Examining Disruptions of Social Systems due to Large Dam Projects in the North East

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Abstract. The vulnerability of the tribals to lose more than the commodity value of land due to large dam projects in the North East has not been given due attention both in policy space and empirical research. Also, the question of whether the living standards of the already displaced tribals have improved after dam construction has not been treated with rigour. The paper tries to disaggregate the social disruption effects of large dam construction along the lines of gender, religious identity and ethnic conflicts and question the conventional economics of resettlement. The study examines the claimed effects (and benefits) of large dams on tribal communities made in non-empirical papers and government documents using available real-world examples from the north-east. The study also validates the findings from the literature through a sentiment analysis of newspaper articles and a public opinion survey of dams in the north-east. This cross-examination is expected to serve as a foundation for further empirical research.

1 Introduction

Large dams are an easily visible example of public infrastructure in India. As per Central Water Commission1 (CWC), a large dam has a height of 15m or more from the foundation. A dam between 10 and 15 metres in height from its deepest foundation is also included in the classification of a large dam provided it complies with some other conditions is also included in the definition. As a typical feature of infrastructure development, they present the trade-off between larger economic benefits and the social costs borne by some local sections of the society. When marginalized communities become the cost bearers, the social dimension of problems caused by dams become more prominent. However, dam proponents have been pushing for more large dams. The main premises of their construction are benefits such as irrigation and hydropower. The main point of contention is who actually benefits the most from these promised benefits (or who loses). Resistance to large dams has its basis on the claim that local economic benefits are marginal while the social costs are disproportionately large. The sources of these social costs are physical displacement, livelihood loss and disruptions related to ethnicity. In addition, the vast amounts of waste generated during construction disrupt neighbouring communities as well [1]. Prediction models based on machine-learning can help in managing such waste and reduce its impact on the project affected communities [2].

As of 2018, there are 5264 completed large dams and 437 large dams are under construction in India [3]. Various anti-dam movements are associated with many of these projects. The northeastern region of India—which is seen as the hydropower hub of India- has also seen a fair share of these movements. Surprisingly, the northeastern region (NER) has roughly 0.4 per cent of these large dams spread across the eight states. With such a meagre proportion, the significance of this study lies in the minority status of tribals and also their vulnerability to exploitation. The ST population is 8 per cent of the total Indian population and 12 per cent of the NER population [4]. The historical developmental lag of the NER in the context of mainstream Indian economy may lead to dam proponents exploiting the lack of capability of the locals to garner wider support in defending their perspectives. Whether project-affected people are conscious about their legal rights and the environmental outcomes of large dams is another issue. This would certainly lead to a biased national viewpoint on whether large dams have benefitted the NER—particularly the people. The objective of this paper is to give a balanced examination of studies on the disruption in the lives of the project-affected people in the NER due to large dams. Our interest in the North Eastern region of India stems from the fact that it is one of the most culturally sensitive, geologically and ecologically fragile and seismically active regions of the country [5]. In fact, as per the Ministry of Science and Technology and Earth Sciences of Government of India, the entire North Eastern region in zone 5 of the seismic zone classification, which is the most vulnerable to earth quakes [6].

The paper is organized as follows- Section 2 elaborates on the methods used for data collection and analysis. Section3 includes the findings from the scoping review; Section 4 sheds light on the findings from our pilot study and Section 5
spells out existing research and policy gaps. The major abbreviations and acronyms used in the study are presented in Table A.1 in the Appendix.

2 Methodology

2.1 Scoping Review

We used Scopus and Web of Science to identify empirical articles that discussed the impact and implication of large dam projects. The final combination of keywords that were used to identify the articles were ("hydropower" OR "HEP" OR "HPP") AND ("dam") AND ("displacement" OR "conflict" OR "disruption"). The search resulted in 119 articles out of which 51 were excluded owing to non-relevance of the topic being studied. The final corpus included 68 articles. These included 59 articles published in peer-reviewed journals, 4 conference papers, 1 book chapter, 1 book and 3 reports.

