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Analyzing the Geographical Narrative of Bholagonj Ropeway Area, Sylhet, Bangladesh

Rubaiat Jannat [a]*

[a]*Department of Architecture, Chittagong University of Engineering & Technology. Email: jrubaiat007@gmail.com*

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ABSTRACT

Yearly approximately 90.106 tons of stones make a reservoir at Bholagonj which is a foot hill area in the India-Bangladesh border at Sylhet division. This vast amount of stones are flushed down by the rivers streaming from the hills of Cherapunjii and Meghalaya. This unique geographical occurrence, makes an opportunity to explore the landscape as it is not only abundant in stone supply but also the biodiversity here is unparalleled because of the mountain meeting the wetland on the spot. This serene place has a possibility of eco-tourism while intervening the least in infrastructure level. Government of Bangladesh is taking this opportunity into account and looking for solution that aids both the locals and the tourists by claiming 600 acres of land called Bholagonj Ropeway Area. Unfortunately, as most of the natural resources, Bholagonj too faces the illegal exploitation of resources if not but all aspects such as illegal stone-mining and stone-crushing within the acclaimed 600-acre land. The government policy has stumbled unto uneven territories as the investments in tourist transit service and creating of Bholagonj Mega Eco-park are being impacted by these illegal activities now. By crafting a strong narrative of the true context of Bholagonj and supplemented by a questionnaire survey on the locals, the research proposes policies and possible interventions to revitalize this critical geological site through mild yet effective possibilities, giving a better visibility to the neglected issue of illegal stone-mining and its lethal impact on the local geological and hydrological system of Bholagonj/Dholai River.

1. Introduction

Situated 48 km northwest of Sylhet city in the Sylhet Division's West Islampur Union of Companiganj Upazila is Bholagonj, the largest stone quarry in Bangladesh. The Indian state of Meghalaya borders the Bholagonj stone quarry from the west, Gowainghat Upazila from the east, Sylhet Sadar Upazila from the south, and Chhatak Upazila from the west. About 1.5 square kilometers of the entirety of Bholagonj's total area (3 square kilometers), is occupied by the main quarry. After entering Bangladesh at Bholagonj, the Dholai River flows westward from India through the unions of Dayar bazaar, Tuker bazaar, and Islampur before joining the Piyain River close to Companiganj (Scholz, 2017b). It is in Bholagonj, where the river Umngot streams down from the Khasi and Jainta hills because of the drastic elevational change of the topography and enters Bangladesh via Sylhet changing its name into Dholai. Dholai River carries vast amount of stones which clog up below and around Bholagonj forming a bottleneck on the upstream side of Dholai River. The majority of the stone laborers employed by the Bholagonj stone quarry live in the villages of East and West Islampur Unions because these bottlenecks are excellent locations for gathering stone and because numerous stone quarries have been established nearby since the colonial era. (Scholz, 2017b).

With this unique geography of white sandstones and blue water of Dholai river and the lush green landscapes of Meghalayan hills, Bholagonj has also become a famous tourist spot where hundreds of tourists gather everyday

* *Corresponding author: Rubaiat Jannat, Department of Architecture, Chittagong University of Engineering & Technology Chittagong, Bangladesh*
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making it one of the most visited tourist spots of Sylhet soon after Government declaring the 5acres of the Sylhet-Meghalayan Border area as tourist spot called Shada Pathor Zero Point, filled with white sandstones on 2015 banning any sort of stone-mining activity there although the remaining area of the 600acres land of Bholagonj Ropeway area remains abandoned and deserted. Currently, the site has become a landscape of conflict as on one hand, Bangladesh Government wants to make the most of the site with touristic amenities and celebrate its rare stone-based natural geography, (Master Plan of Haor Area, 2012).

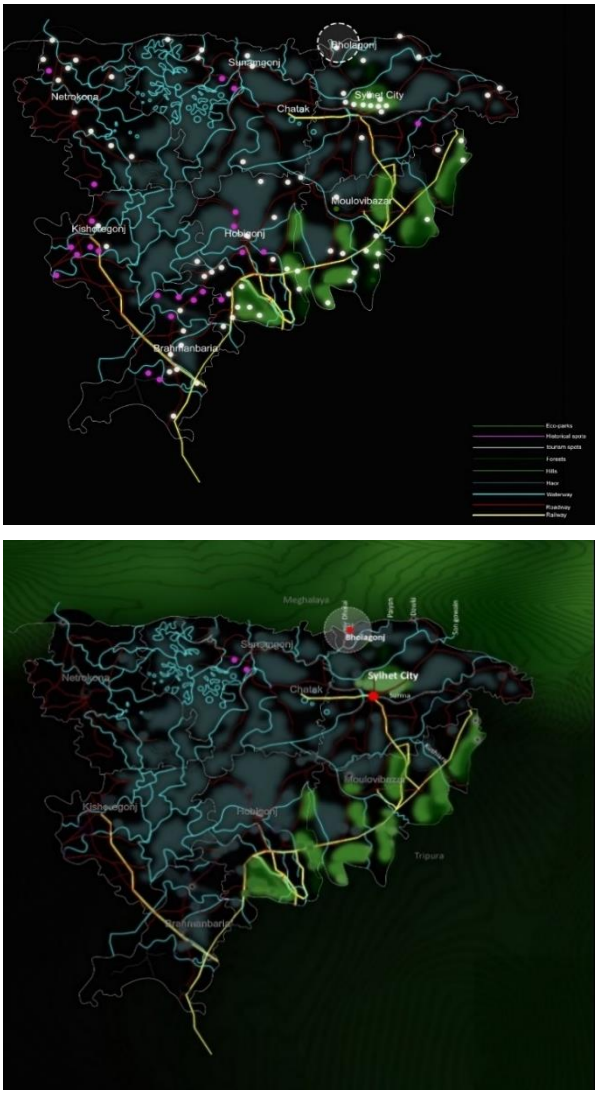

Figure 2: The geological map of the study area (Bholagonj Ropeway area) (Source: Google Earth).

On the other hand, illegal stone-miners want to quarry the whole stone abundant flood shed as the quality of these stones in the construction market is extremely high disregarding the environmental pollution their unauthorized business is causing to.To salvage this critical and unique geography of Bholagonj, the Government has managed to ban any kind of stone-mining in the 600acres land of Bholagonj-Chatak.Ropeway area and decided to develop tourist facilities instead which also has its own drawbacks if not planned properly responding to the geological layers that makes Bholagonj so unique. Since the government has already connected Bholagonj with the Sylhet main city with Bholagonj Shada pathor tourist bus service, the number of tourists are rising everyday although the illegal stone-miners are yet to be stopped. A site and context responsive approach with a logical design intervention is a dire need for this abandoned land as the true context of Bholagonj is rapidly diminishing. So, in order to better understand the true narrative of Bholagonj, a series of studies were designed and carried out using some critical lenses on the geology, history, hydrology, infrastructures and socio-economic condition of Bholagonj so that this site which is currently at the state of abandonment can be revived and revitalized in the best meaningful way possible through design interventions.

