Research Plan

Alexander M. Lorenz
Graduation Studio Architectural Engineering & Technology
2023 - 2024

Learning from the Past for the Future

Adopting the traditional architecture of Assam to build a more sustainable & resilient future

Alexander M. Lorenz
5836859
9.10.2023

Tutors
Design: Mo Smit
Research: Nico Tillie

aE Studio

Keywords: developing & emerging countries, northeast of India, Assam, contemporary practice, sustainable building alternatives, local resources, circular economy

Developing and emerging countries (Figure 1) possess a unique opportunity to not make the same mistakes the Global West has made.The rapid growth during industrialization has led to buildings not defined by their context but rather by the economic desire of a country. Blinded by profit and power we stopped designing/building for people, losing sight of the true needs and well-being of our communities.

Building Contextual = Building Sustainable

By 2030, three of the four largest economies will belong to Global South countries, with China and India leading the way. This is why sustainability should not become a privilege only enjoyed by the Global West, everyone should be included. It is important to understand that sustainability is not a sacrifice but an opportunity that profits you in the long term.

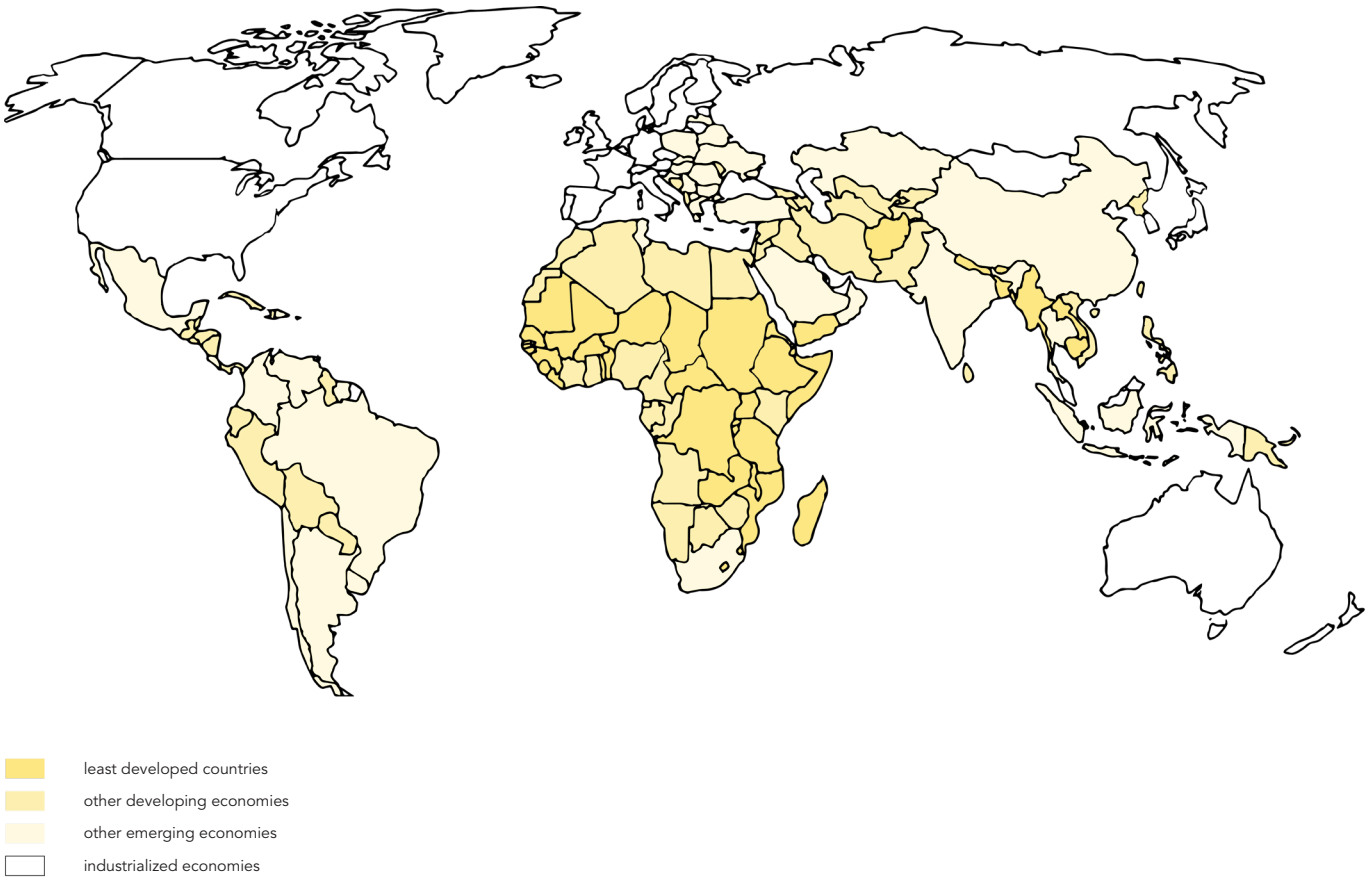


Figure 1. Wold map of countries by stage of industrialization

Countries like India, Africa, the Caribbean and many more strive to achieve the same stability and comfort that the Global West enjoys. This has led to a growth development that tries to replicate what has happened in the Global West during the 19th and 20th centuries.

One material in particular has become a symbol of growth and progress in the Global South, **concrete**. Blinded by what developing countries want to see in concrete, they do not see how concrete is invasive to the local climate and topological conditions. The seduction goes so far that people are willing to leave their traditional practice, which has developed over centuries in unison with the local context, behind for one idea of progress.

India became the most populated country this year, surpassing China, which has held this title at least since 1950. With a population of 1.3 billion people, which is one-sixth of humanity, India plays a vital role in achieving sustainable development goals (SDGs).
In 2016 the Indian state of Assam was the first one to adopt the SDGs. Yet it is shocking to see that in 2021 Assam placed 3rd to last in the statewide SDG assessment.

