

**RIVER HALDA AWAKENING: A RESEARCH TRAINING AND AWARENESS
CENTRE**

At Burischar, Chittagong

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ABSTRACT:

The Halda River, originating from a hill creek at Ramgarh Upazilla in the hill-tract district of Khagrachhari is famous as the fish-mine of Bangladesh. This River and its waters have some unique physical chemical and biological features which generate a favorable atmosphere for four types of carp fishes, rohu, catla catla, mrigal and kalibaush to lay their eggs in the depths of the river bends, where generated whirlpools help in the process of the lifecycle. The focal physical feature, the ox bow bends of this river, combined with various other chemical and biological features such as the marshlands alongside the river edge, give this river its character and life allowing it to be the richest natural spawning ground of these four species of major carps from the time of its formation.

In the 1960s, this river had more life than it has now, producing 3 times the volume of fishes and so generating three times the amount of activity along this river. All this has experienced a major phase of diminishment, generating a situation of large scale depression for the fishermen. The River life degradation is mainly for the straightening of the river ox bow bends along the river edge, which is the source point of fish life generation. The community takes up this methodology in order to protect their homesteads and properties from the disasters of river edge erosion. This approach to the river that the people have adapted to is a cause for the lack of awareness and negligence by the existing government projects and also because the locals lack knowledge about the scientific issues related to this river.

Such disregard to a natural source is leading to illegal fishing of mother fish, improper river edge protection method development and so on. This, in turn leads to the decrease of fish egg generation, which further relates to less economic generation and creates a break in the natural cycle. Due to decreasing opportunity in fisheries sector of this river, most farmers are shifting from that of being a fisherman to agricultural farmers.

The idea behind this project generated from this original of providing a platform for the fishermen, which will help reach out and allow development and interaction of this community at a local scale. It will further achieve awareness at a wider scale, reaching out to other cities and countries in the process of research, conservation and archiving. Functionally developing the project into providing training spaces, research facilities, and exhibition spaces and various awareness programs and processes was based on this hypothesis, so as to support a community and generate a program that has evolved from the site within.

The focus of this project was to generate an architecture that celebrates itself within nature giving the river and its surrounding a more valuable meaning, not taking up the space that it will occupy but instead giving back to nature in multiples of what it is taking.

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1.1 Project Introduction

River Halda awakening is a project of the Bangladesh Ministry of Fisheries and Livestock. This project will further involve the Bangladesh Environmental Lawyers Association and Bangladesh Water Development board for technical decisions involved. The selected site of around 8 acres = 13284sft, for the chosen project was taken at a river bend near the confluence with River Karnaphuli.

The idea of the project is to develop a community based project on the edge of River Halda that will promote the surrounding nature that it is in.

1.2 History

The River Halda (22° 54' North and 91° 48' East to 22° 24' North and 91° 53' East) originates in the hilly streams from Halda chora of Khagrachari district and flows a length of 88 kilometers, through Fatickchari, Hathazari and Rouzan districts and then confluences with the river Karnaphuli. "The river is navigable by big boats 29 km into it (up to Nazirhat) and by small boats 16-24 km further (up to Narayanhat)." (Wikipedia, 2014)

"The River Halda has been the richest natural spawning ground of four species of major Indian carps (*Catla catla*, *Labeo rohita*, *Cirrhinus mrigala* and *Labeo calbasu*), from the time of its formation. The river is fed by several hilly streams starting from its origin, and has 12 important tributaries located in the lower region (downstream), where four spawning grounds of major carps are situated." (Kibria, 2011)

This is the only tidal river of Bangladesh from where naturally produced fertilized eggs of major carps are collected and hatched in the mud made scoop on the river bank, during the summer season of June to August. It is also the biggest source of naturally produced carp fry for country's pond culture. Along with being one of the major sources of brood and larvae of giant freshwater shrimp, a rich assemblage of shell fish and fresh water dolphins (shushuk) are seen in this river. Besides fishing purposes the river serves for irrigation, navigation, sand collection and as a supply of water to the city dwellers of Chittagong. Information and status of Biodiversity of any aquatic or terrestrial bodies are essential for formulating proper management policy, but no detailed works were found on the biodiversity of Halda River.

As per news reports during 1975-76 and 1982-1983, 12 major tributaries of the River Halda (downstream) were blocked by sluice gates and 47 km embankment was made by the Bangladesh Water Development Board for irrigation and flood control purposes. "Since 1948 five major oxbow bends (spawning ground of major carps) of the river were lost due to straightening of these bends by the local people reforming the loops of the river to protect their homestead from destruction by severe erosion of the river edge. The impact of this habitat alteration was observed in the severe declining of major carp fry production from 2470 kg in 1945 to 20 kg in 2004." (Kibria, 2011)

Emphasis has been given only on the spawning sector of the river, but no measures were undertaken to know the diversity and abundance of the other finfish and shell fish, of the river Halda and to provide suggestions for their conservation or to the conservation of the river as a whole. Recent studies have also shown the shift of occupation amongst the locals from fishermen to agricultural farmers as the other sector is more promising. Documentaries reveal that a huge amount of money was wasted while implementing a taka 140 million project that could hardly develop the fish spawning centre, which was unsuccessful due to lack of monitoring and ill minded officials.

The river is facing high level of degradation due to lack of knowledge and carelessness of the local governors. It needs immediate attention as the conditions are already falling out of control.

1.3 Description

The spaces of the project will be designed keeping in focus the locals of this region and community of the country, but will also be able to serve the foreign delegates or researchers visiting or working for the center. The center will be molded to enlighten all ages of the generation.

1.3.1 *Location:* Burischar, Mohora bill, Chittagong, Bangladesh.

(Downstream from the Moduna Ghat bridge)

1.3.2 *Site Area:* 8acres and 13284sft

(DPZ 4, according to Chittagong development authority)

1.3.3 *Client:* Bangladesh Ministry of Fisheries and Livestock

-to preserve fisheries resources

-proper management and planned development

-increase socio-economic conditions of fishermen

-create employment opportunities for the rural unemployed

-expand foreign exchange earnings by exporting fish and fishery products

-to invent new technologies through research for hatcheries

Bangladesh Water Development Board (BWDB)

- To give irrigational solution for the existing processes that hamper the ecological state of the river

Bangladesh Environmental Lawyers Association (BELA)

- To assist efforts to protect the environment

Bangladesh Tourism Board

- To promote responsible tourism that will result in the economic development

1.4 Project Rationale

Statement of the river Halda, as a national river is much required. The deteriorating condition of the river has raised the demands of conserving the heritage and environment of this water body. Being the lone natural spawning center of major carp fishes in this region and a major source of revenue for many fishermen, be it at a small scale or large, the area demands proper management, treatment and design of the river perimeter.

The project was chosen to attend to the physical implementation of a built mass, and also think beyond and address the more critical factors of the conservation of the natural heritage, generate knowledge on an asset of this country, mold out a new economic advantage with tourist activity and a development which will help in setting a vision to the along the whole of the river edge. The project will enhance and introduce a new way of learning, allowing people to learn through more interactive methods of observation and bringing back the method of learning through apprenticeship. The project will promote a self-sustained community of the fishermen, possibly through employment of the locals in that region and also give regards to not harming the natural settings of the river.

1.5 Key Aspect And Objectives

To give a further focused interpretation about the project, the successive objectives will be fulfilled:

- a. Recognize a heritage and natural resource of this country and conserve and prevent the quantity of fish in our country from continuously decreasing facing the possibility of near future extinction.
- b. Facilitate cultural activities (boat racing, fishing etc.) during the seasonal peaks, to present our culture worldwide and encourage the young generation to participate in traditional activities and understand their roots through creating a public realm.
- c. Enhance and introduce a new way of learning, allowing people to learn through more interactive methods of “firsthand experience” and observation and enlighten populace on aqua life of this tropical region through innovative methods of observation.
- d. Enhance the idea of a self-sustained community and utilize the potentials of the locals in behaviors benefiting them and the project.

1.6 Site Rationale

This specific point of the river, near the confluence was chosen highlighting a few factors. It is believed, after much research, that in the ecological being of the upstream regions, where the bends of the river generate and end, it is best for the spawning of the carp eggs. “This makes approximately 20 kilometers length of the river, from Moduna Ghat to Sattar Ghat, feasible for the natural process of fish spawning to come about.”(Kibria, 2011) Any intervention with the existing atmosphere and being of this river may impede with the natural process of the river. “This has once been proven in 1948, by the major impact on egg spawning due to straightening of ox bow bends.”(Kibria, 2011)

But to run a center successfully, at any cost, revenue generation is a necessity. To serve this demand some basic recreational behaviors must be facilitated; such as boating, fishing, aqua-agriculture (floating agriculture). And if a research facility is to be offered then it has to have a minimum longevity, thus bringing up a question of permanence and use of materials that may not always support the chemical status of the river during the construction. As a place for reflection or an awareness center, the physical has to be able to facilitate a certain crowd at times, adding to the noise pollution of the environment.

Thus the site for the given program has been proposed slightly away from the main biological activity zone, and more near to the Karnuphuli River, where the scale of public activity is already high. This also adds to the allowance of exploring materials in terms of construction and the chosen area being close to the existing hatcheries, fishermen’s village and age old Borua Para will be an additional advantage of the tourist routes.

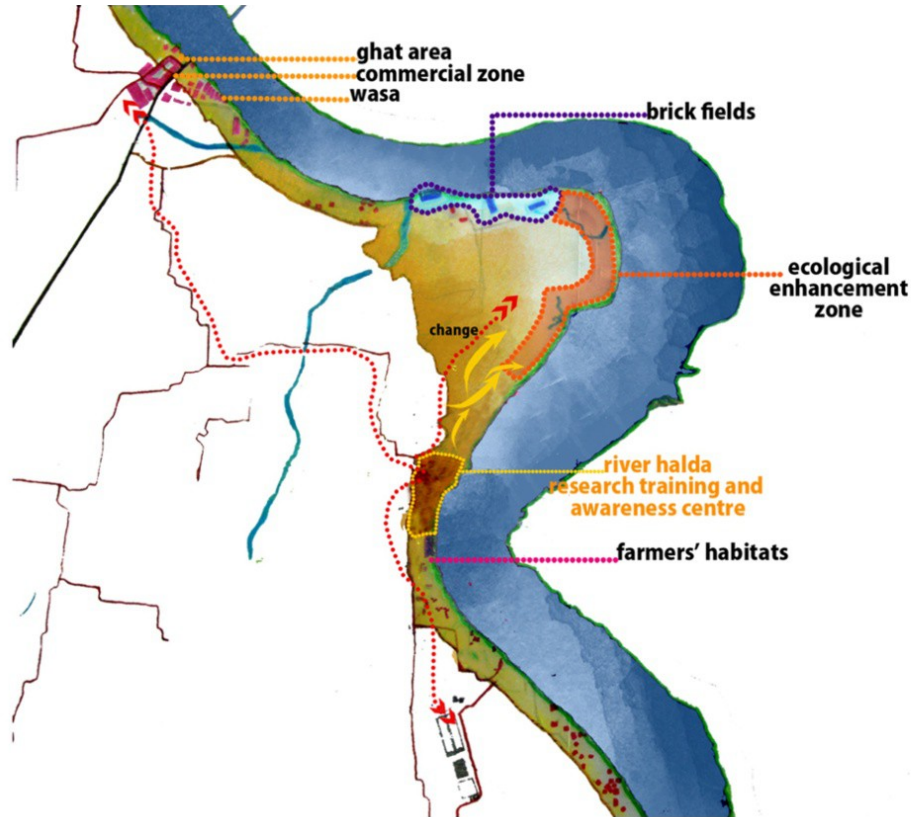


Image 01: Site rationale near to the River Karnaphuli, surrounded by an ecological zone, hatcheries, fishermen habitats, a road proposal from the commercial hub, and brick fields to the opposite.

Source: Farasha Zaman

1.7 The Basis of Program Formulation

Generating from the hypothesis, on a broader scale, two programs were categorized; for the people: research and awareness, for the river conservation.

Providing awareness cancel out the negligence that the people are showing words this river. If the population is aware of the qualities and how they are dependent on this river they will become more conscious. Research will fill up the void spaces of knowledge about the biodiversity and ecology and so on about this river, such as a terrestrial ecology lab will help develop samples of trees that help in conservation of the river edge adding to the ecological factors that help attract carp fishes.

An addition of a training sector will allow the local fishermen to realize that this is a place for them, and create an atmosphere that welcomes them. This will in turn help in the maintenance of the centre, as people will feel that it is their own.

1.7.1 Basic program

- Exhibition routes and spaces: these will be tourist routes addressing both local and international tourists, who want to get an experience of the culture along the river Halda as a whole. This will be including a journey following how the fish market works, to the processing of the hatcheries nearby, to observing exhibits, to the fishermen village nearby. Other areas of historical importance may also be incorporated.
- Training center: for the fisherman to learn and improve their traditional ways and to accommodate more students and allow development of new methods.

- Water vessel dock and other docks for recreational purpose or purely for observational learning.
- Recreational facilities: boating with Shampan, swimming and diving facilities.
- Civic ground or a space for recognition realization and reflection: a ground or space to accommodate activities of festivity or of publicity events.
- Retail ground: development of a bazaar area or business zone, souvenir shops.
- Archive and library: for the documentation of the researches in a proper manner and also for the documentation of the species of fishes, other than carps, found nearby.
- Research labs: mainly research on maintaining the ecological environment will be done.
- Hatcheries and observatories and Bird sanctuaries, incorporating the project with the eco park nearby.
- Interim accommodation for researchers.
- Solid waste management plant.

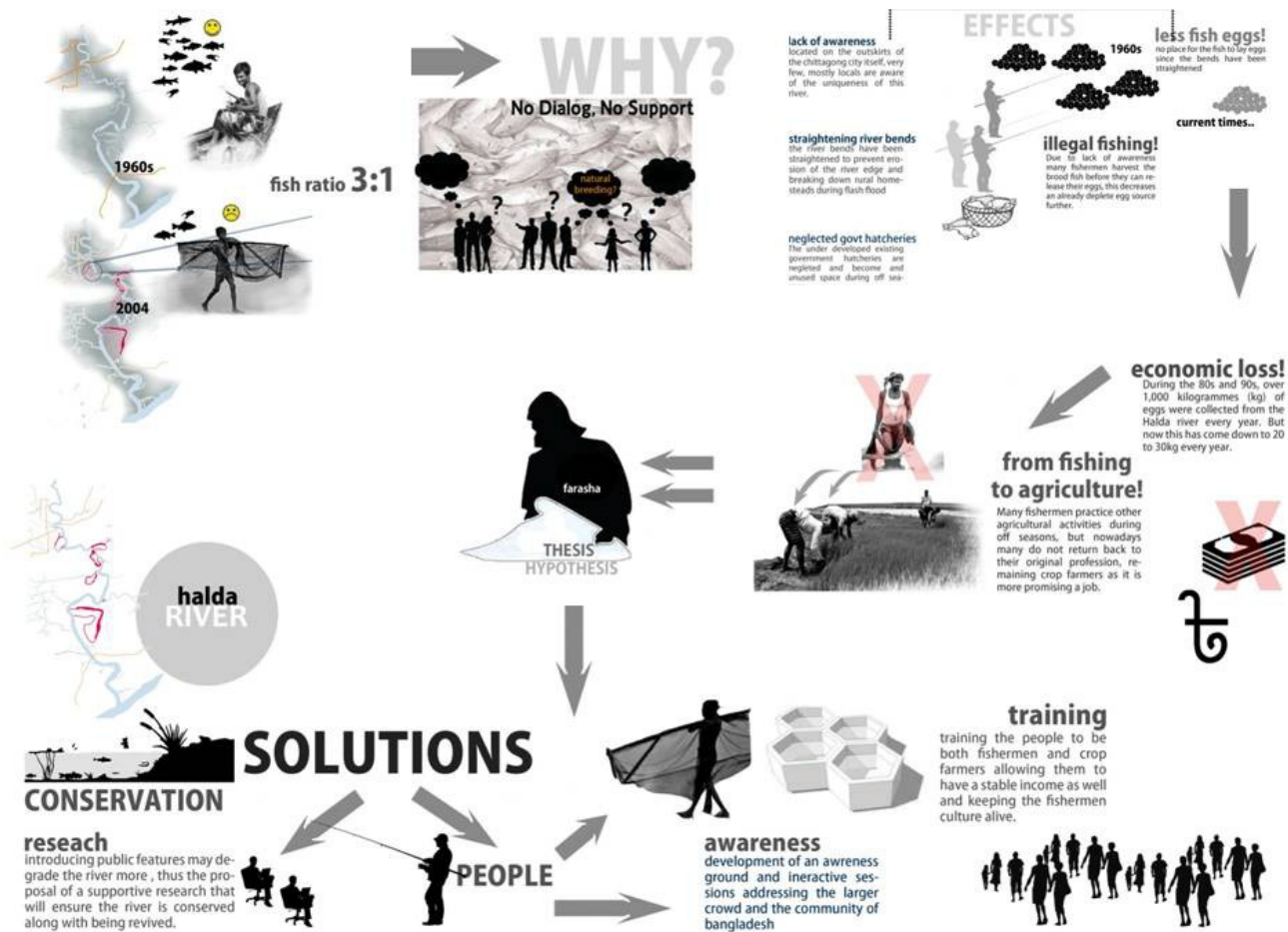


Image 02: Project rationale and program development
 Source: Farasha Zaman

CHAPTER TWO:

Site Appraisal

2.1 Location of the Site

The site is located in Burishchar, Mohora bill, Chittagong, Bangladesh. The area is towards the south-west of the country. This zone falls well outside the compact city centre; being about 45 minutes journey from 'GEC mor' (which is tentatively located at the centre of Chittagong city) by roadways. If travelling by train, the last stoppage from Dhaka is at Janali Hat, from where it takes 20 minutes to reach Burishchar, by roadways. If travelling by air the stoppage is near Patenga, from where it takes about 2 hours approximately to reach burishchar, by roadways.