The same keywords were also used as search terms for news reports and articles on Google News which resulted in 274 news articles and reports in the final sample.

After selecting the final corpus of articles, we divided the articles based on their topic coverage, the theme they were discussing regarding to large hydropower projects (HPP) and the impact of the HPP. We identified two major themes, i) dissatisfaction towards large HPP and, ii) social displacement caused by the HPP.

2.2 Sentiment Analysis

Besides the scoping review, we also conducted sentiment analysis of public opinions to gauge the perception of the society with regards to large HPP. The sentiment analysis of public opinions was obtained through, i) web-scraping of news articles published digitally between 2010-2020, and ii) survey results from regional colleges of North-east India.

3 Growing Dams and Anti-dam Movements

The growing interest of the central government in building large dams in the NER can be linked to the growth of the power sector in India [7]. To tackle the issue of generation capacity deficit, power sector reforms emphasized upon aggressive capacity addition of thermal power and hydropower – with hydropower being relatively cheaper in terms of generation cost. Assessment studies of the hydropower potential of the Brahmaputra basin revealed that it could produce 84,044 MW by building 845 hydropower projects. This was the highest among all considered major river basins. Not surprisingly, as per data from [3], about 80 % of the existing dam projects are hydropower and the 50000 MW initiative aims to realize the full hydropotential of the NER by building more dams. Since the NER is characterized by low demand, these projects are also a source of inter-state export sales for the distribution utilities. The state government either gets an upfront premium or a return on equity or about 12 per cent of the power as free. These monetary gains have seemingly resulted in flouting of EIA (environmental impact assessment) guidelines for dam projects in the NER. A major aspect of the EIA is assessing environmental impacts of inundation caused by reservoir storage. Though [3] has consolidated data on the size of the reservoir area for large dams in India, there is no such data on loss forest land or number of project-affected people (PAP).

The growth of large dams is also facilitated by central and state policies. Since water is a state subject in India, there are no overarching umbrella policies and legislations that apply on creation and operation of large dams. However, existing central policies and legislations may be categorized under R&R, forest rights, and hydro capacity expansion, environmental protection and water resources management. A non-exhaustive compilation of major dam policies based on this categorization is shown in Fig. 1.
While hydro capacity expansion policies such as the 50000MW initiative push for more large dams, R&R and forest rights policies are a testament for social disruptions caused by large dams. As seen in Table 1, there is a long history of resistance to dams in NER headed by various local CSOs and student organizations. These organizations have become the interface between the affected communities and the government. The affected communities are mostly those belonging to the Scheduled Tribe category (tribals) living in remote hilly areas. The tribals derive their identity from the land which has to be cleared for dam construction. Apart from the loss of land, displacement leads to disruption of social systems based on customs and ancestral knowledge. For instance, they lose access to their “scared” forest lands. This land-identity nexus that goes beyond the mainstream monetary valuation of the land is what really drives the resistance against dams. On the formal debate frontier, this reason might manifest as different forms mainly as ecological disruption or flaws in environmental impact assessment. It is interesting to note the viewpoint of the Secretary, Ministry of Power–the continuing nature of the resistance even after allowing public hearings are largely due to troublesome people not losing “individual property”; the PAP get their compensation and are not involved in this.

Table 1 Various anti-dam movements in the NER (Author’s compilation)

