

ABSTRACT

Title of Thesis: CREATING A WEAVING URBANISM
FOR THE WEAVERS WHO WEAVE FOR
LIVELIHOOD

Mohit Ramniklal Dobariya,
Masters of Architecture, 2019

Thesis Directed By: Jana Kristina Vandergoot
Assistant Professor
Affiliate Professor in Landscape Architecture,
College of Agriculture and Natural Resources

This thesis proposes that the holistic traditions and ancient way of life of weavers in the village of Sualkuchi, Assam, India are a forward-thinking model for sustainable urbanism. And will explore strategies to revitalize the traditional weaving heritage of a village (Sualkuchi, Assam, India) by providing a more robust platform to generate economic opportunities. The approach chosen for the benefit of the weavers' community by taking inspirations from the past and implementing in the future, thus increasing potential. It is an institution within itself which benefits the entire complex as one unified whole. This handloom center, informal and accommodating of the weavers' language is an interactive platform for the welfare of the weavers' community, and for understanding of the entire country. The main objective of the project is to promote the development and sustainability of the traditional textiles and

its products by creating a handloom element for the weavers of the country with proper civic arrangements and functions. It is an attempt to preserve the rich heritage of the textiles of India and save it from the clutches of extinction.

CREATING A WEAVING URBANISM
FOR THE WEAVERS WHO WEAVE FOR LIVELIHOOD

by

Mohit Ramniklal Dobariya

Thesis submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
[Masters of Architecture]
[2019]

Advisory Committee:

Assistant Professor Jana Kristina Vandergroot, Chair

Assistant Professor James Tilghman

Professor Emeritus Karl Du Puy

© Copyright by
[Mohit Ramniklal Dobariya]
[2019]

Acknowledgements

This Thesis was initially just a branched out thought which was later groomed and cultivated into something meaningful and fruitful. The people who helped in this journey of bringing forth the best from my side to this thesis were foremost my mentor Jana Kristina Vandergroot, my other faculties who helped me with their supportive and constructive criticism and guided me towards this end where all efforts have bared me fruits beyond my expectations.

The classmates who continuously have been supportive of me during these months of dissertation and otherwise. My family and friends who have put their faith and moral support in me has been a driving force to strive for better results every time.

With this I acknowledge all the people who ever helped me in small or big ways.

Table of Contents

| | |
|--|-----|
| Acknowledgements | ii |
| Table of Contents | iii |
| List of Figures..... | v |
| Chapter 1: Synopsis..... | 1 |
| Section 1: Introduction | 1 |
| 1: The silk weaver’s art forms in India..... | 1 |
| 2: Aim..... | 2 |
| 3: Objectives | 3 |
| 4: Need of study..... | 3 |
| 5: Scope of study | 3 |
| 6: Research questions | 4 |
| Chapter 2: Handloom Industry | 5 |
| Section 1: Handloom Industry of India | 5 |
| 1: Introduction | 5 |
| Section 2: Typologies of handloom handicrafts and current scenario..... | 8 |
| 1: Prominent Typologies | 8 |
| Chapter 3: Weaving Industry of Sualkuchi | 11 |
| Section 1: Introduction to the art and city | 11 |
| Section 2: Introduction to weaving culture and scenario of Sualkuchi | 14 |
| 1: Weaving process components and flow: Fiber..... | 14 |
| 2: Weaving process components and flow: Hand spinning..... | 15 |
| 3: Weaving process components and flow: Dyeing | 18 |
| 4: Weaving process components and flow: Bobbin winding..... | 21 |
| 5: Weaving process components and flow: Warping | 23 |
| 6: Weaving process components and flow: Street sizing | 25 |
| 7: Weaving process components and flow: Attaching the warp on loom | 27 |
| 8: Weaving process components and flow: Weft winding..... | 29 |
| 9: Weaving process components and flow: Weaving..... | 31 |
| Section 3: Site Selection (Criteria & Justification) | 33 |
| Section 4: Site Study | 34 |
| Section 5: Climate Study | 37 |
| Section 6: City’s history and growth | 39 |
| 1: Other artisans and handicrafts in the kamrup district..... | 40 |
| Section 6: City’s current scenario..... | 41 |
| Chapter 4: Case Studies & Program derivation..... | 43 |
| Section 1: Studying silk and silk manufacturing..... | 43 |
| 1: Introduction | 43 |
| 2: Analysis | 45 |
| 3: Inference..... | 47 |
| Section 2: Literature case study –Michael Ezban Working water (Productive landscape)..... | 47 |
| 1: Introduction | 47 |
| 2: Analysis | 48 |

| | |
|---|-----|
| 3: Inference | 49 |
| Section 3: Literature case study – Ganga ma ki textile Studio, Uttarakhand, India | 50 |
| 1: Introduction | 50 |
| 2: Analysis | 57 |
| Section 4: Literature case study – Khamir Artisans village, Kutch, Gujarat, India | 58 |
| 1: Introduction | 58 |
| 2: Analysis | 62 |
| Section 5: Compiled analysis | 63 |
| Section 6: Program Derivation | 64 |
| Chapter 5: Conceptual ideas & Design concerns | 68 |
| Section 1: Preliminary ideas | 68 |
| 1: Diagrams for conceptual ideas | 68 |
| 2: Initial sketches & Design process | 73 |
| Chapter 6: Process of Designing | 76 |
| Section 1: Design Derivations from the activity of weaving. | 76 |
| 1: Structural element: Loggia structure | 76 |
| 2: Structural element: Pivot doors and wall panels | 80 |
| 3: Material selection for all elements | 83 |
| 4: Design process of the training institute | 84 |
| 5: Design process of the adjoining areas (Agricultural and accommodation)..... | 88 |
| 6: Design process of the circulation | 89 |
| Section 2: Design considerations for urban fabric. | 92 |
| 1: Silk Urbanism: Social interaction and circulation..... | 93 |
| 2: Silk Urbanism: Social interaction and circulation..... | 94 |
| 3: Silk Urbanism: Economy and Typologies..... | 95 |
| 4: Silk Urbanism: Raw materials..... | 96 |
| 5: Silk Urbanism: Social interaction and circulation..... | 97 |
| Chapter 6: Final design drawings | 100 |
| Section 1: Plans, elevations & sections. | 100 |
| Section 2: Sketches..... | 103 |
| Bibliography | 108 |

List of Figures

| | |
|--|----|
| Figure 1 The weaving process infographics | 7 |
| Figure 2 Handloom variety in the map infographic of India | 8 |
| Figure 3 The prominent typologies in the market. | 9 |
| Figure 4 The chart showing current hold of handloom market in the field with reference to the mass produced fabrics..... | 10 |
| Figure 5 image of artisan working on the handloom..... | 11 |
| Figure 6 image of local artisans using the handloom | 12 |
| Figure 7 the satellite map of the village. | 13 |
| Figure 8 The info graphic map for the site location | 13 |
| Figure 9 The graphical representation of fiber | 14 |
| Figure 10 Silk worm to fiber process | 14 |
| Figure 11 Graphical representation of hand spinning | 15 |
| Figure 12 Graphical representation of yarn..... | 15 |
| Figure 13 The process endured for producing yarn..... | 16 |
| Figure 14 The current means of people to form a hand spinner from a bicycle..... | 16 |
| Figure 15 The collective show of current scenario in Sualkuchi | 17 |
| Figure 16 graphical representation of dyeing | 18 |
| Figure 17 Dye making process | 19 |
| Figure 18 The output from dyeing is then dried out on bamboo stands..... | 20 |
| Figure 19 graphical representation of bobbin winding..... | 21 |
| Figure 20 work flow from yarn to winding..... | 21 |
| Figure 21 The home made equipment used for winding | 22 |
| Figure 22 The warp drum in use..... | 24 |
| Figure 23 The warp drum in use with a bobbin stand | 24 |
| Figure 24 Graphical representation of street sizing..... | 25 |
| Figure 25 street sizing done in a backyard of a workshop | 26 |
| Figure 26 street sizing done on a a street | 26 |
| Figure 27 graphical representation of warp to loom | 27 |
| Figure 28 components of the process of wrap to loom | 28 |
| Figure 29 a weaver attaching the warp on the loom..... | 28 |
| Figure 30 view of the loom sticks outside a handloom | 28 |
| Figure 31 graphical representation of weft winding..... | 29 |
| Figure 32 weft being used to put in weaving patterns..... | 30 |
| Figure 33 graphical representation of the flow of working with a weft..... | 30 |
| Figure 34 The weft winding done by a charkha | 30 |
| Figure 35 graphical representation of weaving | 31 |
| Figure 36 The components of a handloom | 32 |
| Figure 37 view of the handloom under usage | 32 |
| Figure 38 The site with site section. | 34 |
| Figure 39 The fauna commonly found near site..... | 34 |
| Figure 40 Site photographs current scenario | 35 |
| Figure 41 The tools of trade for Sualkuchi artisans | 36 |