1.1 Objectives of the study

- To understand the conflicting context of Bholagonj Ropeway area.
- To construct a narrative of the shifting paradigms of Dholai River and its adjacent areas based on different timelines and political influences.
- To investigate the issue of illegal stone-mining of the Dholai flood shed and its lethal impact on the environment and local lives of Bholagonj.
- To make recommendations for future development and management planning strategies for sustainability of the sensitive flood shed of Dholai through tourism and mild design interventions.

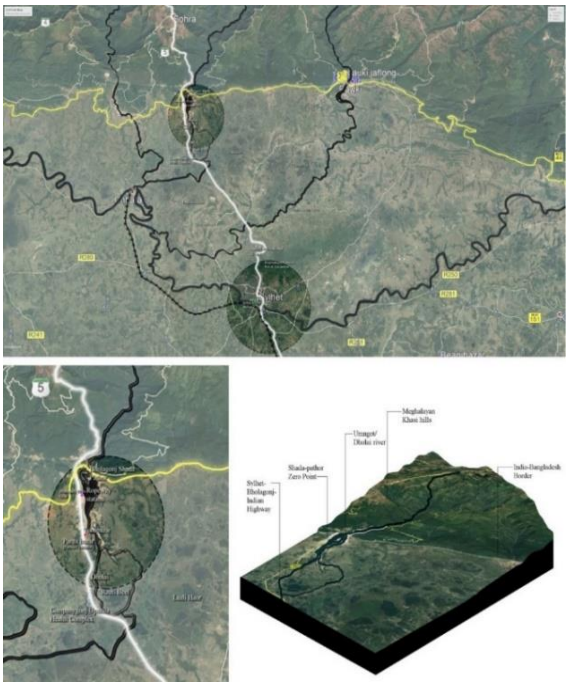

Figure 2: The geological map of the study area (Bholagonj Ropeway area) (Source: Google Earth).

2. Literature Review:

There are recreational opportunities available at the surface mining pits. In recent years, there has been a discernible surge in interest in utilizing these locations and turning them into tourist and leisure destinations through ecological restoration. This is supported by the legal requirements for environmental protection as well as the growing public demands and expectations for the rehabilitation of brownfields. As a result, there is a greater interest in exploring and designing different forms of recreational and leisure spaces. (Majcherczyk & Kryzia, 2017; Fagiewicz, 2010). The Bholagonj Ropeway area, which is near the foothills of the Meghlayan hills and along the trans-boundary river Dholai, is one of the regions rich in natural aggregate deposits. Several sand and gravel quarries have been operating there illegally since the Colonial era, despite its ecological risks although most of these deposits have already been depleted or their exploitation will soon be completed. A call for revitalization is a crying need for this area. This is necessary as without proper reclamation of such industrial brownfields for environmental purpose, such areas are being wrongfully and illegally being converted into industrial or urbanized areas with heavy structures/built-forms which is posing a huge threat on the sensitive geography and landscape of Dholai River and its surrounding areas. Being a foothill area, this area lies near earth-quack fault-line zone which itself is a strong and legit reason to free this area from all sort of industrial or urban activities. Regarding all these factors, Government of Bangladesh has declared the 600acres land of Bholagonj Ropeway area as a tourist zone only to establish a Mega-eco park and tourist facilities here considering the natural heritage of white sandstone and the industrial heritage of the first Ropeway of Bangladesh made of iron towers directly imported from the Great Britain through ships using Kolkata port to the Meghna river route. According to the Government expectations resonating with local expectations, revival of these quarry pits of the Bholagonj Ropeway area will serve as recreation and leisure areas.

Reclamation and re-landscaping activities, which include cleanup, reconstruction, and modernization of the current land cover, are referred to as revitalization (Latin: re – back + vita = life, recovery) (Government Program for Post-Industrial Areas, 2004).In addition to the comprehensive use of land, its structures, and its surroundings, revitalization should be associated with ensuring a higher quality of life for people living nearby; achieved by eliminating environmental risks, creating job opportunities and preserving cultural resources. Making the best use of these abandoned post-mining areas requires a revitalization process that adheres to sustainable development principles. Usually, this is achieved by giving the previously mentioned sections new features and breathing new life into it. The revitalization process can also improve the aesthetics of the areas around open-pit mines by generating new morphological forms in the landscape, promoting the preservation of wildlife, and developing recreational areas. Certain features of the post-mining region and its surrounds influence the choice of revitalization strategy. It also necessitates defining precise standards and outlining the process for determining the mode and function of the revitalized area. The choice of revitalization mode is influenced by the physical characteristics of the area, including its size and composition, internal, formal and legal, environmental (natural), social, spatial, economic, hydrological, infrastructural, and agrarian conditions. (Majcherczyk & Kryzia, 2017; Kasztelewicz, Ptak, 2011; Dołzbłasz, Mucha, 2015; Kasztelewicz, Zajączkowski, 2010; Ostręga, Uberman, 2010; Bobrek, Paulo, 2005; Kwiatkowska-Malina, Wyszomierska, 2014; Ostręga, Uberman, 2005, 2010).

Based on an examination of the various aspects of the proposed Bholagonj Ropeway area, this analysis tries to provide sustainable strategies for revitalizing the site with the optimal interventions. The strength of the study is that the research unfolds the various aspects and stories of the site in form of different narratives which are told to describe the geological, historical, hydrological and socio-economic conditions of the site, but altogether, these narratives combined, served to propose the overall design narrative necessary to revitalize the site rather than just creating a tourism of indulgence in form of Mega-Eco park as per the Government decision, devoid of any layers and dimensions considering the natural and industrial heritage of the site. Beyond thoughtfully designed landscapes constructed with sustainable technologies, sustainable design encompasses much more. Sustainable design is a cultural act, a creation of culture made from natural materials, although it frequently draws on ecological principles. It is also influenced and molded by a particular social formation. Cultural values are often transformed into long-lasting landscape forms and spaces that question, expand, and alter the definition of beauty; the result is design that is not only beautiful but also educative. Landscapes, which are visually appealing and culturally rich, have the power to influence people's thoughts and actions, which can eventually lead to social change. (Meyer, 2008; Xiao, 2016). This research aims to narrate the conflicting context and transformation of the site through thousands of years to propose interventions that will not only cater to the tourist need but also create an awareness on the insensitive material consumption practice which poses great threat on our nature and environment, consequence and cost, only to be paid by the local communities living near those areas. Again, this research also shed spotlight on the lethal threat the illegal stone-mining activities are causing to the Dholai River and the localities depending on the river too which itself can be a starting point for many detailed studies on the local conditions of the people living in such areas where illegal stone-mining is taking place. This study also may act as a guideline to restore abandoned industrial brownfields which are nothing but dysfunctional eco-systems with proper vegetation and environmental remediation too doing minimum alteration to site's topography creating an experiential landscape to appreciate nature and its resources through a well-crafted design narrative.

However, there are few limitations in this research too. Due to time shortage, the portion of Dholai River flowing near the Bholagonj Ropeway area was surveyed in detail although surveys along multiple points near the river could add up to some more information in the socio-economic narrative section. Being a conflicting context, there was a lack of authentic secondary data and documents about the site, presence of which could add a different dimension to the research. Again, the sample collection took place during winter season (January 5, 2020) but a sample collection in rainy season could have different results too.