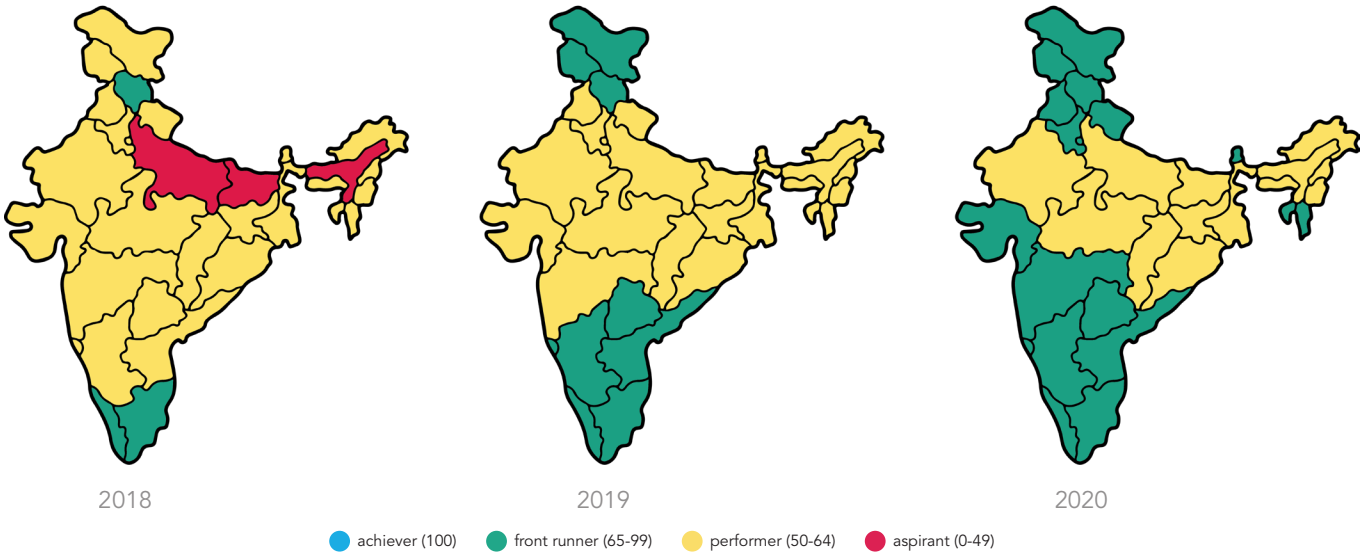


Figure 2. SDG Index Map India 2018 - 2019 - 2020

Assam is part of the seven sisters (Assam, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura and Meghalaya), which make up the northeast of India. In the past two months, travelling from the north to the south of India, I learnt how complex and diverse the country is. Yet, the northeast even surpasses the rest of the country. The seven sisters are home to over a hundred tribal cultures, which have been influenced over time by Hindi and Muslim immigrants, the British ocupance and Christian missionaries. The northeast is one of the most biodiverse regions in the world, defined by lush greenery covering mountains, hills and valleys. The Brahmaputra, Barak and Imphal rivers define the valleys of the northeast. Assam, as the flattest state in the northeast with the Brahmaputra running through is prone to flooding. The tropical monsoon climate causes some of the most severe rainfall and flooding experienced in the country. The monsoon season usually lasts from July until September. To make things worse, Assam is in a seismic active zone of level 5. The state has experienced two major earthquakes in the year 1897 and 1950. The past decades of political unrest and the lack of attention by the Indian government have left Assam with a deficiency to other Indian states.

Figure 3. seven sisters (Assam in red), pictures of Assam

This deficit is shown in the performance of Assam across the SDGs (fig.4). What stands out are the points Zero Hunger, Quality Education, Gender Equality and Industry, Innovation and Infrastructure. Arguably the point with the biggest potential to impact the improvement of many SDGs is Quality Education.
All the worse, Quality Education has only a score of 43 and is even on a decline. The importance of Quality Education to improve the SDGs is explicitly repeated in the Sustainable Development Goals Report of 2023.

> Education is the key that will allow many other Sustainable Development Goals (SDGs) to be achieved. When people are able to get quality education they can break from the cycle of poverty.
> Education helps to reduce inequalities and to reach gender equality. It also empowers people everywhere to live more healthy and sustainable lives. Education is also crucial to fostering tolerance between people and contributes to more peaceful societies.[1]