| | |
|--|----|
| Figure 42 Gandhi memorial (incorporated in the site) | 36 |
| Figure 43 The accessibility map of the city..... | 37 |
| Figure 44 Detail study diagrams for climatic study | 38 |
| Figure 45 Images showing over the ages development of the city..... | 39 |
| Figure 46 The majority of used materials and construction technique..... | 41 |
| Figure 47 The demographics of depleted numbers of weavers | 41 |
| Figure 48 The state was already at the top of its industry in quantity..... | 42 |
| Figure 49 The flow chart of working process of silk production | 45 |
| Figure 50 The ecological cycle of silk worm | 46 |
| Figure 51 The productive landscape images and alternatives | 48 |
| Figure 52 The flow chart info diagram for the ecocycle | 48 |
| Figure 53 Scaled model of the site | 52 |
| Figure 54 The sections referring to the spaces and their impact | 53 |
| Figure 55 interiors of the studio | 55 |
| Figure 56 Site plan..... | 56 |
| Figure 57 Sections referring to the roof scape and congregation spaces..... | 57 |
| Figure 58 Self inferred diagrams | 58 |
| Figure 59 The artisan village workshop area | 60 |
| Figure 60 Plan of Khamir artisan village | 61 |
| Figure 61 diagram display of spaces | 62 |
| Figure 62 Courtyard placement diagram | 62 |
| Figure 63 Addressing the issues seen and observed on site | 64 |
| Figure 64 On site program and space imposition | 67 |
| Figure 65 Initial level zoning | 67 |
| Figure 66 Zoning diagram of the conceptual planning | 68 |
| Figure 67 Conceptual master plan | 69 |
| Figure 68 Conceptual cluster plan of courtyard and shed | 70 |
| Figure 69 The concept for the modular shed..... | 71 |
| Figure 70 the climate responsive techniques for Sualkuchi | 71 |
| Figure 71 Conceptual elevations in ref to courtyards..... | 72 |
| Figure 72 Conceptual working detail of the sheds | 72 |
| Figure 73 Secondary concept in line with the initial concept | 73 |
| Figure 74 The cluster plan for the shed | 74 |
| Figure 75 The sectional cut of the shed for wind and light circulation | 74 |
| Figure 76 The devised structure | 77 |
| Figure 77 The handloom for ref. | 77 |
| Figure 78 The exploded axonometric view of the loggia structure..... | 78 |
| Figure 79 the detail view of the structure under the loggia | 79 |
| Figure 80 diagram for ref. | 80 |
| Figure 81 diagram for door panels | 81 |
| Figure 82 bamboo mat making process..... | 81 |
| Figure 83 patterns normally used for bamboo weaving | 82 |
| Figure 84 Detail description of door bamboo design | 82 |
| Figure 85 Institute plan..... | 85 |
| Figure 86 Exploded axonal view for component visuals | 87 |
| Figure 87 Canal layout with indication for the farming areas..... | 88 |

| | | |
|------------|---|-----|
| Figure 88 | The diagrammatic explanation of the canal usage for agriculture | 89 |
| Figure 89 | The circulation plan for the pedestrian vs. vehicular | 90 |
| Figure 90 | The vehicular access for emergency purposes | 91 |
| Figure 91 | The plan for the social interaction via pedestrian circulation | 93 |
| Figure 92 | Heritage mapping layout via facades | 94 |
| Figure 93 | The info graphic representation of the economy and typologies | 95 |
| Figure 94 | The plan for the indication of raw materials | 96 |
| Figure 95 | The info graphic plan for pilgrim spots in context..... | 97 |
| Figure 96 | diagram for the weekend market scenario | 98 |
| Figure 97 | Image for the community gathering space | 98 |
| Figure 98 | image for the cultural activities..... | 99 |
| Figure 99 | image for the festival times | 99 |
| Figure 100 | Sections 1& 2 through the institute | 100 |
| Figure 101 | Sections 3& 4 through the institute | 101 |
| Figure 102 | The master plan | 102 |
| Figure 103 | The main view of the site and context | 103 |
| Figure 104 | The view under the loggia structure..... | 104 |
| Figure 105 | The view of the multi purpose area..... | 104 |
| Figure 106 | Courtyard to working space sketch | 105 |
| Figure 107 | The multi purpose area - drying of yarn | 105 |
| Figure 108 | The sketch for farm area | 106 |
| Figure 109 | The 3D view of the entry street..... | 107 |

Chapter 1: Synopsis

Section 1: Introduction

1: The silk weaver's art forms in India

The weaving industry has been an integral part of Indian history since ancient times, the art has been diverse throughout the nation. The art is traditionally passed onto the succeeding generation and kept alive.

The art has been exploited in many regions of India, the industrialization has taken away the zest of the art. Globalization has affected the art to evolve and resort to modern means but there are some art forms of weaving that have taken a step back from the original status of respect. The art of weaving originating in Assam is one such endangered form of silk weaving which has been exploited and defamed. The competition which comes with the industrialization has brought people to scam the buyers but wrongly selling goods under the name of their art i.e.: Assamese silk sarees.

The silk clothes that used to be one royal commodity in the ancient times has become a luxury item which many can afford today, while back then it was used by royalty only. The actual weavers had this art form as a sole income generating skill. The richness and ethnicity of this art lured many other sects of society to opt for making and selling these silk clothes too, but sending and selling them in different cities. Which in turn made it famous and known around the nation.

The setback is that the weavers receive less appreciation and aren't generating enough wages to survive in this expensive economy. The weavers have started dropping out and opting out from this profession. There are incidents of people selling unmarked goods as Assamese traditional silk sarees and scamming people in the name of business, thus bringing more of reduced popularity to the actual weavers.

This art of weaving and its diminished value in the global market lead me to the curiosity of the problem underneath it. The core problem lacks infrastructure in this field and the sale of the goods. The lack of infrastructure hinders the sale from a remote location in the hilly regions of the eastern regions of India. Thus this thesis will target a lot many issues in a one shot solution by enlivening the weaving culture in Assam.

2: Aim

The purpose of this thesis is to revitalize and recreate the traditional weaving heritage of a village (saulkuchi, asaam, India) by providing a more robust platform to generate economic opportunities.

The project would create connections to national and international fairs and develop better trade relations. By providing physical space for weaving and group education, knowledge and understanding of modern techniques would progress, marketing acumen and supporting a sustainable profession. Training programs can be expanded to businessmen and designers to collaborate with the weavers. The major components to include are a weaving yard, a training institute and an experience zone.

3: Objectives

To recognize current issues and restrictions on the weavers and explain development and unwillingness to work further. To serve as a reference for weavers who are increasingly losing touch with their own traditions. To provide training in traditional weaving skills, along with modern techniques and marketing salesmanship. To act as a centre for developing new designs and ideas for continuous growth. To energize the weavers and craftsmen by giving them a platform for opportunity development. To spread awareness among both the local and wider public.

4: Need of study

The diminished value of art discourages artists to carry on the art, but the demand of these articles hasn't reduced at all in the global market. The variety of the art forms has its own demerits too, as the preference of a certain art form can surpass the other art forms by lengths. The art forms popular right now have been backed up by industrialization and propagation which is unfortunately not possible for certain art forms. Thus the need to understand the hindrance in the paths of prosperity for these art forms.

5: Scope of study

The research would be targeting the advancement in sustainable. The research would bring light upon options for the approach towards other such art forms in future. The design applications of this research are in a broader approach towards the understanding of the art form and how architectural interventions can revitalize it.

6: Research questions

Q) Why are the traditional arts of the handloom industry dying in their respective regions? – The traditional arts and their background would be studied and concluded to the core reason of downfall and an approach of appropriate solution.

Q) How can the solution for the revitalization of an art be turned in to a universal module of approach towards future scope of this research and solution? – The methodology would be devised to bring forth the best outcome and in a generic manner at the same time. So as to benefit the art forms in future.

Chapter 2: Handloom Industry

Section 1: Handloom Industry of India

1: Introduction

The handloom sector plays a very important role in the country's economy with over 4.3 million people directly involved in the production, the handloom industry is the second largest employment provider for the population of 2 lakh people after agriculture. Handloom products are known for their unique design and finesse, handloom is un-paralleled in its flexibility and versatility permitting experimentation and encouraging innovations. The strength of the handloom lies in the introducing the innovating designs, which cannot be replicated mechanized power loom sector. Thus handloom forms a part of the heritage of India exemplifies the richness and diversity of our country and the artistry of the weavers.

The handloom industry is expanding both nationally and internationally because of the demand for hand crafted artefacts and unique traditional designs, but the socio economic conditions of this community is deteriorating. The problems faced by the weavers are competing the global markets, low level of income, poor market price of the finished commodity and inability to reach the buyers.

Handloom weavers need and deserve a centre where their skills and rich heritage can be utilized where further training will enable them to pursue new opportunities for their future.

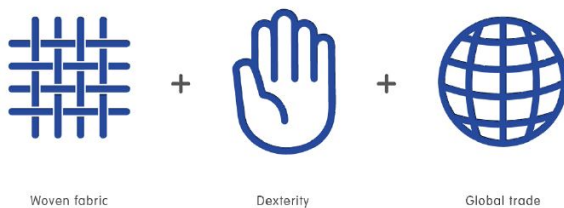
It has a very diverse agro climatic and geographic condition, and each region is known for unique product of its own. It is not so easy to train people in this industry

but the technology is easily understood even by common men. Even today handloom industry occupies an important place in the Indian economy

It is an integral part of the decentralized part of the country, Indian handloom products are well known all over the world this industry is scattered all over the country the states where handlooms are operated on commercial basis as include Andhra Pradesh Bihar, Assam, Karnataka, Kerala, Maharashtra, Orissa, Tamilnadu, Uttar Pradesh and Madhya Pradesh it provides direct and indirect employment to over 13 million weavers.

One of the largest family based traditional industries in India is handloom. In India handloom sectors are scattered and decentralized. Handloom sectors are a source of livelihood for lakhs of weavers and artisans in India.

Indian handloom designs takes its inspiration from nature and the products of various regions reflect the colors of the flora and fauna of that area and makes the uniqueness of handloom products. Indian handloom products are as different and varied as our cultures and languages. Handloom sector plays an important role in the Indian economy in the context of employment generation and the economic development of India. Handloom units are also very important for welfare resources.