<table>
<thead>
<tr>
<th>Year(s) of starting</th>
<th>Dam (Status)</th>
<th>Affected Tribals</th>
<th>Associated Organizations</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990s</td>
<td>Mapithel (Operational)</td>
<td>Tangkhul, Kuki</td>
<td>Citizens Concern for Dams and Development; Mapithel Dam Affected Villagers Organization</td>
<td>Manipur</td>
</tr>
<tr>
<td>1990s</td>
<td>Loktak (Operational)</td>
<td>Rongmei</td>
<td>Association Loktak Project Affected Areas Action Committee</td>
<td>Manipur</td>
</tr>
<tr>
<td>1990s</td>
<td>Tipaimukh (Unbuilt)</td>
<td>Hmar, Zeliangrong</td>
<td>Citizens Concern for Dams and Development</td>
<td>Manipur</td>
</tr>
<tr>
<td>2003</td>
<td>Teesta Cascade (Operational &amp; ongoing)</td>
<td>Lepcha</td>
<td>Affected Citizens of Teesta</td>
<td>Sikkim</td>
</tr>
<tr>
<td>2005</td>
<td>Lower Subansiri (ongoing)</td>
<td>Adi</td>
<td>Peoples Movement for Subansiri Valley</td>
<td>Assam-Arunachal Pradesh</td>
</tr>
<tr>
<td>2010-11</td>
<td>Siang Cascade</td>
<td>Adi, Galo</td>
<td>Siang Dialogue, Siang People’s Forum and Siang Indigenous Farmers’ Forum</td>
<td>Arunachal Pradesh</td>
</tr>
</tbody>
</table>

4 Social Displacement- Questioning the Economics of Resettlement

The displacement due to dams causes irreparable loss to biodiversity, culture and society that communities derive their identity from and are thus intangible losses which cannot be compensated by any amount of money. Conventional

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2 Ongoing means the project is ongoing.

3 This dam has attracted protests from downstream non-tribal areas in Assam spearheaded by Krishak Mukti Sangram Samiti and All Assam Students’ Union
cost-benefit analysis that focuses on the market value of individual property consumed by large dam projects undermines important aspects of tribal life. Also, another complexity is that the costs are changing with time since R&R is bound to take time for completion [13]. What is the appropriate method for calculating the market value for tribals who are less exposed to the market? Are tribals sufficiently aware of their legal rights to initiate negotiation for setting prices? Should the risk of conflict escalation be factored into cost calculation? While the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement 2013 has made significant progress in making compensation fair for PAP, the actual implementation is a grey area for tribals. Non-availability of land records is also a major hindrance to land settlements [11].

There is also a tension between the Indian Law and the tribal laws. The tribal communities that inhabit the North-eastern states are often bound by and follow customary laws that dictate the utilisation of Common Property Resources for their agricultural requirements and sustenance. The dominance of common lands as compared to private lands can be conjectured using Fig. 2. That fact that for most states in the NER, the rural areas dominated by the ST population have a high proportion of landless people suggest that many of these people are depending on common lands not counted as “owned land” legally.

<table>
<thead>
<tr>
<th>State</th>
<th>Share of Rural households with no land (%)</th>
<th>Share of ST in rural population (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arunachal Pradesh</td>
<td>44%</td>
<td>69%</td>
</tr>
<tr>
<td>Assam</td>
<td>57%</td>
<td>14%</td>
</tr>
<tr>
<td>Manipur</td>
<td>70%</td>
<td>46%</td>
</tr>
<tr>
<td>Meghalaya</td>
<td>76%</td>
<td>86%</td>
</tr>
<tr>
<td>Mizoram</td>
<td>80%</td>
<td>94%</td>
</tr>
<tr>
<td>Nagaland</td>
<td>43%</td>
<td>87%</td>
</tr>
<tr>
<td>Sikkim</td>
<td>40%</td>
<td>37%</td>
</tr>
<tr>
<td>Tripura</td>
<td>68%</td>
<td>41%</td>
</tr>
</tbody>
</table>

Some laws relating to CPR may be recognised by the governments in regions falling under the ambit of the Sixth Schedule while many don’t fall under the category [14]. [11] has raised doubts in the competency and the capability of district administration bodies to diffuse the issues arising out of land acquisition given that these bodies have a “plethora of work”. The government’s disregard for CPR can be seen in the case of the Idu-Mishmi community who reside in the Dibang Valley of Arunachal Pradesh, the site where the controversial Etalin Hydro Project is to be set up. [15]. Community lands in nearby villages have been put up for compensatory afforestation without the consultation and consent of the villagers. The tracts of lands have been allegedly finalised based on satellite imagery when the land is not barren but used by cattle to graze.