3. Methodology

Since Bholagonj shows a transient and dynamic landscape, the research focused on the changing scenarios and context of the site with growing time which rapidly shaped up the current conflicting context of Bholagonj rather than only relying on secondary data and historical maps which also guided the research and documentation of the site to a great extent. But being a remote and conflicting area, and having a setup in a transient landscape like Meghalaya foothill and Dholai river floodshed, firstly, it was necessary to clearly understand the geological phenomenon that has shaped up the site and its serene landscape for thousands of years. The research began with the geological understanding and documentation of the site. Historical mappings, on-site survey, digital documentation paved the way for creating new maps of the site and the overall Sylhet city which greatly contributed to have a clear perception of the geographic location and its impact on the site. From those geological mappings, it was clearly visualized how the elevational drop from Meghalayan hills to Bholgonj made Bholagonj itself a natural sand-stone deposit which attracted the British rulers to establish a stone-quarry there during the Colonial period without any natural consideration for which the very first Ropeway of Bangladesh supported by 120 Iron towers was established here adding an industrial dimension to the site (Scholz, 2017b). The establishment, operation, construction phase and industrial impact of the Ropeway on the serene landscape of Bholagonj was narrated on the second phase.

On the third phase, the hydrological narrative of the site was created with overlaying historical maps with the current mappings which showed the diminishing layers of sandstones due to excessive stone-quarry from the Dholai riverbed which has not only imposed a huge threat of river pollution affecting the surrounding haor communities along the river but also created a geological threat as the site itself sits on an earth-quack fault-line zone which demands to be left as free of industrial activities as possible. Then to better perceive the socio-economic scenario and tourist perception of the site, an on-site questionnaire survey was done which helped to construct the socio-economic narrative of the site supporting the newly generated mappings of the site. Throughout the research, field-survey, visual documentation, hand- sketches were done from which the findings were put into the schematic mappings of different scenarios and narratives of the site. Case studies were also done in parallel on similar contexts to understand what potential prospects may generate through proper design interventions to reclaim and revitalize the study area.

Finally, all these findings lead to generate a design narrative for the site that could help the government to capture the site for touristic purpose through soft-interventions making a dialogue with the sublime nature and landscape of the site through thoughtful place-making for the tourists using the natural and industrial heritage of the site which will not only cater to the tourist needs but also put an end to the illegal stone-mining and crushing activities that threatens the site.

3.1. Case Studies:

A significant part of the research methodology was the use of case studies which focused on the quarry reclamation and cultural representation of different contexts and scenarios (Xiao, 2016). Three case studies: The ROM-Redesign Roma Quarry in Austria, Quarry Garden in China and The Zinc Mine Museum in Norway have been mentioned following the same format that focuses on the contextual need and the architectural response toward the abandoned mine-field sites.

Figure 3: The ROM-Redesign Roma Quarry in Austria (Source: Saieh, 2019).

3.1.1. The ROM-Redesign Roma Quarry in Austria:

The primary objective of the ROM design was to enhance the immersive experience of a quarry landscape by creating a more visceral and visually engulfing atmosphere throughout the entire theatrical arena by extending the ambiance of the magnificent rock-face scenery. Instead of attempting to conceal or cover up the quarry site's current state of disrepair, this project attempts to keep the topographical characteristics of the site exposed and uses the levels and the natural enclosures created by the terrains and rock surfaces to create a natural theatre with good acoustics. (Saieh, 2019). The project is an excellent illustration of how quarry terrain can be used adaptably while still being attractive and useful. It makes use of the quarry's special features to enhance the music festival's auditory and visual experience, which is a part of Austrian culture. The massive rock face also produces the dramatic visual effects required for an opera or concert (Xiao, 2016).

3.1.2. The Quarry Garden, Shanghai, China:

The quarry garden occupies 4.26 hectares (10.53 acres) in the center of the Shanghai Chen Mountain Botanical Garden. The quarry activities of 1980s caused significant damage to the site and its scenic natural surroundings. Deep ground excavation resulted in the creation of one deep pool in the west quarry. Considering the site and its social context, this project aimed to restore the abandoned quarry ecologically and to retrieve the five iconic sights of the "Chen Mountain Eight Sights" culturally (Xiao,2016).

Figure 4: : The Quarry Garden, Shanghai, China. (Source: ASLA 2012 Professional Awards | Quarry Garden in Shanghai Botanical Garden, n.d.)

The beauty of the Quarry Garden increases as it seeps down and observers are revealed to the magnificent beauty of the site as they gradually descend down toward the pool feeling more connected to the restored nature which was once damaged by industrial activity (ASLA 2012 Professional Awards | Quarry Garden in Shanghai Botanical Garden, n.d.).

3.1.3. Zinc Mine Museum, Norway:

Ar. Peter Zumthor created a historical art installation, inspired by the shuttered zinc mines of the late 1800s (Effa, 2022). The buildings here are all about being both inside and outside resonating with the world of the miners, being contained within the dark, deep stone mines. The buildings' interiors are purposefully maintained as dim, dark rooms that echo the darkness of stone mines (Effa, 2022).

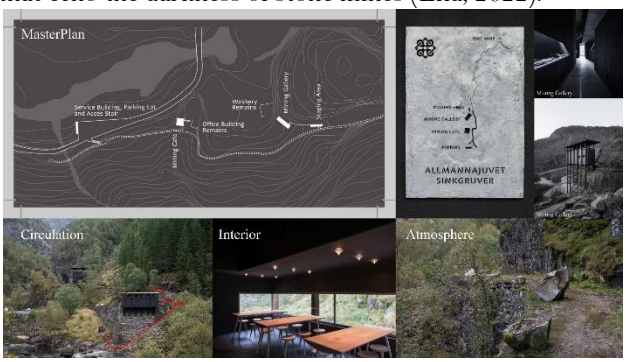

Figure 5: Zinc Mine Museum, Norway

The project takes the minimalist yet effective approach of converting an abandoned zinc mine into a tourism land-use in the form of an outdoor museum where the exhibition, or the zinc mine itself, is the main exhibit. The visitors explore the natural drama of this outdoor museum through a well-designed tourist trail along which tourist amenities like a mining history museum building, a café building, toilet and parking facilities, paths and stairs are organized (Effa, 2022). The mining operation, the toil, and the demanding daily lives ofthe workers had an impact on the utilitarian structures of the master plan. Each building was constructed on-site after being prefabricated in advance. On the interior walls, dark paint has been used to mimic deep, dark stone-mines in form of a gallery. With its high requirements for accuracy, the foundation work for the museum and café buildings is among the most difficult projects ever undertaken in Norway. The project comes into focus as a memorial to the mining operation and the hard lives of the miners in the late 1800s.The National Tourist Routes attraction consists of eighteen carefully selected drives through breathtaking scenery in Norway, enhanced by innovative architecture and thought-provoking art. There are many different tourist routes that travel through areas with unique topography, such as mountains, waterfalls, fiords, and coastlines. (Effa, 2022).