The infographic slogan as an approach to this thesis.

The entire process of silk weaving explained in infographics as below

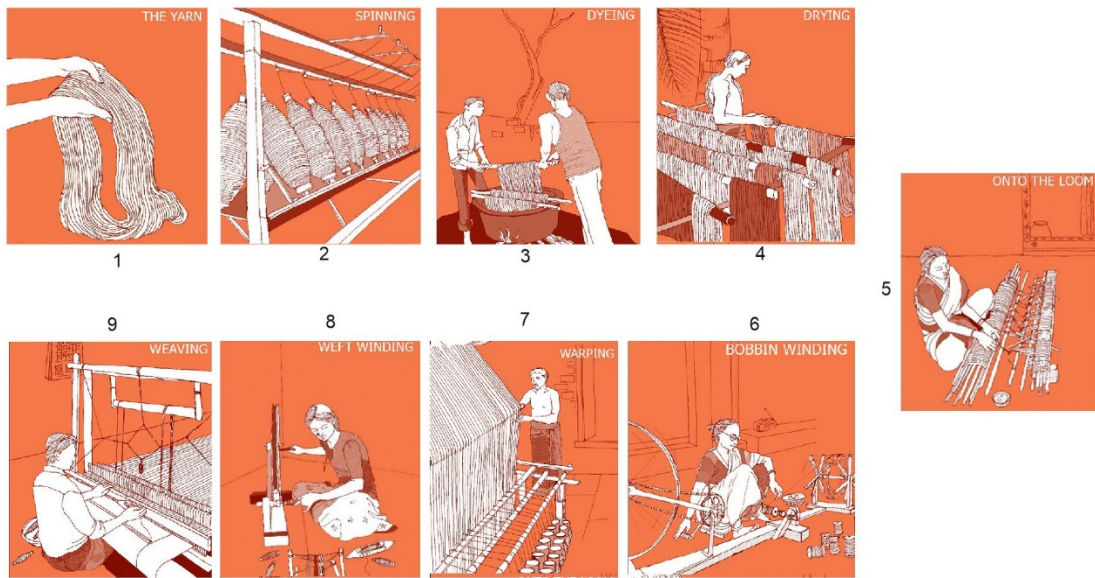


Figure 1 The weaving process infographics

1. Acquiring yarn
2. Spinning the yarn
3. Dye process
4. Drying the dye
5. Looming process
6. Bobbin winding process
7. Warping process
8. Weft winding
9. Weaving

The process listed is generic and has certain process done differently in different forms of art.

The processes will be discussed further in depth for in depth understanding in Chapter 3.2

Section 2: Typologies of handloom handicrafts and current scenario

1: Prominent Typologies



Figure 2 Handloom variety in the map infographic of India¹

¹ (Pinterest n.d.)

The variety in the typologies can be seen vividly in the image above.

The variety in these have died over the period of time, due to certain heritages not extending into the younger generations. The low income generation plays a vital and impactful role in the deterioration of these arts. One of which is exploited and devalued in the market due to scammers in the market.

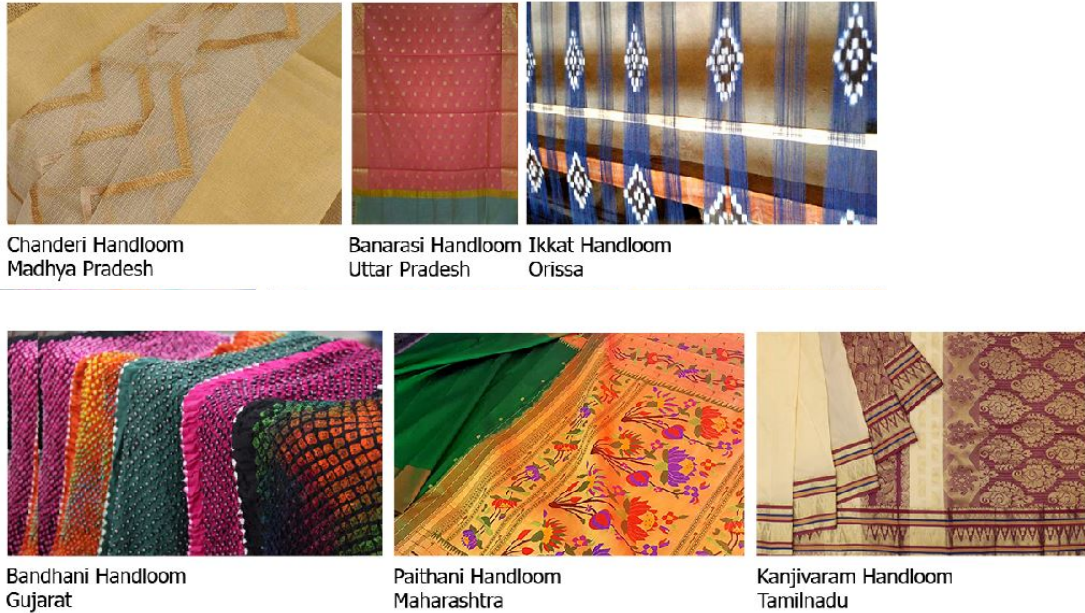


Figure 3 The prominent typologies in the market².

A few examples of the variety in the reference image above.

The difference is evidently seen in craftsmanship and skill honed over years of traditional teachings and heritage. Teachings of the lineage of a weaver have kept this art alive even in the modernization of textile industry.

Which can be seen in the image below.

² (Pinterest n.d.)

FABRICS PIE

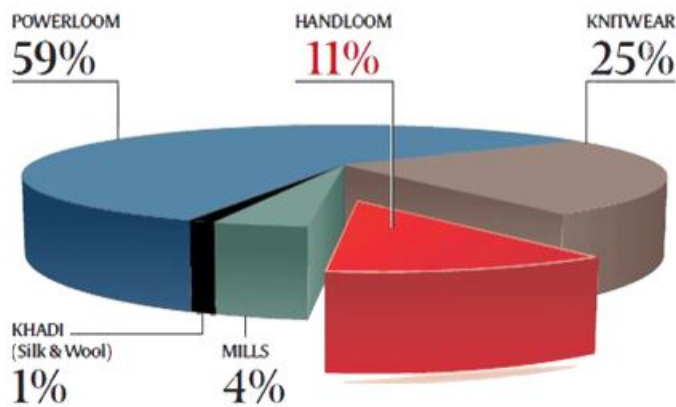


Figure 4 The chart showing current hold of handloom market in the field with reference to the mass produced fabrics.

The value of traditional and authentic handloom industry is reducing and declining with time. As the modern techniques have taken out laborious hours which used to be the spine of this art. The art has been undervalued and unappreciated over time that now the varieties of this art is also depleting and nearly becoming extinct. The typologies which have been highly recognized due to ease of availability have made it to the textile market and left an impact which still contribute to the upheld statistics seen here.

Chapter 3: Weaving Industry of Sualkuchi

Section 1: Introduction to the art and city

This village is situated 35 km away from Guwahati, Assam on the banks of the Grand River Brahmaputra.

The village is known for its silk weaving traditions and established in the 17th century by Momai Tamuli barbarua, a great administer of the Ahom kingdom during the reign of the king Swarg deo Pratap Singh. (1603-1641). the village took shape as a silk weaving village when the Ahom's occupied it during the mid-17th century by defeating the Mughals. Patronized by the Pala and Ahom kings the craft established itself and during that period it was a luxury afforded by the royalty and the noble families of Assam.



Figure 5 image of artisan working on the handloom



Figure 6 image of local artisans using the handloom

The weaving industry of Sualkuchi remained confined to the Tanti community till the 1930's later on people from other communities also took up weaving.

Even some fisherman and Brahmin communities took to weaving as their main source of income as handloom was emerging as the most profitable source of income.