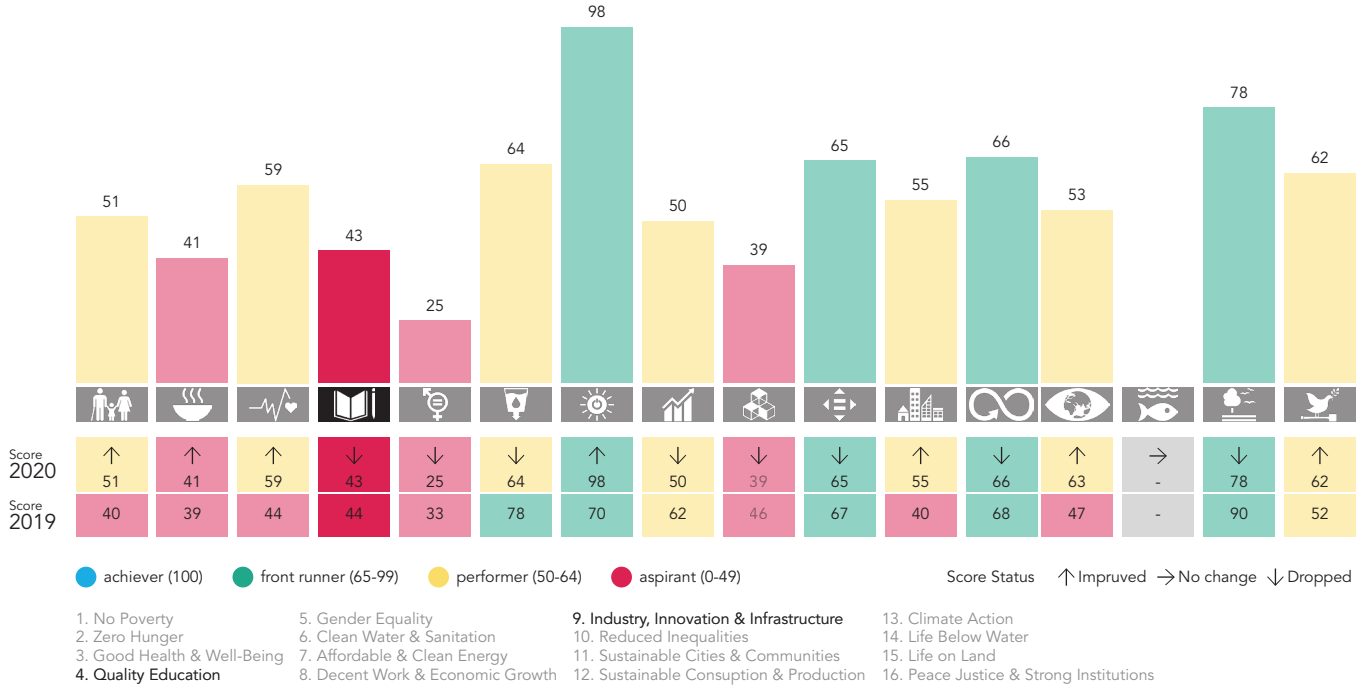


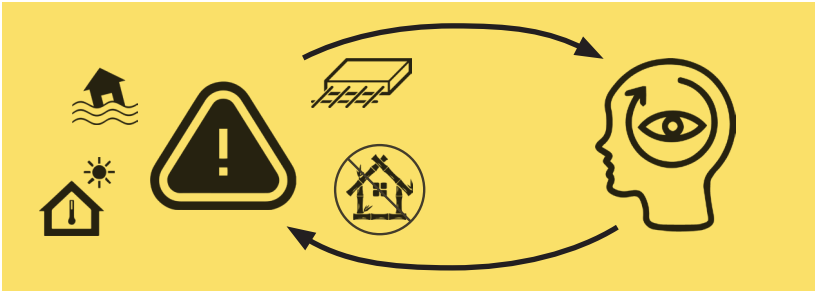
Figure 4. Performance of Assam across SDGs in 2019 & 2020

1. https://www.un.org/sustainabledevelopment/education/

Problem Statement

Like many developing regions, Assam undergoes a building trend that promotes materials like concrete and steel instead of adopting the traditional building practice to fit the demands of our modern age. Materials like bamboo, mud, straw and many others are viewed as primitive materials that can not be used to build modern buildings.
The general perception is that traditional architecture which uses these materials is well suited for the climate and landscape of Assam but it is just the past and not the future. People strive for a modern and comfortable lifestyle, which in most minds only comes with using steel and concrete.
With the establishment of concrete and steel industries, the availability, knowledge and affordability of natural materials are on a constant decline. Not only do the materials vanish but also the knowledge of how to build in harmony with the climate and landscape, which leads to an unresponsive and invasive practice that creates a whole new set of issues.
It is to point out that through conversations with locals, it became clear that the biggest driver of this trend is a narrow assumption that this is the only way into a better future. This behaviour is not to judge because people always act to their best abilities, but if you are only presented with one way, this will be the way you follow. The lack of awareness comes from the missing exposure you would receive through quality education.

The current building practice in Assam has evolved from being context-responsive, using local materials and design to react to the context, to being growth-orientated. This practice focuses on industrial materials like concrete and steel while using technology to resist the context. Promoting only this practice has created a narrow point of view in the general population and led to the erasing of traditional architecture.



Before the design question, the Akshar school has to be introduced. Akshar is a school in the south of Guwahati in the district Pamohi. The school is well known for providing quality education for free to children between the ages of 6 to 17. What sets Akshar apart is that each week students are required to bring plastic waste to the school. Through this process, the students learn about sustainability and recycling but also what a better and more resilient future can look like. Plastic waste is used to make small products and furniture. Currently, the school has 100 students and 7 teachers. In Fig. 7, we can see a plan of the Akshar school. Concrete buildings are marked in red and traditional buildings are marked in yellow.