3.2. Study Area & Site Scenario:

The study area consists of 3 main land chunks, 1. An abandoned stone-mine field near Sylhet-Bholagonj-India Highway (Site A) of 65acre, Ropeway station Island (Site B) of 35acre and Bholagonj Shada Pathor Zero point (Site C)

of 5 acre with the remaining fluid area consisting of the Dholai River, each having its natural historical, geological and industrial narratives of its own, unfolding an untold

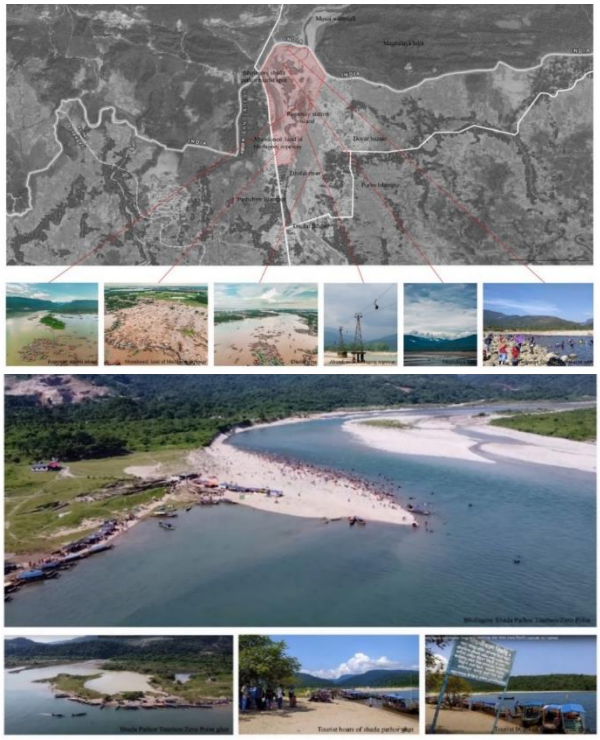

Figure 6: Site scenarios of the abandoned land of Bholagonj Ropeway Area and Bholagonj Zero Point (Source: Google Earth)

story of the site all together making up the Bholagonj Ropeway area of 600acre.

4. Narrative:

In the following paragraphs, the findings from the methodology are discussed. The narratives represent the Geological, Historical, Hydrological and Socio-economic layers of Bholagonj and try to unfold the interlaced relationship that has shaped the current conflicting scenario in Bholagonj which exists today to make possible propositions to improve the scenario for environmental and touristic reasons.

4.1. Geological Narrative:

The primary quarry at Bholagonj, covering an area of approximately 1.5 square kilometers, is the largest stone quarry in Bangladesh at the moment. After splitting into the Dholai and Piyain rivers near the Companiganj Upazila Sadar, the Umngot River flows into Bangladesh from the Musai waterfall in the Cherapungi hills bearing stones of considerable size with it which become deposited near Bholagonj, Jaflong, Ballaghat, and Bisnakandi. This creates a sequence of river bottlenecks in those areas that are perfect locations for gathering stones easily to be transported by the Dholai and Piyain Rivers which is why there are many stone quarries in and around this area dating back to the British imperial era. (Scholz, 2017b). Since, Sylhet is a complex geography of a natural basin/bio-filter which absorbs the vast amount of rainwater coming from the wettest place (Meghalaya) of the world due to its drastic elevation change, the foothill of the Meghalayan hills, the river Dholai and its flood shed where Bholagonj lies is of extreme importance. This flood shed is a crucial riparian ecology of stone and water which therefore needs to be protected for the transient and dynamic geological phenomenon of a haor (basin) geography like Sylhet as the ground beneath the surrounding areas are wet inside. Loss of one crucial element of such geography like sandstone can pose huge threat to the overall natural system of the basin.

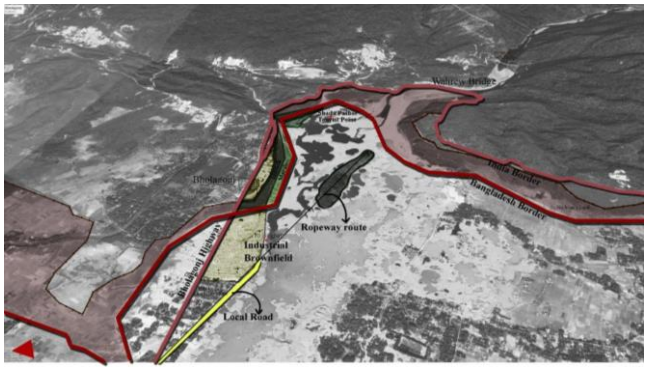

Figure 7: Schematic map of different conflicting zones of Bholagonj Ropeway area near the bottleneck formed by the Dholai River. (Source: Google Earth)

Again, Bholagonj, being a foothill area lies very close to the Dauki fault which makes it a critical earth-quack prone area too. Therefore, excessive and illegal stone-mining which has been done here since ages had and have a huge impact on the changing scenarios of Bholagonj creating deserted landscapes and conflicting zones.

4.2. Historical Narrative:

This river, Dholai of Bholagonj was once a celebratory landscape because of its crystal clear water, white sandstone bed and its picturesque surroundings and beauty as the ancient tribal group Jainta living in the hills of Meghalaya were preserving the White stone landscape and the fresh crystal clear water of Dholai for their own celestial purpose believing that such white stones coming with river water

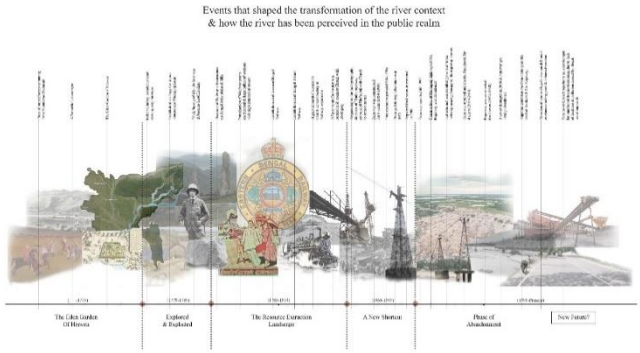

Figure 8: Historical Narrative of Bholagonj Ropeway Area. (Source: Author)

are the blessing of Bholanath coming from the uphill of Bholanath.
As a result, they worshipped the river, its blue water, and its stones. The Jainta craftsmen used to sell their stone crafts on the bank of the Dholai River in a bazaar named Bholagonj bazaar from which the place borrowed its name Bholagonj afterwards although previously named as Pundhuabhoomi (Threshold to Heaven). Pundhuabhoomi now Bholagonj along with the river Dholai was a calm, sublime, spiritual and a holy landscape. Even the Mughals

4.2.1. The stone quarries:

The Sylhet District's stone quarries were in use from the late 1940s until the end of World War II. To gather most of the stone, a three-plank river raft called a "barkee" was originally utilized (Scholz, 2017b). It was local tax collector Robert Lindsay who proposed quarrying in the Meghalayan hills and the Bholagonj floodplain without any environmental authorization. Using a manual quarry and river transportation, he started quarrying there in 1779. The plan was to siphon these stones from Bholagonj to the Chatak Cement Factory and then to the port of Kolkata in order to ship them to Great Britain. However, because of used this area as their leisure spot due to its scenic beauty. (Chowdhury, 1910). At the first stage of British rule, Bholagonj was called to be the "Eden Garden of Paradise"