The fact that the traditional matrilineal system still exists in some of the tribal communities, like the tribes of Meghalaya, is a proof of the high social status and the economic autonomy that women have held for generations, despite men holding more social rights [16]. Direct displacement by large dams would mean stripping off their rights to the community owned resources, which is as good as taking away their decision-making authority. Since the economy in these regions is mostly informal in nature, displacement takes a toll on their livelihood and many may not be able to adjust to a formal economy and modern livelihood process, often pushing generations into a vicious cycle of poverty. Cash compensations towards the displacement may be used to pay overdue debts and the money is spent in a short period, leaving them with no other livelihood source. Uprooted from their daily way of life, the women and children are the most vulnerable in the community, having to fully rely on the men for financial needs and other necessities. This increased dependency often leads to a deterioration in the role of a woman within the tribe, she loses her right to make decisions for the household, she loses the control to finances, and she loses the very land that had come to shape her identity.

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*As per [14], Assam, Mizoram and Meghalaya and Tripura have 10 areas under the Sixth Schedule.
The rivers, the mountains and the forests are not only a means to sustain the local communities but also a repository of information about their ancestors, their traditions and their history [17,18]. For instance, tigers hold a significant place in the IduMimshi culture where folktales passed down from their ancestors tell about how the tiger and the first Idu were born from the same womb, and thus are brothers [15].

Besides, the region where the displaced community is resettled may not have the infrastructure to enable the communities to pick up where from where they left. The wealthier of the displaced may choose to resettle in more urban areas, which will leave the ones left behind with no employment sources and neither a trusted source for guidance, eventually making way for the disintegration of the otherwise centuries-old of community ties.

Moreover, the new areas may already have their own indigenous communities living there eventually leading to increased pressure on land and the resources that are available. Common Pool Resources don't come with ownership rights and hence may be a root cause for ethnic conflict in the area. Apart from the overpopulation problem, conflicts may arise between the communities due to cultural differences, increased competition for jobs and livelihood, and the issue of encroachment [19]. These growing regions are bound to then attract immigrants who will come to settle in there, adding further to the population pressure and causing the demographic balance to change. Although immigrants may bring in their own sets of skills and knowledge and contribute to the development of the region, it is often sidelined because of the risk they pose to the native people, their language and their culture and fuel the differences that lead to ethnic tension.

Political autonomy and conflicts over land may also result in the formation of insurgent groups that might resort to violence and ethnic cleansing, as noted in the states of Assam, Manipur and Tripura [18]. Fragmentation of the social system and the loss of identity is bound to arise, emanating from either a result of falling victim to development projects or assimilation into a more dominant social model [20]. Two cases are relevant to the issue of ethnic conflicts. First, the Kaptai Project displaced around 40,000 people from the Chakma Tribe who were resettled in the erstwhile North Eastern Frontier Agency in the 1960s [21]. The resettlement surfaced as an issue when Arunachal Pradesh was declared a Union Territory and eventually a state, in 1972, when the local communities and regional parties opposed to harbouring the displaced in their lands fearing a shift in the demographic balance and sharing of their common resources [22]. Second, the state of Tripura witnessed its first major ethnic clash between the resettled tribal communities, of the Gumti Hydel Project, and the Bengalis after four years of its inception, although the connection was never truly established between the two events [23]. The Environment Justice Atlas describes the ongoing conflict as a result of the project, commissioned in 1974, at Thirthamuk, Tripura that left the indigenous tribes landless and only compensated one-fifth of the people, who could prove their ownership of the land. The emergence of insurgency in the state has been alleged to be a consequence of inadequate rehabilitation policies and discontent among the displaced [24,25].

