rivers And History: Brahmaputra Valley In The Last Two Centuries”, Thesis submitted to Jawaharlal Nehru University.

situation was remained almost unchanged till the first decade of the twentieth century, when the great earthquake of 1897 and its effects on agrarian expansion once again brought back the important question of flood-protection through embankments to the government. Because of this earthquake, many rivers have got blocked as well as dry, many rivers changed their course entirely and due to these reasons, the subsequent floods caused much more damages in the valley. This resulted in some major projects of embanking the flooded rivers being taken up in the eastern districts of the Brahmaputra Valley.¹¹² Another reason that has motivated the colonial government to find out a solution for the flood problem in Assam was the extraction of higher revenue from the valley. As mentioned earlier, the char and chaporis (riverine Tracts) are used temporarily for the cultivation of various winter crops. As these chaporis were cultivated temporarily, so the colonial state unable to raise any revenue from these tracts as there has been no survey done to find out the crop yield or production pattern. Thus transforming these tracts into productive category had gained a serious attention of the British in the end of nineteenth century. By this time, the valley became famous for its petroleum, tea-plantations, coal mining and forest dense with timber.¹¹³ As such, the transformation of riverine tracts of the valley into permanent land had done by the British by introducing the cultivation of Jute in those tracts. They had to choose Jute instead of tea plantation as the land was not suitable for the later.

In the early twentieth century, jute was the uppermost export earner for India. The revenue earned from the jute trade helped Britain to overcome its trade deficit with the United States and Germany. The colonial government wanted to expand the jute acreage beyond Bengal as the latter had exhausted all its land and was by now saturated. The riverine tracts of the Brahmaputra in Assam were consisted of “grassland and savannah” similar to Bengal, a condition best suitable for cultivation of jute. As the rainfall pattern, texture of soil and accessibility of water in the alluvial tracts of the Brahmaputra Valley also fulfilled the criteria

¹¹² Ibid.

¹¹³ Saikia A, “Forests and Ecological History of Assam, Oxford University Press, New Delhi, 2011; Sharma J, *Empire’s Garden: Assam and the Making of India*, Duke University Press, Duke, 2011; Saikia A, “Imperialism, Geology and Petroleum: History of Oil in Colonial Assam”, *Economic and Political Weekly*, Vol. 46, No. 11, 2010, pp. 48–54.

for jute cultivation.¹¹⁴ As such, inviting the peasants from Bengal, the colonial government started the cultivation of jute which in a way resulted in the movement of a large number of peasants from the northern districts of East Bengal into the districts like Goalpara, Darrang and so on. Notably along with this transformation, floods in those areas acquired new meaning, posing a new challenge to the jute. As jute was washed away, damages became more visible. It pushed the government for the need of protecting those cultivated land from flood.

So, while the demand for new 'public' embankments were frequently turned down by the colonial state in the nineteenth century on the basis of financial calculations, the same reasoning also prompted it to take up the construction and repair of such embankments in the beginning of the next century. Learning from the experience of negotiating the floods in nineteenth century Assam, the colonial authorities were now gearing up for a new set of works for flood protection in the beginning of the 20th century. The government proposed to undertake the restoration of a "complete system of main bunds" in Sibsagar district in the winter season of 1902.¹¹⁵ Matadin Sukul, the Executive Engineer of the PWD deputed to special duty for this purpose, submitted his report after conducting field visits in April 1903. He identified six major rivers that caused damage in the district: Brahmaputra, Dehing, Desang, Darika, Dikhu and Jhanji. Sukul suggested that the colonial government take up the construction and restoration of sixteen river embankments to rein in these rivers in the following order of priority:¹¹⁶

(1) *Dehing bund from Nahorkutia to the Assam Trunk Road, 41.4 miles.*

(2) *Dikhu bund, left bank, 1st and 3rd sections, with improvement of 2nd section from Bamunpukhurito near Gaurisagar, 26 miles.*

¹¹⁴ Saikia Arupjyoti, "Ecology, Floods and the Political Economy of Hydropower: The River Brahmaputra in the 20th century", NMML Occasional paper, Perspectives in Indian Development, Nehru Memorial Museum and Library,

¹¹⁵ Goswami Rituporn, "Rivers And History: Brahmaputra Valley In The Last Two Centuries", Thesis submitted to Jawaharlal Nehru University. Pp-287

¹¹⁶ Ibid, pp-288

- (3) *Dikhu bund, right bank, 1st section, from Assam-Bengal Railway to Serekapar, and improvement of 2nd section from Serekapar to Tax Ali junction, 14.6 miles.*
- (4) *Desang bund, left bank, 1st section, from Dhodor Ali to Sologuri Ali, 16.6 miles.*
- (5) *Darika bund, left bank, from Dhai Ali to Harmatigarh, 51A miles.*
- (6) *Dikhu bund, right bank, 3rd section, from Tax Ali junction to Darikamukh, 21.2 miles.*
- (7) *Dikhu bund, left bank, from near Gaurisagar to Rupahi bridge of Dikumukh road, 13.4 miles.*
- (8) *The Brahmaputra bund, 3rd section, from the terminus of the Dikhu bund, left bank, to Kotaikhamgarh crossing of dead Jhanjhi, 3.7 miles.*
- (9) *Desang bund, right bank, 1st, 2nd and 3rd sections, from Assam-Bengal Railway bridge at Dilli to Dhai Ali, 57.5 miles.*
- (10) *Darika bund, left bank, from Harmatigarh to Darikamukh, 12 miles.*
- (11) *Darika bund, right bank, from Assam Trunk Road to Dillimukh, 8.2 miles.*
- (12) *Brahmaputra bund from Desangmukh road to Dikumukh, 6 miles.*
- (13) *Brahmaputra bund from Dhai Ali to Balomamukh, 10% miles.*
- (14) *Brahmaputra bund from Jorhat State Railway line to Nigrating, 16 miles.*
- (15) *Brahmaputra bund from Kotaikhamgarh to jorhat State Railway line with bunds along its tributaries, 35 miles.*
- (16) *Desang bund from Balomamukh to Dhai Ali, 6.5 miles.*¹¹⁷

¹¹⁷ *ibid*, pp-289

It was the basic calculation of the colonial government that once the proposed embankments were completed it would protect 184,900 acres of cultivable land from inundation. This would further increase the revenue to a great extent by adding Rs. 5, 54,700 to the annual revenue.¹¹⁸ Similarly, the construction of a 14 miles-long embankment along the Gosaingaon Suti and Kukila River in the Northern Jorhat Group in 1904-05 undertaken by the government at a cost of Rs.43,623 also saw a steep increase of Rs.38,735 in the annual land revenue assessment.¹¹⁹ So it is clear enough that the initiative taken by the Britishers were always motivated by the hope of extracting more and more revenue from the region. Another major change that had happened in the first two decades of twentieth century was the potential of the River Brahmaputra and its tributaries as a possible means of hydropower generation. Along with other parts of India, extensive surveys had also done to find out the hydroelectricity generation capacity of Brahmaputra and its tributaries. As far as Assam is concerned, the task was given to a British electrical Engineer, named B. A. Blekinsop. Submitting his report in 1923, Blekinsop proposed Sixty-six sites across the major tributaries as well as different geo-ecological formations. The survey estimated that 93,000 kilowatts of hydropower could be possibly generated from these rivers. However this idea did not work due to the political and economic uncertainties of 1920's.¹²⁰

Although, the proposal of Blekinsop could not be implemented, yet it had worked as an ideological and material source for the hydroelectric projects in the region. Even the Assamese ruling class also demanded for the construction of big dam in the River Brahmaputra and its tributaries presenting the problem of flood as a reason for Assam's sufferings. In 1940's, Assam was suffering from famine like situation, hence the failure of crops pushed up the Assamese ruling class to find a concrete solution for flood control. The

¹¹⁸ 'Note by Pandit Matadin Sukul, Executive Engineer, Public Works Department, Assam, on the protective embankments in sadar subdivision of Sibsagar district and portions of Sibsagar and Lakhimpur districts', Sibsagar 6 April 1903, Nos.180-208, Assam Secretariat Proceedings, Revenue A, September 1904, ASA.

¹¹⁹ Goswami Rituporn, "Rivers And History: Brahmaputra Valley In The Last Two Centuries", Thesis submitted to Jawaharlal Nehru University. Pp-291

¹²⁰ Saikia Arupjyoti, "Ecology, Floods and the Political Economy of Hydropower: The River Brahmaputra in the 20th century", NMML Occasional paper, Perspectives in Indian Development, Nehru Memorial Museum and Library, pp-10

advocacy of Mega Dam as a solution to this was reflected from the arguments of Gopinath Bordoloi when he; in the Assembly debate argued that it was possible to control rivers by constructing some dams and as far as The Brahmaputra is concerned, a dam is needed to be constructed some 8 miles away from Pasighat.¹²¹ This need has become more crucial when in 1950; the great earthquake has taken place in the valley and it once again changed the river ecology in the region. Thus in 1951, the Assam Pradesh Congress Committee passed a resolution seeking the help of the central government of India to undertake any step to deal with the flood problem in the valley.¹²² This decision had no doubt affirmed that the modern Engineering technology could tame the river accepting helplessness of its own in doing so. Thus, coinciding with the devastating floods of 1950, the “First Five Year Plan of the country” (1951–56) laid emphasis on the necessity for mega dams in order to produce hydroelectricity and also to create irrigation facilities. Several rivers from north and east India have come to be combined with this framework. However, no storage dams had conceived for the River Brahmaputra or its tributaries till this time.¹²³

In 1954, there was a severe flood in Assam along with all other northern and eastern states. It resulted in huge loss due to erosion of the cultivated land. The immediate response to this was the construction of embankments and earthen dykes along the Brahmaputra and its tributaries. Hence in the winter season of 1954-55, flood control measures included over 400miles of tributary dykes in Kamrup, Nowgong, Darrang, Sibsagar, Lakhimpur and Cachar districts and 125 miles of dykes on the Brahmaputra in the districts of Goalpara, Kamrup, Darrang, Sibsagar and Lakhimpur.¹²⁴ Along with this, the Government of Assam also brought the Assam Embankment and Drainage Act 1953 as a significant legal intervention. Accordingly, the impetus for flood control in the following years was directed by constructing more and more embankments in the region. The most noticeable protection work was done in