Figure 9: Cultural & Religious Narrative of Bholagonj Ropeway Area (Source: Chowdhury, 1910; Robarts Library | University of Toronto Libraries, n.d. TRAVELS OF XUANZANG (629-645 CE) - Google Arts & Culture, n.d)

because of its unique presence with a harmonious blend and symphony of nature, blue water, green hills, waterfalls and white sandstones resembling the conjecture of heaven by Adlectorem (Figure 9). But this happiness did not last for long. The British took hold of the land as they thought the abundance of such stone reserve found in Bholagonj and Meghalayan Hills would open Pandora's Box for them and their economic competency. So, they took the decision to

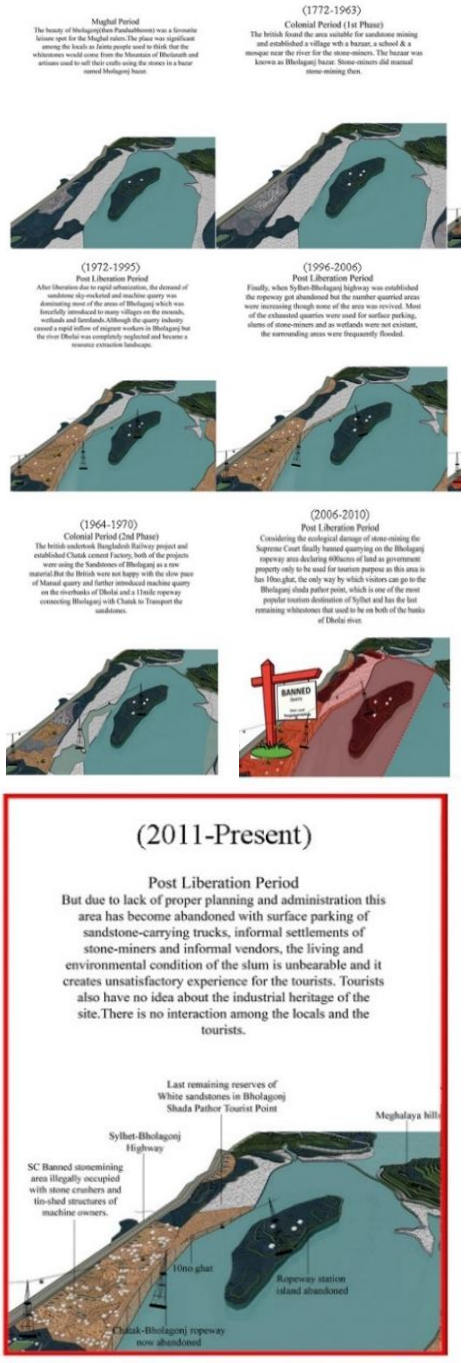

Figure 10: Site transformation of Bholagonj Ropeway Area with time (Source: Chowdhury, 1910; TRAVELS OF XUANZANG (629-645 CE) - Google Arts & Culture, n.d.)

quarry the floodplain without any authorized geological survey. Soon a river of a spiritual landscape got converted into a resource extraction landscape (Robarts Library | University of Toronto Libraries, n.d.).

The industrial revolution and the intensifying cold wars between western nations, the British were dissatisfied with the slow pace of manual quarry and boat transportation, and they needed a quicker way to transport stones. So, they chose to construct a ropeway to connect the Chatak Cement factory and the Bholagonj quarry areas in response to the haor (basin) geography of Sylhet, in order to facilitate the transportation of stones more quickly (Chowdhury, 1910). Between 1964 and 1969, 120 towers, four substations, and an excavation machine were installed along the 11-mile ropeway. Two diesel-powered electric generators, one on each side, powered the entire structure. In addition, a school, a mosque, a rest area, a ropeway colony in Bholagonj, and two diesel-powered electric powerhouses at either end of the ropeway were to be built as part of the project. Stone extraction was done automatically with the help of excavation plants until 1994, at which point the practice was stopped. Over a period of approximately 12 years, the excavation machine has been out of service due to an engine malfunction and a shortage of labor. Prior to being transported by ropeway to the Chatak Cement Factory for processing to create clinkers, excavated stones were broken, washed, and divided into categories such as sand, stone chips, and truck ballast, among others. Each bucket held 238 kilograms of stones. Due to all of this activity, a village sprang up to support and house the local development, and many migrant workers, primarily stone miners, were employed to work in the stone quarries and on the ropeway. The ropeway's operation was very beneficial to the railway that connected Bengal and Assam because the stones were used in that railway track. Due to the construction of a major highway and the construction of local roads, the demand for stones has increased dramatically between 1995 and 1996, which has led to a greater effort to remove stones from the Dholai River. The river's surface deposits have been almost completely depleted as a result of this. Again, the setting up of crushing equipment nearby the extraction areas has accelerated stone processing, which has had a significant impact on the Dholai River flood shed along with increased stone mining activity. (Scholz, 2017b).

4.3. Hydrological Narrative:

Since the River Umngot/Dholai carries a vast amount of stones which finally gets deposited in the Bholagonj area once the river enters Sylhet due to the enormous elevation drop creating a vast deposit of white sandstone, this river has been perceived spiritually important since the ancient times by the Jainta tribal group. However, with colonization, the river became a service corridor for illegally extracting and transporting stones through boats. The cultural connection between the community and river riverbed became much easier, many illegal quarry-

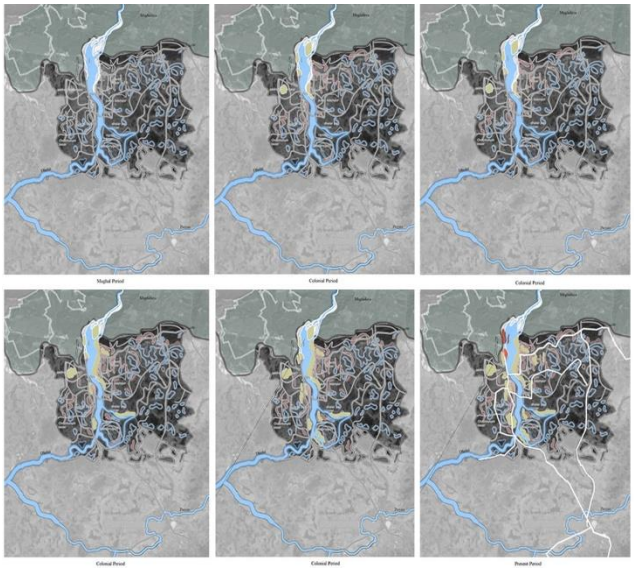

Figure 11: Dholai River transformation with time.
(Source: Author)