There are also other knock-off effects. Waterlogging and increased salinity of lands around the catchment areas may lead to reduced agricultural productivity while the reservoirs used to store water may be a source for vector-borne diseases [26]. Floods as a downstream impact have been recorded wherein the excess dam water was released during heavy monsoon when it should have resorted to water control and stored for water generation in the drier seasons when water was required by farmers for cultivation of Kharif crops [27]. In addition to these, development-oriented resettlement has never been discussed by the authorities forcing the displaced to resettle in lands which have much lesser productivity, without an effort to re-establish the social and cultural structure they enjoyed [28].

At present, over 35 per cent (26 per cent central, 9 per cent state) of the total installed capacity is hydro in the NER against the all India Fig. of 12 per cent) [29,30]. Around 2 per cent of the cost of hydropower generation is allocated to the Local Area Development Fund (LADF) which is compensatory in nature. However, there is no proper mechanism at the local level for the collection and utilization of the fund [11]. Apart from benefits to compensate for disruption, the expected local benefit of a hydropower dam in area is affordable electricity access and higher hours of power availability. At the state level, the expected benefit is a reduction in energy (kilowatt-hour) deficit since hydropower serves the base load. However, there is no empirical evidence to show that the growth of hydropower capacity in the NER has contributed to improved access and power availability either at the community level or at the state level.

Employment generation from the project is beneficial only to people from outside the region, who are more skilled and are usually brought in by the contractor, thereby killing any opportunity for the local to be hired [31]. Most of the employees who worked in the Teesta HPP have been identified to be from outside the state.5

5 Telephonic Interview with Mr. Gyatso Lepcha, member of the Affected Citizens of Teesta
The question of whether PAP become better off once a large dam is constructed is contestable. For tribals, the picture is vague in the first place since consolidated displacement data is not available. While no empirical study on poverty alleviation specific to the NER was found, Duflo & Pande, in their article, presented proof for dams deepening poverty of the residents of the catchment area in the case of irrigation dams in India [26]. Also, the hydropower dams promise cheap electricity, conflicts between the PAP and the government pose to increase the tariff rates. Due to delays, the interest during construction rises which might increase the levelized cost of electricity to unviable levels [11].

5 Sentiment Analysis

Results of sentiment analysis of textual data from the news and survey are discussed in the following subsections. After conducting a thorough review of academic literature, state policy drafts, parliamentary committee reports and activist perspectives, we also explored public perspectives regarding the costs and benefits of large dams. In this regard, we employed a sentiment analysis of public opinions obtained through, i) web-scraping of news articles published digitally between 2010-2020, and ii) survey results from regional colleges of North-east India. Sentiment analysis was conducted to examine the perspectives of the public and media regarding the costs and benefits of large dams in Northeast India. The results of sentiment analysis of textual data from the news and public survey are discussed in the following subsections.

5.1 Analysis of patterns in news about dams taking the case of Subansiri dam in Arunachal Pradesh

The media takes the role of an influencer in shaping public discussions about dams. As an analytic component of this study, 274 Google News results, published digitally between 2010-2020, were scraped from the web to find out the media attention to the Subansiri dam across years (construction started around 2007). Subansiri dam was chosen as it has been a case of inter-state conflict where Assam lies in the downstream area of the project. As observed in Fig. 2, it has drawn phenomenal media attention in recent years.

![Fig. 2 Yearly trend of news references to Subansiri dam](image)

Furthermore, in Fig. 3, “The Sentinel Assam” has the highest referencing to Subansiri dam with publications flooded in 2019. Two publishers from Arunachal Pradesh namely Arunachal24 and “The Arunachal Times” have picked up marginal traction on reporting about the dam. Polarity of the sentiment in news published about Subansiri dam has largely been neutral. However, in 2019, a jump in negative polarity is seen from Fig. 4.