It is downstream from the Moduna Ghat Bridge, very near to the confluence of river Halda with the river Karnaphuli. It is a total of about 25 minutes boat ride from the Moduna Ghat Bridge to the chosen site and a 15 minutes ride to the Karnaphuli Bridge. The site falls under the division DPZ 4 and is influenced by areas of DPZ 10 of the Chittagong development authority plan.

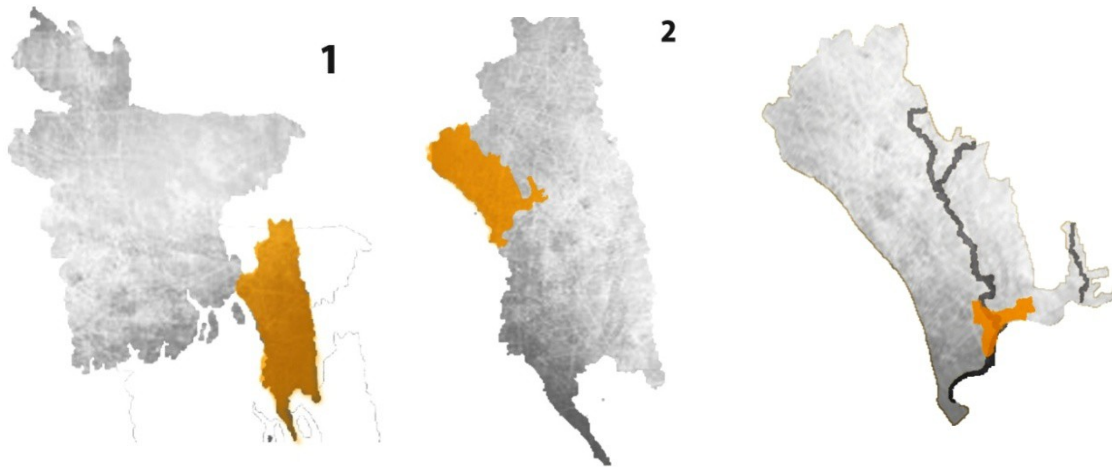


Image 03: Site location. 1: In reference to the country, 2: In reference to the Chittagong city. 3: In reference to the DPZ location

Source: Farasha Zaman

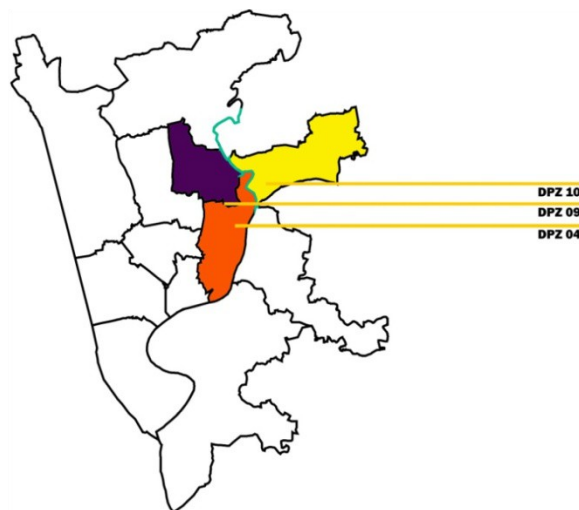
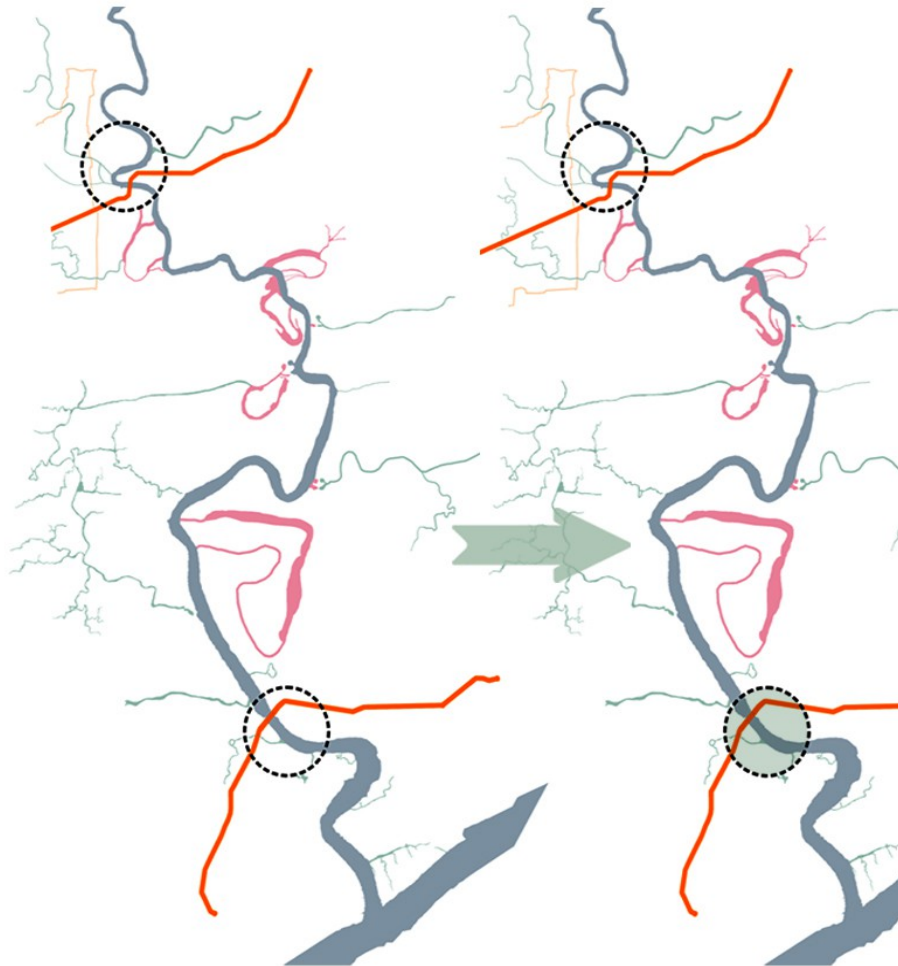


Image 04: DPZ location.

Source: Chittagong Development Authority

Image 06: Site location at river edge
Source: Farasha Zaman



ACCESSIBILITY



MONITORING



CELEBRATION

Image 07: site location is near to the river edge to achieve monitoring, accessibility and celebrate the river
Source: Farasha Zaman

The site is 8 acres and 13284sft. (DPZ 4, according to Chittagong development authority) located in a secluded bend of the river Halda. It has the river running along its south western side and has vegetation towards its eastern side. The main idea behind choosing this location is that the placement of the centre here allows spectacular experience of the aquatic wildlife. Being near to the confluence this part of the river is visited by the dolphins of the Indian Ocean, Shushuk, and also lobster are seen here in shoals. Migratory birds visit the char area near to the site. Being away from the main hub of the urbanization, this place will add to supporting the tranquility of a research centre, and being right beside the river will help collecting fresh samples.

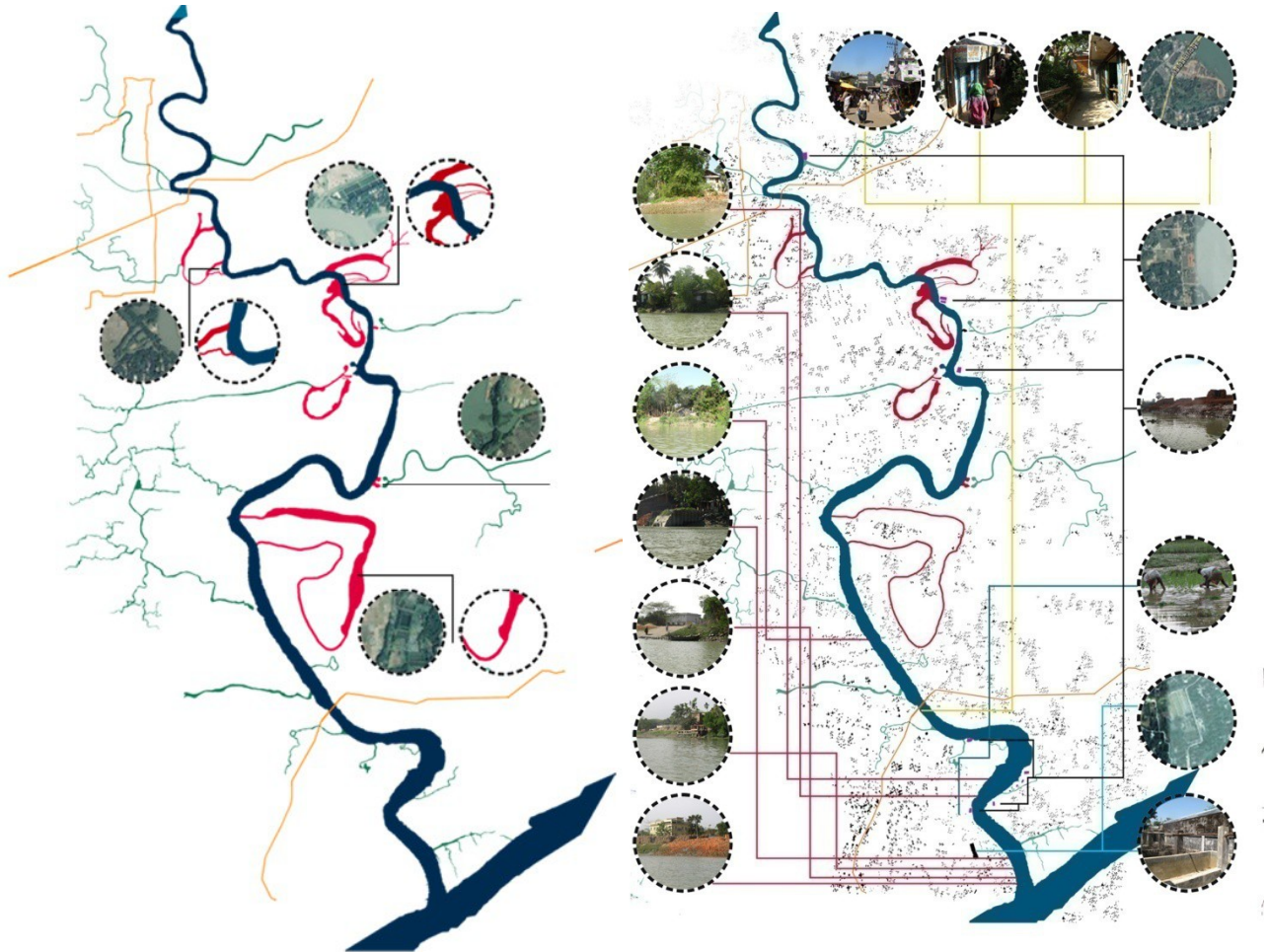


Image 08: Site surrounding features
Source: Farasha Zaman

The area having agricultural fields nearby will allow in seasonal cultivation of the spawns when mud houses are needed. Having the training block near to the river will help in maintaining observation of the fisherman and illegal methods. The place being near to the confluence is well outside the “off-limit” zone of the river Halda, so accommodating recreational facilities such as swimming boating will not hamper the ecosystem, and if hand- driven boats are introduced and maintained from this point onwards it will reduce the damage done to the spawning environment by motor boats. The project will act as a civic ground or a space for recognition realization and reflection: a ground or space to accommodate activities of festivity or of publicity events. The placement of a Solid waste management plant here will help filter the mixing of the toxic water into the breeding grounds, which will influence other more majorly effected zones of the river to be addressed.



Image 09: River view of the site
Source: Farasha Zaman



Image 10: View from site
Source: Farasha Zaman

2.3 Site Potentials and Threats

Our country is called the ‘daughter of the rivers’. Our economy has flourished and our civilization has developed centered around the rivers. The driving force of our economy is the rivers. But lack of knowledge and eagerness of people has led to the development of major threats to the waters of many rivers along with that of River Halda.

Notable threats to this region are caused mainly by the spontaneous growth of brick fields and the partakers of the agricultural practice. Their lack of knowledge has allowed concrete slopes to be developed as river edge treatment preventing biodiversity, the straightening of the bends (breeding grounds) and dredging in artificial tributaries, “khals” which hamper the river flow. The river water chemical level is changed not only for climatic reasons but also the drainage of untreated water directly into the rivers.

2.3.1 Water bodies

The main reason of water pollution in this area is the brick fields. The private owned lands are using these zones for revenue generation by building brick fields. These should be stopped immediately if we want to save the river. Their land should not however be taken forcefully but relocation can be a good option taken up by the government

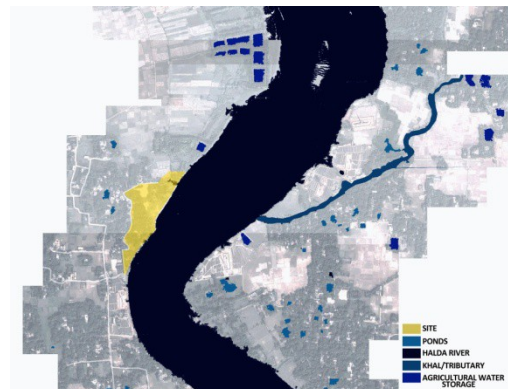


Image 11: water bodies in and around site
Source: Farasha Zaman



Image 12: brick fields at the edge of the river
Source: Farasha Zaman



Image 13: The unacceptable condition of the river edge
Source: Farasha Zaman

The edge where the commercial hub of the river is located is unacceptable. The development show complete disregard to the environmental issues and brings out the need for awareness amongst the locals.