4.4. Infrastructural & Socio-economical Narrative:

The 11miles long Bholagonj-Chatak Ropeway (the very First Ropeway of Bangladesh) was established during 1964-1969 for rapidly transporting stones over haor (basin) geography of Sylhet got completely abandoned when the Sylhet-Bholagonj-Indian Highway was established during 1995-96 (Scholz, 2017b). With this highway the illegal extraction and transportation of stones from Dholai brownfields were created along the Dholai River floodshed

was lost and the river flood shed became polluted, barren,dry and devoid of greenery. Now, 75% of the clean, blue water of the Dholai River is polluted, pollution being carried downstream affecting the communities nearby. Through time, the river has transformed, lost its navigability, its stone bed got depleted, water got polluted and now the river itself has become a visual testimonial of the brutal industrialization that has left countless scars on an once celebratory landscape of blue water, green hillocks and white stones causing a great inflow of migrant workers who hardly know anything about the indigenous landscape or lifestyle of local Sylhety people. These migrant workers illegally live in nearby squatter/slums creating conflict with local farmers, fishermen and boatmen who live negotiating with the haor (basin) geography of Sylhet. Illegal settlements of quarry-workers and unauthorized quarry brownfields are encroaching local settlement and farmlands and destroying both land and water reserves. As these illegal mine-fields and settlements are in the authority of local mafia and goons, indigenous people are forcefully being pushed away from their lands and the river. The map (Figure 12) clearly shows how illegal mine-fields (marked red) are encroaching the Dholai river floodshed and local settlements (marked purple) and leaving a strong scar of industrialization with a barren brown non-vegetated landscape within the lush Greenfield of the haor (wetland)

surrounding Dholai River.

Riverside settlements are common scenarios in sylhet and it is clearly visible that the illegal encroachment of stone-quarries are creating a pattern of segregation within the communities and such areas are nothing but land of pollution and a meeting point of smugglers which itself is a threat to the community women and children. (Rahman, Uz-Zaman, Sakamuto & Fukui, 2004) Many air and water

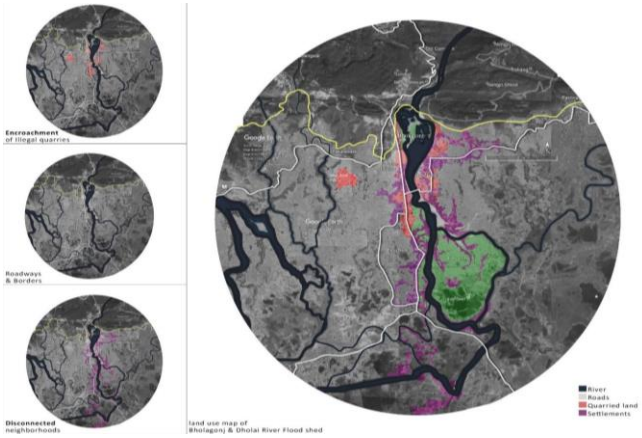

Figure 12: Schematic land-use map of Bholagonj and

4.4.1. Questionnaire Survey:

To understand the local perspective and user need, a questionnaire survey was done on the local people (local boatmen and fishermen) about their problems and need. From the questionnaire, it was discovered that most of the locals are leaving the edge of the Dholai river to avoid stone-mining practice and migrant workers are taking over their lands turning their "Haati" settlements (an indigenous linear settlement of Haor area on mounds) into slums if not so, they are being converted into illegal stone-mine fields and stone-crushing areas.

It was also found that the locals want income generating tourism culture in this area as a huge number of tourists

Date & Location:
User Name:
Age:
Gender:
Spare a few minutes to answer the simple questionnaire.
1. How many tourists visit the site every day?
a)50-250 b)250-500 c)500-1000 d)1000-2000
2. How much do you earn every day from tourists by providing them boat journeys?
a) 500-1000BDT b) 1000-1500BDT c) 1500-2000BDT d) above 2000
3. Which time is mostly crowded by the tourists?
a) Day b) Night
4. What happens on the site at night?
a)Tourism b)Stone-crushing c)Smuggling d)Drug addiction activities
5. What is site's the environmental condition?
a)Poor b)Moderate c)Good d)Excellent
6. What happens when a stone-quarry gets exhausted and abandoned in this area?
a)Left deserted b)Turned into industrial or urban area c)Reclaimed and recovered with vegetation
7. What is the current status of the Ropeway towers now?
a)Left abandoned b)Used sometimes c)Given adaptive reuse
8. Why are the number of tourists degrading day by day?
a) Illegal industrial activity b) lack of tourist amenities c) Safety issues d) Lack of transportation

Table 1: Sample data collection Questionnaire

gather here and use boats to reach borne diseases are also omnipresent due to extreme pollution caused by the stone-mining and crushin activities. People live here in extreme poverty and hostile environmental condition. Local boatmen serve the tourists by commuting them from Bholagonj 10no. ghat of (Site A) to the Shada Pathor Zero Point (Site C) near Indian border (the protected /salvaged tourist area with 5acre of vast sheet of last remaining exposed white sandstone layer) although they are also suffering as the tourist number is gradually deteriorating due to lack of essential facilities and increasing pollution in the government declared tourist land by unauthorized stone-mining and crushing.

Shada Pathor Zero Point (Site C, the border area filled with the last remaining exposed sandstone area) from 10no. ghat of (Site A) of Bholagonj Ropeway Area. The sample study gave a clear perspective of the local perception of the site and their future expectations which supported the Government decision of enhancing tourism facilities within the site. Several factors, such as the need of robust use of the abandoned land and recovery of abandoned stone-mine fields were considered in the design to avoid negative use of such a potential area which now threatens the site and the locals.

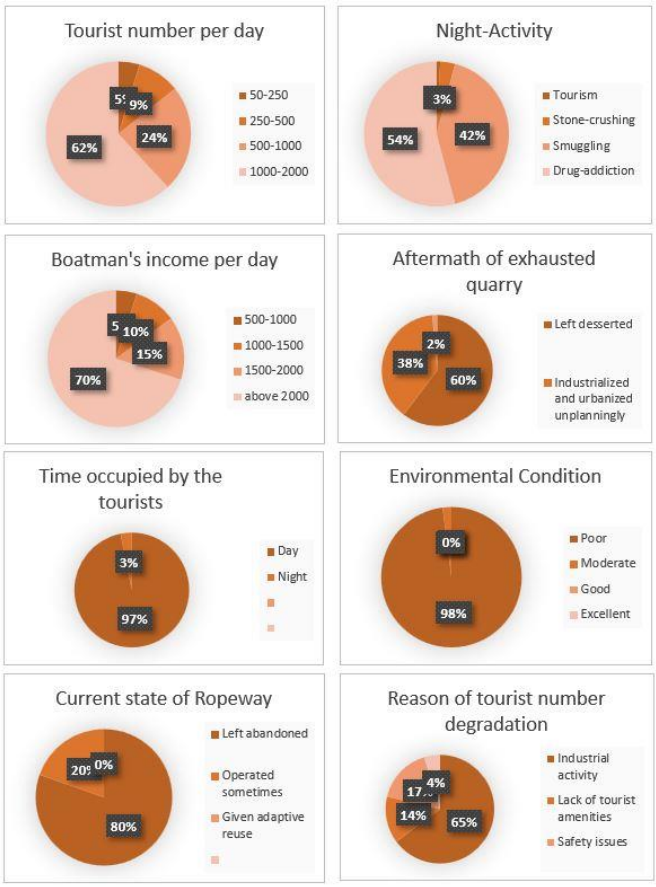

Figure 13: Survey Data from questionnaire

5. Findings & Discussion:

The increasing impact of human activity leaves the landscape with numerous open wounds including heavily altered, deserted areas with exposed rocks, collapsed ecological systems, and a very little to no vegetation (Xiao, 2016). The negative consequences mining has on the environment are:

Habitat/Biodiversity Loss: To get to the aggregate underneath during mining operations in pits or quarries, nearly all of the surrounding vegetation, topsoil, and subsoil must be removed, topography is altered. It causes a significant loss in biodiversity in addition to the extinction of existing animal wildlife and aquatic life (The Environmental Impacts of Aggregate Extraction | Toronto Environmental Alliance, n.d.; Xiao, 2016).