It is interesting to see that negative polarity is higher in The Assam Sentinel than others. This is of course expected given that Assam lies in the downstream area of the project. More interesting is the prominence of Lakhimpur in news related to Subansiri dam. Lakhimpur has experienced devastating floods every year due to an upstream project called Ranganadi in Arunachal Pradesh.
5.2 Analysis of patterns in public perceptions of dams in India

In order to validate our findings from the news-based sentiment analysis, we conducted a pilot study comprising of qualitative assessment of public opinions using survey data. We received 23 responses from graduate students and faculty from regional colleges of North-east India. We discuss the findings from our survey below.

From Fig. 6, it can be seen that while the majority student respondents belonging to the engineering school of thought believe that public criticism is largely hyped, the opposite holds for students from B-School. Surprisingly, students from humanities and social sciences have a higher proportion than engineering students who believe that the criticism is hyped. In Fig. 7 we see that with more interest towards knowing about dams, the sentiment lies in neutral to the negative zone. Positive sentiment is confined to those with low interest in knowing about dams.
The perception about dams largely comes from the knowledge of the costs and benefits of large dams that the public possesses. In this regard, news agencies and publishing houses play an important role in disseminating information about dams. Our findings from the sentiment analysis of news articles clearly show more negative sentiments towards dams owing to the content that focus on the social and environmental costs of dams. This is also reflected in the negative perception of participants in our pilot study. The negative perception of dams comes from the information they have accumulated from various sources. [5]

Since water is a state subject, the role of local administration bodies is of paramount importance in the implementation of R&R policies. Also, whether the conflicts arising out of large dams are “unreasonable” given their claims of “just” compensation needs more empirical research. The research also needs to revisit existing policy frameworks to see if they pay attention to the tribal way of living. The specific geography of North eastern states may also be This is important because displacement for tribals goes beyond conventional cost-benefit analysis and whether the tribals are capable of and have effectively communicated their needs to the policymakers at any point of time is an open question.

The hydropower projects in the North-eastern regions of India have surely ushered in an era of modernisation and regional growth. Huge capital expenditure is required to set up and run these gargantuan sites, implying that developers end up focussing on the long-term profitability of the projects rather than the social and environmental impact the project will have. The result of imprudent nods to clearances on these projects by the State Governments also add fuel to the fire, eventually resulting in backlash from the communities, activists and CSOs. Mismanagement of the project can lead to devastating effects in the region, and downstream, leading to loss of life and livelihoods. It is therefore suggested to conduct simulation studies, in advance, with regards to changing rainfall patterns and river capacity. Protocols followed to operate the dam as well as disaster management strategies need to be critically assessed and strengthened.

### 6 Conclusion

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Although clearances are in place to check the feasibility of the project, a thorough assessment is seldom done, with developers often misquoting the facts and the state governments accepting the misquoted facts. Clearances for hydropower projects ought to be a critically scrutinized process, which India lacks at present. The EIA process should include more public participation and not portray a biased view towards hydropower. The report should include a detailed study of the dam’s capacity, biodiversity in the region, the livelihoods that is supported by the river and the forests, variables that might affect the water levels in the dam and the resettlement and rehabilitation strategies for populations who may get impacted by the dams. The EIA report should be able to provide information on which future decisions.

7 References

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Appendix

Table A.1 Major Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>CWC</td>
<td>Central Water Commission</td>
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<tr>
<td>NER</td>
<td>North Eastern Region</td>
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<tr>
<td>HPP</td>
<td>Hydro Power Project</td>
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<tr>
<td>MW</td>
<td>Megawatt</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<tr>
<td>PAP</td>
<td>Project Affected People</td>
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<tr>
<td>R&amp;R</td>
<td>Research and Rehabilitation</td>
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<td>------</td>
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<tr>
<td>ST</td>
<td>Scheduled Tribe</td>
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<tr>
<td>CPR</td>
<td>Common Pool Resources</td>
</tr>
<tr>
<td>LADF</td>
<td>Local Area Development Fund</td>
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