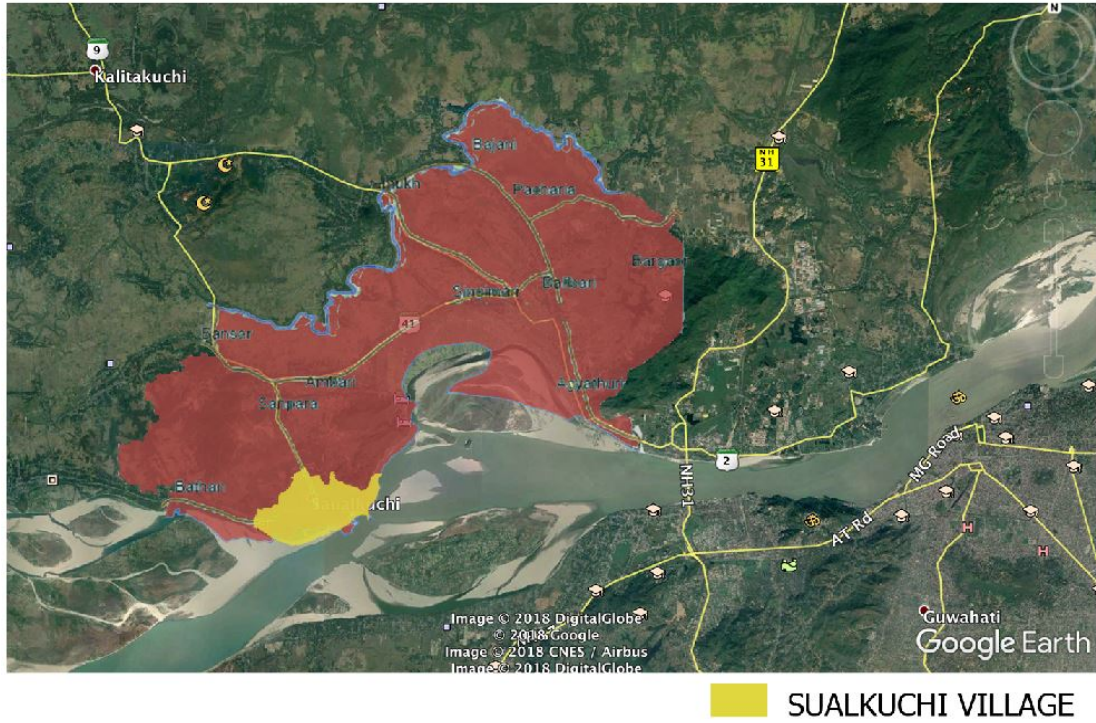


Figure 7 the satellite map of the village.³

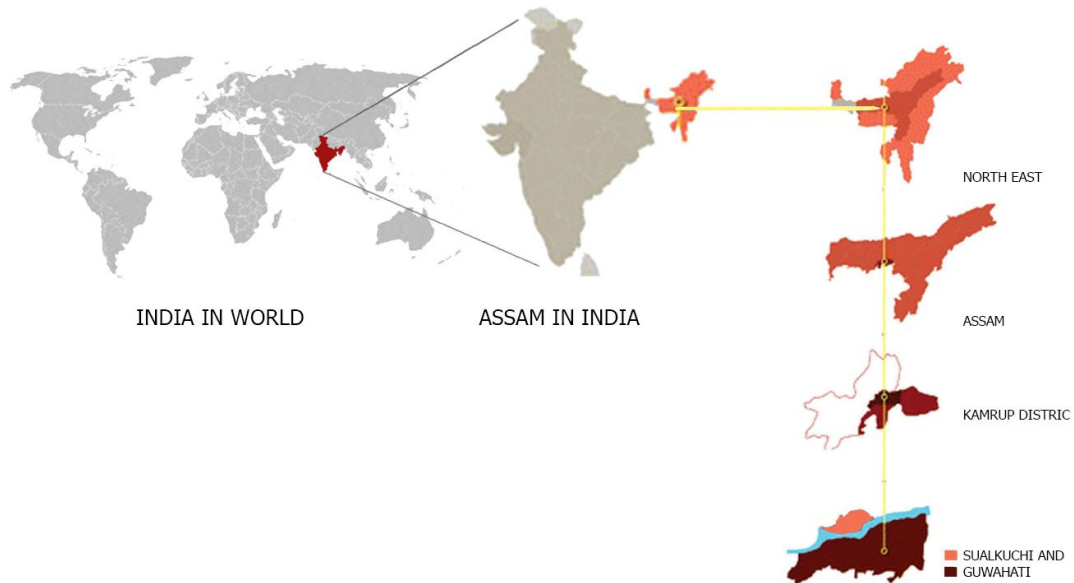


Figure 8 The info graphic map for the site location

³ Google earth image screenshot edited for graphical representation

Section 2: Introduction to weaving culture and scenario of Sualkuchi

1: Weaving process components and flow: Fiber

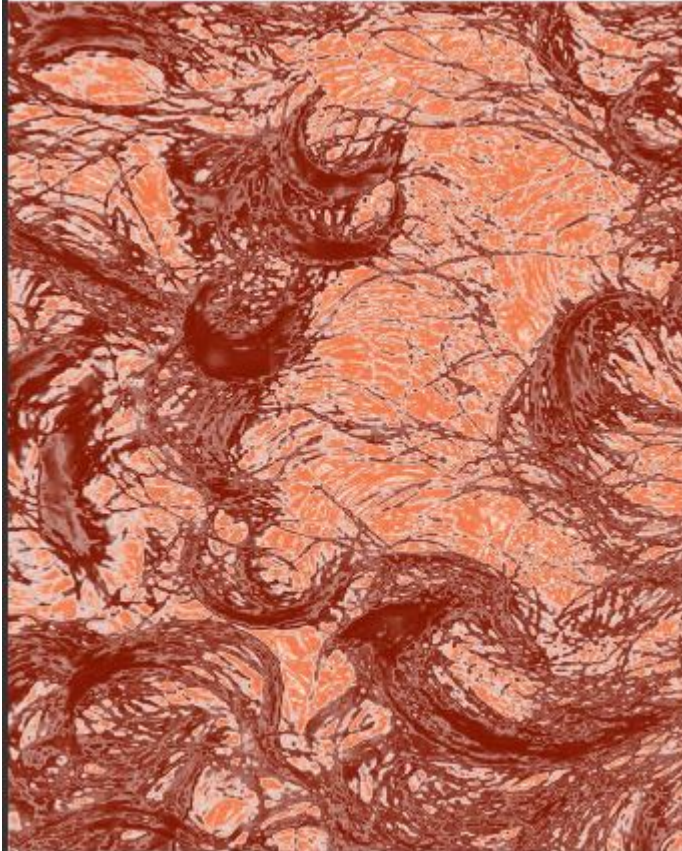


Figure 9 The graphical representation of fiber

The silkworm is actually the larvae, or caterpillar stage, in the life cycle of the silkworm moth. If allowed to develop from pupa, and not destroyed at this stage in the cycle so that silk can be created.



Figure 10 Silk worm to fiber process

2: Weaving process components and flow: Hand spinning

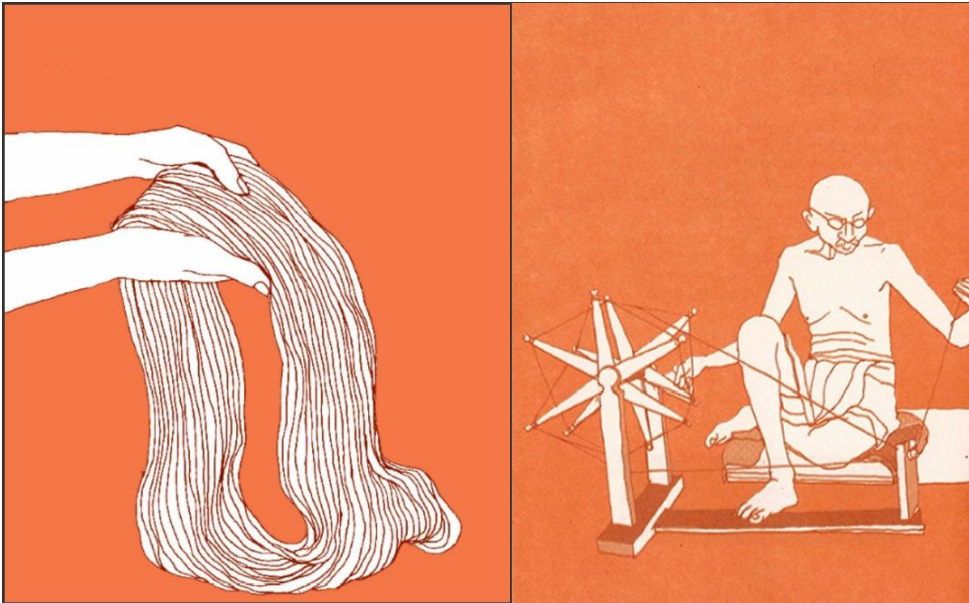


Figure 11 Graphical representation of hand spinning

Figure 12 Graphical representation of yarn

Yarn is a long continuous length of interlocked fibers. Staple length of silk fiber determines the thickness of yarn spun and this is referred to as “Silk yarn”.

Standard measure for a length of silk yarn is “Hank”. A hank measures 840 yards.

Hank yarn is typically used in handloom Production as opposed to cone yarn which is used in mill production.

Hand spinning is process of converting fiber into the Yarn. The process of converting silk fiber to yarn is complex and the strength and fineness of yarn is dependent on the staple length of the fiber and the skill of the spinner



Figure 13 The process endured for producing yarn



Figure 14 The current means of people to form a hand spinner from a bicycle



Figure 15 The collective show of current scenario in Sualkuchi

The equipment used by villagers is mostly seen due to the varied costs of a proper conventional hand loom equipment.

The villagers have grown accustomed to the entire mechanism and have formed and devised their own equipment for their necessity of spinning yarn.

As seen in the images above the use of all kinds of wooden wheels or broken parts of a carriage are used to make a spinning equipment, even a bicycle pedal is used for the same purpose.

3: Weaving process components and flow: Dyeing



Figure 16 graphical representation of dyeing

There are mainly two types of dyeing used by the weavers, namely natural dyeing and chemical dyeing.

Natural dyeing: Dyes extracted from natural materials such as the bark of trees, flowers, leaves and minerals are known as natural dyes. Vegetable dyes are a sub-category of natural dyes, referring to colors that come from plant matter only

Chemical Dyeing: There are different types in chemical dyes like - direct dyes, chemical dyes, Sulphur dyes, naphtha dyes, vet dyes and reactive dyes that are used today were developed during the period 1878-1956.

Yarn dyeing is a predominant practice in North India unlike in the South India where fabric is dyed for developing prints in craft sector.



Figure 17 Dye making process

The local experts are the ones who carry out the entire process of dyeing from mixing proportions of the additive to color mixes everything is handled by these experts for a single reason of material wastage, the yarn that is being dyed is always put in hanks (1 hank is 840 yards) thus if the dyeing is done by some novice dye maker, there is a huge loss margin on the artisans and weavers side.