Figure 5. Akshar school in Pamohi Guwahati, Assam

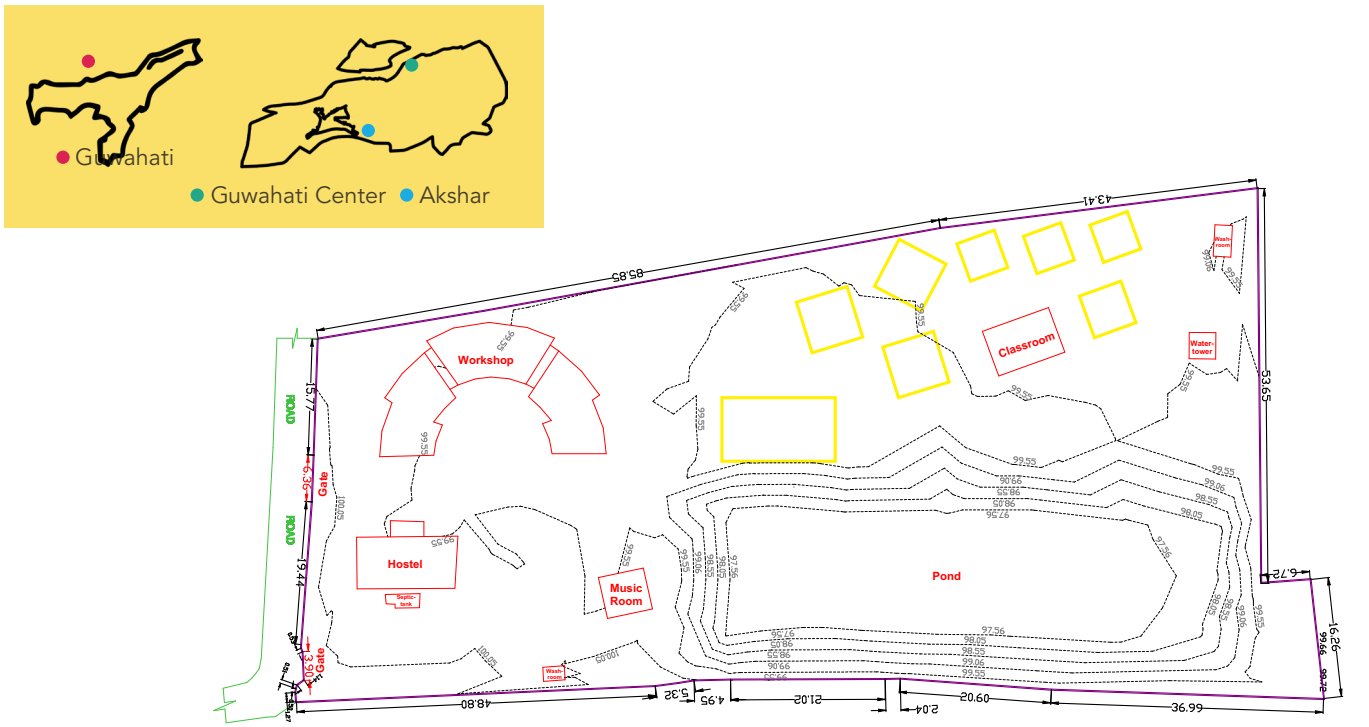


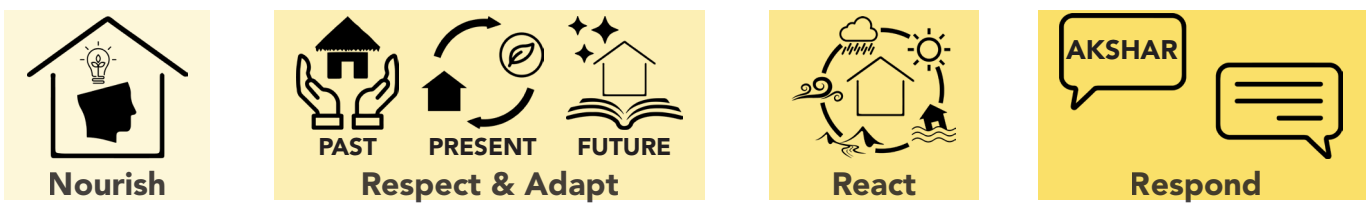
Figure 6. Plan of the Akshar school

Design Question

How can you build a school in Assam that response to climate and landscape through design?

Design Objective

The objective of the project is a holistic design that inspires the students to think differently about the use of local materials. Further, how we deal with the existing concrete and traditional buildings as well as introduce the results from the research is important. Finally, the interaction with Akshar itself to respond to their problems.



Design Hypothesis

By showing the potential of natural and waste materials in Architecture, through a school building, students will gain a better understanding of what sustainability means and how it can be achieved. This will not only affect the students but also their families and villages.

Reflection

Initially, I came to India with the idea of working on new affordable housing typologies, wanting to step away from the standard practice of box-like concrete homes, and helping to revitalise traditional architecture and natural materials. However, once at the IIT, I discovered that the initial interest of the IIT was not that strong anymore, and it would imply many logistical, social and religious problems. The complexity of housing in Assam and the lack of interest in other building materials besides concrete and bricks led me to rethink this approach.
Discovering the Akshar School and how it can have a positive impact, not only on the children but their entire community, made me understand that this approach is much more suitable for long-lasting change. One thing that encouraged me in this approach was seeing the movie „The Story of Lumshnong - In Northeast India, Cement Plants Disrupt Forest and a Way of Life". In particular, one thing that was said in the movie by H. H. Morhan, environmental, writer and activist:

> ... we have existing regulations of forest laws, we have enough of this, the only thing which lacks to regulate this is the will to regulate. [2]

The movie focuses on the environmental impact of cement plantations in the northeast of India but it also does a great job of showcasing the lack of awareness and what the consequences are.