¹²¹ Assam Legislative Assembly Debate, 1947

¹²² Assam Legislative Assembly Debate, 1951

¹²³ Saikia Arupjyoti, “Ecology, Floods and the Political Economy of Hydropower: The River Brahmaputra in the 20th century”, NMML Occasional paper, Perspectives in Indian Development, Nehru Memorial Museum and Library, pp-19

¹²⁴ A Note on the Damage caused by floods in Assam during 1954-55 and relief measures undertaken or proposed, Shillong: Assam Government Press, 1956.

the Dibrugarh town with raising the height of several flood prone villages constructing some new embankments and spurs. The reason behind this special attention was tea-plantation interests of the government.¹²⁵ As such, with a very selective way, the government of Assam initiated various flood control measure allocating a distinguished amount of money in the financial plan. In the financial year 1962-63, the single-largest head of expenditure was 'Flood Control' primarily through embankments for which out of a total budget of Rs.156 lakhs, nearly a half or Rs.70 lakh was earmarked. Similarly, out of a total capital outlay of Rs.4.32 crores for the Flood Control and Irrigation Department under the fourth Five Year Plan in 1966-67, Rs.3.15 crores were set aside for embankment and drainage work intended for flood-control, while the remaining Rs.1.7 crores was spent on medium and small irrigation projects.¹²⁶

While discussing the legal as well as financial aspects of the flood control machinery in the valley, it is quite necessary to understand the institutional framework that has come into being for solving the same. It is mention worthy that till 1954, the flood control works were done by the Public Works Department (PWD) though its main task was to construct buildings, roads and bridges. This department did not have the specialized expertise to deal with the flood control. In order to overcome this problem, the government of India had established several institutions.

Thus, in 1970, a three tier technical set up for giving the department "high level policy guidance" through consultation was put in place. This consultative mechanism involved the Brahmaputra Flood Control Board (BFCB), the Brahmaputra Flood Control Commission (BFCC), and the Board of Technical Consultants. "The Brahmaputra Flood Control Commission" was a whole time organization constituted by the government of Assam on the advice of the Government of India to work within the broad framework of policy directions issued by Brahmaputra Flood Control

¹²⁵Master Plan of Brahmaputra Basin, Part I, Main Stem, Brahmaputra Board, Government of India, Ministry of Water Resources, 1986.

¹²⁶GoswamiRituporn, "Rivers And History:Brahmaputra Valley In The Last Two Centuries", Thesis submitted to Jawaharlal Nehru University.

Board. The Board of Technical Consultants was chaired by an eminent engineer, the members being the heads of the service organizations like Central Water Commission (CWC), Indian Meteorological Department (IMD), Geological Survey of India (GSI), a professor of the Assam Engineering College (AEC), Director of Soil Conservation, Assam and members of the Brahmaputra flood Control Commission. Among these organizations, the BFCB was formed as a high powered policy making body to decide priorities in the implementation of the planned flood control schemes, in sanctioning estimates and approving allocation of funds.¹²⁷

It was these organizations which in a decade have become the keystone for establishing the Brahmaputra Board. However, the Brahmaputra flood Control Board was dissolved with effect from 1982 with the coming of the Brahmaputra Board.

4.5: BRAHMAPUTRA BOARD AND ITS FUNCTIONS

Having seen the importance of the river Brahmaputra, the government of India has found it necessary to develop as well as regulate the water resources in the valley in a planned manner. The Brahmaputra Board has come as the arch stone of the regulatory regime for flood control in Assam. In order to fulfill this interest, the government had passed an act of Parliament called the “Brahmaputra Board Act” in September 1980 which resulted in the constitution of the Brahmaputra Board with effect from 31-12-1981. The Board consists of “a Chairman, a Vice-Chairman, a General Manager, a financial Adviser, a member each to represent the Government of Assam, Meghalaya, Nagaland, Manipur and Tripura and the Administrations of arunachal Pradesh and Mizoram and the North Eastern Council. The Central Ministries of Agriculture, Water Resources, Finance, Power and Transport have a member each on the Board. The concerned Central technical organizations, namely, the Central Water Commission, the Central electricity Authority, the Geological Survey of India

¹²⁷ Ibid.

and the India Meteorological Department have also a member each on the Board.”¹²⁸The main functions of the Board can be summarized as below-

- *To carry out survey and investigation in the Brahmaputra valley and to prepare the Master Plan for control of floods, bank erosion and improvement of drainage in the valley and activities connected therewith.*
- *To prepare the Master Plan in parts with reference to different areas of the Brahmaputra valley or with reference to different matters relating to such areas and may, as often as, it considers necessary to do so, review the Master Plan or any part thereof.*
- *To prepare the Master Plan on development and utilization of water resources of the Brahmaputra valley for irrigation, Hydropower, Navigation and other beneficial purposes.*
- *To submit Master Plan/ revised Master Plan to the Central Government after consultation with the State Governments concerned, approved the same subject to such modifications as it may deem fit.*
- *prepare detailed project reports and estimates in respect of the dams and other projects in the Master Plan as approved by the Central Government and indicate in each case the cost attributable to different purpose or uses.*
- *To draw up standards and specifications for construction, operation and maintenance of such dams and other projects.*
- *To construct, with the approval of the Central Government, multipurpose dams and works connected therewith as proposed in the Master Plan approved by the Central Government and maintain and operate such dams and works.*

¹²⁸The Brahmaputra Board Act, 1908, Chapter 2, pp-2.
online accessed-
http://www.brahmaputraboard.gov.in/NER/Archive/Act_Legislation/brahmaputra_board_act-1980

- *To prepare in consultation with State Government concerned, a phased Programme for construction by the State Government of all dams and other projects proposed in the Master Plan as approved by the Central Government.*
- *To maintain and operate any dam or project for so long as it deems necessary to do so.*
- *To perform such other functions as are supplemental, incidental or consequential to the functions specified above.*¹²⁹

With the above mentioned mandate and responsibility, the board started working from 1981. In the starting five years of its constitution, the board had been collecting data in the valley and also analyzed the previously collected data by several government departments and institutions. No doubt preparing a comprehensive master plan for an exceptional river like Brahmaputra was an enormous task, so it has conducted detailed field survey, investigations and observation where is felt necessary. In order to have a systematic development of the Brahmaputra Valley, the board carried out the Master planes in different parts. Accordingly, "The first priority has been accorded to the main stem of the river. Individual plans are to be prepared for each tributary or group of tributaries." In this exercise, a number of specialist organizations such as the CWC, Central Electricity Authority, Geological Survey of India, Indian Meteorological Department, Survey of India, Central Water and Power Research Station, Central Soil and Minerals Research Station, College of Earthquake Engineering, Remote Sensing Agency, and even the Indian Institute of Management, Bangalore were mobilized to assist in this project.¹³⁰ Till date, it has prepared in three parts 68 master plans, master plan part 1 for the river Brahmaputra, part 2 for the River Barak and its tributaries and the part 3 for the 68 tributaries of the river Brahmaputra, like Kolong-Kapili, Ranganadi, Dikhow, Puthimari, Dhansiri, Pagladiya, Dikrong, Jia-Bhoroli, Disang, Champamati, Jiadhal, Bharalu, Lohit, Moridhal, Jhanji, Dhaleswari, Subansiri, Bhogdoi, Beki-Manas-Aie, Didhnoi-

¹²⁹ *ibid*,

¹³⁰ GoswamiRituporn, "Rivers And History: Brahmaputra Valley In The Last Two Centuries", Thesis submitted to Jawaharlal Nehru University.

Krishnai and also for the Majuli Island, 9 rivers of Tripura, 12 rivers of Meghalaya, 1 river of Manipur, 2 rivers of Mizoram, 3 rivers of Sikkim and North Bengal falling in Brahmaputra Basin.. (The status of the Master plans of the Brahmaputra Board is appended in the Appendix 2 for reference.) Out of these 68 master plans, 49 master plans have been approved by the Government of India.¹³¹

The Master Plans are prepared on the basis of river basin/sub-basin wise, which include information on Water Resources availability, temporal distribution of Water Resources, water requirement for various uses, design flood, water balance study, problem areas identified, past works done, suggested measures for tackling balance problem, probable cost of measures suggested, benefits likely to accrue on implementation of Master Plan recommendations etc. The main recommendations include both structural and nonstructural measures for flood management on short, medium and long-term basis apart from multi-purpose projects.¹³² A detailed study has been made by the Board while preparing the Master plans and as a result certain recommendations were made in order to solve the flood problem in those river basins. In this regard, the board recommended the flood plain zoning for the riparian zone of these rivers and called for the studies of river channel processes and river behavior so that the reason behind erosion and bank migration can be understood. In order to reduce the excessive silt load in the rivers, watershed management on extensive scale is prescribed by the board. It also prescribed the regular evaluation of the existing waterway of culverts and bridges both on the roads and railway and of channels. Regarding embankments, the Brahmaputra Board has made certain suggestions. According to the Board, “the existing embankments should be checked for raising and strengthening to make them conform to the prescribed standard. New embankments should be constructed to these standards and adequate provision made for the protection of the threatened reaches against erosion. Embankments should be designed for urban and strategic locations for 100-year flood and in other cases for 25-year flood; and checked against overtopping for the maximum observed flood if it is

¹³¹ Important Features and Status of Master Plans prepared by Brahmaputra Board,
http://www.brahmaputraboard.gov.in/NER/Archive/Master_Plans/Status_Master_Plans.pdf

¹³² Citizen’s Charter of Brahmaputra Board, Government of India, Ministry of Water Resources, River Development and Ganga Rejuvenation.

higher.”If embankments are constructed for closing the gap, it may generate drainage problem on the rural area. This is needed to be scrutinized in detail before undertaking those works.¹³³

With the continuous effort for almost 5 years, the board has prepared the Master plan for main stem Brahmaputra and submitted it to the Ministry for approval in 1986. By this time, the Assamese ruling establishment has shown the urgent need for inaugurate multi-purpose river valley projects in the valley with a dream of flood control, hydropower generation and so on. While preparing the Master plans, the Board clearly admitted that it was both difficult and time consuming task to investigate the prospective of “multi-purpose river valley projects” in the valley because of the insufficient geological, hydrological and hydro-meteorological data available on the basin. Nevertheless, it prepared Detailed Project Report (DPR) for more than thirty rivers in the Brahmaputra valley as well as in other North Eastern states. The list of DPRs prepared by the Brahmaputra is given bellow.