2.3.2 Vegetation

The whole length of the river continues to surprise the traveler with beautiful wildlife. Starting the journey upstream will allow experience of seeing shoals of jumping lobsters and other fishes in the clear water and many birds on land. Downstream towards the Karnuphuli will allow the sight of the shushuk.

Other interesting features are hidden amongst the lush green lining the river at point where it has not been damaged by human encroachment to build brick fields or any other unacceptable purpose.



Image 14: vegetation in and out of site
Source: Farasha Zaman



Image 15: The edge area of the site
Source: Farasha Zaman



Image 16: Many species of the birds seen here
Source: Farasha Zaman



Image 17: Site is surrounded by beautiful aquatic life
Source: Farasha Zaman



Image 18: herons are a common bird here
Source: Farasha Zaman

2.3.3 Urban Potentials: tourist areas and routes

The site chosen for implementation is not far from a few experiential places in Chittagong. These include observing and learning the traditional ways of agricultural practice in Bangladesh, the festive nature of the river during the season of collecting carp eggs (April to June), the daily bazaar activity along the roadside along with various street foods being served, the ways of bamboo treatment and the lifestyle of the fishermen and farmers as a whole. Other than these architectural places include that of the old Arakan civilization, near Chandgaon area and the Chittagong University, designed by an architect of this nation, Mazharul Islam.

The site is located at a point of 15 minutes diversion from the route towards Kaptai and Rangamati, so can be a wonderful one day stoppage for tourist visiting these places.

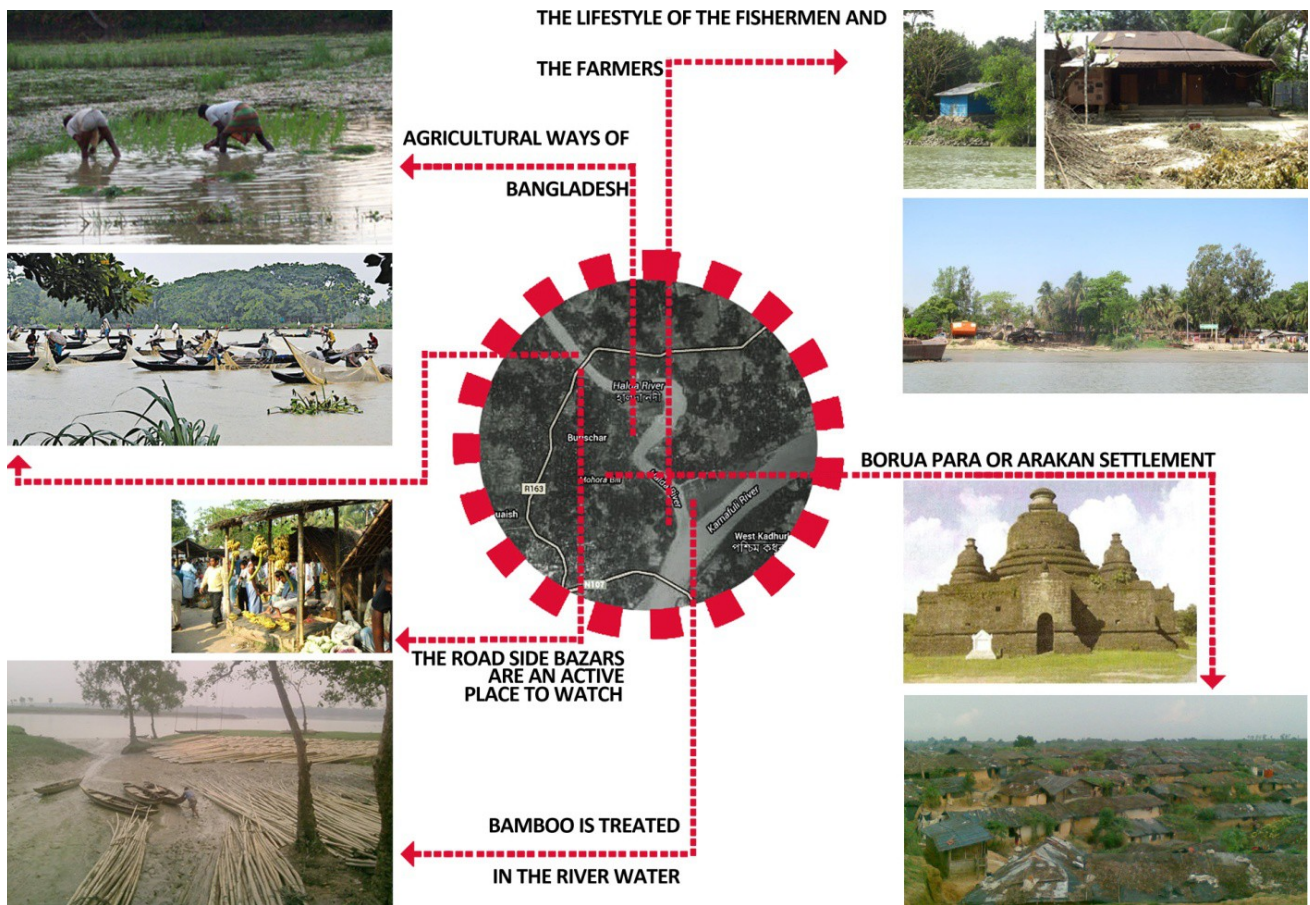


Image 19: tourist places near to site
Source: Farasha Zaman

2.3.4 Built forms

The character of the land studied shows that the settlements are mainly more towards the southern end of the site, which is near to the confluence with the river Karnaphuli. This pattern has evolved due to the reason of employment being available in this area. The rest of the land is left vacant for paddy fields and other agricultural purposes.

The western side of the river is seen to have more alarming situation in case of urbanization lined with brickfields and spontaneous growth of habitats to house their workers. The brick fields are exactly at the edge of the river, which means dumping of their waste and debris into the river by default during the high tide, which do not dissolve in the water and cause severe sedimentation, along with changing the chemical balance of the river water.



Image 20: built forms related to site
Source: Farasha Zaman

The local houses of this place are mainly of fishermen or farmers, some having the rural character which is observed to be lost in other places of Bangladesh. This is notable factor that could be incorporated in the tourism to be proposed in the later phase.



Image 21: fisherman's habitats at the edge of the river
Source: Farasha Zaman



Image 22: the fishermen's and farmer's habitats are a beautiful experience altogether
Source: Farasha Zaman

2.3.5 Landuse Pattern

The area is widely cultivated in rice. Some small areas are cultivated in other crops such as bamboo. The main source of income here is seasonal though, depending largely on fish cultivation. The cultivation not only involves that of carp fishes but also lobsters and other variety of fishes.

The recent development of the land use includes brick field, with sand dredged from Karnuphuli river and water being readily available from the river Hlada itself. This is an alarming scenario harming the river water faster than any other cause.

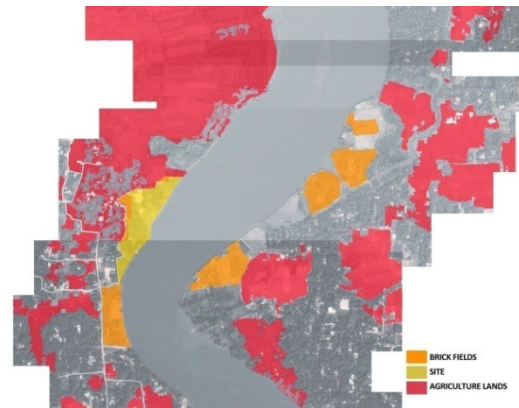


Image 23: Land use pattern
Source: Farasha Zaman



Image 24: agricultural and hatcheries
Source: Farasha Zaman

2.3.6 Transport Network

The road network is not properly developed in this area. The water way is used as a means of transport, with Ghats at Moduna and another further upstream at Sattar. These are also not properly maintained but have an economy growing around the bridges there in an interesting pattern which may go unobserved due to the development of the bridges.

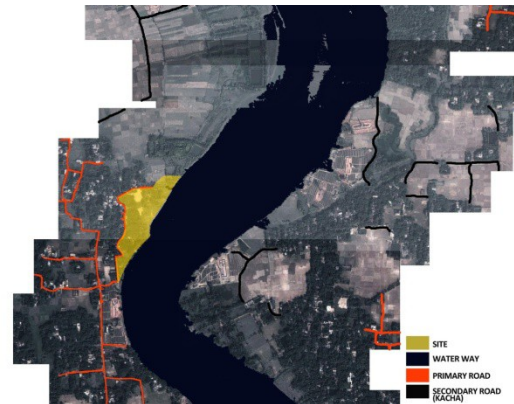


Image 25: Road networks
Source: Farasha Zaman



Image 26: Local shops selling all kinds of goods have developed in layers along the edge of the bridges
Source: Farasha Zaman

2.4 SWOT Analysis

2.4.1 Strength

- The site is located near to the confluence and well outside the zone where no physical implementation is allowed by CDA.
- Being near to the river it can serve as a base for water based recreational activities.
- There are a number of tourist places around such as the fisher village, Borua para, CUET, the hillsides towards the west, the hatcheries and places where fishing culture is practiced.
- The site is only 25 minutes boat ride from Moduna Ghat and 10 minutes by road from Moduna Ghat bridge, and so can act as a day stoppage for visitors to Kaptai and Rangamati.
- Having still being untouched by urbanization, the site allows the nature to be realized as the wild.
- Being in a slightly secluded area it has the advantage of being away from noise pollution.
- Variety of wildlife, terrestrial and aquatic can be observed, along with migratory birds in winter.

2.4.2 Weakness

- Roadways are not developed leading to the site.
- The site experiences flooding and is in a flat muddy area.

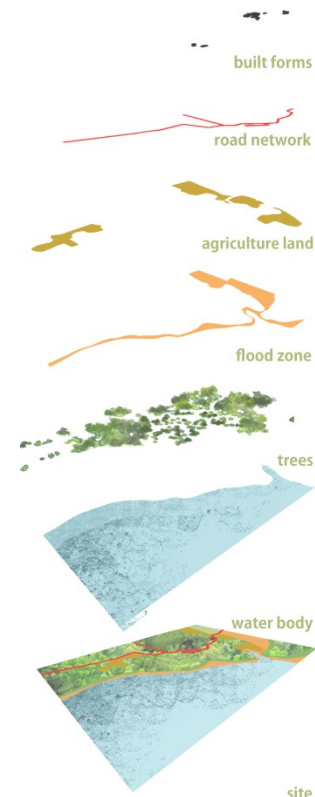


Image 27: Site Layers
Source: Farasha Zaman

2.4.3 Opportunity

- The site experiences flooding and is in a flat muddy area so architecture can be explored.
- The project may help preserve the untouched experience of nature that is present in the site.
- Increase the economic growth in the sense of providing more employment.
- Traditions can be preserved and enhanced.

2.4.4 Threats

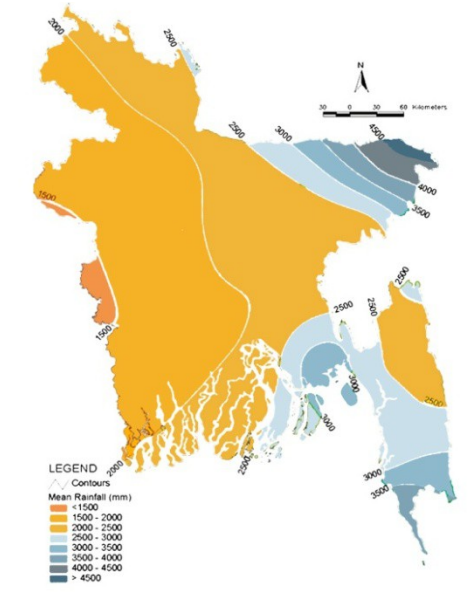
- Being very near to the river may experience landslide.
- The river is in danger of losing its ecological balance due to spontaneous unplanned growth, brick fields, and improper drainage.
- Proper awareness must be provided to a natural heritage of our country which will otherwise be lost.
- Serves the economy of the country which will be affected.



Image 28: slope study and potential threat zone analysis
Source: Farasha Zaman

2.5 Climate

Chittagong has a tropical monsoon climate and is generally a cyclone prone zone. The temperature in Chittagong ranges from 13.8 to 32.05. (Celsius) and average rainfall varies from 18.0 to 2688.0 (mm/month). The prevailing wind directions are from South to South East during the months of April through September. After taking easterly direction for a while the wind turns to the northerly and north easterly directions, the later prevails from November to January. During the months of February and March winds turn via westerly direction back to the Southerly to south Easterly. 20 Knots/ Beaufort wind scale 5 prevails for 6 percent of the time while those in excess of 30 Knots/Beaufort wind scale 7 persists for about 0.1 percent of time during cyclones.



av. max and min temperature



av. monthly precipitation



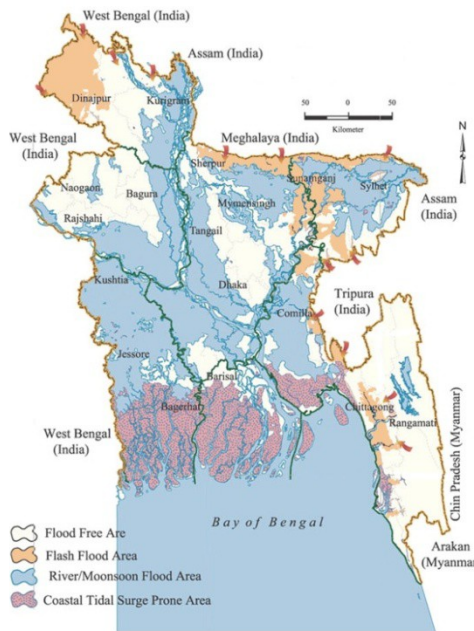
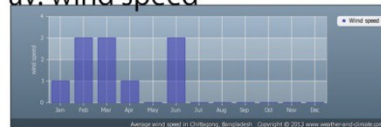
av. monthly rainy days



av. humidity



av. wind speed



% land area affected by flood

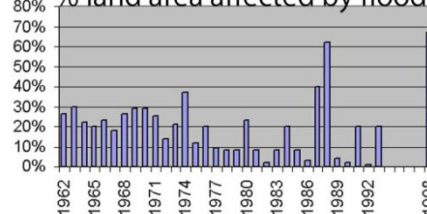


Image 29: Climatic graphs and data
Source: Wikipedia

CHAPTER THREE: Literature Review

3.1 Learning

"Learning is the act of acquiring new, or modifying and reinforcing, existing knowledge, behaviors, skills, values, or preferences and may involve synthesizing different types of information. The ability to learn is possessed by humans, animals and some machines. Learning is not compulsory; it is contextual. It does not happen all at once, but builds upon and is shaped by what we already know. To that end, learning may be viewed as a process, rather than a collection of factual and procedural knowledge. Learning produces changes in the organism and the changes produced are relatively permanent." (Wikipedia, 2014)

The main idea of learning is to develop and experience, not just gain knowledge. The traditional means of learning were that in which a guru was involved and learning was obtained in the nature from the nature. People were taught first to respect the nature and then experiment with it. The new city ways however have become more advanced, with children having to learn everything that has already been researched on so that they can dig deeper into the knowledge. This is not a negative way, but while doing this the basic knowledge of the small things are being lost. A child growing up in the city knows how to catch a fish with the fishing rod only in the "fishing game", not in an actual river or pond. He is aware of the nature facing extinction but never has seen it die in reality.

Today the ways of learning are mostly based on books and written textual formats rather than observation or experience. The basic learning is limited to schools or formalized to examinations. Children only learn what is needed for them to become graduates or obtain higher education degrees. Very few know the roots, heritage and base of their country and their source.

One reason behind this is the lacking in the ways knowledge is placed to the children. The children get easily attracted to easily accessible knowledge through the internet and rarely visit libraries, or work beyond what is need for them to graduate in school, thus remaining unaware of many issues, and consequently being unable to serve the needs of a country for young spirits in creating awareness or taking socially helpful steps.