2. https://e360.yale.edu/features/in-northeast-india-cement-plants-disrupt-forest-and-a-way-of-life

Themetic Research Question

How to build responsive to the climate & landscape of Assam using local resources in the 21st century?

C: what can we learn from traditional architecture about context responsive design?

S: what has changed in the needs of people for their homes?

M: what is the potential of natural resources for construction in the 21st century?

Themetic Research Hypothesis

By studying the traditional architecture of Assam, we can learn more about climate and landscape-responsive design strategies. By combining these with the new societal demands, local resources and a higher awareness of engineering, it will be possible to create a context-responsive design tool kit that fits our modern society.

Themetic Research Objectiv

The research objective is to focus on three subtopics, Climate and landscape, Society and Materials, to answer the research question. Each topic focuses on a crucial part of the context of Assam. The goal is to reach a holistic understanding of the situation and present a design strategy that has evolved out of the entire context rather than just focusing on one element.

Methodology

Climate & Landscape

observing & analysing

The climate and landscape will be analysed through four case studies. They will be tested on what role structure, materials and use play in context-responsive design.

Materials

testing

Material assesment through first hand experience & literature research.
Defined by the context and material assesment material prototyps will be developed om the base of a compisition matrix.
The material prototyps will be tested on compression strength and water resistant properties.

Society

listening & engaging

Interviewing a variety of people will give a holistic view of society.
The questions will focus on housing past-present-future, materials, climate and societal norms.
The group of interviewees will be as followed: villagers, students, teachers, architects, housing officials and activists.

design strategies

material prototyps

outline of needs & problems

design tool kit

Research Plan Diagramm

problem statement

By 2030, three of the four largest economies will belong to Global South countries, with India and China leading the way.

India as the most populated country in the world plays a vital role in reaching the sustainable development goals. Assam first state to adoped SDGs in 2016.

CONTEXT

tropical monsoon climate

Northeast India

Guwahati, Assam

problems

- replacement of traditional architecture by concrete, steel & brick buildings => support of industrie not nature
- no real industrie for natural industries, people are forbiden to take materials from forests
- people are traped in one idea of progress => unawareness of consequences
- new structures are not responsive to climate & landscape => vulnerable to earthquakes, flooding, humidity, heat and cold <= unskilled and imported labour

research question

how to design responsive to the climate & landscape of Assam using local resources in the 21st century?

1. qualitative subquestion

what can we learn from traditional architecture about context responsive design?

Climate & Landscape

- climate and landscape analysis through assesing case studies according to their responsiveness & vulnerabilities (1.Assamies house, 2.Kuccha house, 3. Gharaunda house, 4. Khasi house)

2. quantitive subquestion

what is the potential of natural resources for construction in the 21st century?

Materials

material potential assesment

- interviews
- literature

3. qualitative subquestion

what has changed in the needs of people for their homes?

Society

- interviews
- literature

design strategies

material prototypes

outline of needs & problems

design tool kit

design (school)

aE Studio

Graduation Plan Diagramm

Research

september

1.1 4 - 10
Trip to Assam (1.9 - 20.10)
getting to know the campus of IIT - visit to village with A. K. Das - experience of traditional architecture in Assam and how it is changing (case study Bodo Tribe house and Assam-Typ house)

1.2 11 - 17
Meeting with architects Jai Prakash and Ronojoy Sen - Trip to Meghalaya, visit to Rikynjai Resort, Sohra and Nohwet (villages) - Meeting with architect Aiban in Schillong - understanding of traditional Khasi architecture (casestudy Khasi home)

1.3 18 - 24
Work on assignments from netherlands

1.4 25 - 1
Discussion with Prof. A.K. Das on affordable housing in Assam
Meeting with architect Hirok - previous experience with Indian Housing Federation on affordable housing solutions (case study Gharunda house for Mishings Tribe)

october

1.5 2 - 8
Visit of akshar school pamohi - discovering the akshar principle
Meeting with architect Ronojoy in Guwahati and Roon Bhuyan, what does sustainability mean and how to use bamboo in construction
Meeting with young architect Abhinav Dilip and friends (young architecture educators and professionals)