TABLE 3- D.P.R UNDER BRAHAMAPUTRA BOARD

No	NAME OF DPR	YEAR OF PREPARATION
1	Nelli	March, 2012
2	Larsing	March, 2012
3	Rudrasagar	March, 2006
4	East of Barpeta	Year, 2009
5	West of Barpeta	March, 2002
6	Mora Dikong	March, 2002
7	Badri	March, 2002
8	Singla	Feruary, 2001
9	Jakaichuck	August, 2006
10	Pola	August, 2001
11	Kalamonijan	March, 2011
12	Jangrai	October, 2002

¹³³ Activities of the Brahmaputra Board in Arunachal Pradesh, Report by the Brahmaputra Board to the Ministry of Water Resources, http://brahmaputraboard.gov.in/NER/PMO_VIP/15.pdf

13	Demow	December, 2007
14	Sessa	March, 1993
15	Joysagar	October, 2002
16	Harang	May, 2001
17	Deroi	February, 1995
18	Amjur	December, 2005
19	Barbhag	March, 2002
20	Kalisashahar	March, 2001
21	Konwapur	March, 1994
22	Dharamnagar	January, 2008
23	Sonai	October, 1991
24	Rajatilla	March, 2007
25	Noa-Dihing	March, 2014
26	Bhairabi	March, 2000
27	Subansiri	April, 1983
28	Dihing	May, 1983
29	Tipaimukh	January, 1995
30	Pagladiya	May, 1990

Source- Official document, Brahmaputra Board, 2015

With the preparation of these Detailed Project Reports, the Brahmaputra Board has paved the way for establishing various multi-purpose river valley projects in Assam. In the initial years of construction of the Board, it has taken up the survey and investigation for the Subansiri dam Project and Dihing Multi-purpose dam project. The initial report submitted for these two projects were objected by the government of Arunachal Pradesh for which it had to restructure the same with three alternative dams at (1) in the upstream of Yingkiong near Pugging Village (2) at 15 km upstream of “Kaying” on the river siyang near “Raying village” and (3) upstream of “Pasighat” near “rotung” village for the Dihing Multi-purpose project. To overcome the objections regarding the Subansiri project, three dams (1) in the upstream of Daporijo near Menga on Subansiri River (2) On Kamla River upstream of Tamen and (3) in Gerukamukh at the original site of the River Subansiri. Subsequently, these 3 project

proposals on Subansiri and 3 projects proposals on Dehang were handed over to NHPC in March, 2000 for further implementation and execution.¹³⁴ The Board has prepared DPR for a number of important river basins which can be summarized below-

The Brahmaputra Board has made investigation for the Tipaimukh Dam Project recommending the construction of a 162.8 metre high rock fill dam across the Barak River near Tipaimukh village on Manipur-Mizoram border with the installed capacity of 1500 MW electricity and also flood protection in the Cachar, Karimganj and Hailakandi District of Assam. In October 1999, this project is handed over to the National Hydroelectric Power Corporation (NHPC). For the Pagladiya dam Project, the DPR of the board involves the construction of an earthen dam of about 26 meter heights over River Pagladiya in Nalbari District of Assam. Once the project will be completed, it is estimated to have irrigation benefitsto 54,000 hectare, flood moderation in 40,000 hectare and a small component of power generation of 3 MW as incidental benefit. The Brahmaputra Board has projected 4 other multi-purpose projects in Arunchal Pradesh. (1) It prescribed a 200 meter high rock fill dam with an installed capacity of 1100 MW electricity across River Kameng for the Kameng Multi-purpose dam Project (2) Lohit multi-purpose project in the Lohit river of arunachal Pradesh with the construction of a 272 m high rock fill dam across river Lohit with installed capacity of 2000 MW. (3) In the Noa-Dehing River, the board envisages construction of 57 m rock fill dam with installed capacity of 75MW electricity near Miao in Arunachal Pradesh. (4) lastly, for the Debang multi-purpose project, the board recommended the construction of 165 m high rock fill dam near Munli in arunachal Pradesh with installed capacity of 1000 MW electricity. As far as Meghalaya is concerned, DPR for 4 projects namely, Jadukata multi-purpose project (a 120 m high rock fill dam with installed capacity of 450 MW), Someswari Multi-purpose dam (a 63 m high concrete dam with installed capacity of 130 MW), Um-N-Got Multi-purpose project (preliminary investigation for a storage dam with capacity

¹³⁴ Citizen's Charter of Brahmaputra Board, Government of India, Ministry of Water Resources, River Development and Ganga Rejuvenation.

of 710 MW) Kulsidam (a 60 m high composite dam with capacity of 36 MW) was prepared by the Brahmaputra Board.¹³⁵

On the basis of the Master plans, the Brahmaputra Board has identified 41 Drainage Development schemes. A total of 33 Drainage Development Schemes (22 in the Brahmaputra valley, 8 in Barak Basin and 3 in Tripura) has been identified and DPR for all those has been prepared. Till March 1999, the Board has submitted Detailed Project Reports (DPR) for 18 Drainage schemes have been submitted to the Central Water Commission. It has handed over 5 Drainage Development Schemes to the Flood Control Department, Government of Assam the name of which are as follows-

- 1. Harang Drainage Development Scheme (Rs. 30.49crore): The scheme was started in 1999-2000 and completed in 2001.*
- 2. East of Barpeta Drainage Development Scheme (Rs. 2.96 crore): The scheme was started in 2009 and completed in 2011.*
- 3. Barbhag Drainage Development Scheme (Rs.14.80 crore): The scheme was taken up during the year 2006and is estimated to be completed in 2016-17.*
- 4. Amjur Drainage Development Scheme (Rs.14.15 crore): The work was started in 2006-07. It is yet to be completed.*
- 5. Jakaichuk Drainage Development Scheme (Rs.2.96 crore): It was started in 2008-09 and is targeted to be completed in 2016-17.¹³⁶*

So, after analyzing the activities of the Brahmaputra Board, it can be summarized that it has been working as a planning mechanism of the modern state of India. It was entrusted with the responsibility to find out the proper solution for the flood and erosion problem in the valley and also to analyze the potential for hydropower generation. However it should be noted that till the beginning of the 20th century, the board was not entrusted with any major implementing task for flood control. The master plans prepared by the Board were

¹³⁵ *ibid.*

¹³⁶ *ibid*

handed over to the various other organizations for execution. It was only from the year 2004; the board was powered with the execution of flood control policies. Hence it has carried out some steps of its own to deal with the problem of flood and Erosion in the valley. Among the steps taken by the Board, protection of Majuli, the largest river island is the main.

4.6: RIVER BANK EROSION IN MAJULI AND THE WORKING OF THE BRAHMAPUTRA BOARD

Lying between the two channels of the River Brahmaputra, Majuli has formed itself as the largest river island of the world. Formerly it was an administrative sub-division under Jorhat District, but only in this year it has been granted the district status. The island has a rich cultural integration with a huge population belonging to the tribal communities like Deori, Mishing, Rajbonshis, Kachari and so on. Majuli is the center for the Assamese neo-Vaishnavite culture which was initiated by the great Saint Sankardeva in the 15th century. Since then, around 65 satras (monasteries) adhering to Vaishnavism had been established in the island. But most of them had to relocate in the mainland of the state because of the flood and erosion. Originally, Majuli was formed by thirteen small islands which are called chaporis inter-connected by channels. Gradually these are transformed into present shape and size because of topographical changes brought by the earthquake and river action. Majuli is surrounded by the river Subansiri in the north, river Brahmaputra in the south and the kharkatia Suti and a spilt channel of Brahmaputra in the North-East. In this reach, “the River Brahmaputra divides into two channels – the northern Kherkatia channel and the southern Brahmaputra channel between Dibrugarh and Lakhimpur Districts and both the channels join

again about 85 km downstream at Ukhalchuk - forming Majuli, the largest inhabited River Island in the world.”¹³⁷

Majuli has been suffering from two main problems,

- (1) *Flood: The Island has been facing severe floods since time immemorial, significantly in the years like 1931, 1935, 1948, 1951, 1954, 1962, 1966, 1969, 1970, 1977, 1987, 1988, 1991, 1993, 1995 and 1996.*
- (2) *Erosion: One of the major problems faced by Majuli is the problem of erosion caused by the river Brahmaputra and Subansiri. As per 1971 census, the geographical area of the island was 924.60 sq. km as against 1246 sq. km during 1950. The island has 244 nos. of villages as per the census of 1991, out of which 35 villages have been eroded away so far. Prior to the great earthquake of 1950, erosion at Majuli was not so acute. It has become more serious after the floods of 1954 and since then erosion has become a continuous feature on both the sides of the island.*¹³⁸

According to a research work done by Swapnali Barman and S P Agarwal,

“Majuli is seriously affected by erosion of the Brahmaputra and the Subansiri rivers. The extreme braided nature of the Brahmaputra coupled with silt and sand strata of the banks is the main cause of erosion. Erosion in this area was not much before the 1950 earthquake of magnitude 8.6 Richter scale but became active thereafter and attained serious dimension after the 1954 flood. In 1987, Majuli suffered the most severe flood having lost 50,000 cattle and crop. Porcupines are being used to control erosion only at a few places, but it has not been found to be effective. The area of the island has been reduced from 706.14 sq. km in 1966-1975 to 578.38 sq. km in 1998 and to 484.34 sq. km in 2008. Space Application Centre (SAC) and Brahmaputra Board (1996) jointly studied the river erosion problem of Majuli

¹³⁷ “protection of Majuli island from Flood and erosion”, Brahmaputra Board, May 2012, Guwahati.

¹³⁸ “Master plan for the Majuli Island”, Brahmaputra Board, Government of India, Ministry of Water Resources.