The more people learn about some issue, the more aware people will be. Targeting children is the best approach as these spontaneous youth spread anything that they learn faster than the aged, mainly as their level of interaction is more varied and larger in number.

Innovative methods such as workshops, school study trips, and exhibitions may enlarge the awareness level locally.

Studies show that people learn more through interactions and observations than through attending lectures. It is also observed that visual means of gaining knowledge is retained more than that knowledge that is taught.

3.2 The Learning Center

A learning Centre is a facility where students engage in independent and self-directed learning activities. A learning Centre may be one which offers a pupil the chance to focus on specific areas of study or it may be one in which a pupil can explore options. The Learning Centre proposed should focus on delivering or exposing an aspect of study. There is a fine difference between a learning center and a school. This is in the variety of options that are provided for study, which is that the Learning Centre focuses on various topics of a sector of study while a school provides more option in case of sectors of study and targets a larger group of the population. The proposal of this Learning Centre is to create awareness and give recognition to the river Halda, which is at the verge of losing its character of being a natural spawning zone for carp fishes.

“Awareness is the silent and choice less observation of what is; in this awareness the problem unrolls itself, and thus it is fully and completely understood. A problem is never solved on its own level; being complex, it must be understood in its total process.” (J.krishnamurti, 1960) Awareness is not self-induced, nor is it the outcome of practice; it understands the whole content of the problem, the hidden as well as the superficial. The surface of the matter must be understood for the hidden meaning to show itself. This whole process is not verbal, nor is it a matter of mere experience. Verbalization indicates dullness of mind; and experience, being cumulative, makes for repetitiousness. Awareness is passive alertness which reveals its total process. Thus just to perceive or to be conscious of events objects or experiences is not awareness. The whole of an idea must be known and understood. To understand a problem, one has to be able to experience the beauty of what is, and then only will he know what its absence may be.

If a space can create an experience or memory that one would cherish or want to relive, then only can he know what its absence will be like to endure. Only knowing about something vaguely or through articles may not be an effective method to approach everyone.

There are many ways of providing awareness such as

- Campaigns for publicity
- Targeted efforts _ targeting certain groups of people to be addressed such as economy class people to sell hybrid cars which are energy efficient thus maintenance cost is less.
- Using the media _ Television, radio, talk shows, etc
- Reach out to NGOs _ for educating people if the person directing is comfortable with foreign language to that of the locals
- Classroom educations _ arrange workshops with children as they are potentially more creative and spontaneous in nature.
- Arrange seminar/presentations
- Create well used spaces that the community can learn from automatically
- Create spaces of experience or a place that initiates a memory.

Out of these, a Learning Center was chosen to reach out to the young generation of Bangladesh. Some steps of campaign and publicity through media has already been taken and failed, so a further strong step, of giving a space to the people who want to work further on the conservation of this river was thought necessary. The basis of generating awareness here is that otherwise the place will be lost. The river is a site of pride for Bangladesh, and has been declared as a natural heritage of the country. Proper awareness of this place and the ecological issues related to it will bring about changes and required development that is much needed for the river. Due to lack of appropriate knowledge and awareness the development along this river is going as a waste as the proper treatment is not being provided, so the area needs to be addressed immediately before further deterioration can take place.

The basic concept of research is to gather knowledge in order to understand an issue, a concept, or a topic to the highest depth possible and then to determine or judge how valid the knowledge gained is. It is required to understand and analyze the solution of a situation and assess what the impact of the solution will be. "In the broadest sense of the word, the definition of research includes any gathering of data, information and facts for the advancement of knowledge." (Shuttleworth, n.d.) The limitations of a research center, not always having institutional facilities, will be overcome since the site demands training facilities provided to the local people to improve their traditional methods of capturing and cultivating fish. However in this case the methodology will first be learnt from the people and then the improved version will be taught to them. The whole process will not be changed. Thus there will be

additional functions to that of a conventional research center. People who are already learned on this sector will have a space to practice further, but also have an opportunity of training the locals.

Research of this area is needed to support the development proposal of this place, to support and improve methods of implementations that can happen alongside rivers. The research may not be limited to that of River Halda only, but spread widely for all rivers of this country and maybe continent. The project would be most feasible here since the river already has an ecologically rich environment to be studied which will vary from other river but could be similar as well. The proposed site also has scope of tourism which will act a pull factor for people and also as a generous revenue generator.

3.3 Recreation as a revenue generator

These are basically factors which enhance the economy of a country in feasible methods. The process of marketing and selling products or services to produce income. There are many ways of revenue generation some elevating urbanization of a country others enhancing the heritage sites, such as conservation, tourism and so on.

“Tourism is travel for recreational, leisure, or business purposes, usually of a limited duration. Tourism is commonly associated with trans-national travel, but may also refer to travel to another location within the same country.” (World tourist organization, 2014.) Tourism has become a popular global leisure activity. Tourism can be domestic or international, and international tourism has both incoming and outgoing implications on a country's balance of payments. Today, tourism is major source of income for many countries, and affects the economy of both the source and host countries, in some cases it is of vital importance.

Tourists are people "traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes" (World tourist organization, 2014.) Recreation can be a part of tourism or it can just serve the locals of a country or even just the city or part of the city. Recreation is anything that freshen the mind, allows relaxation and helps build healthy environment and people. Recreation is an essential and growing activity in the world. It is an activity that a person does for enjoyment, usually to refresh the body and mind. Recreation often involves some degree of exercise as well as visiting areas that contain bodies of water such as parks, wildlife refuges, wilderness areas, public fishing areas, and water parks. Recreation is popular for various reasons. Besides being a way to enjoy free time, many people use recreation as a way to socialize. Recreation can be categorized into two general types: active and passive. Active recreation, entailing direct participation, involves activities such as jet skiing in bays and kayaking down rivers. Passive recreation, involving observation, includes such activities as walking along rivers, sunning at beaches, and watching swim competitions.

Numerous surveys show that water-based activities are among the most popular recreation activities. Certain lands around public reservoirs are open for recreational uses such as hiking, hunting, snowmobiling, and snow skiing. In addition, their waters are available for activities such as boating, water skiing, swimming, fishing, and canoeing. Sometimes restricted zones are set up so that certain activities, such as fishing, do not interfere with other activities, such as swimming. Even a medium-sized hydropower project can have recreational and tourism value to residents and visitors, provide jobs for thousands, and have a monetary benefit in the millions of dollars. “Activities that are expanding in popularity are cross-country skiing, downhill skiing, backpacking, day-hiking, running and jogging, pool swimming, and visiting prehistoric sites. By 2040 the most popular recreational activities are anticipated to be bicycle riding, swimming, pleasure driving, walking, day hiking, sightseeing, wildlife observation, picnicking, family gatherings, photography, visiting historic sites, and developed camping. With increased interest in the environment and nature, it is important to create

effective strategies for developing recreation to meet growing demand, particularly in areas close to water. Recent surveys have shown that extended long-distance vacations are being replaced by more frequent, close to-home recreation trips. As a result, the importance of recreation opportunities close to urban areas is being acknowledged.” (Atkins,n.d.)

Recreational areas near urban areas represent one of the most important opportunities to meet the increasing demand for recreation. One major role for the government and other federal, state, and local agencies is to manage recreational areas. Increasing public access to both public and private properties will be necessary in the future as more people spend more time in recreational pursuits. Moreover, achieving sustainable recreation in coastal areas will require examination of issues such as continued sprawl development, growing constraints upon public access, nonpoint pollution generated by recreational activities, and other forms of environmental degradation caused by intensifying development and multiplying recreational activities.

Tourism has been known to uplift the economy of countries where it is practiced, if the resource is not exploited. Introducing tourism creates new job opportunities such as for maintenance, staff support for running the rest houses, tourist guides and so on. Other than this, tourism to a certain extent ensures awareness and publicity of a place by default.

Tourism brings along people which sometimes is a negative issues, as not all tourists keep the environment to be visited clean, but this is a small issues which can be controlled with government support.

3.4 Threats to Recreational Waters

The sheer volume of boats, jet-skis, and swimmers increases the potential for pollution. Increased activity of any kind can affect sensitive ecological areas including habitat that wildlife relies on for nesting or spawning. The type of recreation can also threaten water quality. While swimming and fishing can be relatively safe and harmless, boats and jet-skis are powered by gas and oil that can leak into the water. They also kick up waves, which speed up the natural erosion of banks, contributing sediment to the waterway.

Although ATVs (all-terrain vehicles) are used on land, they also present a threat to water quality. The powerful vehicles tear up the land, exposing dirt to erosive forces like wind and water. The erosion not only hurts the landscape, but the dirt and sediment can move into waterways, impairing water quality. This section explores the types of pollutants found in water. Almost anything can be considered a pollutant if it's in water and it's unwanted. Here's a list of some of the most common water pollutants and where they can come from.

Pollutant

Where it can come from

Why it's a problem

sediment:



wind and water erosion on ag land, storm water runoff, erosion from construction sites, erosion in urban areas

Changes water habitat which affects what can live there. E.g. prevents sunlight from infiltrating water and reaching plants and animals. domino effect on food chain

Tiny soil and rock particles. Chemicals can attach themselves to these particles as well.

Nutrients:



nitrogen and phosphorous

runoff from farm field fertilizers
runoff from residential lawns
runoff from recreational areas (golf courses)
runoff from septic systems
runoff from manure

Causes explosive plant growth which uses up available oxygen in water (hypoxia) leaving areas unable to support aquatic life.

When consumed in high levels by babies, nitrates reduce the blood's ability to carry oxygen.

Toxic chemicals:



organic or inorganic chemicals used in industry, agriculture and in the home e.g. oil, cadmium, lead, mercury, copper, zinc

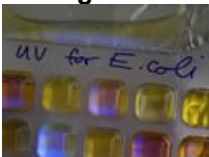
Chemicals can be spilled, dumped or leaked directly into waterways.

Chemicals that get spilled, dumped, leaked, or are improperly stored can be moved into waterways by runoff.

If ingested, these chemicals can build up and cause serious health problems.

chemicals can negatively affect a water habitat and the wildlife living there

Pathogens:



disease-causing agents, like fecal coliform bacteria, found in animal or human waste

improperly managed sewage, improperly managed livestock, pets

can cause serious diseases like dysentery, hepatitis, food poisoning, parasitic infections

Image 30: water pollutants and its effects
Source: Iowa Public Television, 2004

Tourism is advantageous in the creation of jobs, growth of the economy and improvement of the living standards of the locals. The tourism industry also leads to the development of the local crafts industry as well as exploitation of various resources. Tourism also generates different types of income for a community: business income, wage earnings and so on. There are many opportunities for employment for young people and for people interested in part time or casual work. While some of the employment is skilled, there are also opportunities for people less skilled and who lack formal qualifications. A thriving tourism industry supports growth in other sectors, such as transport, construction, agriculture and retailing. In this case the basic activity of the fisher men may become revenue generators, more boatmen will be employed thus ensuring illegal means of harvesting the fish eggs or fish fry be avoided. The souvenir shops can employ more craftsmen.

“Tourism can act as a shop window for the lifestyle of the area. It is increasingly common for people who visit and are impressed with the area to return as residents, thereby increasing demand for housing and other services.” (Holderfield, 1999) The social benefits of tourism are that it can stimulate new and expanded community facilities and infrastructure initiatives, such as the improvement of retail, restaurant and entertainment options, transport services, education and sporting facilities. These increase the quality of life for the community, which may not otherwise not be provided, based on the residential population alone. Tourism activity often prompts the conservation of cultural heritage, either as a result of increased awareness and pride, or because it can be justified on economic grounds as a tourist attraction. Tourism can encourage communities to widen their outlook and to embrace new ideas. It provides opportunities for residents to interact with other people, lifestyles and cultures. Attracting visitors to an area can heighten local awareness and interest, resulting in a greater sense of pride and ownership. The community takes stock of its assets and distinctive characteristics. This increase in pride can lead to community celebration or the revival of cultural activities. Knowing that others have travelled across the state, country or world to visit can considerably boost a community’s collective ego. “On the credit side, tourism has been partly responsible for increased interest in, and concern for, the natural and built environment and its condition.”(Holderfield, 1999) Effective visitor information services, interpretative signing, guided tours etc. can raise the profile of natural assets and issues surrounding them. In many cases tourism has provided an economic argument for conservation, preservation and restoration of natural and built resources.

3.5 Heritage_ culture_ tradition

Heritage is not always the monuments, but any resource of the country. Heritage may be a mountain or an old chapel. Tangible heritage includes buildings and historic places, monuments, artifacts, etc., which are considered worthy of preservation for the future. Objects significant to the archaeology, architecture, science or technology of a specific culture can be heritage. Objects are important to the study of human history because they provide a concrete basis for ideas, and can validate them. In case of intangible heritage the values are the same but only the fact remains that the resources are not built, but they can be felt and realized.

Culture refers to the cumulative deposit of knowledge, experience, beliefs, values, attitudes, meanings, hierarchies, religion, notions of time, roles, spatial relations, concepts of the universe, and material objects and possessions acquired by a group of people in the course of generations through individual and group striving.

"Cultural heritage is the legacy of physical artifacts and intangible attributes of a group or society that are inherited from past generations, maintained in the present and bestowed for the benefit of future generations. Cultural heritage includes tangible culture (such as buildings, monuments, landscapes, books, works of art, and artifacts), intangible culture (such as folklore, traditions, language, and knowledge), and natural heritage (including culturally significant landscapes, and biodiversity)." (Wikipedia, 2014)

Traditions relate to people largely. It is practiced by the people and bought into course by the people themselves. It is not just the architecture and the objects from the past that define who we are. It is the great variety of folksy customs that are just as alive today, that form a shape a country and its customs. Modern day traditions and culture of the Bengal does not relate to the actual values always. There is very little of the population that takes into accord these issues and values and tries to modernize them. Modernization does not mean that the basis or source of a culture be forgotten.

The generation today has knowledge on computers, gadgets and many more things that are worth appreciating. But in the process of understanding the future, people are forgetting their origin. Bangladesh being a river based country has a wonderful exposure to a variety of fishes being available. But hardly any Bengali child knows the name of these fishes, while knowing much about salmons and tunas. Knowing is not a negative, but not knowing oneself first and knowing about others is.

In the recent times the traditions and culture are given value to and observed. Many countries have gone through a process of using these resources to develop their economy while conserving it. It is an observed practice being positive or negative but in the process the resource is preserved.

Our country being as resourceful as the neighbors, India and Myanmar and Sri Lanka can easily conserve its resources. Influences of the west have become to dominating over a non-colonized nation, where people widely adapt the practices of the west forgetting the identity unconsciously. Presenting the values of this nation has become essential in order to retain the distinctiveness of this country as an individual. Values can be presented in many ways such as conferences, through broadcasting and also through practicing the traditions so as they are presented by default. Presenting traditions only during times of festivity is encouraged, but conventional. Following it through the year, making it a part of the daily routine is more appreciated.

3.6 Exhibition Spaces

The spaces of awareness should more likely be one of an abstract space rather than one that is defined and guided. The main objective of these exhibition spaces is to achieve awareness, relating to people in the easiest of manner rather than be museums where people can only observe. The major difference between a museum and this centre would be that the displays here need to be interactive and welcoming, allowing touching and holding and experiencing, rather than just observing as such in a full scale museum.

These spaces may be temporary, open to air, open to sky or enclosed as per the demand of the space rather than the exhibit. Being a river oriented exhibit space set in nature, the proper interpretation would be to welcome and integrate nature as much as possible into these spaces where the observer or visitor will not only enjoy the exhibit but also the setting in which it is placed.

3.7 Materials

The architecture, being set in a place where the question of conservation is very strong, should also have an influence of the surroundings.