Natural Drainage destruction: Surface water and groundwater flow are already disrupted by pits and quarries (Xiao, 2016).

Water pollution: More people die from a lack of clean water than from war, terrorism, and all forms of weapons of mass destruction put together (Berman, 2005).Due to Mining pollution, the quality of drinking water for the inhabitants living close to or downstream near quarry sites is decreased. (US EPA, n.d., "EPA in 2009: Progress Report | About EPA"). Sylhet's basin geography is an important eco-system of water and stone, and illegal mining has an extremely detrimental impact on this ecosystem.

Noise & Air Pollution: For both locals and visitors, the noise pollution caused by large machinery used in stone quarries, such as crushers and detonators, is a huge concern. The stone quarry employees are susceptible to severe respiratory illnesses mainly affecting the children. Large trucks and stone crushing equipment generate massive clouds of dust and release a lot of suspended dust particles from crushed stone. Puffs of black, sooty smoke billow from the cheap, dirty diesel and kerosene-powered sand-clearing or shallow machines harming the overall environment of the surrounding areas. (Scholz, 2017b; The Environmental Impacts of Aggregate Extraction | Toronto Environmental Alliance, n.d.).

Such issues leads to proposing the following policies to be implemented in Bholagonj Ropeway Area:

- Proper survey and documentation of current gravel deposits in the Dholai River.
- Put a complete ban on any kind of machine quarry or stone-mining that exceeds the mining depth of 5m or more.
- Any sort of stone-crushing activities creating dust, air and noise pollution for tourists must be relocated nearby adjacent to the Highway.
- The abandoned ropeway land which has become an industrial brownfield o surface parking and stone-crushing yards must be vegetated through phytoremediation with local vegetation for the healing of this wounded landscape.
- Illegal structures must be eliminated from the land to facilitate an integrated tourist sight-seeing facility which will consider the geological and industrial heritage of the site.

6. Future Scope & Design Narrative:

The topographical distinctiveness and cultural significance of the abandoned mine lands represent opportunities for innovative design approaches (Xiao, 2016), such as:

- Material Consumption/Evolution Museum.
- Landscape Interpretation Center.
- Quarry Reclamation.
- Culture Sustainability (Axelsson et al., 2013).

Considering such factors, a proposal of rethinking the abandoned 600acres government land of Ropeway is established, which mainly consists of 3 land chunks 1. Shada Pathor Zero Point (no intervention border area), 2.Abandoned Ropeway Station Island and 3.An abandoned Quarry brownfield with 10no. Ghat. By connecting these sites with an engaging sight-seeing experience, tourists can reconnect with the industrial and geological heritage of the site as well as get aware of the local and global issues of excessive industrial material consumptions. The master plan phase are diagrammatically shown below which will ensure a sustainable transition of a polluted industrial brownfield into a healed, sustainable and regenerative natural system where stones can find their own space back within the River to choreograph their own narrative. The ultimate result is a memorable journey with few points of rests each unfolding an untold story of the site.

The journeybegins with the Visitors' Center which is

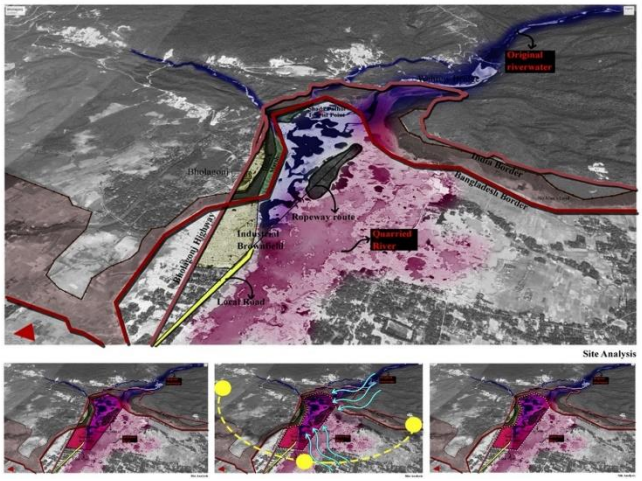

Figure 14: Site Analysis (Source: Google Earth)

embedded into an existing quarry pit. The next point is a stone-observatory cum amphitheater where tourists can see the variations in the stone deposit levels in the flood shed during different seasons. The 10no. ghat will remind the tourists of the true local context of the site where boatmen act as custodians of the River Dholai as well as they can closely observe the Iron towers of the Ropeway, a unique

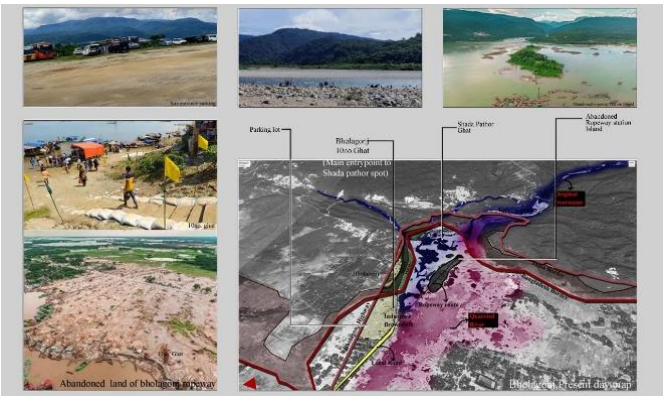

Figure 15: Site Micro-context Analysis (Source: Google Earth)

industrial heritage before they set out for the boat journey to explore site B, the island and Shada Pathor Zero Point near the border. Reaching site B, tourists will experience the industrial heritage of the site with full enthusiasm. The abandoned ropeway is converted into a cable-car route. The abandoned Ansar Camp (an old industrial building) is given public use simply by removing walls and exposing its frame structure. From here, tourists can take boats to reach their final destination, Shada Pathor Zero Point to witness the last remaining vast sheet of exposed white sandstone layer. For landscaping, indigenous plantation techniques can be implemented. Since most of the site is contaminated, phytoremediation with vetiver (a local plant) is proposed. Different seasonal plants can be used responding to different water levels for productive landscape and afforestation for lost riparian bio-diversity regeneration at the final stage. Thus, site A will act like a geo-tourism park and site B as an island park positively responding to the river serving as an unconventional tourist retreat.

6.1 Site and Masterplan Zoning:

Site C, Shada Pathor Zero Point is a restricted no intervention zone declared by the Government which by default was left as it is in the proposed master plan. Site B, the Ropeway Station Island consists of a Ropeway station and an abandoned Ansar camp both given adaptive reuse to keep the industrial essence of the site alive rather than imposing any new intervention on it.