Island and identified the areas of the island which have undergone changes along the bank line due to erratic behavior of the river. Brahmaputra Board (1997) prepared a report where the area of the island was mentioned to be 925 sq. km in 1971. The erosion in Majuli has become more acute due to two reasons:

1. Migration of Subansiri: During the year 1966-1975 to 1998, the Subansiri migrated towards north for 0.64 km at the western end of Majuli causing deposition whereas during the period 1998-2008, the river shifted its course towards east and met Brahmaputra about 15 km ahead from its earlier confluence. Thereafter, the river migrated towards north about 1.58km at MajarChapori which shows deposition of sediments to the island.

2. Migration of Brahmaputra: During the period 1966-1975 to 1998, the river migrates towards north at most of the place which caused heavy erosion in the Majuli Island. During the period of 1998-2008, both the river Brahmaputra and Subansiri had joined indicating heavy erosion at many places of the Majuli Island.¹³⁹

Initially, in order to handle the flood problem in the Island, embankments, spurs, RCC porcupines and dykes were regarded to be the main solution. These embankments were constructed to serve both as roads and flood control mechanism, but with very less hydrological and topographical survey due to which those are breached frequently. In order to come out of these failures, the Brahmaputra board had been entrusted with the responsibility to make an investigation on the flood and erosion problem in the Island. In November 1999, the Government of India requested the Brahmaputra Board to prepare a plan for “protection of Majuli Island from Floods and Erosion’ at the estimated cost of ` 86.56 crores, based upon the recommendations of the Master Plan of Brahmaputra River, prepared earlier by Brahmaputra Board. Submitted to the CWC by Brahmaputra Board during August, 2000 for examination, the scheme was examined in the River Management (RM) Wing of CWC and recommended to Ministry of Water Resources (MoWR), Government of India for acceptance, at the

¹³⁹Dutta M K, Barman Swapnali, Agarwal S P, “A study of erosion-deposition processes around Majuli Island, Assam”, Open access e-Journal Earth Science India, Vol. 3 (IV), October, 2010, pp. 206-216 <http://www.earthscienceindia.info/>; ISSN: 0974 – 8350.

estimated cost of ` 86.56 crore, through letter No: 59/Majuli Island/FM-11/95/354 dated 25th August 2003.¹⁴⁰

The Brahmaputra Board planned to complete the protection of Majuli in 3 phases. But prior to that, in June 2003, a central team led by Director, Flood Management of the Central water Commission visited Majuli. It recommended some immediate measures to be implemented before the actual protection works. Brahmaputra Board formulated a scheme for undertaking immediate measures at the estimated cost of 6.22 crores. The execution of the same was started in January, 2004 and was completed in February, 2005 at the costs of 5.92 crores. Among the 'Immediate Measures'- (a) Closing of 20 breaches – 16 on Malual-Malapindha Dyke and PWD Road and 4 on Pahumora-Garmur-Jengrai-Haldibari (PGJH) road, (b) Raising and Strengthening of 5.55 km long embankment from Kamalabarighat to Kharkharijan and (c) Casting and laying of permeable RCC porcupine screens / spurs / dampeners at various locations are the major ones.¹⁴¹ After the completion of the immediate measures the implementation of the phase 1 was started by the Board. Under the phase 1, the following works are done¹⁴²-

- (a) Plugging / Closure of 3 breaches on Pahumora-Garmur-JengraiHaldibari (PGJH) road,
- (b) Raising and strengthening of 90.70 km of embankment from Molual to Balichapori, Bokora to Kamalabari, Kharkharijan to Tekeliphuta and MiliTiniali to Jengrai,
- (c) Casting and laying RCC porcupine screens / spurs / dampeners on northern and southern sides of Majuli Island and
- (d) Construction and Repair of nose portion of land spurs at SonowalKachari and Kandulimari.

¹⁴⁰ "protection of Majuli island from Flood and erosion", Brahmaputra Board, May 2012, Guwahati, pp-3, http://www.brahmaputraboard.gov.in/NER/Archive/report_on_protection_of_majuli_island_from_floods_and_erosion.pdf

¹⁴¹ Ibid, pp-4

¹⁴² Ibid, pp-5

Some satisfactory results have come out from the works done under the phase 1. Erosion has reduced in the places like kamalabari, Kordoiguri, Malual, Bhakat-Chapori, dkhainpat, Salmara, Sonowal-Kachari and Ukhalchuk in the Brhmaputra bank. In the Subansiri-Kherkutia bank also, erosion got arrested in many places likenatunChapori, Chelek-Pathali and Jengrai. People of kordoiguri and Salmara have come back to the own places as the situation has improved. In the meantime in 2007, a massive flood has occurred in the Island for which the Board has to undertake some immediate measures again, which included the construction of various RCC porcupines and dampeners in Bhogpur, Besamara, Dakhinpat, kamalabari and several other vulnerable places. This work was done satisfactorily in 2008 at the expenditure of 4.62 crores. Preceding the emergent measures in 2008, the work for phase 2 and phase 3 were started accordingly. Under these two phases, a number of works have been initiated by the Board. As for example, 5 boulder spurs with geo-bags below lowest water level are constructed, RCC porcupines (127396 porcupines) have been laying and casting, bank revetment with boulders and geo-bags at 4 locations for a total length of 5190 metre, bank revetment at Jengrai, raised platforms at 5 locations, construction of check bunds at Sonowalkachari and Kandulimari etc...¹⁴³

It is worthwhile to mention that there has been continuous erosion in Majuli since 1964 to 2004. But according to the various reports, after the Brahmaputra Board has taken up the protection work in 2004, there is a significant reduction in the erosion of the Island. This becomes evident from the following table-

¹⁴³ Ibid, pp-9

TABLE 4- Total land gained in Majuli

Year	Area of Majuli Island (In Sq. Km)	Net Area reclaimed (in sq. Km)
2004	502.21	
2008	506.37	4.16
2011	520.26	13.89
2013	522.73	2.47
2014	523.88	1.15
2016	524.29	0.41
Total land mass gained from 2004 to 2016		22.08

Source- Brahmaputra Board, Ministry of Water resources,2016

As per mentioned in the Government report, in the year 2007 the Sumoimari channel of Brahmaputra river, flowing along southern bank of Majuli Island from Dakhinpat to Kamalabari for an approximate length of 25 Km, carried a considerable discharge of Brahmaputra (40%-45% of total discharge of Brahmaputra). Use of RCC porcupine screens in Aphalamukh-Dakhinpat area i.e. at the mouth of the Sumoimari channel induced heavy siltation, as a result, gradually; flow in the channel got reduced substantially. Similarly, judicious laying of porcupine screens in the upstream at Tekeliphuta and downstream areas encouraged heavy siltation, as a result of which the entire upper Majuli reach of Brahmaputra has seen no erosion during the monsoons of the years 2009 and 2010.¹⁴⁴ Various images showcasing the appropriate measures taken by the Brahmaputra Board in order to combat the flood and erosion problem in Majuli has been given below-

¹⁴⁴ "protection of Majuli island from Flood and erosion", Brahmaputra Board, May 2012, Guwahati, pp-3, http://www.brahmaputraboard.gov.in/NER/Archive/report_on_protection_of_majuli_from_floods_and_erosion.pdf

Protection work at Majuli



Raising and Strengthening of the Embankment



4.7: AN ANALYSIS OF THE WORKING OF THE BRAHMAPUTRA BOARD

From the above discussion it can be said that flood is definitely a recurrent natural phenomenon and it has both social and economic impact. Brahmaputra being the lifeline of the larger Assamese society has much more pivotal role in the socio-economic lives of the people inhabited in the valley. So, any measure adopted to solve the flood problem of this river needs a detailed and careful study of the river. In this regard, actions that were taken up by the state both in the pre and post independent era had to be analyzed.

- It is so well known that the Brahmaputra is a unique river in terms of its geography, geomorphology, hydrology as well as geology. It cannot be paralleled with any other river of the world. Besides this, the Brahmaputra valley is situated in a highly seismic zone for which taking any structural measures for the rivers in this geographical location need certain specific as well as serious study. But in reality, it has seen that no such detailed study of the river Brahmaputra has been done till the coming of the British. It is only in the end of 18th century; James Rennell started examining the lower reaches of the Brahmaputra River which laid groundwork for the future possibilities. After him, a few other British explorers had planned to study the hydrology of the Brahmaputra, but the main focus was not to understand the nature of the said river but to explore the river route to China, in other words to find out the easier routes that are existed beyond the eastern most states of India.¹⁴⁵ So understanding the basic characteristics of the river and its importance in the valley was neither a concern for the Britishers nor it was felt by the independent state on India.
- Although some research works on the river Brahmaputra have been done in the last decades of nineteenth century as well as the beginning of the Twentieth century by the Britishers, those were not intended to control flood in the valley. They adopted some structural and non-structural measures on the Brahmaputra so that the valley can be made more productive, more revenue generating and more profitable for settling industries. The major hydraulic intervention by the British in the Brahmaputra valley has taken place in the form of making the riverine tracts useful for permanent cultivation. Earlier these tracts were used for temporary cultivation due to which the British were unable to raise any revenue. So, they introduced jute cultivation in those chaporis encouraging the migration of the Bengali peasants in the Brahmaputra valley. This colonial policy has come up with two main implications in the subsequent years. First, due to the use of the riverine tracts for permanent cultivation, the flood has become more acute posing a severe challenge to the jute crops. Secondly, under the umbrella of jute cultivation, a large number of Bengali laborers entered Assam leading to the increase in population density. These people while working in jute fields

¹⁴⁵ Saikia Arupjyoti, "Ecology, Floods and the Political Economy of Hydropower: The River Brahmaputra in the 20th century", NMML Occasional paper, Perspectives in Indian Development, Nehru Memorial Museum and Library

started inhabiting in the Chaporis, hence the damage happened to them due to flood has posed an another reason of tension for the state. Again, more than half a million people already migrated to Assam for tea-plantation. So these sudden increases in population have made the indigenous people of Assam scared about their identity.