1.6 9 - 15
Work on assignments from netherlands

1.7 16 - 22
Visit to akshar school pamohi, interview with students on sustainability, the building industry and what they think about the school - afterwards lively discussion with students

1.8 23 - 29
Meeting with co-founder of akshar, Parmita Sarma; on working together with akshar for my graduation project
Gathering of young and senior architects in the tea story at Uzan Bazar, presentation of my previous work and open discussion on the topic of sustainable architecture in the 21st century in Assam
Giving a class at the akshar school on architecture drawing and practical excercises
Invitation by Milin Dutta founder of Anajoree to speak about sustainable practices and start a discussion with the team

1.9 30 -5
Finish research plan and prepare presentation for P1

november

1.10 6 - 12
P1 - Presentation
Nov. 9th 2023

2.1 13 - 19
Chapter 3
Material matrix, build molde for prototypes and make prototypes (curing time 28 days)

2.2 20 - 26
Chapter 1
Comparison of case studies and distill key features

2.3 27 - 3
Chapter 2
Writte down key learnings from intervies with Hirok from the Indian Housing Federation, Villagers from Sohra, Nohwet and Bodo Trib, Students from Akshar, Proffesor from the IIT Guwahati, Founder of Akshar and local Architects

december

2.4 4 - 10
Abstract, Intro and Method

2.5 11 - 17
Testing of Prototypes
compression strength and waterresistance

2.6 18 - 24
Chapter 3
Design conclusion, build prototyp of design conclusion and reflect with architects from Assam

Christmas
25.12 - 7.1

january

2.7 8 - 14
Reflect and Edit
Make final conclusion

2.8 15 - 21
Reflect and Edit
Prepare P2 Presentation

2.9 22 -28
Reflect and Edit
Make 3d-model of akshar campus

2.10 29 - 4
P2 - Presentation
29.1 - 2.2, 2024

Springbreak
5.2 - 11.2

Design

february

3.1 12 - 18
Schematic Design
Concept for bringing together existing, traditional and new

3.2 19 - 25
Schematic Design
Make scatches and abstract plans

3.3 26 - 3
Reflect and Edit
feedback session with architects from assam and akshar

march

3.4 4 - 10
Design

3.5 11 - 17
Design

3.6 18 - 24
Reflect and Edit
feedback session with architects from assam and akshar

3.7 25 - 31
Prepare P3 Presentation

april

3.8 1 -7

3.9 8 - 14

3.10 15 - 21
Design

4.1 22 - 28
Drawing Set
Qularify what is important and what I want to show

4.2 29 - 5
Design
Work on building services, watermanagement and ventilation + landscape

mai

4.3 4 - 10
Design
Work on building services, watermanagement and ventilation + landscape

4.4 11 - 17
Prepare P4 Presentation

4.5 18 - 24
P4 - Presentation
18.5 - 22.5, 2024

4.6 25 - 2
Finalise drawings

june

4.7 3 - 9
Finalise Renders

4.8 10 - 16
Modell + Presentation

4.9 17 - 23
Modell + Presentation

4.10 24 - 30
P5 - Presentation
24.6 - 28.6, 2024

Degree: Master of Science Architecture, Urbanism and Building Science

Bibliographie

1. Quality Education, Accessed November 9th 2023, https://www.un.org/sustainabledevelopment/education/
2. In Northeast India, Cement Plants Disrupt Forest and a Way of Life, Accessed November 9th 2023, https://e360.yale.edu/features/in-northeast-india-cement-plants-disrupt-forest-and-a-way-of-life

References

Fig.1: Gbaguidi, Camille. World map of countries by stage of industrialization. 2021. Map.
Fig.2: https://sdgindiaindex.niti.gov.in/#/state-compare?goal=9&area=IND018&timePeriod=2020
Fig.3: https://www.sentinelassam.com/north-east-india-news/assam-news/assam-tea-gardens-all-you-need-to-know-522992, https://tourdefarm.in/blog/bohag-bihu-festival-the-heartbeat-of-assam/, https://www.bavaria-fernreisen.de/indien-rundreise, https://www.thecrimsoncanvas.com/post/5-interesting-things-to-do-on-majuli-island-assam,https://housing.com/news/assam-tourist-places-that-will-leave-you-in-awe/
Fig.4: https://sdgindiaindex.niti.gov.in/#/state-compare?goal=9&area=IND018&timePeriod=2020
Fig.5: https://www.aksharfoundation.org/
Fig.6: Akshar Foundation