Bamboo is a natural surface covering material that has many of the properties of hardwood flooring, even though it is actually produced from a type of grass. It shares many of the positive benefits of a hardwood floor, as well as the drawbacks and vulnerabilities. Bamboo is made from natural vegetation. The bamboo plant is a highly renewable resource that is able to grow to maturity in as little as three to five years. "This is much faster than hardwood trees which can take upwards of twenty years or more to reach maturity." (Joseph Lewitin, 2011) Bamboo is relatively easy to maintain. You just have to sweep or vacuum it regularly to remove small particle debris. You can also occasional damp mop it, or clean it with a non wax, non-alkaline, hardwood or bamboo floor cleanser. The use of natural materials is an important trend in the construction industry right now. As people are becoming more ecologically conscious they are demanding products that reflect these values. There are certain types of bamboo that can be extremely strong, hard, and durable. Natural, un-carbonized bamboo that was properly harvested and manufactured can be as durable as red oak. Strand woven bamboo can be manufactured even harder than that.

Bamboo is a natural material that is made from a highly renewable resource. However there are a number of environmental concerns regarding bamboo. The adhesive used in its construction can contribute to the toxicity of an interior space. There are also some concerns that forests are being cut down and replaced with bamboo fields for commercial purposes. While bamboo definitely has some green qualities it is still environmentally ambiguous in a lot of ways. However, unlike most timber, bamboo is a self-regenerating natural resource; new shoots that appear annually ensure production after individual culms are harvested.

3.8 Architectural Considerations of lab design

Over the past 30 years, architects, engineers, facility managers, and researchers have refined the design of typical wet and dry labs to a very high level.

3.8.1 Lab Planning Module

The laboratory module is the key unit in any lab facility. When designed correctly, a lab module will fully coordinate all the architectural and engineering systems. A well-designed modular plan will provide the following benefits:

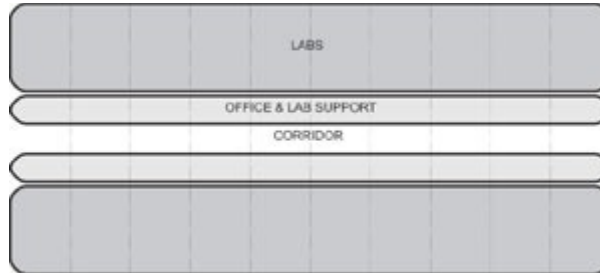
- Flexibility—the lab module, as Jonas Salk explained, should "encourage change" within the building. Research is changing all the time and buildings must allow for reasonable change.
- Expansion—the use of lab planning modules allows the building to adapt easily to needed expansions or contractions without sacrificing facility functionality. The depth is based on the size necessary for the lab and the [cost-effectiveness](#) of the structural system.

3.8.2 Two-Directional Lab Module

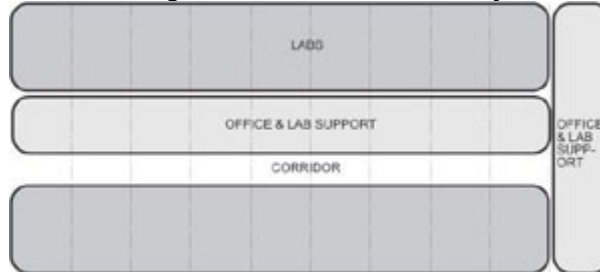
Another level of flexibility can be achieved by designing a lab module that works in both directions. This allows the casework to be organized in either direction. This concept is more flexible than the basic lab module concept but may require more space. The use of a two-directional grid is beneficial to accommodate different lengths of run for casework. The casework may have to be moved to create a different type or size of workstation.

3.8.3 Three-Dimensional Lab Module

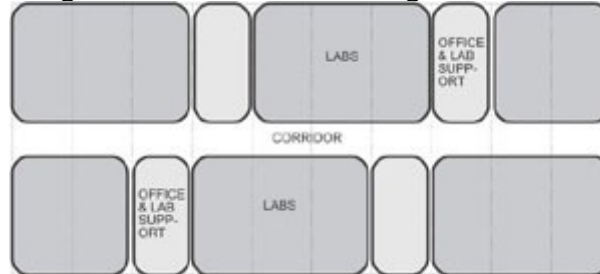
The three-dimensional lab module planning concept combines the basic lab module or a two-directional lab module with any lab corridor arrangement for each floor of a building. This means that a three-dimensional lab module can have a single-corridor arrangement on one floor, a two-corridor layout on another, and so on. To create a three-dimensional lab module:



Single corridor lab design with labs and office adjacent to each other



Single corridor lab design with offices clustered together at the end and in the middle



Single corridor lab design with office clusters accessing main labs directly

3.8.4 Open labs vs. closed labs

An increasing number of research institutions are creating "open" labs to support team-based work. The open lab concept is significantly different from that of the "closed" lab of the past, which was based on accommodating the individual principle investigator. In open labs, researchers share not only the space itself but also equipment, bench space, and support staff. The open lab format facilitates communication between scientists and makes the lab more easily adaptable for future needs. A wide variety of labs—from wet biology and chemistry labs, to engineering labs, to dry computer science facilities—are now being designed as open labs.

3.8.5 Flexibility

In today's lab, the ability to expand, reconfigure, and permit multiple uses has become a key concern. "The following should be considered to achieve this:

- Flexible Lab Interiors
- Equipment zones—these should be created in the initial design to accommodate equipment, fixed, or movable casework at a later date.
- Mobile casework—this can be comprised of mobile tables and mobile base cabinets. It allows researchers to configure and fit out the lab based on their needs as opposed to adjusting to pre-determined fixed casework.
- Flexible partitions—these can be taken down and put back up in another location, allowing lab spaces to be configured in a variety of sizes.

- Overhead service carriers—these are hung from the ceiling. They can have utilities like piping, electric, data, light fixtures, and snorkel exhausts. They afford maximum flexibility as services are lifted off the floor, allowing free floor space to be configured as needed.”

(Daniel Watch and Deepa Tolat, 2010)

3.9 Deduction

The learning center will incorporate the features of a research centre, a training center for people interested in ecology, fishing methods, local crafts, study and archiving on aquatic life and some awareness programs such as galleries and interactive zones. The center will have a tourism sector and some recreational activities acting as revenue generators. Incorporation of exhibition routes and spaces will help support awareness.

The project demands community spaces and dealing with the locals as this will ensure that the centre be self sustained and be for the people and the river itself.

CHAPTER FOUR:**Contextual Analysis****4.1 Formulation of the Project**

The pride of Bangladesh is its rivers. The main rivers namely the Padma, the Jamuna, the Teesta, the Meghna, the Brahmaputra, and the Surma run through a large area of Bangladesh along with their thousands of tributaries. "With one of the largest network of rivers, the total number of rivers including tributaries was 700, until when it has dried up to only 350 in the recent times." (Wikipedia,2014) "About 12% of Bangladeshi people are directly or indirectly engaged in a lifestyle dependent on fishes. The fisheries sector accounts 4% of GDP and more than 11 percent of annual export earnings. Estimates of livelihood dependence are scattered: 1.4 million full time fishermen and 11 million part time fishermen. However, case studies and surveys in different regions indicate that some 70 % of all households in the flood plains catch fish either for income or for food." (FAO fisheries country profile,) There are 260 species of fish and 24 species of prawns in Bangladesh, but many fish types are not known to people of this country. Bengali cuisine is rich and varied with the use of many specialized spices and flavors. *Shutki* (dried sea fish) is a popular cuisine in this region. Available sunlight and temperature throughout the year is an added advantage for fish production. Water fertility is conducive to fish growth, which is a massively growing sector, in terms of economy. Being a port city from early times, Chittagong attracted people from various regions of the world. These international contacts left a lasting impact on the language, religion and culture of the city. Rice and fish is the staple food of the people. Because of close affinity to the sea, seafood is quite popular. People are highly dependent on the rivers and have an affinity towards the ports and the river cultures.

But today not only is the culture of this fish based region becoming absent in many places, the source itself is also receiving less attention and nearing extinction.

POPULATION INVOLVED IN FISHING

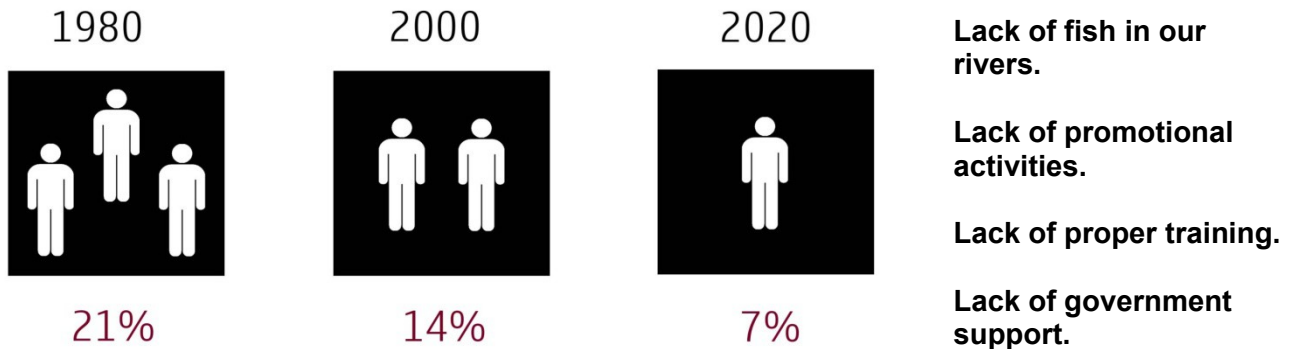


Image 31: Population decrease of fishermen
Source: Bangladesh ministry of fisheries and livestock, edited: Farasha Zaman

Just like many other river Halda river is also facing deterioration in terms of environmental issues. This river is a natural spawning zone of Bangladesh, supporting the economy of the country largely. The Halda and its waters have some unique features which cause fishes to come to lay eggs. "These features are of three kinds: physical, chemical and biological. The physical include the ox-bow curves of the river, a good number of hill-streamlets, and the existence of one or more marshes up from every streamlet, the depth of the river, low temperature, and strong current and excessively muddy water. Low conductivity, tolerable levels of water-soluble oxygen, favorable Ph, less hardness, low level of alkalinity etc are among the chemical reasons. The biological reasons are regarding the availability of nutrition: with the first shower of monsoon, the marshes overflow both of their banks and inundate a wide stretch of land, so that a huge variety of organic compounds mix with the water and leave it enriched with more-than-sufficient food for the maturation of the pre-breeding gonads of fishes." (Kibria, 2012) It is also believed that the water pouring down from a good number of hill-streamlets is rich with many kinds of macro and micro nutrients which help create sufficient food-molecules in the river. The combined effects of these features create a favorable environment in the Halda, which is completely different from other rivers of Bangladesh that stimulates carp fishes to lay eggs during the monsoon.

Carp fishes choose certain places to lay eggs, at special kinds of Bāks (bends) of the river. They are called ox-bow bends. These bends generate favorable motion and currents of the water, and other bio-chemical factors, to create an advantageous environment for fishes to breed and help them fertilize their eggs. (Kibria, 2012)

4.2 Why the Halda is called a heritage of natural fish breeding in Bangladesh

The River Halda deserves recognition as our Natural Vintage of Fish Breeding for its resources, contribution to our economy and other unique features. It is still waiting its recognition as one of our national heritages due to the lack of sufficient information and publicity.

The methods of collecting eggs from the Halda, of hatching broods from the eggs and taking care of the broods, are completely indigenous. The local people are using these methods that combine religious faiths and technological knowledge, since ages immemorial. The local egg-collectors are traditionally using this technology for generations.

The Halda is continually contributing to our national economy and playing a very crucial role in it. A strong chain of economic activities revolves around this river round the year. "Taken together, the

eggs collected from the Halda, the broods produced from these eggs, and the fish grown from these broods contribute to our national economy about Tk 800 crore.”(Kibria, 2012)Agricultural production, communication and other activities are also a significant contribution of the Halda to our national economy. This contribution can easily be multiplied many times by preserving this river in an eco-friendly manner and managing it in a planned way. It is also believed that the growth-rate of the carp fishes of this river is much higher compared any other sources in our country. This advantage can be exploited properly in cultivating and hatching carp fishes allowing fish cultivators and hatchery owners to make a profit at a much higher rate. The River Halda is the main source of drinking water in Chittagong, the commercial capital and the port city of Bangladesh. “Considering the special quality and availability of the water of this river, the Chittagong WASA has been producing and supplying nearly 20 million gallons of drinking water every day through the Mohra Water Treatment Plant, since 1987.”(Kibria, 2012) The water of this river contains much less heavy metals that are below the standards set by WHO, making Halda an important river as a source of pure drinking water in Chittagong. The Chittagong WASA has started constructing its second project, with the same capacity of the previous one, in 2007 in the Maduna Ghat area of the Halda.

During the season of egg-collection, a festive atmosphere is created on two sides of the river. The local fishermen and egg-collectors wait impatiently throughout the year for the time of year to come. The preparations for catching eggs start from January and February, which include digging ponds and Kuas, repairing boats and collecting partners. After having collected the eggs in May, June and July, the hatching, the raising of the broods and selling these young fishes continue up to September and October. The local egg-catchers traditionally live busy days in these seven or eight months. This makes the Halda our natural heritage for fish breeding. The Halda, like Cox's Bazar and the Sundarbans, is another of the natural heritages of our country. But for the lack of information provided and lack of publicity, people have been in the dark concerning this natural resource of our country. The people of Chittagong have been demanding announcement of the Halda as the national heritage of natural fish breeding for long.

The icon of the heritage of Chittagong is the Shāmpān – a special kind of boat which reigns the waters of the rivers Halda, Karnaphuli and Sangu. “Numerous songs, Pālās (ballads), dramas and films have been made on the lives and struggles of the boatmen of the Shāmpān (Shāmpānwala).” (Kibria, 2012)The three rivers are the bearer of the folk culture of Chittagong. To the Bengali-speaking people around the world, the folk songs of Chittagong are dearly beloved. This is not only a heritage of Chittagong, but also an important part of the ancient culture of Bangladesh. Even the logo of Chittagong University has been designed upon the shape of a Shāmpān. A special genre of songs sung by the Shāmpānwalas of the Halda is called Haldapada songs. Today these traditional songs are about to be extinct in the face of the aggression of western and Indian culture. The Halda of Chittagong is a great birthplace of our old cultural heritage.

4.3 Announcing the Halda as the national river of Bangladesh

Every sovereign country has some national icons such as national flower, national tree, national fish, national animal etc. that are a symbol of the country's heritage. The river based countries of the world have their own national rivers. For example, our neighboring country India's national river is the Ganges, Pakistan's national river is the Sindhu, and the national river of Egypt is the Nile. In these countries, several factors have been emphasized on for acknowledgement of the national rivers. They are: source of the river concerned, its contribution to national economy, communication, water supply, fishery and agricultural production and its role in the field of tourism and heritage. Our country is called the ‘daughter of the rivers’. Our economy has flourished and our civilization has developed centered around the rivers. The driving force of our economy is the rivers. But the fact is, 40 years have gone by after our liberation, but unfortunately, none of our rivers has been announced as the national river of Bangladesh. Taking the contribution and importance of the Halda into account and in

light of the features discussed above, announcement of this river as the National Heritage of natural fish breeding of Bangladesh would assure the maintenance and the security of the brood fishes that come to this river to lay eggs, and at the same time would help it take a further step to be recognized as one of the world's natural heritages.