- With the coming of the Brahmaputra Board, some detailed work on the rivers of the valley has been done. As mentioned above, it has prepared around 68 master plans for several rivers of all the North-eastern states for which it has made a detailed study of the respective rivers. It should be submitted that since the establishment of the Brahmaputra Board in 1982, the board has been performing its responsibilities in a good way as a result of which the basic nature of the rivers in the Brahmaputra valley has become more apparent. But it has also been following the same engineering solutions adopted by the Central government without making either a critical look or a mere modification of the policies.
- While the independent state of Assam has been influenced by the colonial legacy, depending upon structural solutions for flood control in the valley, some local ecologists had developed a different perspective on the flood problem. Haladhar Bhuyan, a member of the assembly, condemned the indiscreet policy of the government for settling land for permanent settlement on the bank of the river. According to him, this has accentuated the flood problem more than the natural cause. Forests always acted as the buffer between the river and the villages as flood water cannot pass across the forests in speed. "With a very few man-made impediments on the river's natural path of drainage in the form of embankments, dykes, etc., floods in general used to remain on the fields only for three to four days' duration. This was natural, and since there were miles and miles of forests on the Brahmaputra, floods did not trouble the villages much, and whatever water percolated to the villages was in fact beneficial to the agriculture", Bhuyan argued.¹⁴⁶ This, according to him culminated in the intensification in the magnitude of damage caused by floods in the Brahmaputra Valley. So, Bhuyan prescribed to undertake re-forestation programme along the banks of the Brahmaputra of at least a quarter-mile width as an effective way of countering flood. "The flood water passing through this forest cover will raise the level of the banks, and after a gradual gain of height the spilling of

¹⁴⁶GoswamiRituporn, "Rivers And History: Brahmaputra Valley In The Last Two Centuries", Thesis submitted to Jawaharlal Nehru University.

the bank would be stopped completely", Bhuyan suggested. But the opinion of these intellectuals was continuously ignored by the modern state of Assam. Following a national consensus, the modern state of Assam, like the center developed a political economy of river control in the valley.

- If the policies adopted by the flood control organizations of Assam is analyzed it is seen that there is a huge difference between flood control policies of the state and flood adaptation processes adopted by the local Assamese people. Over the centuries, the local people of Assam especially the tribal people have developed elevated "Chang ghar"¹⁴⁷. These Chang Ghars are not generally submerged in normal floods. People without Chang Ghar had elevated tables that are made of bamboos or ceilings where they usually keep the food grains or other agricultural products considering them as "Lakhimi" to save from water. Again these people are always forearmed with boats keeping in the backyard. Those who do not have boats, make raft made of banana tree trunks at the time of need. When roads and houses are swamped, these boats and rafts serve as the principal mode of transport and shelter. The normal flood period in the Brahmaputra valley is from May to July. In order to escape the flood, the farmers in the flood affected area avoid the cultivation of the winter crops in the time as recommended by government specialists. Instead they have developed their own strategies cultivating Boro paddy¹⁴⁸ in the flood plains. In the low land where flood is more frequent, people usually cultivate Bao Dhan¹⁴⁹ which is adaptable to moderate flood water. Besides this during the time of flood, construct bamboo porcupine to divert the flow of the river if they find the possibility of channel shifting. The pictures of these local measures are appended in the later part of the dissertation for better understanding. (Appendix 3)

In contrast to the traditional measures adopted by the village communities, what the technocratic government does is based on engineering models. They usually construct embankments as a proper solution to flood and erosion. But the construction of embankments changes the nature of floods in the area. The floods become sudden having much destructive

¹⁴⁷ Chang Ghar refers to Bamboo houses on silts which can easily be dismantled or quickly restored after flood.

¹⁴⁸ Boropeddy is a specific crop of Assam. It is called the summer rice.

¹⁴⁹ BaoDhan means deep water rice.

power, bring a huge quantity of sand with it and remain for longer period. Again the government has constructed National Highway 52, Railway line and other PWD roads in west to east direction cutting across the main rivers. So this tussle between primitive knowledge and the modern flood management always created instability in the region.

- Another notable impact of the policies adopted by the Brahmaputra Board has been seen in the conflict both between man and environment and also between man and man in Assam. As mentioned earlier, the independent government of India notified the North-east India as the future powerhouse of the country, accordingly the Brahmaputra Board has made investigation and recommended for the Subansiri Hydroelectric Project in the River Subansiri expecting 2000MW electricity to be supplied from it. Although the government has projected it as an emission free power-plant, but in reality it has brought with it certain adversaries. First, the construction process has made the environment more prone to landslide, earthquake and so on as the region is situated in highly seismic zone. Secondly, the project according to the ecologists will hamper the bio-diversity of the river because of the deforestation, change river currents, change in water levels that has happened due to the construction of this dam. Third, the project will have colossal impact on the livelihood of the people living in the downstream of the river. This people rely on fishing, transportation of cultivable products through boats and many others which will be affected once the project will be completed. Due to these negative impacts a conflict between man and man is also taking place in the valley in the form of protest movement led by civil society against the government. The two distinguished Non-Governmental Organization namely All Assam Students Union and Krishak Mukti Sangram Sammitte led the movement demanding the removal of the project. The magnitude of such developmental conflict becomes visible in the statement of Akhil Gogoi, the president of the Krishak Mukti Sangram Sammitte where he says, “Technical issues are vital. But the debate on dam in the valley cannot be constrained to these issues alone. It is a matter of our rights over our natural resources. Those resources are handed over to the power companies and our rivers are transformed dramatically by political decisions taken in New Delhi and within the

state governments of the region. This requires a political response from the people of the region and that will be our focus in the coming days.”¹⁵⁰

So, to conclude it can be said that the river control policies that have been adopted in Assam have certain direct and indirect implication in the valley. Since the time of British and specifically in the independent era, there are several policies that are adopted to deal with the river only have in turn culminated in the political, economic and importantly social instability in the region. The state machinery thus should always keep in mind the fact that the North-east India is a place where people are much more prejudiced with the “Art of not being governed”¹⁵¹ so while governing these people the state should be enormously careful and at the same time responsible. But in the real side of the picture, the state is lacking in this ability resulting in instability in the region.

¹⁵⁰BaruahSanjib, “Whose River is it Anyway: Political Economy of Hydropower in the Eastern Himalayas”, *Economic and Political Weekly*, July 21, 2012, vol-XLVII. No-29.

¹⁵¹ Scott James, “The Art of Not Being Governed: An Anarchist History of Upland Southeast Asia, Orient Blackswan, Hyderabad, 2009.

CHAPTER 5:

5.1: CONCLUSION

"To write history without putting any water in it is to leave out a large part of the story. Human experience has not been as dry as that."- Donald Worster ¹⁵²

Rivers have always had a dominant hold on the humankind. It is an integral part of human civilization. It is a proven fact that most of the largest deltas of the world are densely populated as well as heavily farmed. But at the same time, a large portion of these people are increasingly become vulnerable to flooding and conversion of land to open ocean. This vulnerability has always brought back the concern of how to deal with rivers and the problems associated with them. No doubt, water is the basis for human survival and for this, equitable and sustainable use of the same is quite necessary. But in the last few centuries it has been seen that the consequences of population growth along with the urbanization and industrialization, the consumerist culture associated with it, the technological advancement etc...have affected the entire natural environment including rivers. So, while locating the rivers in the human history, it is much important to understand the interconnection between natural environment and Human being. So, the dissertation has been started with the broader theoretical framework of Political Ecology and its status in the modern state system.

Political Ecology, being a complex as well as recent issue has occupied a major concern in the second half of the 20th century. The concept political ecology simply refers to the inter-connection between ecological issues and the political, social, and economic issues of the society. It is seen that on one hand environmental degradation has caused political, social and economic instability in the form of global warming, increasing pollution and so on whereas on the other side of the picture the consumerist culture of the modernized society is having the same impact on the environment. So, the basic objective of the 2nd chapter is to

¹⁵² Worster Donald, "Rivers of Empire: Water, Aridity, and the Growth of the American West", Pantheon Books, New York, 1985.

analyze how with the advancement of capitalism, science and technology in the modern state system, ecological issues have been transformed.

As mentioned, the modern state has developed in 16th century with the revolutionary ideas of the political and social scientists which were culminated in the form of treaty of Westphalia, industrial revolution, enlightenment and many others. These developments have made a serious consequence on both the modern states and on its citizens concerning how to treat natural world. The basic belief of the modern state on technology, science, reason etc... has made the human being supreme over nature. The modern state has started considering nature as a mere commodity which are there on the earth only to fulfill the needs of human being. In this consideration, a process called enlightenment had contributed a lot. The main implication of enlightenment was the authority over nature. As a result of this movement, science has gained a hegemonic position with an idea of nature as something being subordinated to man or as something which needs to be conquered. This idea of domination of nature has obviously given rise to the idea of river control for human settlement. It is worthwhile to mention that rivers on the earth have always been considered to be sacred, even compared with the Goddess in Hindu scriptures. As described in the 2nd chapter, earlier the people inhabited in the river valley, always tried to adjust and co-exist with the river without harming its ecology. But with the increase in population, industrialization, urbanization people started to settle down in the delta of the river which interrupted the regular course of the river. This resulted in the flooding of the river in a more destructive manner causing severe loss to the human being and their property. This had made river and their flooding process antithetical to human development urging a concrete mechanism to control it as soon as possible. The developments in the form of canal irrigation, embankment construction, dam construction, and more recently the inter-linking of rivers was the result of this urgency. So the main argument put in the 2nd chapter was that the development of modern science and technology motivated by the enlightenment thinking of the 16th century has given birth to the idea of taming as well as harnessing rivers culminating in a diverse human-nature relationship in recent decades.

The 3rd chapter focuses on the Indian scenario in terms of how it has been dealing with the rivers of the region. It is basically based on historical perspective on the transformation of the rivers from a natural entity to a power-generating commodity. The chapter is started with the introduction of the various river valleys of the country and the frequency of flood associated with them. It is argued in the chapter that in the earlier times, flood was not considered to be that destructive as it is today. Earlier, the idea was to live with flood, not to control it. However, with the passing of time, certain interventions were made to solve the flood problem. In the pre-colonial era, various attempts were made by the kings of Vijaynagar, Firoz Shah Tughlaq and several other Mughal empires in the form of canal irrigation, but were not so harmful for the ecology of those rivers. The actual exploitation of the rivers in India has been taking place with the coming of the British. The Britishers came to India in order to make profit from the idle natural resources lying in the region. They, in their 200 years of reign tried to extract revenue from the land as much as it could. For this reason, land was always given the primacy over the water bodies by the British. Thus, regular floods occurred by the rivers had been visualized by them as something undesirable to their very idea of a modernized society. So overcoming this issue was an urgent need for the colonial administration. As the colonial government was fully influenced by the European Enlightenment, so it tried to homogenize the rivers of India with that of the Europe. As a result, they had adopted the same technology of embanking as well as damming of the rivers with engineering solutions to control flood. But these engineering solutions have their own implications resulting in the intensification of the flood problem causing huge loss of lives and land in the preceding years.