BAMBOO STAND



METAL TUB



Figure 18 The output from dyeing is then dried out on bamboo stands

4: Weaving process components and flow: Bobbin winding

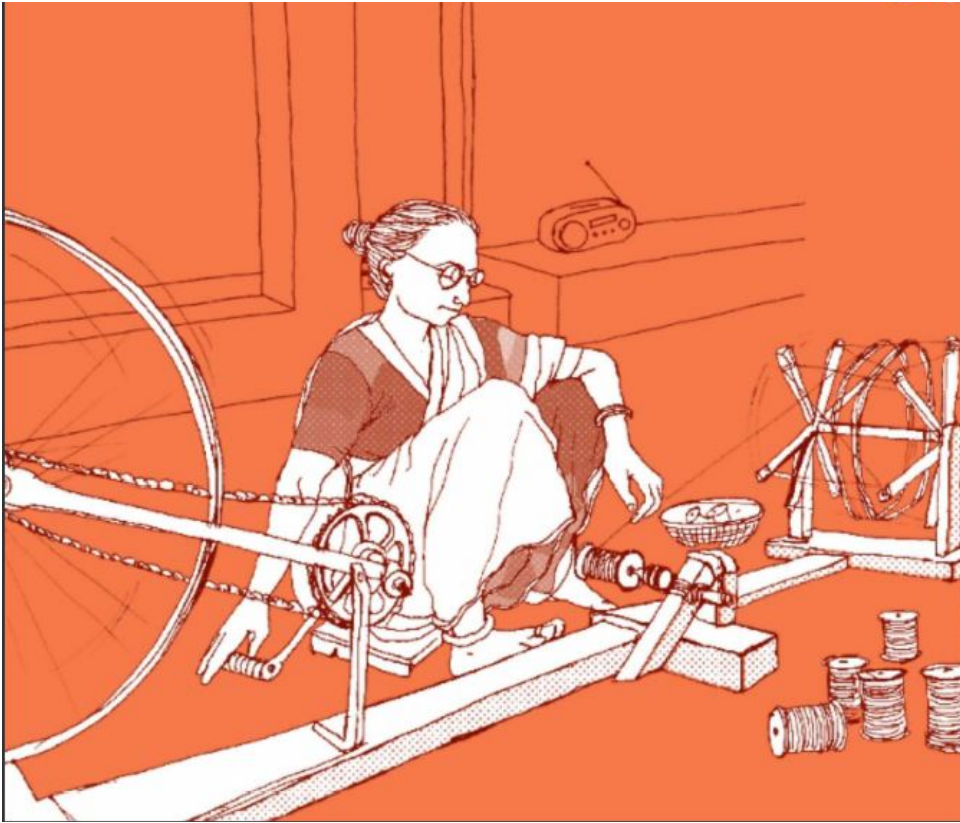


Figure 19 graphical representation of bobbin winding

Yarn in the hank form is wound on to bobbins in this process. This is the first step in transforming the yarn from the hank form to linear form.

Dyed hank yarn is wound on to bobbins with the help of charkhas. This process enables the laying out of yarn lengths for weaving. Bobbin winding is done by women in the weaver household



Figure 20 work flow from yarn to winding



Figure 21 The home made equipment used for winding

The equipment as seen before can be made from scraps and be utilized for the work style and quantum that suits the weaver. For example the weavers which have financial backing from working for a few years in the market might have better equipment and on the other hand the struggling ones who can't afford market made looms or charkhas devise and make their own from scraps.

5: Weaving process components and flow: Warping



Warping is the process of creating the base yarn that runs along the length of fabric through which the ‘weft’ yarns are filled into make the fabric.

For a 46” wide fabric, over 3,200 individual yarns run along the warp of the fabric.

Typically 196,550 yards of yarn are aligned by wrapping them around the circular warping drum.



Figure 22 The warp drum in use



Figure 23 The warp drum in use with a bobbin stand

The artisans who can do well in the market have declined in the past decade, thus the infrastructure seen here is less than which is expected or anticipated.

6: Weaving process components and flow: Street sizing



Figure 24 Graphical representation of street sizing

The warps are stretched out onto two beams and natural adhesives are applied to add strength to the yarn. In most handloom centers, rice starch is mixed with coconut / groundnut oil and applied as “size” material.

Sizing is carried out by weavers or specialists in the village. Since this activity is done on the street, it is called “street sizing



Figure 25 street sizing done in a backyard of a workshop



Figure 26 street sizing done on a street

There are many possible ways of street sizing which are used by the locals on a daily basis, based on the locality or sun direction and tree cover they shift or utilize their surroundings to support this process sooner. The climate plays a major role here.

7: Weaving process components and flow: Attaching the warp on loom

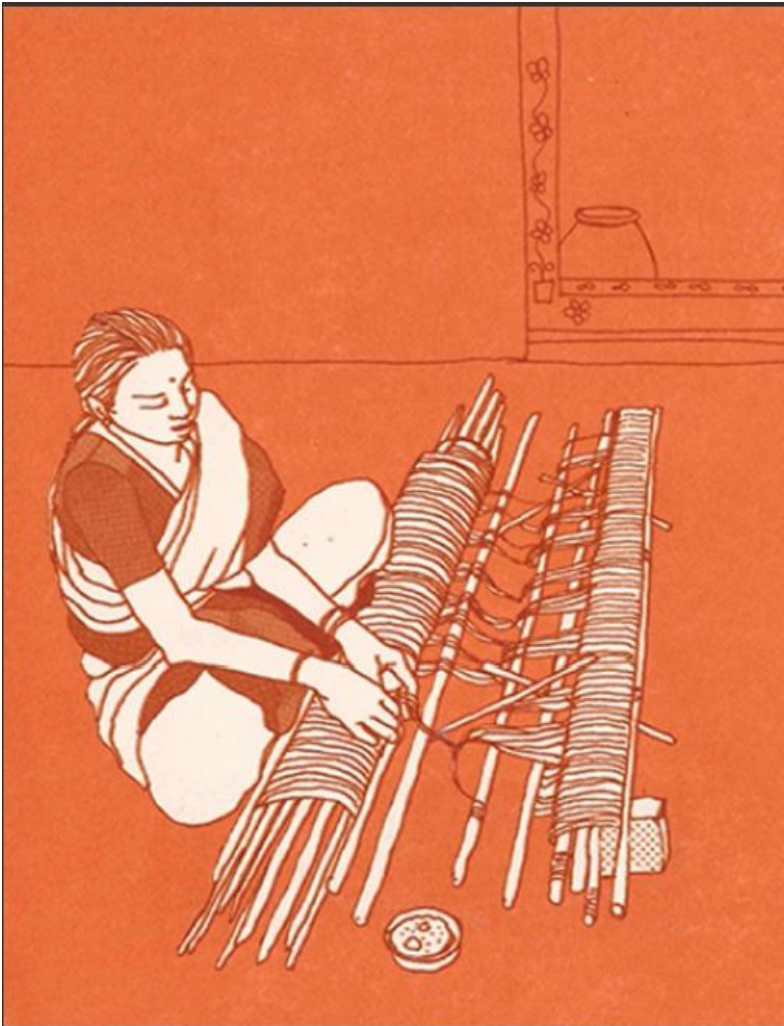


Figure 27 graphical representation of warp to loom

Individual warp threads are drawn through heddles taken through a set of reeds and tied onto beams located on the both ends of the loom.

The heddles separate the warp into two sections which allows the weft threads to pass between them easily. Checks and stripes are created by segmenting the warp and weft yarn. For motifs, looms are equipped with “dobbies” or “jacquard” cards which helps in lifting segments of warp yarn into the weft. Heddles are made out of rods or cords, each with an eye through which the warp thread is drawn.

Reed is a comb like frame that pushes the weft yarn firmly against the finished cloth after each insertion.



Figure 28 components of the process of wrap to loom



Figure 29 a weaver attaching the warp on the loom



Figure 30 view of the loom sticks outside a handloom

8: Weaving process components and flow: Weft winding



Figure 31 graphical representation of weft winding

Hank yarn for weft is wound onto a Pirn. The weft yarn is then inserted into a shuttle.

Weft preparation is done on the charkha, using the finger tips to give the correct tension to the yarn. This operation is normally done by women.

Pirn is a small bobbin.

Shuttle is a device used in weaving to carry the weft thread back and forth between the warp thread.



Figure 32 weft being used to put in weaving patterns

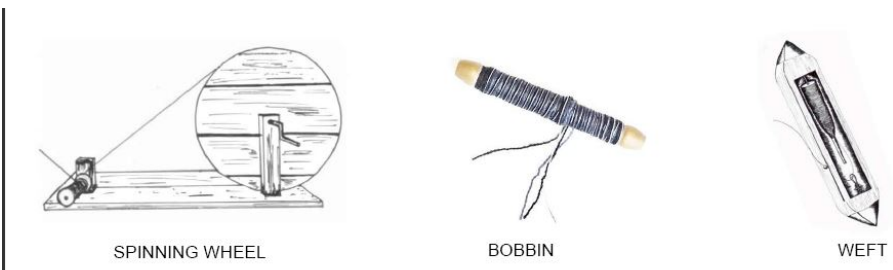


Figure 33 graphical representation of the flow of working with a weft



Figure 34 The weft winding done by a charkha

9: Weaving process components and flow: Weaving



Figure 35 graphical representation of weaving

The process of weaving is the interlacing of two sets of yarn - the warp and the weft.

The equipment that facilitates this interlacement is the loom.

A “handloom” is a loom that is used to weave fabrics without the use of electricity.

The manipulation of the foot pedals to lift the warp has to be in sync with the throwing of the shuttle which carries the weft yarn.