It is possible to vitalize the national economy by restoring the natural fish breeding areas of the Halda through proper preservation and management in a planned way. "With this thought, in 2007 the Directorate of Fishery of the government of Bangladesh started the activities of a project to preserve and recover the natural fish breeding areas of the Halda. That five year project (2007-12) was targeted mainly to play a role in increasing the natural production of broods of carp fishes in the Halda and developing the socio-economic conditions of the local people concerned, by helping them to increase their incomes and employment."(Kibria, 2012)But the do-as-you-wish tendency and shady deals of the people concerned with the design and materialization of the project, the detachment of people who are closely related to the river and the intense personal greed turned that dream into a nightmare. "Four years after the project started it has almost failed to reach its primary target due to faulty design based on unplanned, false and imaginary facts and information."(Kibria, 2012)

The local people have already started to figure this out. What is needed to restore the natural fish breeding areas of the Halda is the planned, scientific and social management of this river. From the very beginning, the researchers, the conscious civil society of Chittagong, the journalists of the electronic and print media and the local people have been strongly demanding a review of the project. This must be done immediately, otherwise, it will remain impossible to preserve and develop the natural fish breeding areas of this river. The site chosen for implementation is not far from a few experiential places in Chittagong. These include observing and learning the traditional ways of agricultural practice in Bangladesh, the festive nature of the river during the season of collecting carp eggs (April to June), the daily bazaar activity along the roadside along with various street foods being served, the ways of bamboo treatment and the lifestyle of the fishermen and farmers as a whole. Other than these architectural places include that of the old Arakan civilization, near Chandgaon area and the Chittagong University, designed by an architect of this nation, Mazharul Islam.

4.4 Experience within the site

EXPERIENCE



People experience nature as it is. When experiencing nature they are not guided by lines or any physical boundary. Rather they are manipulated by nature itself, and they travel or experience nature by moving through it.



The movement pattern is of a person who is experiencing, observing and is in nature is also random and flowing. It is not one that follows any linear direction. The contemporary exhibition spaces today are also not limited, restricted and regularly guided, but rather spontaneous, developing from the need of the spaces and the experience to be provided. The museums or exhibition spaces today have become more flexible.



Contextualizing the program of an exhibition space in the site, it is highly demanded that the spaces flow through nature and celebrate it rather than define a new boundary itself. The spaces should be such that it celebrates the nature, welcoming it as much as possible, rather than control it.

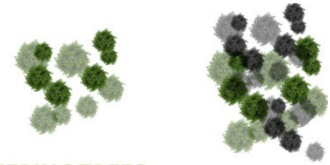


The site is such that it is dotted in trees. It is high in biodiversity. Since the project is one that concerns conservation and also otherwise the approach towards the architecture must be guided by the trees.

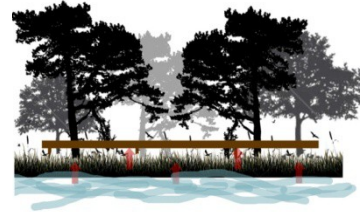
Another major issue behind choosing to keep the trees would be that the site is vulnerable in places during flash flood, and experience erosion all year round. Tree roots have been known to be a major source of support against eroding soil. Thus the conclusion of keeping the trees as much as possible as their roots holds the soil together.

The site being located in Chittagong allows local material sourcing. Steel and glass are produced within Chittagong city, while wood and bamboo can be harvested from within the site. Earth is also available adding to the cultural face of the architecture.

Using these materials, help ensure that the architecture will be one of a low carbon footprint in ways possible.



KEEPING TREES



MINIMUM INTERVENTION AT-GROUND



LOW CARBON FOOTPRINT

The materials chosen for the project are selected, keeping in mind that they can be found within a certain boundary of the site, from rangamati to chittagong

CHAPTER FIVE:**Case Studies****5.1 Case 1: RENZO PIANO. Jean-Marie Tjibaou Cultural Centre**

Materials: The materials used in the building of the conical domes consisted of laminated wood and natural wood, concrete, coral, aluminum castings, glass panels, tree bark and stainless steel. The iroko (*Clorophora excelsa*) timber used extensively was imported from Africa (native to tropical Africa, from Sierra Leone to Tanzania); it was decided to use iroko because it was durable, and mostly resistant to attack by insects, fungi and mould. The frames of all cases were pre-fabricated in France and assembled on-site.

Design of the cases: The exterior part of the huts is given an ancient appearance whereas the interior of each hut has rectangular space (for housing permanent and temporary exhibitions, administration offices and studio spaces), where all amenities feature modern technology. The space within each hut was achieved by discarding the central pillar, a deviation from the traditional Kanak hut design. In the circular design of the hut's shells, the height to diameter ratio was reduced giving more space, which also resulted in greater dynamic ventilation, as was corroborated by wind tunnel tests.^[2] The cases have giant curved ribs or staves, which are made of iroko slats and steel connections and which also, act as climate control devices. The outer ribs are a curved assembly of slats, which are joined to a straight vertical rib that together form part of the case structure. The staves are designed in such a way that the individual pieces appear as if they are woven together. The roof is made of corrugated aluminum sheets. It has a double roof system, which contributes to the play of shadows. The bottom of the wall, formed by the arc of the staves, has special louvers, called "nacos". The "nacos" open and close in tandem automatically by computer control calibrated to the speed of the wind. The double roof system also allows air to pass through the roof unchecked. During the monsoon season, the

winds that blow over the cases are very strong; the compound curve of the cases resists the wind, with the “nacos” facilitating this action further by allowing air to pass directly through the cases.

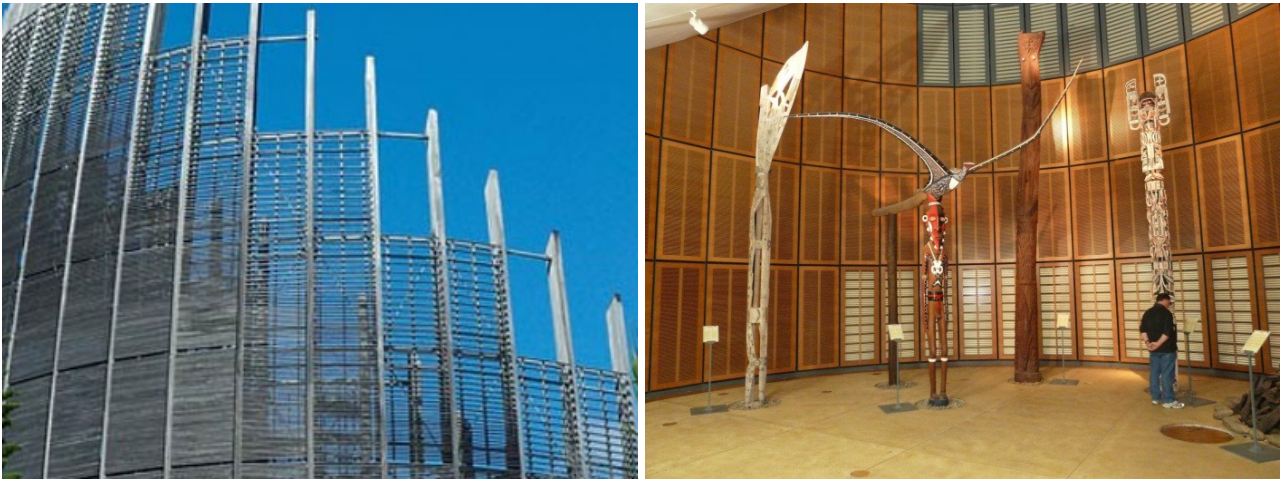


Image 32: Eco friendly material incorporation with modern techniques
Source: Google

VENTILATION DUE TO WIND FORCES | pressure differential created by incoming force of wind

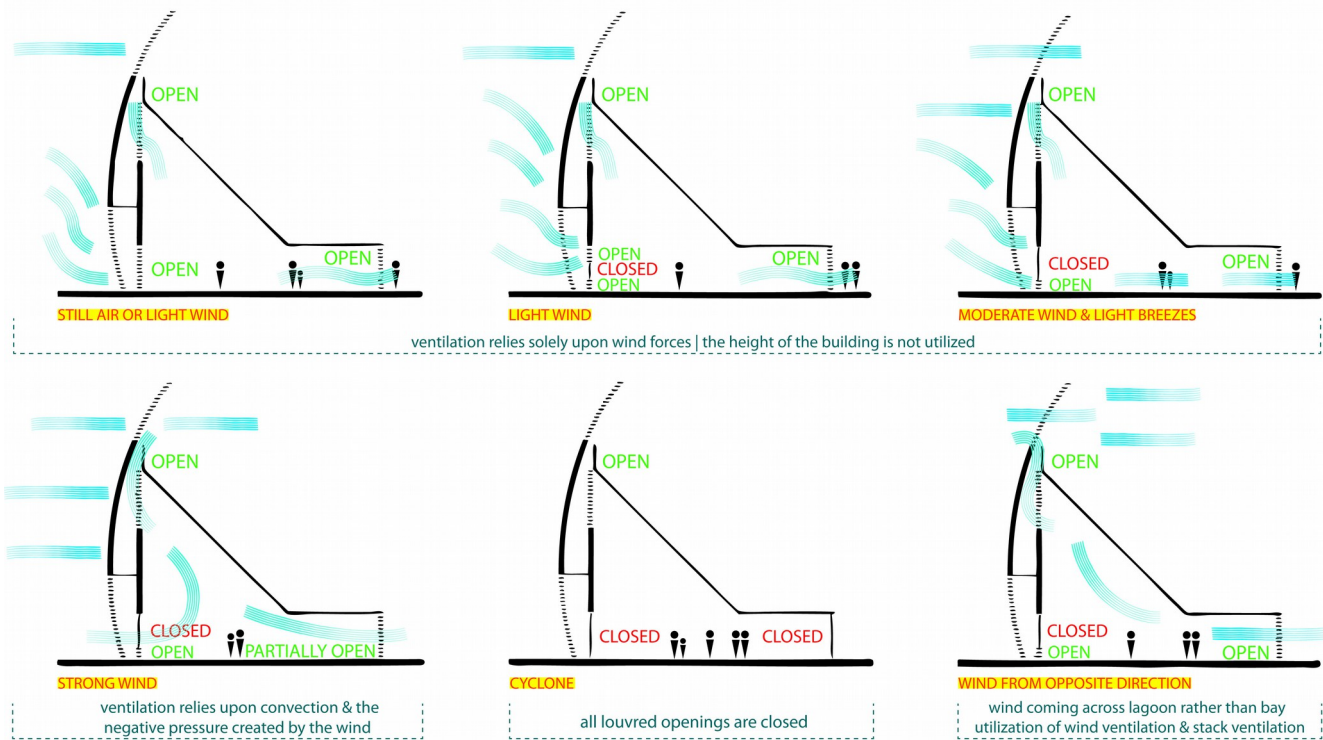


Image 33: study of wind flow
Source: Google

5.2 Case2: Center for Ecological Living and Learning (CELL)

The Center for Ecological Living and Learning (CELL) offers life-changing sustainability education programs for students who believe that they can make a difference in the world: students who would like to play an active role in creating long-term solutions to problems facing our local and global communities and environment. CELL offers college semester (and short course) programs focusing on a theme of sustainability through community. Our Middle East Program has a more specific theme of sustainability and peace through community. The purpose of any CELL experience is to ignite a life-long commitment to living sustainably and to giving and receiving support for this commitment through community. During the course of a semester program, students learn about the concepts of sustainability while living in eco-villages and learning from internationally recognized partners who are modeling how a “small group of committed people” can make a big difference in achieving local and global sustainability. At the end of a CELL program, students develop action plans that empower them to return home and employ what they have learned in their own lives and through implementing sustainability initiatives in their own communities. This individual and collective action is at the heart of what CELL is all about!

Although our programs have a sustainability theme, they are interdisciplinary by design and emphasize:

- Transforming how students view themselves, their relationship to community, and their role as change agents.
- Teaching college students (our future leaders) how problems can be solved through the application of critical inquiry, imagination, ingenuity, and individual and community commitment.

- Modeling creative, systemic solutions that are being successfully practiced at the local and global levels.
- Demonstrating, through thought-provoking readings, deep reflection exercises, challenging course content, and experiential and service-learning, how learning is not a spectator sport and how students can integrate sustainable practices into their individual lives and current and future leadership roles.
- Collaborating with internationally recognized organizations committed to building sustainability through community.
- Partnering with colleges and universities committed to taking a leadership role in offering internationally recognized sustainability education programs that maintain academic rigor and dovetail with institutional curricula.

CELL believes that problems can be solved through the application of critical inquiry, imagination, ingenuity, and individual and community commitment. CELL further believes that true education should spur an inner transformation that impels life-changing action. CELL's educational programs stir and spur students to think more deeply and more broadly about themselves, their connection to community (locally and globally), and the leadership role they can play in living more responsibly as a global citizen.

5.3 Case3: River Bend Environmental Education Centre

Mission: River bend Environmental Education Center teaches environmental principles to children in Southeastern Pennsylvania through a direct connection with nature, inspiring respect for our natural world and action as aware, responsible and caring citizens.

Since 1974, River bend Environmental Education Center has been enriching the lives of children and families through engaging environmental education. From its beginnings as a quiet nature preserve, River bend has evolved to a thriving center for environmental education that touches the lives of nearly 12,000 people annually. Whether it is to participate in a public program or just to wander on our trails, a visit to River bend offers families a quiet place to relax, unwind and observe the wonders of nature.



Image 34: River bend
Source: Google

Values:

- Excellence in environmental education for all children.
- Connecting children to nature is a vital component for their wellbeing.

- Being good stewards of the environment and the land we own.
- Collaboration and partnerships with other organizations to fulfill our purpose.
- Responsible governance and management to ensure a stable financial foundation.
- Fun – our work is recreational, creative and educational.

5.4 Case 4: Floating gardens can feed Bangladesh



Image 35: floating gardens of barisal
Source: Google

Bangladesh is a crowded nation where more than 150 million people live in an area smaller than the U.S. state of Washington. Poverty, malnutrition, and rural unemployment are daily challenges to food security. Declining access to fresh water, increasing salinity, and the impacts of climate change further magnify the need for sustainable food production. By 2050, it is predicted that there will be 100 million more people in Bangladesh. More than three quarters of the Bangladeshi population live in rural areas where livelihoods often depend on small-scale fishing and farming. For the people of Barisal in the south of the country, it is homestead aquaculture and agriculture in particular that provide essential food and income. Typically, household ponds in this region are used to culture fishes like carps and tilapia, and cultivate crops of vegetables along the banks. The banks of the ponds are also planted with tall trees that provide firewood for cooking meals. However, these trees often cast large shadows that reduce the productivity of both the pond and the vegetable garden. Recognizing the food and income benefits that maximizing the productivity of these household spaces could bring Bangladeshi families, the Agriculture Nutrition Extension Project began working with communities to design and test a new approach to combining small-scale fish and vegetable farming. Together with the project staff, the women and men of nine Barisal households constructed floating gardens that allow vegetables to be grown on the sunny areas of the pond's surface. Connected to the bottom of the frame is a submerged cage that provides a protected space for fish fry to grow. As the fish are bred in cages that can be pulled over the edge of the pond, women find them easier to harvest than pond fish, as they don't have to enter the water.



Image 35: An Integrated Floating Cage-Aquaponics System (IFCAS) in Barisal, Bangladesh.
Source: Google

A form of aquaponics, this method allows the vegetables on the surface to absorb the nutrients from the pond water below, and increase the yield of fish and vegetables from one homestead plot. This provides families with food to eat at home and a source of income through selling excess produce at the market. This is particularly important for the rural poor, as fish are a key source of animal protein and micronutrients that contribute to a balanced diet. In the first 2 months after the floating gardens were installed, the Barisal families ate between 4 to 12kg of vegetables, and were able to begin harvesting fish from the cage. This innovative solution can also be installed in naturally occurring bodies of water throughout Bangladesh, as well as canals and rivers. By maximizing the productivity of these natural and household spaces, Bangladesh's rural poor can secure food, nutrition, and incomes for their families.