In spite of knowing the inadequacy of the flood control measures adopted by the British, the post-colonial government of India had continued the same. The government in its five year plans sanctions a huge amount of money only to build embankments and dams so that flood can be controlled. In the post-independent era, a large number of legal as well as implementing agencies were established by the government, but no significant improvement has been seen in this regard. Notably, in this period, the veiled aim of the state is hydropower generation from the rivers as a result of which the policies adopted are not having much

welfare motivation. So the main argument that has been made in this chapter is that like other modern states, the flood control policy of India is also characterized by a modern enlightenment thinking borrowed from the west which relies mainly on science, technology and it has always had a capitalist motive behind it.

The 4th chapter of the dissertation is specifically based on the North-Eastern part of the country analyzing the flood situation in the Brahmaputra valley. It is seen in the chapter that due to the unique nature of the river Brahmaputra, colossal flood and erosion have been faced by the people inhabiting in the valley annually during pre-monsoon and monsoon period. So the initiatives of both the central as well as state government in the way of negotiating with the river Brahmaputra and its tributaries and their subsequent implication on the river ecology and also on the lives of the people has been given the utmost importance in this chapter. Emphasizing the importance of the river in the lives of the Assamese society, the chapter has found out that the Assamese folk life has been being entirely river-dependent since time immemorial and all the aspects of their lives whether it is individual, social, cultural, economic, political or something else have been controlled by the river. Coming of the Ahom in 1228 has made the picture somehow different as with them the idea of settled agriculture has come up for which a number interconnected embankments had been constructed so that cultivable land can be protected from flood. But like other parts of the country, the coming of the colonial government had transformed the Brahmaputra valley to a different extent.

But the basic difference that has been found out in the chapter is that unlike the other part of the country, initially the Britishers were not that interested to tackle out the flood problem in the valley. As such, no serious survey had been made by them to study the Brahmaputra River. In fact, the investigations that had been made on Brahmaputra were only to find out a possible route to China. But gradually, this notion had changed and from last two decades of the 19th century certain initiatives in the form of construction of embankments were adopted by the colonial government. In this regard, it is mention worthy that the Britishers had introduced the tea plantation in the region and it was proved to be an enormously profitable industry. No doubt it has motivated the colonial government to utilize the other idle land of

Assam for further cultivation. The riverine tracts which were used by the Assamese people for temporary cultivation had been selected by the Britishers for cultivation as a permanent land. As these lands were not suitable enough for tea cultivation, so the colonial government had introduced jute cultivation in those riverine tracts inviting a large number of Bengali peasants as laborers. The Britishers organized the jute cultivation in such lands which were frequently flooded by the rivers in monsoon period. So, settling people and agriculture in those land had portrayed a different picture of flood in the Brahmaputra valley. Now flood has become more acute in the region making much more visible damage to the crops, people and property. This visibility of flood damage has compelled both the colonial government and Assamese elite to rely heavily on the engineering solution like embankment, dam construction and so on through the innovative use of science for flood control.

Brahmaputra Board which was established as a planning as well as implementing mechanism of the central government has been characterized by the same colonial philosophy of taming and harnessing the rivers in all possible ways. No doubt, the board has taken up the planning and documenting of the water resources in the Brahmaputra basin. Being both bureaucratic and technocratic in nature the board has done the work in several phases. The result has come up in the form of 68 master plans and a number of Detailed Project Reports, which have given a clear picture on the basic nature of the Brahmaputra River and its tributaries. But as the river and their resources are under the national control so the board had to take prior approval from the Centre for all constructions on the Rivers. As such, the dream of the modern state of India to control the river, their very idea of development of the region in the model of industrial development, using of river water for hydropower generation has clearly reflected in the functioning of the Brahmaputra Board.

Concluding the dissertation, certain general actualities can be noted down. First, the modern western civilization has within it a central motive to subjugate nature under science and technology. This is culminated in a very manipulative, challenging and arrogant relationship between human being and nature. As far as India is concerned, the realization of evils of western modernity was felt in Gandhian philosophy. Gandhi was quite critical of the

so called modernity which was according to him based on the doctrines of materialism and instrumental rationality, the belief in scientific and technological progress, practices such as large scale methods of production, rapid transportation and many others.¹⁵³

Second, it is clearly seen in the dissertation that people of both ancient India and Assam made use of water resources for their survival very habitually, yet the real exploitation of the river had happened only after the coming of the British. Earlier people accustomed with the flood problem, hence adopted their own means of flood protection measures. As for example, they normally avoided the places near river bank which were more vulnerable for floods. Population was not that increasing due to which avoiding those places and settled in a secured one was not an issue. But as time passed, population also increased demanding more land for settlement as well as habitation. This problem was intensified by the British through the inauguration of a development project dominated by industrialization, capitalization as well as urbanization, considering the nature as a mere commodity. So when the British came to India, they came with an idea of rivers as only water pipes to be harnessed and this hydraulic intervention had made the flood a calamitous event rather than a normal natural process. This consideration has made a deep impact in the flood problem faced by the people of India in general and of Assam in particular.

Third, the engineering solutions such as embankment, dam construction adopted by the colonial government and followed by the independent state of India have both positive and negative results. In general, embankments remain effective in containing flood for a period of time, if it is constructed with proper engineering design. But as embankments grow older, they damage due to natural weathering, leakage, seepage, and piping and also due to lack of proper maintenance. Secondly, embankments restrain the flow of the river and deprive it of its natural space to stabilize resulting in faster flow of the river, rise of water level within embankments, enhancing siltation ultimately causing the river bed to rise. Similar kinds of problems are associated with the dams as a flood control measures as reservoirs also confine

¹⁵³ Misra Anil, "Reading Gandhi", Pearson Education India,

the natural flow of the river affecting the river ecology. But these issues were not taken into consideration either by the colonial government or the modern state of India.

The fourth conclusion that can be made is that the flood control policy in India is also led by the colonial capitalism. The British built embankment on the rivers so that the revenue extracting land where they had established number of industries can be secured from the flood water. Besides, they constructed these embankments precisely as roads, railways in order to make transportation of products or raw materials as well as the military troops easier. In fact, they had studied the River Brahmaputra and initiated the flood control policies for it so that the transportation of tea, jute and other cultivable products can be done easily. In the post independent era, this trend has been intensified by making big dam construction as the only possible remedy through which rivers can be controlled. After independence, India has started its race to become an industrialized country for which energy was found to be the sole necessity. So hydro-power generation was become the arch stone for Indian development paradigm resulting in a huge number of river valley projects. India's North-east has been recognized as the future hydro-power potential in the country with figuring out 168 hydro-power projects in the region.

Fifth, the Brahmaputra Board, an organization under the central government, is also operating under the same mechanism following the colonial capitalism in dealing with rivers. It is the organization that had made the foundation for the above mentioned hydro-power projects by preparing master plans for those concerned rivers. It is thus mention worthy that the recommendations made by the Brahmaputra Board in their master plans were not for a power only dam aimed to produce only electricity but for a multi-purpose dam intended to control flood, provide irrigation and navigation and to produce some amount of electricity. But by the late 20th century, the National Water Policy of India has started emphasizing in converting the water resources of the country into productive national wealth. This transformation has also been experienced in the Flood control policies adopted for Brahmaputra valley by the Brahmaputra Board in the recent times.

Lastly, the attitude of the modern state of India in terms of its relation with the nature in general and with the rivers in particular is not only affecting the ecology only but it has also affecting the polity, economy and society of the country. The political economy of river control has faced an active people's resistance in the last decades of the twentieth century in various parts of the country. The Narmada Bachao Andolan, the anti-dam movement against the Lower Subansiri Hydro-electric Projects led by Krishak Mukti Sangram Sammitte are the examples of this resistance. These anti-dam movements have drawn their ideological inspiration from their engagement in the local ecosystem and their dependence on the floodplain for the agrarian production. The ideologues of the popular resistance repeatedly cite the crucial dependence of the peasants on the river and its floodplain as their primary reason to oppose the hydropower projects.¹⁵⁴

Summing up, it can be said that the state is an actor which is supposed to work for the welfare of all. Since the dominant class with control over political power in the modern state tries to impose its world-outlook on the entire society, it also defines the dominant mode of the society's relation with nature. So, we find distinct ways of perceiving and making use of a river in the pre-capitalist Europe from that of post-Industrial Revolution. Similarly, ways of perceiving the river in late-nineteenth century India is different from that of late-twentieth century.¹⁵⁵ The Brahmaputra valley, in the same way had experienced colonial and Semi-colonial domination in the nineteenth century and some sort of neo-colonial domination in post-independent era which has shaped and again reshaped the social relations transforming the human-nature relations as well. So there are reasons to argue that the processes unleashed by colonial state still hold sway in the politics and policies of the Indian state when it comes to the attempt to remould people's relation to their lived environment - be it the forests, hills or the rivers. This is also the precursor to the forging of an extractive and exploitative relation with the Brahmaputra and the people on its banks in the late-twentieth century mainly through

¹⁵⁴ Saikia Arupjyoti, "Ecology, Floods and the Political Economy of Hydropower: The River Brahmaputra in the 20th century", NMML Occasional paper, Perspectives in Indian Development, Nehru Memorial Museum and Library, pp-36

¹⁵⁵ GoswamiRituporn, "Rivers And History: Brahmaputra Valley In The Last Two Centuries", Thesis submitted to Jawaharlal Nehru University

the state's mediation and accompanied by the rhetoric of domination over the rivers. This process is not unique to the Brahmaputra Valley; it has its parallels in the Indian subcontinent that came under colonial rule.¹⁵⁶