A perfect weave demands coordination between mind and body. the weaver achieves a harmony of motion and rhythm to create a unique and an incredible fabric

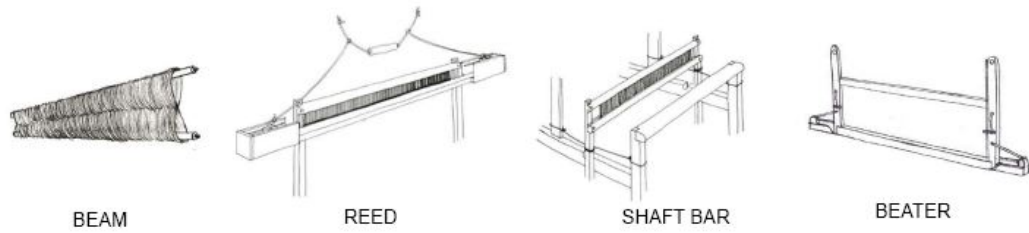


Figure 36 The components of a handloom



Figure 37 view of the handloom under usage

The final process for the silk handloom in the making of silk fabric, the lengthy yet fruitful process behind the journey of fiber to fabric is indeed worth all the effort and appreciation which this field has been deficient of since the past few years.

As seen the intricate yet beautiful process of silk manufacturing, the undervalued artisans of Assam still stand the market standing against commercially produced goods.

Section 3: Site Selection (Criteria & Justification)

The primary point of selecting a site is the region and context. Here the art form of silk weaving was born in Sualkuchi. The secondary point is to revitalize it, as it is not so known in the other regions it needs a landmark which can be relied on the initial levels of progress in the objectives of this thesis.

Thus the landmark must be a well-known in its own region. The selling point of the project would be the view, the product, the exhibition of the art and its working style.

Section 4: Site Study



Figure 38 The site with site section.⁴



Figure 39 The fauna commonly found near site

⁴ Self-interpreted study based on site study and analysis



Figure 40 Site photographs current scenario⁵

The river banks are plainier than most other undulated river banks of Brahmaputra.

The site offers more open areas and wind flow due to zero hindering elements.

⁵ Self-clicked photographs of the site



Figure 41 The tools of trade for Sualkuchi artisans⁶



Figure 42 Gandhi memorial (incorporated in the site)

⁶ (AssamInfo n.d.)

Section 5: Climate Study

The city is on the banks of the river Brahmaputra,

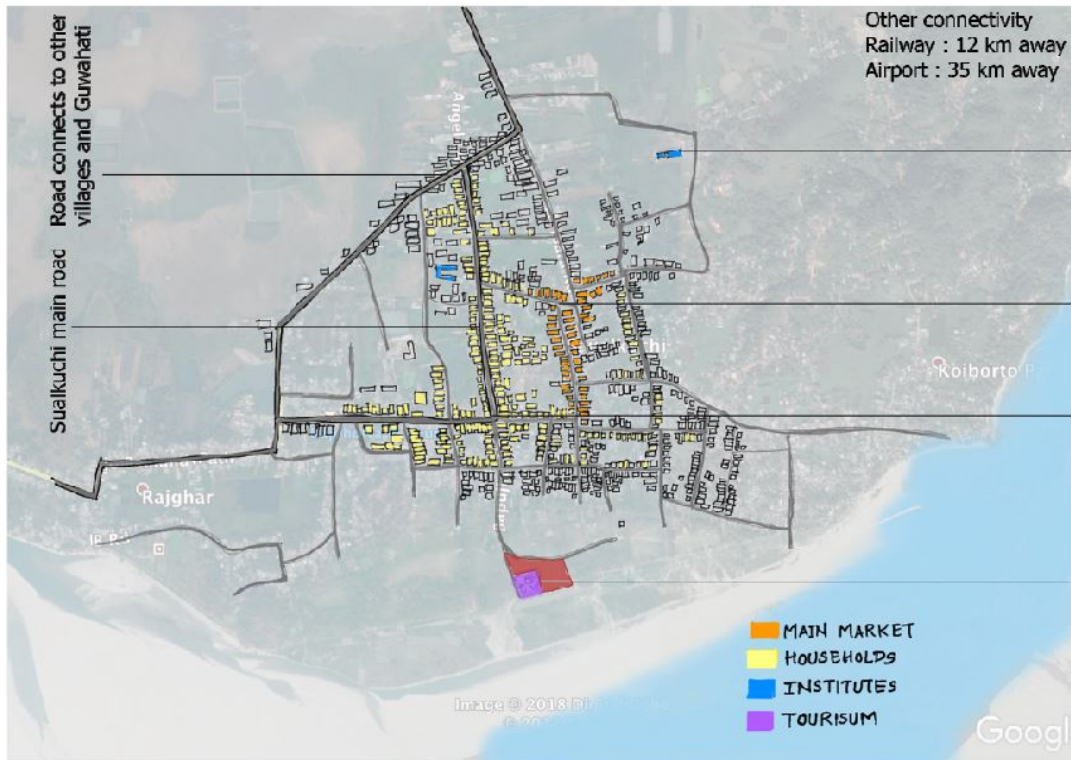


Figure 43 The accessibility map of the city.

The city is seen as a rural area which has developed around certain axes and the main road network has its sprawl of development on a superficial stage. As in the sprawl is leaving out huge masses of land inhabited and left out. The sprawl is more towards the southern end altogether for the basic reason of topography and psychological need to develop around the water reservoir which is observed in a lot many such villages who rely on natural resources more.

The site is a bit isolated than the city and the basic observation is that there is thick plantations naturally settled around the banks which hinders the development around it. For the reason of sustaining the natural river bank beauty of avenue of trees for meters at a stretch.

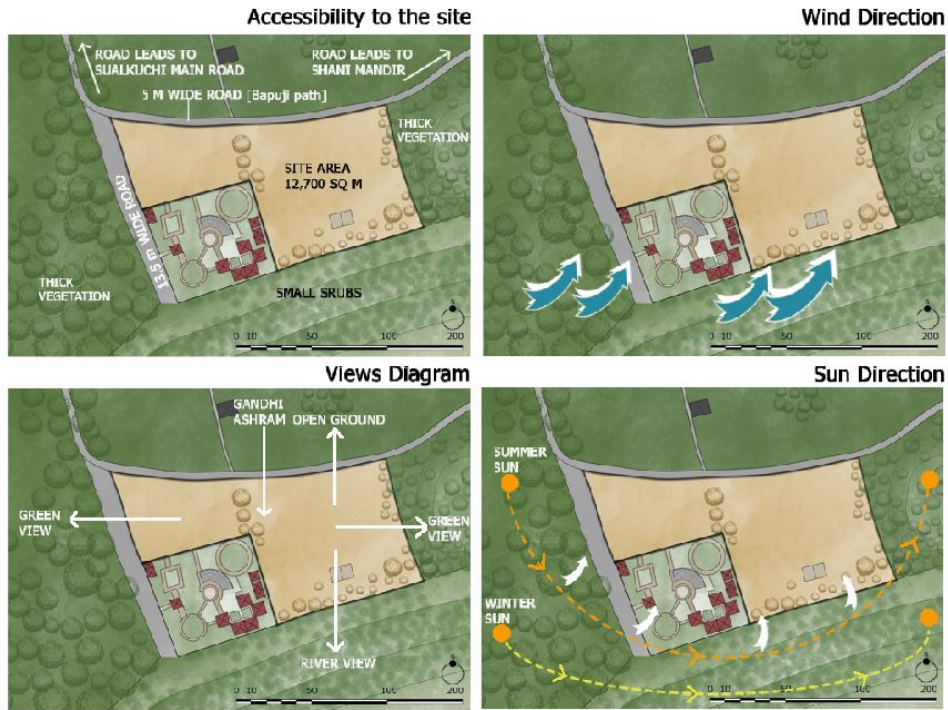


Figure 44 Detail study diagrams for climatic study

The first diagram shows the accessibility of the site in which the wider road is ending at the southern side of the site from which is the entrance to the Gandhi memorial.

The second diagram highlights the micro climatic wind direction of the site, as the macro climate here wouldn't be the dictating element here because of the river on the southern side of the site.

The third diagram acts as view compass where the heavy plantations available naturally add to the beauty of a river bank, on 3 sides of the site.

The fourth diagram helps in understanding the height matrix around the site which is seen with the sun diagram, the tall trees don't have heavy thick foliage, and the southern side is all but small shrubs alongside the river bank.