The Agriculture and Nutrition Extension Project (ANEP), is a partnership between International Development Enterprises (iDE), the World Fish, CIMMYT, IRRI, Save the Children International, CODEC, and CEAPRED and is funded by the European Union (EU). The project seeks to sustainably raise agricultural productivity and promote effective market linkages to improve the nutrition of poor rural and urban households in the south of Bangladesh and the Nepal plains. This action research is jointly conducted by World Fish and Bangladesh Agricultural University (BAU).

5.5 Case 5: Aquatic Life Research Facility, Canada



Image 36: Research labs and corridors of aquatic life research unit, Canada.
Source: Google

Located at the [Canada Centre for Inland Waters](#) (CCIW) in Burlington, Ontario, the Aquatic Life Research Facility is a \$4.6M state-of-the-art laboratory designed for studying fish and aquatic life health in the contexts of toxicant and stressor exposure. Built as a joint project between Environment Canada and Fisheries and Oceans Canada, it provides space for scientists, graduate students, and university partners. Completed in summer 2009, the new facility replaces one originally built in the 1970s.

Features of the Laboratory

- The self-contained facility consists of a series of rooms for conducting studies of aquatic life, including:
 - A fish holding room for hatchery- and laboratory-raised fish with four banks of three holding tanks on water recirculation systems
 - An experiment room capable of supporting 260 50-L aquaria where large numbers of fish can be exposed to toxicants and stressors at several levels, and can be tested in replicate
 - A separate wild-fish room where fish caught in the wild can be tested for food chain and stressor experiments while preventing pathogens from spreading to laboratory-raised experimental fish
 - A room of environmental chambers for testing stressor effects on turtles, amphibians, invertebrates and other forms of aquatic life
 - A dissection room and a chemistry room where tissue samples can be harvested and prepared for testing post exposure, but separated from the live fish rooms to prevent pathogens from contaminating running experiments
- Improved research security: The laboratory was designed with great attention given to proper care of animals. It has several features intended to ensure that safety of research animals is maintained, including security controlled entrances and exits. It has a main corridor with large bay windows where tours can be conducted without interfering with experiments or researchers.
- Reduced waste and energy consumption: The new facility features water recirculation systems that conserve 80% of the water, filtering out harmful waste compounds before passing it back into the tank, and allowing for a reduction in the energy needed to maintain a constant temperature. These cost savings will result in the new facility paying for itself in less than 10 years.

CHAPTER SIX: _____ Program Development

Awareness

FUNCTION	REQUIREMENTS	ELEMENTS	NUMBER OF ELEMENTS	SQUARE FEET
OUTREACH AND NATURE SECTION	OFFICE AND ADMINISTRATION	1.office rooms 2. Main lobby 3. repair area and storage area	1 Curator room	121
			1Collection room	400
			2 monitoring personal	200
GALLERIES	GALLERY FOR RIVER LIFE_HALDA	1.River map 2. photo exhibition galleries 11 types	1	1535
	AQUA GALLERY FOR HALDA SPECIES OF FISH AND THEIR HABITATS _ENDANGERED AND EXTINCT	1. 71 species available 2. 15 extinct	1	5346
	VIRTUAL VISUALIZATION GALLERY FOR LIFE CYCLE OF A CARP FISH (3D)	Holographic projections	1	1764
	GALLERY FOR ARTIFICIAL BREEDING SYSTEMS	Open for observation hatcheries	4	
	GALLERY FOR FISHING EQUIPMENT_SUPPORTIVE AND PROHIBITED	Models and visuals (8 nets, 4 boats, 2 hand lines)	1	1080 and outside
	SPECIAL EXHIBIT SPACE (FOR RELATED SCIENCE TOPICS/ OTHER RIVERS OF THE WORLD)	Any new innovative achievement or advancement : example fishing gear	1	1764

Research

**FUNCTION
REQUIREMENTS
ELEMENTS
NUMBER OF USERS/ELEMENTS
SQUARE FEET
RESEARCH SECTION
OFFICE AND ADMINISTRATION**

1.office rooms
2. Main lobby

1 documentation
100

9 monitoring personal (security)
Waiting room 10 = 260

1 monitoring head
100

1 lab technician
100

1director
121

1 advisor
121

1 research examiner or head per lab
 $100 \times 6 =$
600

1 field supervisor +assistant
152

Male toilet
TOILET (50 people)
3

Female toilet
3

SEMINAR ROOM
200
1873

DISCOURSE AREA
Informal discussion area
6 heads + advisor + director + field supervisor +4 outsiders
575

ACCOMODATION
Chittagong university 25 people per batch
ROOMLETS
10 people
162 PER ROOM
 $X 10 = 1620$

TOILETS
5 people _3 male/2 female

LIMNOLOGY AND OTHER RESEARCH LABS
AQUACULTURE LAB-NATURAL SPAWNING HABITATS OF MAJOR
CARPS CONSERVATION LAB

Controlled pond in which tests are done and monitored

1. sample archive area
2. locker room
3. equipment storage area

1+2 (HEAD AND RESEARCHER)
621

MICROBIOLOGY LAB (FOR INVASIVE SPECIES AND OTHERS)

Basic Biology lab-

1. sampling area
2. equipment (machine) desk
3. locker room
4. equipment storage area
5. sampling archive (aquariums)

1+6
(HEAD AND RESEARCHER)-existing in chandpur

Existing 5 researchers
610

HYDROLOGY AND WATER POLLUTION LAB

Basic Chemistry lab

1. sampling area
2. equipment (machine) desk
3. locker room
4. equipment storage area
5. sampling archive (racks)

1+6
(HEAD AND RESEARCHER)-existing in chandpur

Existing 5 researchers
610

TERRESTRIAL ECOLOGY LAB

Basic Biology lab – to study agro farming products and conservation trees for this zone

1. sampling area
2. machine desk
3. locker room
4. equipment storage area
5. sampling archive

1+4(HEAD AND RESEARCHER) –existing argo researchers in chandpur

Existing 5 researchers
621

METEOROLOGICAL LAB (air temperature,
wind speed, and solar radiation)
for conservation

1+4 (HEAD+ RESEARCHER)
280

STRESSOR CHAMBER AND LAB (LAB FISH AQUARIUM)1
(WILD FISH AQUARIUM)

Studying of fish life in stress - chemistry lab

1. Sampling area (aquariums)-ph and salinity, manmade pollution, food diversity, breeding systems.
3. locker room
4. equipment storage area
5. sampling archive

1+4(HEAD AND RESEARCHER PER NUMBER OF SECTIONS)
482

WASTE RECYCLING CHAMBER

- Input area
Recycling area
Output area

1 OPERATOR + 1 ASSISTANT

Training

FUNCTION	REQUIREMENTS	ELEMENTS	NUMBER OF USERS/ELEMENTS	SQUARE FEET
TRAINING SECTION	ADMINISTRATION	Office rooms Lobby space	1 documentation	100
			1 examining head	100
			1 hatchery technician	100
			1 director	121
			1 field supervisor +assistant	152
TRAINING IN HATCHERIES 1100 PEOPLE INVOLVED EX_80 people PR_100 people	EGG COLLECTION CHAMBER (HATCHING PROCESS)	1.egg collection cell	1' RADIUS CELLS X 50 CELLS	1481
	OFFICE		1 field supervisor +assistant	152
MULTIPURPOSE SPACE:	WORKSHOP AREA		100	5025
1.TRAINING FOR AGRO BASED CULTURE + RESEARCH (1600 PEOPLE INVOLVED)	STORAGE ROOM 1 FOR EQUIPMENT PURPOSE			200
	PRACTISE POND			4000
	STORAGE ROOM 2 FOR AGRO PURPOSE			200
	COLD STORAGE FOR FOOD PRESREVATION			150
2.TRAINING FOR EQUIPMENT USAGE				
3.WORKSHOP FOR FISH FOOD AND ORGANIC PROCESSING				

Common facilities

FUNCTION	REQUIREMENTS	ELEMENTS	NUMBER OF USERS/ELEMENTS	SQUARE FEET
RESTAURANT	1.KITCHEN 2.RECEPTION/RETAIL ZONE 3.VISTORS AREA	Seating area	60	5515
		Retail zone		1143
		Kitchen		2760
		Office/ service	Manager room	100
MEDICAL FACILITY	RECEPTION AREA AND FIRST AID STATION		1	172
	TREATMENT/ NURSING AREA, BED		2	16X20 = 320
LOCAL SHOP COMMUNITY SPACE	STALLS FOR LOCAL CRAFTS, FISH PRODUCTS, ORGANIC	1.Retail area 2. storage area	1+1	5000

	PRODUCTS			
BOATING DOCK (MAX. 200 SCHOOL STUDENTS_50 AT A TIME)	PASSENGER BOAT			10/8
	RESEARCH BOAT			2
	FISHING BOAT			20
	SPECIAL SHAMPAN			2
	LONG TOUR			25/3
SWIMMING FACILITY AND FISHING FACILITY (MAX. 200 SCHOOL STUDENTS_50 AT A TIME)	SWIMMING GEAR STORAGE			60 gear
	WASH AREA			15 PERSON
	FISHING GEAR STORAGE			30 gear
	LIVE FEED STORAGE			
PARKING	BICYCLE			20
	SELF DRIVEN CARS			8
LOCKER ROOM FACILITY FOR EXPLORERS		1.Counter 2.Store area		
LIBRARY RESEARCH BATCH_25 TO 30 STUDENTS	VISITORS AREA	Reading area		EX_25,PR_30
		Stack area		2000 books (BFRI HEAD QUARTERS)
		Retail area		1 person
ARCHIVE AND DOCUMENTATION AREA		Sorting room		1 person
		Documentation room		3 students (EX in ctg uni)
		Videography and photo processing area		1 shot director 1 shot assistant 1 photography director

REGULAR ACTIVITY

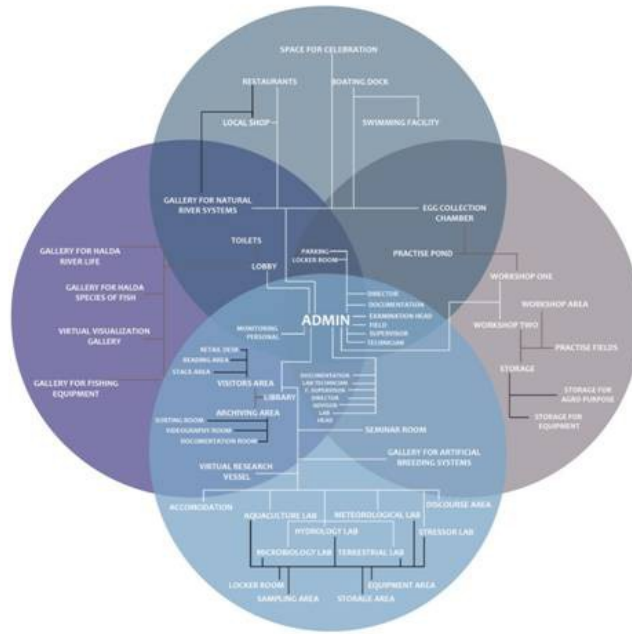
- regular classes for farmers and interested personnel.
- discourse with and by international and national associates.
- meetings on program formulation and development.
- monthly lectures on training methods and awareness.

PERIODIC ACTIVITY

- hatchery and rearing culture.
- workshop on farming and methods, and water drainage
- presentation of endangered species of fish.
- discourse and workshops on research methodology
- conservation methodology and workshop
- documentation and research on aqua life, brochures, booklets, river history, fish history, ecology and conservation.
- awareness program week: science day, fishing day, plantation day, fish food, expo, river cleaning day, student field trips, etc.

OTHER ACTIVITY

- student competitions: planting events, cleaning events, etc.
- small scale competition and local events.
- workshop spaces open to public activities.
- exhibitions: farmer life-style, organic food development, etc.
- exchange methods on development and conservation.
- activities based on clubs and forums of existing public and private institu-



hatcheries better equipped

awareness will bring in funds that will allow the development of the hatcheries and ensure other supportive features



OUTCOMES



government revenue

the overall economy of the country will be benefited through pond culture and hatcheries

natural fish habitat and improved env

conservation of the river for a bigger cause, for future generations for mother earth



researchers and environmentalists

an opportunity for interested people to exercise in their field of practice to a wider extent and supporting the ecology of the place itself



fishermen trained and earning

the living standards of a certain population that is dependent on this river will be ensured



recreation, knowledge, experience, tourism

along with serving the local farmers an interactive learning space of experience and awareness will be generated

Image 37: bubble diagram and basis of program formulation

Source: Farasha Zaman

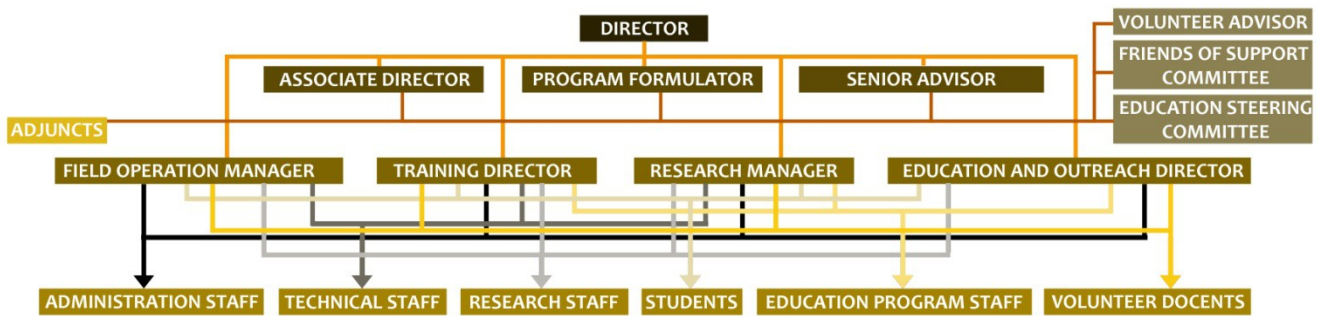


Image 38: Organogram

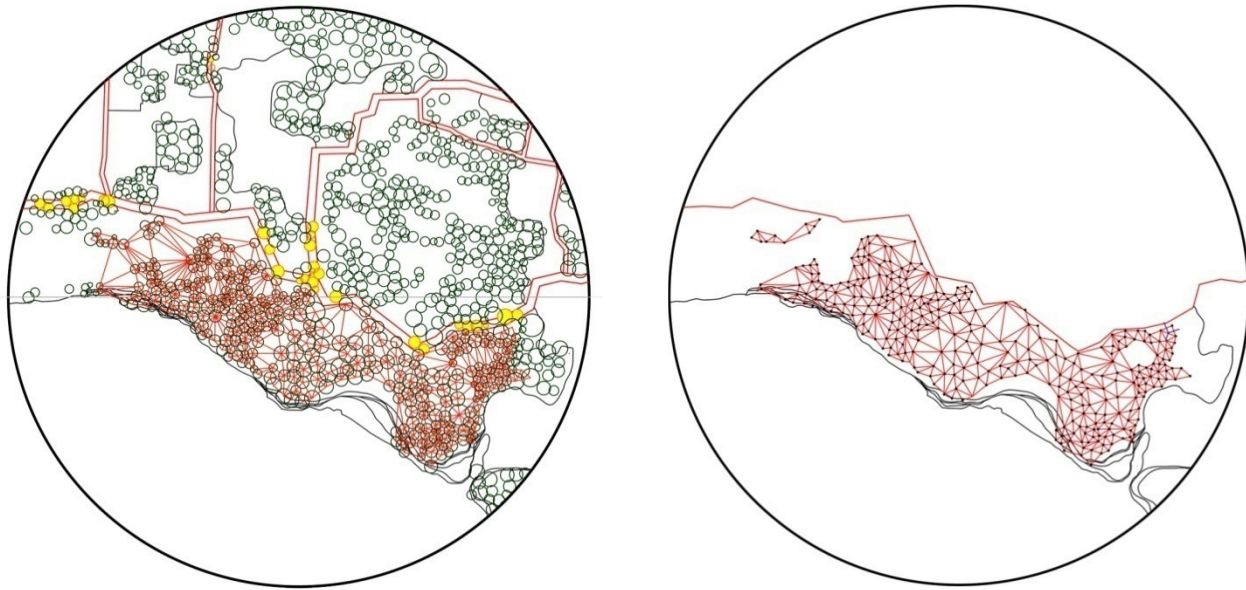
Source: Farasha Zaman

CHAPTER SEVEN: Design Development

7.1 Idea Generation

The idea of the project was developed from the fact that the site is located at the edge of a river that is constantly eroding, but cannot be noticed. It is a known fact that soil erosion can be naturally prevented by planting trees, as the tree roots help in holding the soil tight preventing erosion.