¹⁵⁶ *Ibid.*

APPENDIX

APPENDIX 1

STATUS OF MASTER PLANS PREPARED BY BRAHAMAPUTRA BOARD AND APPROVED BY GOVT. OF INDIA

Sl No	Name of Basin / Sub-Basin	Completion Year	Reference of approval of MoWR (GOI)/ present status
1	Brahamaputra Basin(Main stem) Part-I	1980	Approved vide F.No. 30/4/97-ER dtd. 08-08-1997
2	Barak and its Tributaries Part-II	1988	Approved vide F. No 30/4/97-ER dtd. 08-08-1997
3	Bruhi-Dehing	1995	Approved vide No. 30/5/2000-ER-1/427-513 dtd. 23-02-2004
4	Dikhow	1995	-do-
5	Kapili-Kolong	1995	-do-
6	Puthimari	1995	-do-
7	Ranganadi	1995	-do-
8	Gumati	1996	-do-
9	Dhansiri(S)	1996	-do-
10	Pagladiya	1996	-do-
11	Dikrong	1996	-do-
12	Muhuri	1997	-do-
13	Manu	1997	-do-
14	Noa-Nadi	1998	-do-
15	Jia-Bhareli	1998	-do-
16	Champawati	1998	-do-
17	Desang	1998	-do-

18	Bharalu	1998	-do-
19	Jinari	1999	-do-
20	Juri	1999	-do-
21	Na-Noi	1999	-do-
22	Burima	1999	-do-
23	Dhalai	2000	-do-
24	Lohit	2000	-do-
25	Jiadhhal	2000	-do-
26	Majuli(Island)	2000	-do-
27	Khowai	2000	-do-
28	Ghiladhari	2000	-do-
29	Jinjiram	2001	-do-
30	Moridhal	2001	Approved vide No. 30/5/2000-ER-II dtd.08-11-2004
31	Jhanji	2002	-do-
32	Dhalewsari	2002	-do-
33	Subansiri	2002	-do-

APPENDIX 2

IMAGE OF CHANG GHAR OR UPLIFTED BAMBOO HOUSES



IMAGE OF BHORAL OR STORE HOUSE FOR GRAINS



IMAGE OF RAFT MADE OF BANANA TREE



BREACHING OF NH 52 IN 2010



IMAGE OF FLOOD SITUATION IN THE BRAHMAPUTRA VALLEY



BIBLIOGRAPHY:-

PRIMARY SOURCES:

“Master plan for the Majuli Island”, Brahmaputra Board, Government of India, Ministry of Water Resources.

“National Water Policy”, <http://wrmin.nic.in> website of the Ministry of Water Resources, Gol,

“protection of Majuli island from Flood and erosion”, Brahmaputra Board, May 2012, Guwahati, pp-3, http://www.brahmaputraboard.gov.in/NER/Archive/report_on_protection_of_majuli_island_from_floods_and_erosion.pdf

“River Basin Atlas of India”, www.cwc.nic.in website of the Central Water Commission of India, (CWC) of India,

A Note on the Damage caused by floods in Assam during 1954-55 and relief measures undertaken or proposed, Shillong: Assam Government Press, 1956.

Activities of the Brahmaputra Board in Arunachal Pradesh, Report by the Brahmaputra Board to the Ministry of Water Resources, http://brahmaputraboard.gov.in/NER/PMO_VIP/15.pdf

Allen B C, Assam District Gazetteers, vol. 5, Darrang, Allahabaad Pioneer Press, 1905

Annual Reports of Brahmaputra Board from 2007 to 2013

Assam Legislative Assembly Debate, 1947

Assam Legislative Assembly Debate, 1951

Citizen’s Charter of Brahmaputra Board, Government of India, Ministry of Water Resources, River Development and Ganga Rejuvenation.

Das Partha, ChutiyaDadul and Hazarikanirupam, "Adjusting to Floods on the Brahmaputra Plains", Project Report made by Aryanak, Guwahati, Assam

E-Book of the Ministry of Water Resources, River Development and Ganga Rejuvenation, (<http://wrmin.nic.in/forms/list.aspx?lid=322#>)

Geological Survey of India Report, "Top ten flood prone areas in India", <http://www.mapsofindia.com/top-ten/geography/india-flood.html>

Government of India, Census of India, 1901, Assam, Vol.3, Part 1.

Government of India, Ministry of Water Resources, Annual Report 2010-11, Ganga Flood Control Commission

Important Features and Status of Master Plans prepared by Brahmaputra Board, http://www.brahmaputraboard.gov.in/NER/Archive/Master_Plans/Status_Master_Plans.pdf

Master Plan of Brahmaputra Basin, Part I, Main Stem, Brahmaputra Board, Government of India, Ministry of Water Resources, 1986.

Master plan of the Brahmaputra Basin", Brahmaputra Board, 1985.

National Disaster Management Guidelines, "Management of Floods", published by National Disaster Management Authority, Government of India.

National Disaster Management authority (2009), Government of India,

Note by PanditMatadinSukul, Executive Engineer, Public Works Department, Assam, on the protective embankments in sadar subdivision of Sibsagar district and portions of Sibsagar and Lakhimpur districts', Sibsagar 6 April 1903, Nos.180-208, Assam Secretariat Proceedings, Revenue A, September 1904, ASA.

RastriyaBarhAyog (1980), Government of India, Report on Flood Damage in India

Report On Development of Chronically Flood Affected Areas, Planning Commission, Government of India, November 1981, New Delhi.

Results - Framework Documents (RFD) for Brahmaputra Board, Ministry of Water Resources, 2014-15

The Brahmaputra Board Act, 1908, Chapter 2, pp-2.online accessed-
http://www.brahmaputraboard.gov.in/NER/Archive/Act_Legislation/brahmaputra_board_act-1980

BOOKS:

AlaghYogindar K, Pangare Ganesh and GujjaBiksham, “Interlinking of Rivers in India: Overview and Ken-betwa Link”, Academic Foundation, New Delhi

Atkinson Adrian, “Principles of Political ecology”, BalhavenPress ,25 Floral street London WC2E9DS, 1991.

Baviskar Amita, “In the Belly of The River: Tribal Conflicts Over Developments In Narmada Valley” Oxford University Press, YMCA Library Building, 1 Jai Singh Road, New Delhi 00110001, India.

Blaikie P and Brookfield H, “Land degradation and society”, Methuen and Co. Limited, London and New york, 1987,

Bonnett Michael, “Retrieving Nature: Education for a Post humanist Age”, Blackwell publishing, 350 main Street, Malden, MA 02148-5020 USA.

Bryant Raymond L and Bailey Sinead, “Third World Political Ecology”, Routledge, 11 New Fetter Lane, London EC4P 4EE.

Chaturvedi B K, “Narada Purana”, Diamond Books-Paperback_Edition-01,

D'souza Rohan, "Drowned and Dammed: Colonial Capitalism and Flood Control in Eastern India", Oxford University press, New Delhi-110001.

D'souza Rohan, "The British Empire and the Natural World: Environmental Encounters in South Asia.", Oxford University Press, 2011, New Delhi.

Eklavya Prasad, K J Joy, SuhasParanjape, ShrutiVispute, "Agony of Floods: Flood Induced Water Conflicts in India", Published by: Forum for Policy Dialogue on Water Conflicts in India, Pune, c/o Society for Promoting Participative Ecosystem Management (SOPPECOM) 16, Kale Park, Someshwarwadi Road, Pashan, Pune 411 008, Maharashtra, INDIA

Forsyth Tim, "Critical Political Ecology: The Politics of environmental Science", Routledge, Taylor and Francis group, 11 New Fetter lane, London, EC4P 4EE, First Published 2003.

GadgilMadhav and Guha Ramachandra, "Ecology and Equity: The Use and Abuse of Nature in Contemporary India", Penguin Books India Private Limited, 1995

GadgilMadhav, "Ecological Journeys, The Science and Politics of Conservation in India", Permanent Black, D-28 Oxford Apartments, 11 I.P Extension, New Delhi 110092

Gogoi Lila, "NoiBoi Jai", Banalata, Dibrugarh; Banalata Edition, 2006

Huxley Aldous, "The Politics of Ecology: The question of Survival", Santa Barbara, Calif, Centre for Studies of Democratic Institutions, 1963.

Iyer Ramaswami R, "Towards Water Wisdom: Limits, Justice, Harmony" Sage Publication India Private Limited, Mathura Road, New delhi-110044.

Jain Sarad K, AgarwalPushpendra k & Singh Vijay P, "Hydrology and Water Resources in India", Springer, 2010, Dorrecht.

Lahiri-Dutt, Kuntala. "Commodified Land, Dangerous Water: Colonial Perceptions of Riverine Bengal." In: "Asian Environments: Connections across Borders, Landscapes, and Times," edited by Ursula Münster, Shiho Satsuka, and Gunnel Cederlöf, RCC Perspectives 2014, no. 3, 17–22.

McCully Patrick, “Silenced Rivers: The Ecology and Politics of Large Dams”, Zed Books Ltd, 7 Cynthia Street, London N1 9JF, UK.

Misra Anil, “Reading Gandhi”, Pearson Education India.

Pant Niranjana, Verma R K, “Tanks in Eastern India: A Study in Exploration”, Dhruvi Design, 2010. Hyderabad

Raghuramaraju A, “Modernity in Indian social Theory”, Oxford University Press, 2011

Robbins Paul, “Political Ecology: A Critical Introduction”, Blackwell Publishing, 350 Main Street, Malden, MA 02148-5020, USA,

Saikia A, “Forests and Ecological History of Assam, Oxford University Press, New Delhi, 2011;

Saikia A, “Imperialism, Geology and Petroleum: History of Oil in Colonial Assam”, Economic and Political Weekly, Vol. 46, No. 11, 2010, pp. 48–54.

Scott James C, “Seeing Like a State: How Schemes to Improve Human condition have Failed”, Yale University Press, New Haven and London, 1998

Scott James, “The Art of Not Being Governed: An Anarchist History of Upland Southeast Asia, Orient Blackswan, Hyderabad, 2009.