CHRONOLOGICAL DEVELOPMENT OF TOWN

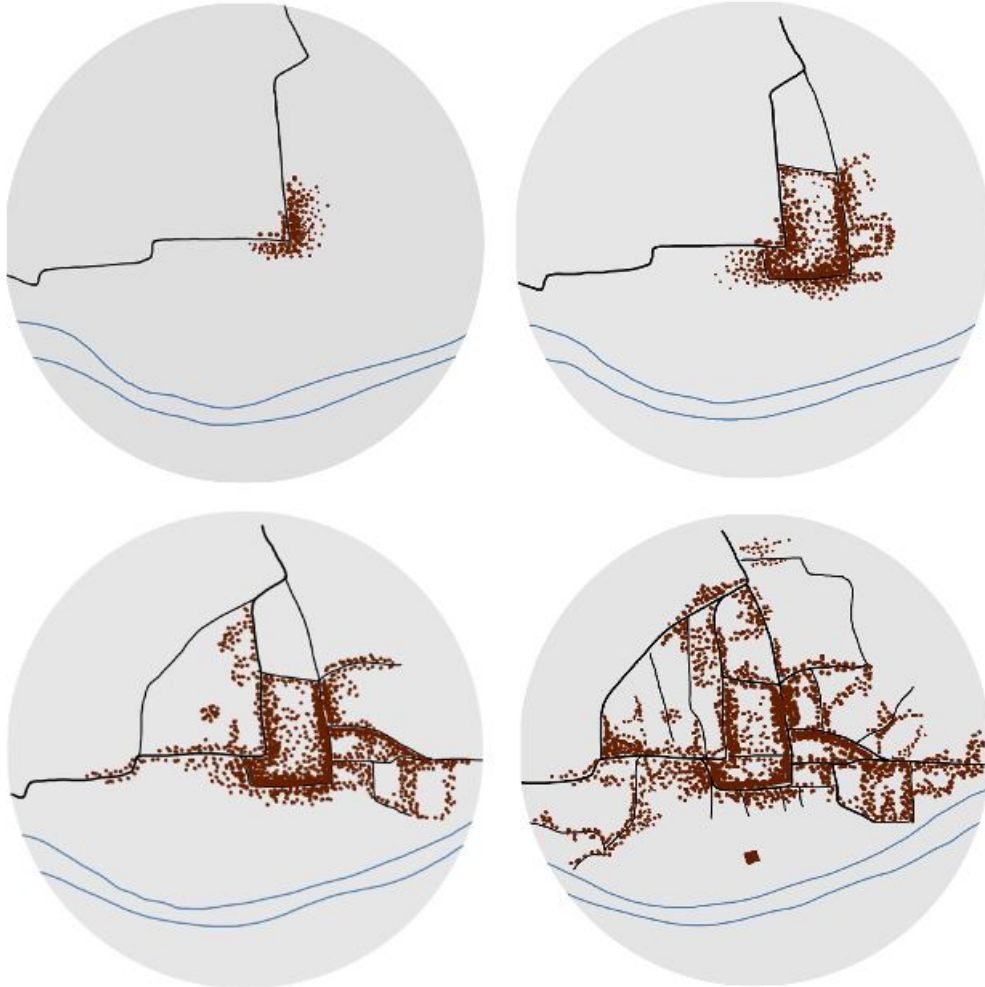


Figure 45 Images showing over the ages development of the city.

The village was developing from the epicenter, a temple which served as the origin of the city in the previous era. Although the temple has been changed to another location and reestablished.

The village gradually started growing from main road called Sualkuchi main road which was the only road of connection to the other villages and cities. In 17th

century, King Dharma Pal who brought few silk weaving people to Sualkuchi village from Tantikuchi, settled them. The streets with handlooms and dyeing yard in every houses played very important role. Main market is established in the center of the town which attracted many people from outside and town have been connected to main cities like Guwahati through highway. As the purpose of tourism public activities and places took place on the bank of river.

1: Other artisans and handicrafts in the kamrup district

Even though the primary artisans are silk weavers, there are handicraft artisans who make a living by using their skills in the construction of houses and sheds. The artisans are varied in these regions which range from bamboo wall weavers, mud wall artisans and composite bamboo + mud wall construction. The artisans make a living by working locally and do not have better opportunities due to the city's remote location. The project of silk weavers in Sualkuchi would facilitate the bamboo weavers who can add more value and variety to the project. (An optional precedent T.B.D.).

The more the construction is sustainable, the less the investment for the artisans in the initial capital raising. The bamboo weavers do furniture, articles and decorative elements which can be developed into the shops along with the shops of the weavers. The materials used in the city and techniques developed over the years for tackling the climate and sustainability can be termed as below:

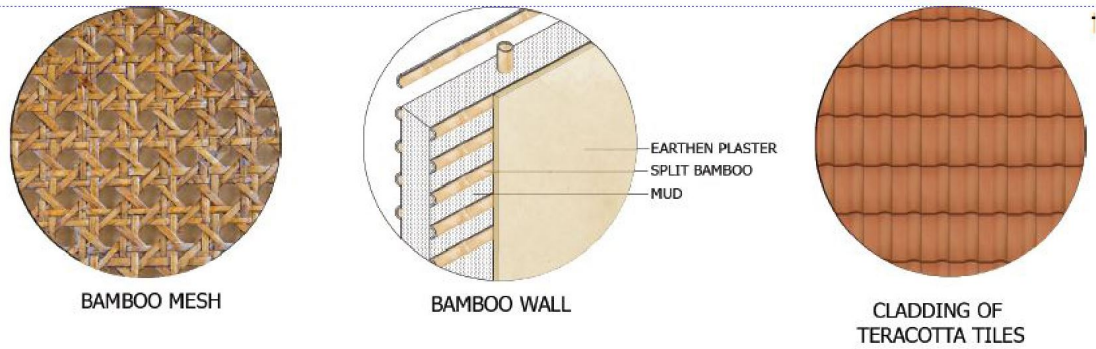


Figure 46 The majority of used materials and construction technique

Section 6: City's current scenario

The city and state both have seen a decline in the overall statistics of income generation from handloom industry. The industrialization has brought upon a drastic change in the handloom industry, the factory made goods have become cheaper and easily accessible and are readily home delivered under certain channels.

The effect of industrialization can be seen in the images below:

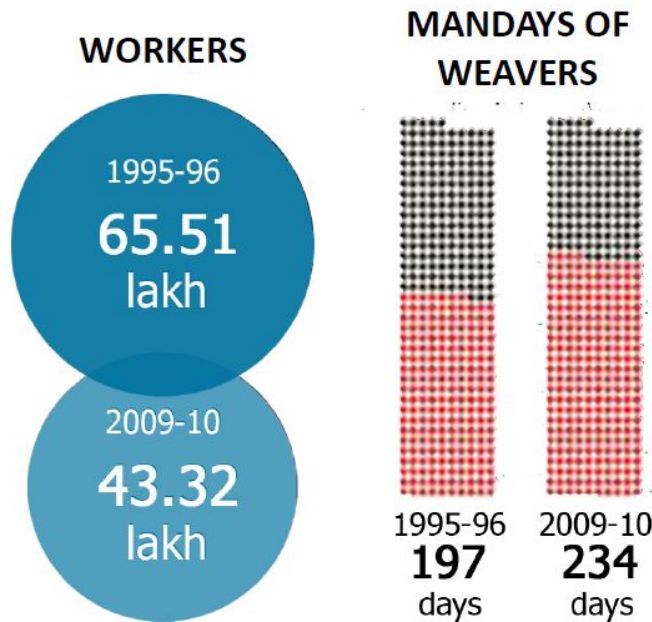


Figure 47 The demographics of depleted numbers of weavers

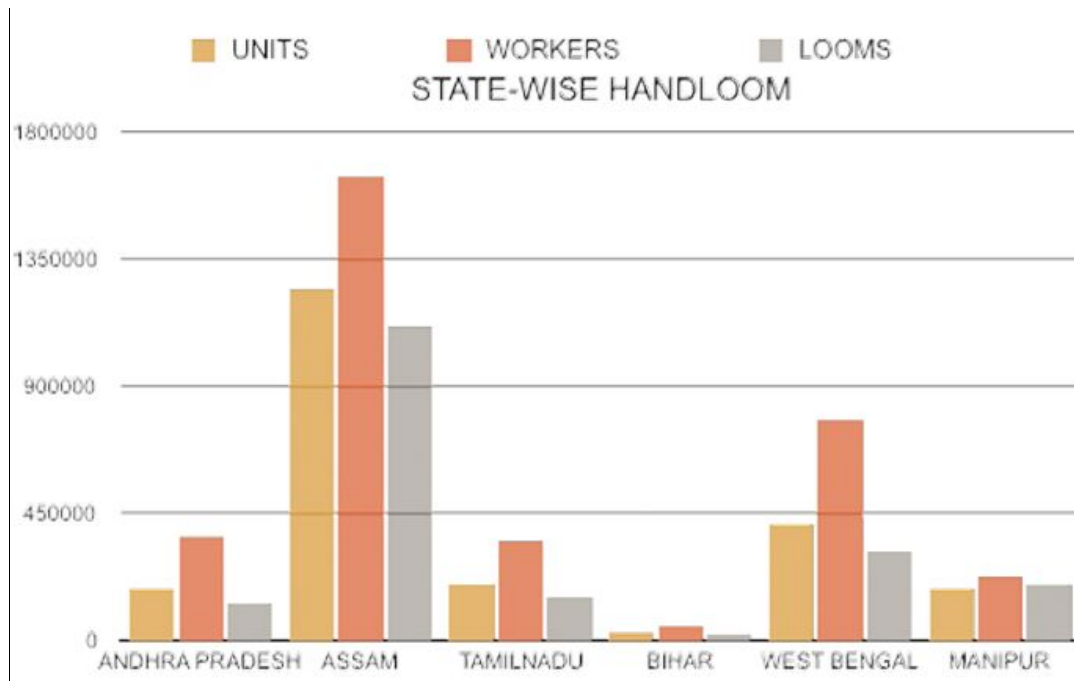


Figure 48 The state was already at the top of its industry in quantity.

Chapter 4: Case Studies & Program derivation

Section 1: Studying silk and silk manufacturing

1: Introduction

Silk has a long history in India. It is known as Resham in eastern and north India, and Pattu in southern parts of India. Recent archaeological discoveries in Harappa and Chanhu-daro suggest that sericulture, employing wild silk threads from native silkworm species, existed in South Asia during the time of the Indus Valley Civilization (now in Pakistan) dating between 2450 BC and 2000 BC, while "hard and fast evidence" for silk production in China dates back to around 2570 BC.

Shelagh Vainker, a silk expert at the Ashmolean Museum in Oxford, who sees evidence for silk production in China "significantly earlier" than 2500–2000 BC, suggests, "people of the Indus civilization either harvested silkworm cocoons or traded with people who did, and that they knew a considerable amount about silk."