“In mathematics, a Voronoi diagram is a way of dividing space into a number of regions. A set of points (called seeds, sites, or generators) is specified beforehand and for each seed there will be a corresponding region consisting of all points closer to that seed than to any other. The regions are called Voronoi cells” (Wikipedia, 2010)



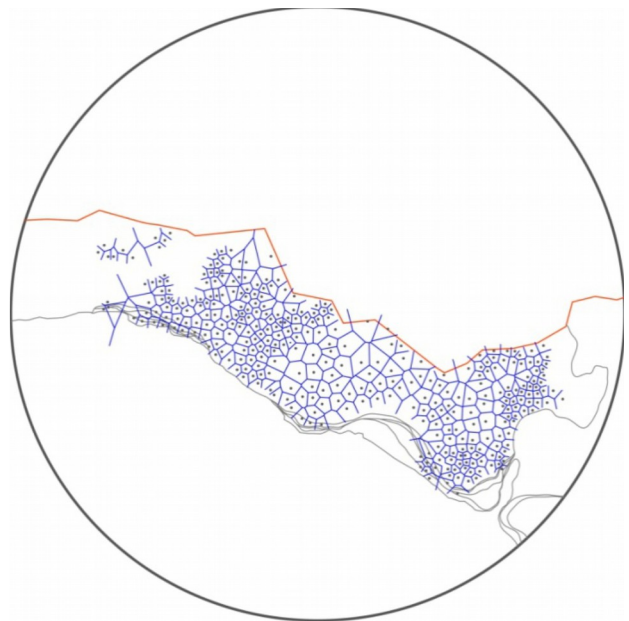


Image 39: Voronoi Development
Source: Farasha Zaman

7.2 Volume and Space Generation

In this case each tree trunk was chosen to be a seed point, connecting them in triangulation first and then through the voronoi to create optimum spaces for one tree.





Image 39: Space Development Inspired from Voronoi
Source: Farasha Zaman

Further development was done so as to not cut down a single tree on site. Spaces in between the trees were found out being inspired from the system. Then each of these spaces were manipulated and structured according to the voronoi.

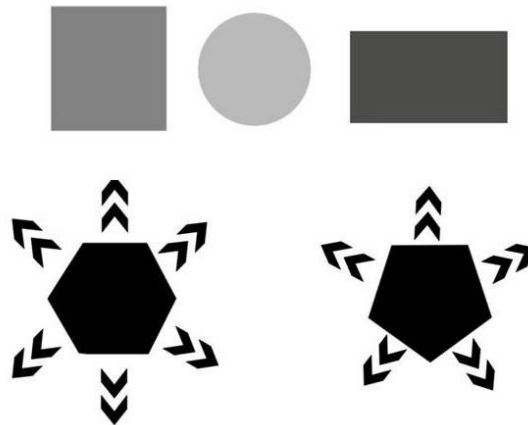
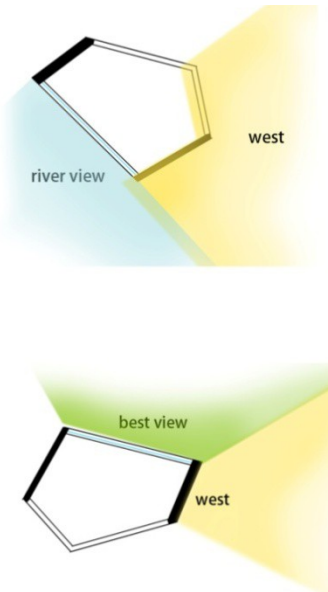


Image 39: choosing polygons
Source: Farasha Zaman

The volumes developed within the spaces in between the trees could be a pure geometry or have gained any formal expressions. The reason for choosing polygons was based on the observation that each polygonal volume provides more interactive surfaces than that of a pure volume. Each polygon also allows the relation with the voronoi to be maintained alongside serving the functional zones. Each cell of the architecture was placed according to the need of the function based on its orientation and in order to achieve maximum view from within the functional zones.



The voronoi cells can be observed to manipulate themselves according to the needs to give an optimum space. They are seen to be unequal at sides, elongating and shortening, or taking the direction most feasible to form the space in harmony with in harmony with its adjacent cell.

Likewise, this interpretation was used to generate the architectural spaces of the centre. The facades of each functional cell, has been elongated where needed, to achieve a wider view, and in places the facades have been tilted to avoid exposure directly to the western sun.

Each of the cells has their own shape and volumetric difference, as they have been developed from the need of the function itself. For instance the gallery spaces have a height of 12' at their lowest point, in order to achieve loftiness and grandness of space.

Image 40: orientation of polygons
Source: Farasha Zaman

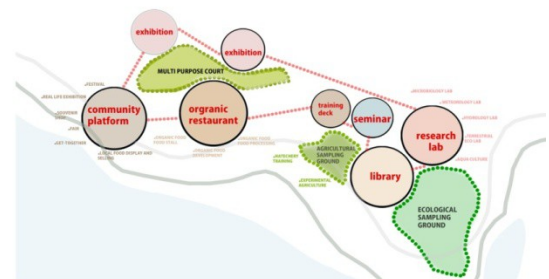
The master plan of the project has been achieved through designing each void space in between the trees into a voronoi character of that particular space. No single space can be seen to be repeated or can be used for a function that has not been assigned to it.

The architectural arrangement of the functional zones and the circulation is such that it follows the random yet guided pathway through nature. The whole volume has been elevated to a height of 3' allowing the biodiversity of the place to be retained.

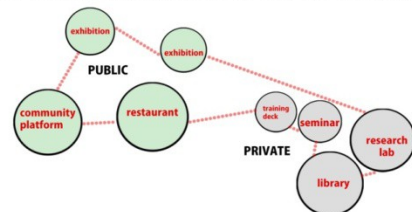
The centre is divided into a public zone consisting of the galleries, a central open space for discussions, exhibitions and interactions and a community deck. The private zone consists of the library, the research labs, the seminar space and accommodation for the researchers. These two zones have been connected by the training zone and the restaurant area, in order to hold the two functions. The research spaces are placed towards north, near to the ecological zone, which can be used as a sampling ground for the labs. The training zone and the kitchen are deigned to function in a way so that the food processing systems can be observed. It is kept at a bending edge of the river allowing this zone to become the first agricultural sampling zone from where the food for the restaurant will be served. The placement allows visitors to know how and where the food is generating from, adding to the learning experience.



BASIC ARRANGEMENT OF ACTIVITIES



EXTENDED ARRANGEMENT OF ACTIVITIES



PUBLIC-PRIVATE INTERRELATIONS

Image 41: zoning of functions and their relation
Source: Farasha Zaman

7.3 Activity and relation to nature



Image 42: Central courtyards like space allowing gatherings and Interaction



Image 43: ecological sampling zone outside library

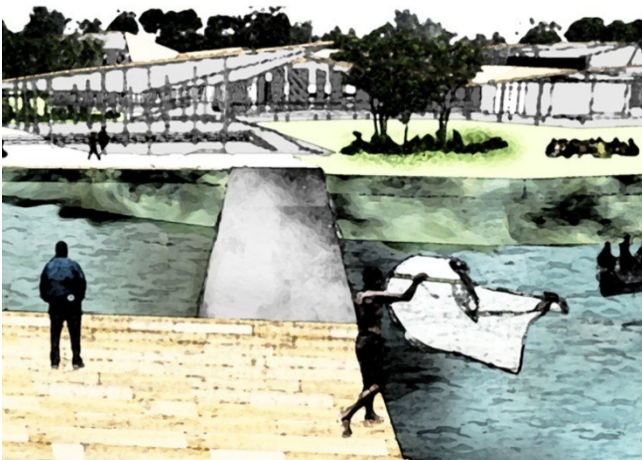


Image 44: community participation area and deck



Image 45 agricultural sampling zone

7.4 Façade Derivation and Development



Image 46: elevation derivation and façade treatment
Source: Farasha Zaman

Taking up a space in nature dotted in trees, four elements can be made out, the ground, the tree trunks, the tree canopy and the grass or smaller trees. Interpreting them into architecture, the tree trunks are abstracted into structural columns, the canopy to the roof, the ground to an elevated platform and the grass to screens. The roof structure has been further manipulated according to the need of achieving views and light entry to the functional spaces.

7.5 Architectural Drawings



Image 47: Site Plan
Source: Farasha Zaman



Image 48: Ground floor plan
Source: Farasha Zaman

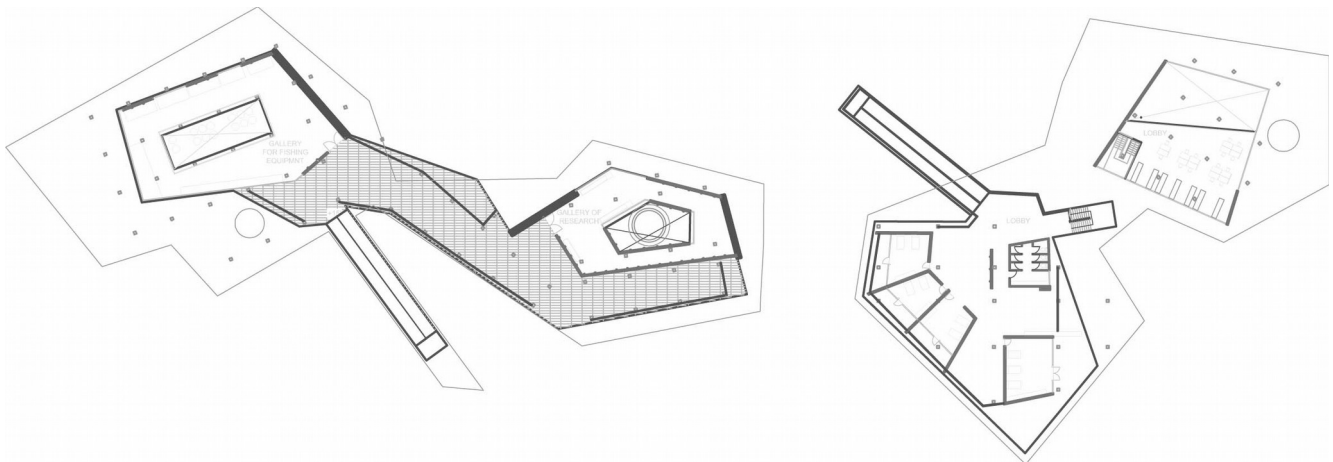


Image 49: First Floor plan
Source: Farasha Zaman

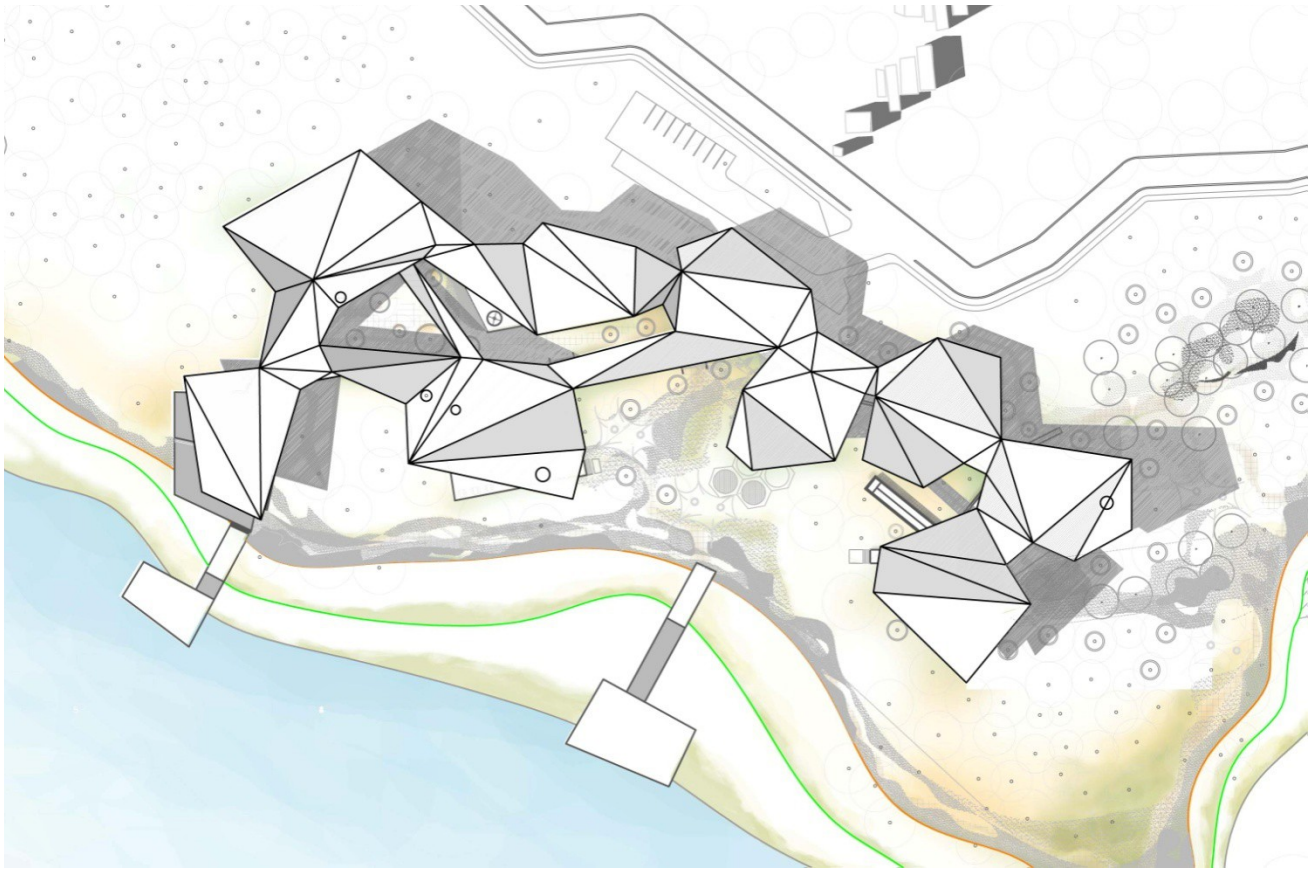


Image 50: Roof plan
Source: Farasha Zaman



Image 51: river view (east elevation)
Source: Farasha Zaman



Image 52: section AA (longitudinal section)
Source: Farasha Zaman



Image 53: section BB (through gallery spaces)
Source: Farasha Zaman

7.5 Renders



Image 54: gallery space
Source: Farasha Zaman



Image 55: Training space
Source: Farasha Zaman



Image 55: outdoor exhibits
Source: Farasha Zaman

Conclusion

River Halda awakening is a project for the people of Chittagong whose lives are dependent on this river. The project was taken up to help generate awareness, starting from the studio itself, and then further.

People today know very less about the rivers, their ecology, and little do they realize how dependent our daily lives are on rivers. This project has helped achieve this goal, of making people aware of the nature and how we are dependent on each other. The aim was not to generate architecture only but to help people relate to bigger issues which we neglect.

The architecture will create a dialogue in nature, welcoming it and yet restricting it but celebrating it, while attending to the functional requirements of a training research and awareness centre. Through this project not only will the locals be addressed but also the children and the aged will be able to enjoy the river side.

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