Sharma J, Empire’s Garden: Assam and the Making of India, Duke University Press, Duke, 2011;

Shiva Vandana, “The Violence of Green Revolution: Ecological Degradation and Political Conflict in Punjab” Research Foundation for Science and Ecology, Dehra Dun.

Thakur Shailendra Nath, “Irrigation and Interlinking of Indian Rivers”, Daya publishing House.

Thorat Sukhadeo, Ambedkar’s Role in Economic Development and Water Policy”, Shipra Publication, Delhi, 1998.

Vaccaro I, "Political ecology and conservation policies: some theoretical genealogies",

Verma Neel Moni P, "Irrigation in India: Themes on Development Planning, Performance and Management." M D Publication, New Delhi, 1993.

Worster Donald, "Rivers of Empire: Water, Aridity, and the Growth of the American West", Pantheon Books, New York, 1985.

ARTICLES:

"Brahmaputra – The Beautiful River or the Battleground?" Posted on July 17, 2013, Article Published by South Asia Network On Dams, River and People.

Ahmed Imtiaz, "A Post Nationalist South Asia", Himal South Asia, July 1996

BaijalPradip and Singh P K, "Large Dams: Can We Do without Them?" Economic and Political Weekly, Vol. 35, No. 19 (May 6-12, 2000), pp. 1659-1666

Barua A, "Geographical Background and the Development of Communication in Medieval Assam", Chow NagenHazarika ed., TichowFa: Souvenir of the Capital Me-Dam-Me-Fee, Dispur, Guwahati: Capital Me-Dam-Me-Fee Celebration Committee, 1997, KrishnakantaHandique Library (KKHL), Gauhati University.

Barua, H. 1991. The Red River and Blue Hills. Guwahati: LBS.

Baviskar Amita, "A Grain of Sand on the Banks of Narmada", Economic and Political Weekly, Vol. 34, No. 32 (Aug. 7-13, 1999), pp. 2213-2214

Bhavanishankar B S, "Irrigation Systems in Vijaynagar Times and Irrigation Structures in the Old Mysore state", International history SeminerOn Irrigation and Drainage, Tehran-Iran, May2-5 2007

Boruah Sanjib, “whose river is it anyway? Political economy of Hydropower in the Eastern Himalayas”, *Economic and Political Weekly*, July 21, 2012. Vol-XLVII, No 29, pp. 41-52

BuzarboruahPallaviDeka, “Rivers And The Assamese Folk Life: A Right Relationship Of Man And Nature”, *International Journal of Social Sciences, Arts and Humanities*, Vol. 2, No. 2, 2014, ISSN 2311-3782.

Clark John P, “Political Ecology”, *Encyclopedia of Applied Ethics*, 2nd Ed., Vol. 3. (San Diego: Academic Press, 2012), pp. 505–516

D’souza Rohan, “Framing India’s Hydraulic Crisis: The Politics of the Modern Large Dam”, *MONTHLY REVIEW*, 2008, Volume 60, Issue 03 (July-August).

D’souza Rohan, “Supply side Hydrology in India: The Last Gasp”, *Economic and Political Weekly* September 6, 2003, pp-3786

D’souzaRohan, MukhopadhyayPranab, Kothari Ashish, “Re-Evaluating Multi-Purpose River Valley Projects :A Case Study of Hirakud, Ukai and IGNP” *Economic and Political Weekly* February 7, 1998

Das Partha, ChutiyaDadul and Hazarikanirupam, “Adjusting to Floods on the Brahmaputra Plains”, Project Report made by Aryanak, Guwahati, Assam.

Das Parthajyoti, Patwary B C, Kumar S R and Choudahury B, “The Brahmaputra River: A hydrological Appraisal”, “River Brahmaputra:In The Culture and Vision of Assam”, edited by H N Dutta&SujitSom, Vol. 1, Series 1, 2010.

Das, J.D. and A.K. Saraf. 2007. “Technical Note: Remote sensing in the mapping of the Brahmaputra/Jamuna River channel patterns and its relation to various landforms and Tectonic Environment”, *International Journal of Remote Sensing* 28(16) (August).

Dhar, O.N. and S. Nandargi. 2000. ‘A Study of Floods in the Brahmaputra Basin in India’, *International Journal of Climatology* 20: 771–781.

Dixit Ajaya, “Kosi Embankment Breach in Nepal: Need for a Paradigm Shift in Responding to Floods”, Economic and Political Weekly, february 7, 2009

Dutta M K, Barman Swapnali, Agarwal S P, “A study of erosion-deposition processes around Majuli Island, Assam”, Open access e-Journal Earth Science India, Vol. 3 (IV), October, 2010, pp. 206-216 <http://www.earthscienceindia.info/>; ISSN: 0974 – 8350.

Embree Ainslie, “India- A Plural society”, The University of North Carolina Press, Vol-56, No-1, 1972. Pp-1

Gogoi, Lila, NoiBoi Jai, Banalata, Dibrugargh; Banalata Edition, 2006

Goswami D C and Das Parthajyoti, “The Brahmaputra river, Assam: A Hydro geomorphological Appraisal”, Landforms Processes & Environment Management, Editor: S. Bandyopadhyay et al. ISBN 81-87500-58-1, ACB Publications, Kolkata, India, pp.121-144.

IyerRamashwamiI,”Interlinking of Rivers: A Plea to Government”, Economic & Political Weekly December 13, 2014 volxLIX , no 50.

Kamble G S, “Dr. B R Ambedkar’s Contribution in Formulation of water Policy.” Research Directions, Vol- 2, Issue- 1, July 2014,

Kant Immanual, “What is Enlightenment”, accessed from-
<http://www.columbia.edu/acis/ets/CCREAD/etscc/kant.html 1/>

KarManik, “The Brahmaputra: Floods and Preventive Measures”, EBH Publishers India Limited, Guwahati.

Lahiri Siddhartha Kumar and Borgohain Juli, “Rohmoria’s challenge: Natural Disasters, Popular Protests and State Apathy”, Economic and Political weekly, January 8 2011, Vol- XLVI No-2, pp.31-35

Lahiri-DuttKuntala, “Imagining Rivers”, Economic and Political Weekly, Vol. 35, No. 27 (Jul. 1-7, 2000), pp. 2395-2399.

Leiss William, "The Dual Role of Science in the Modern Society", prepared for the Canada-United Kingdom Colloquium "Science and Public Policy", November 20-23, 2003, Tortworth, South Gloucestershire, England, pp-4 &5

Mahanta Chandan and Mahanta Anjana, "Contending Water Uses, Bridge over the Brahmaputra", Economic and Political Weekly February 18, 2006.

Mahanta Chandan, "Preliminary Studies on the Environmental Geo-chemistry of the Brahmaputra River Basin", M Phil Dissertation submitted in Jawaharlal Nehru University.

Moench Marcus, Dixit Ajajya and Caspari Elisabeth, "Water, Human Rights and Governance: Issues, Debates and Perspectives", Water Nepal, Vol. 9/10, NO. 1/2, 2003, 1-9.

Mukhim Patricia, "Floods in the North east: Lack of Planning and red Tape", Economic and political Weekly, October 18 2014, Vol-XLIX, No-42, pp.21-23

Phukon Ankur Tamuli, "A Tale of River Borne Erosion in Assam", Deeper Water: Himal South Asia, September 24, 2013.

Prasad Ramachandra, "The Organisational Pattern Of The River Valley Projects In India: A Study Of Thecontrol Board Vis-A-Vis The Public Corporation" The Indian Journal of Political Science, Vol. 22, No. 3 (1961), pp. 214-225Published

Prasad Ramachandra, "The Organisational Pattern Of The River Valley Projects In India: A Study Of Thecontrol Board Vis-A-Vis The Public Corporation" The Indian Journal of Political Science, Vol. 22, No. 3 (1961), pp. 214-225Published

Saikia Arupjyoti, "Ecology, Floods and the Political Economy of Hydropower: The river Brahmaputra in the 20th century", NMML Occasional Paper Perspectives in Indian Development, New Series 22. Published by Nehru Memorial Museum and Library, Teen Murti House, New Delhi-110011

Sebastian Sunny, "The Waterman of Rajasthan" Frontline, Vol-18 Issue 17, Aug 18-31,2001.

Somanathan E, “Are Embankments a Good Flood–Control Strategy: A Case Study of the Kosi River”, Indian Statistical Institute, Economics and Planning Unit 7, S. J. S. Sansanwal Marg, New Delhi 110016, India

Vishwambhar Prasad Sati, “Environmental And Economic Implications Of Multipurpose River Valley Projects : A Case For The Madikheda Dam (India)”, Journal of Environmental Research And Development Vol. 2 No. 4, April -June 2008

Weiming Tu, “Beyond Enlightenment Mentality”, Confucianism and Ecology: The Interrelation of Heaven, Earth and Humans”, edited by Mary Evelyn Tucker and John Berthrong, Harvard University Press.

Whitehead Judy, “Sunken Voices: Adivasis, Neo-Gandhian Environmentalism and State—Civil Society Relations in the Narmada Valley 1998-2001”, Anthropologica, Vol. 49, No. 2 (2007), pp. 231-243

UNPUBLISHED THESIS AND DISSERTATION:

Goswami Rituporn, “Rivers And History: Brahmaputra Valley In The Last Two Centuries”, Thesis submitted to Jawaharlal Nehru University.

D’souza Rohan, “Floods, Embankments and Canals: The Colonial Experience in Orissa (1803-1928)”, Dissertation submitted to Jawaharlal Nehru University.

D’souza Rohan, “The Deltaic Rivers of The Bengal Presidency: The Political Economy Of Flood Control in Colonial Orissa”, PhD thesis submitted to Jawaharlal Nehru University.

Saikia Biswajeet, “Harnessing the Brahmaputra and Disaster Management”, dissertation submitted to Jawaharlal Nehru University.

Parida Gunanidhi, “A Study of Gandhian Political Philosophy in the Context of ecology vs. Development and Conflict Resolution”, thesis submitted to Jawaharlal Nehru University.

OFFICIAL WEBSITES:-

Ministry of Water Resources, wrmin.nic.in

Central Water commission, www.cwc.nic.in

Brahmaputra Board, www.brahmaputraboard.gov.in

Planning Commission, planning.commission.gov.in

Ganga Flood Control commission, gfcc.bih.nic.in