Figure 16: Site Features (Source: Google Earth)

Only the degraded landscape regeneration is proposed so that this site may act like an Island park or a resting spot for the tourists who can take pause in the island while taking their journey by boat from the 10no. Ghat of Site A (the abandoned stone-mine field), being proposed as a geo-tourism park in the master plan with a visitors' center and a stone observatory toward Site C, Shada Pathor Zero Point. The location of the visitors' center, the only proposed built-form was decided considering the border and river setbacks. The proposed tourist trails followed the depleted terrain and on the edge of river, berms were proposed for slope stabilization.

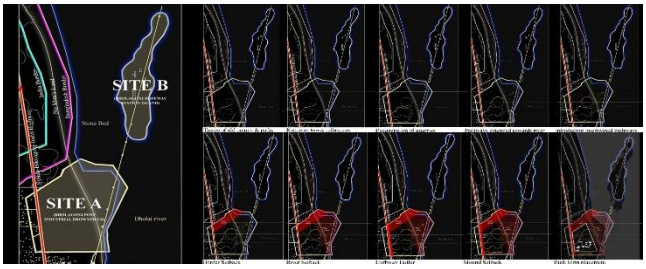

Figure 17: Site Zoning (Source: Author)

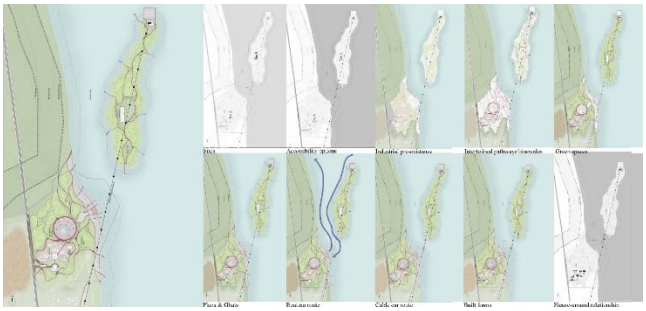

Figure 18: Master plan Zoning (Source: Author)

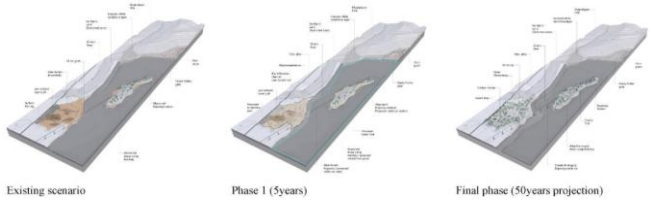

Figure 19: Proposed design intervention with Remediation Park and sight-seeing opportunities for tourists (Source: Author)

6.2 The Proposed Master plan

The master plan carefully crafts the Geological, Historical, Hydrological and Socio-economic narratives of the site into a thoughtful design narrative by creating a journey for the tourists connecting the 3 main land chunks of the study area. The master plan tries to establish a positive dialogue with the river Dholai and the serene landscape of the site in both master plan and sectional details.

Master plan (Wet Season)

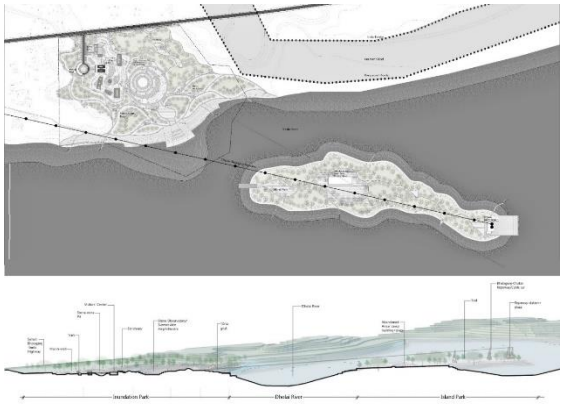

Figure 20: Proposed design intervention with Remediation Park and sight-seeing opportunities for tourists in Master plan and section (Source: Author)

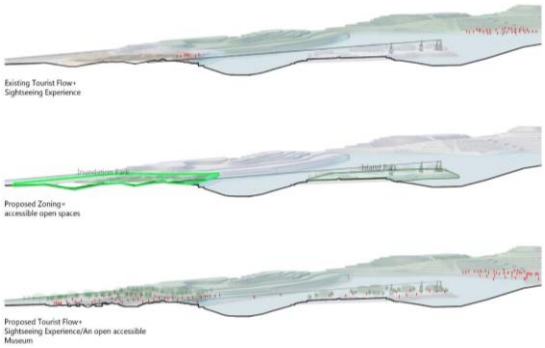

Figure 21: Proposed Sectional interventions to increase tourist sight-seeing experience. (Source: Author)

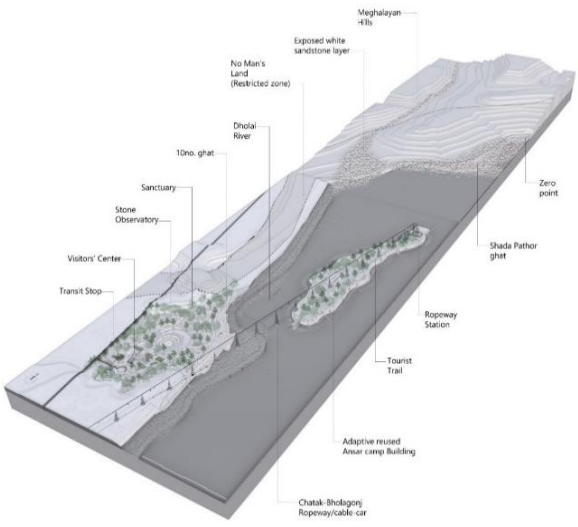

Figure 22: Arial view of the proposed revitalization master plan of Bholagonj Ropeway Area
(Source: Author)

7. Conclusion

The paper mainly focuses on the significant geographical and economic phenomenon that has shaped up the current conflicting context of Bholagonj where on one side there is a major threat of Bholagonj becoming a dessert of extraction landscape due to abundance of stones while on the other side, it shows a great opportunity of a flourishing touristic site with some significant features of landscape, ecological and industrial heritage that clearly narrates the story of this magnificent site from where the very industrialization of Bangladesh began. The aim of this study was to understand how this landscape of Bholagonj was transformed with time through the narratives of geography and historical changes and then analyze how these changes have been perceived locally and have impacted the local economy, environment and local lifestyle of the surrounding people so that thoughtful and informed design decisions and interventions could be made in order to reuse and re-organize the Government declared 600 acres of Bholagonj Ropeway land for touristic purpose. All the studies were presented in the form of a visual narrative through mappings and historical references for better communication. With these mappings, diverse issues were found which created another scope for analysis and discussion. The discussions paved the way for finding about the future scope of working in this critical geographical land. Lastly, few acupunctural interventions were proposed to improve the existing section and tourist flow of the proposed land for creating a better sight-seeing experience that can better resonate with the site and work beautifully with the true nature, culture, history and spirit of Bholagonj, which was once called the celebratory and celestial "Threshold to heaven" or the "Eden Garden of Paradise".

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