India is the second largest producer of silk in the world after China. About 97% of the raw mulberry silk comes from six Indian states, namely, Andhra Pradesh, Karnataka, Jammu and Kashmir, Tamil Nadu, Bihar and West Bengal. North Bangalore, the upcoming site of a \$20 million "Silk City" Ramanagara and Mysore, contribute to a majority of silk production in Karnataka.⁷

In Tamil Nadu, mulberry cultivation is concentrated in the Coimbatore, Erode, Bhagalpuri, Tiruppur, Salem and Dharmapuri districts. Hyderabad, Andhra Pradesh,

⁷ (Nature 2009)

and Gobichettipalayam, Tamil Nadu, were the first locations to have automated silk reeling units in India.

India is also the largest consumer of silk in the world. The tradition of wearing silk sarees for marriages and other auspicious ceremonies is a custom in Assam and southern parts of India. Silk is considered to be a symbol of royalty, and, historically, silk was used primarily by the upper classes. Silk garments and sarees produced in Kanchipuram, Pochampally, Dharmavaram, Mysore, Arani in the south, Banaras in the north, Bhagalpur and Murshidabad in the east are well recognized. In the northeastern state of Assam, three different types of silk are produced, collectively called Assam silk: Muga, Eri and Pat silk. Muga, the golden silk, and Eri are produced by silkworms that are native only to Assam.⁸

⁸ (Nature 2009)

Mulberry Silk Production: People & Process

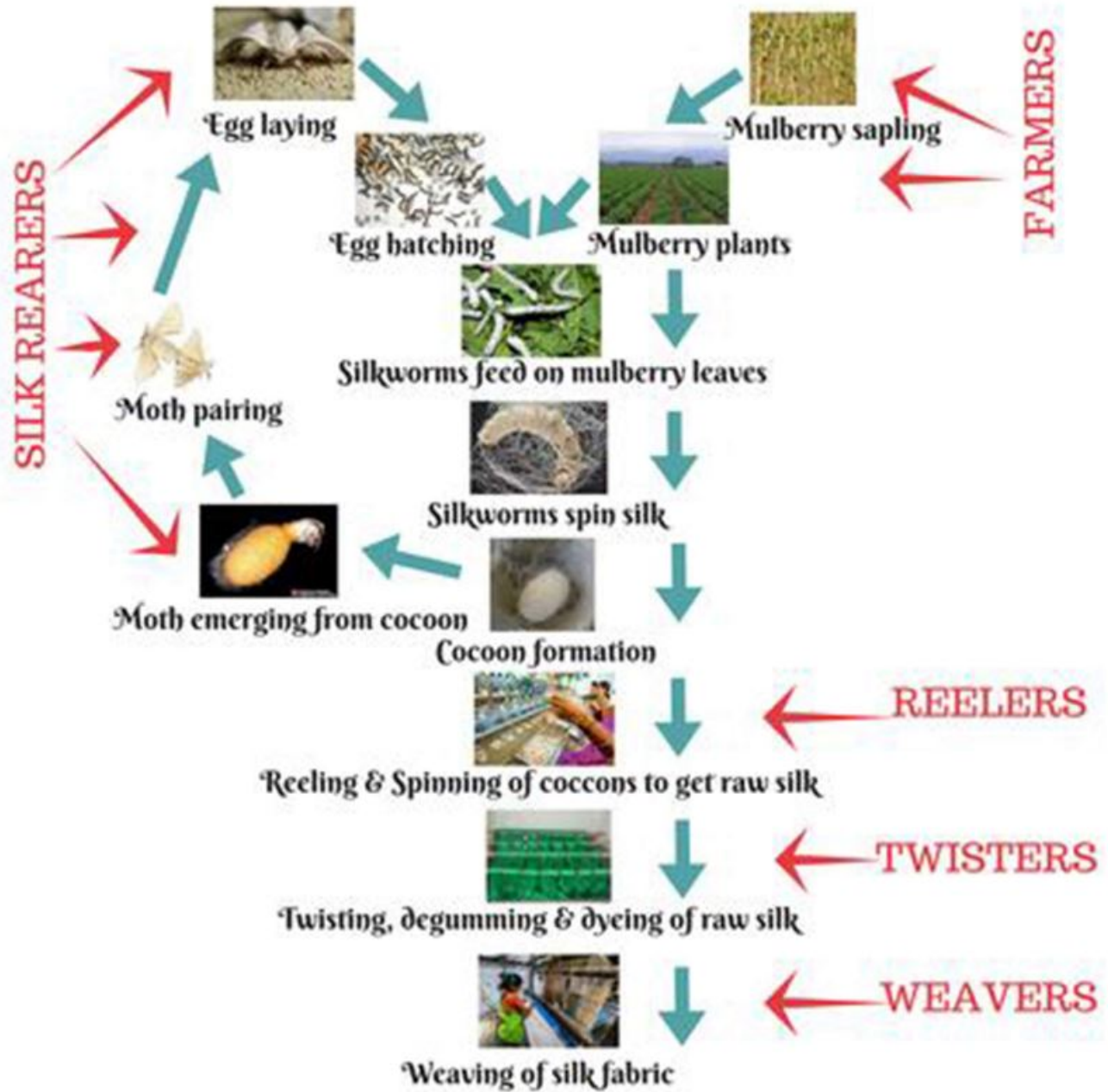


Figure 49 The flow chart of working process of silk production⁹

⁹ (Sarees n.d.)

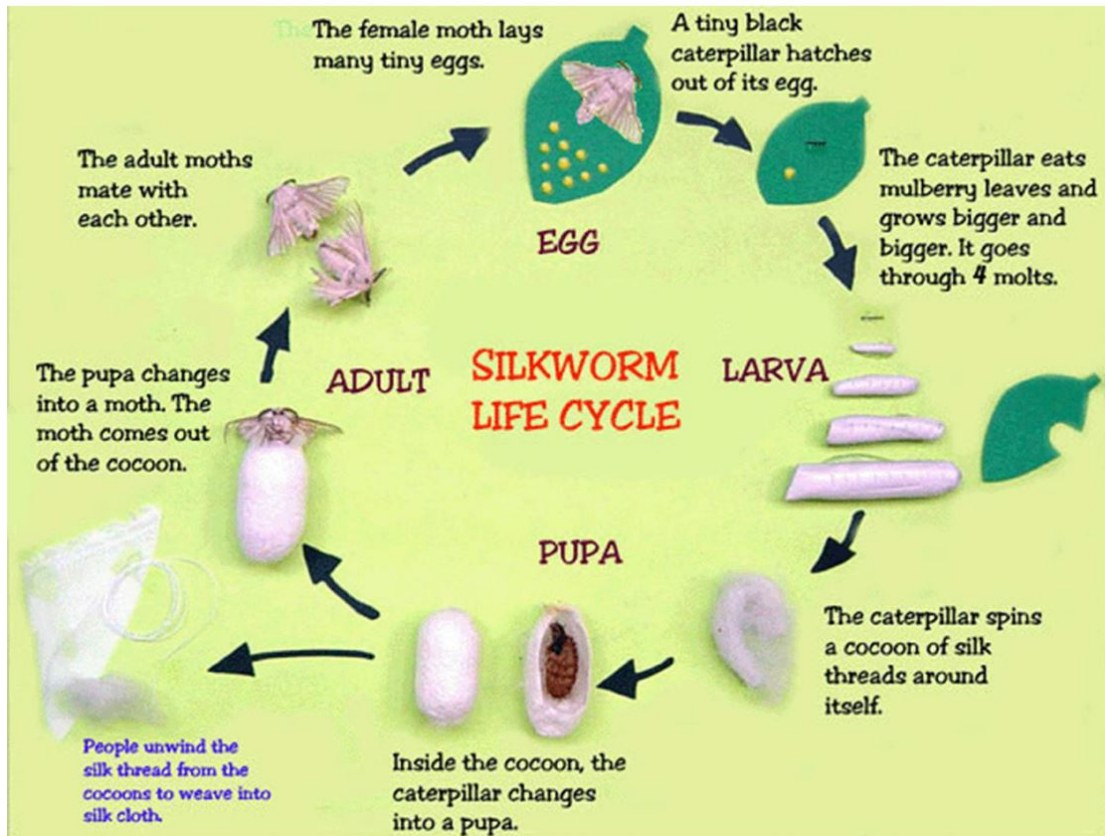


Figure 50 The ecological cycle of silk worm¹⁰

The silk farms are a productive biological setting in which the human interference remains at the minimum for most of the process, which can in turn be treated as an intervention to uplift the nearby contextual biology namely the flora and fauna. The biological ecosystem around a river is also revitalized in this precedent.

¹⁰ (Sarees n.d.)

3: Inference

The site selected in Sualkuchi is perfect for both the precedents, the silk farm idea is appropriate for the silk handloom revitalization precedent where both the programs complement each other and bring out a better solution as an architectural intervention.

Section 2: Literature case study –Michael Ezban Working water (Productive landscape)

1: Introduction

Working Water brings the fish farm to the perennial discourse on designed productive landscapes in the discipline of landscape architecture. The work explores contemporary and historical models of aquaculture landscapes where recreation, conservation, waste management and cultivation are enmeshed in the public realm. Working Water concludes with the speculative design of Quabbin Fishery, a 240-acre aquaponics and angling landscape in central Massachusetts. Quabbin Fishery anchors a proposed regional network of ecological fishery landscapes that expand the utility of some of the state's greatest assets: its freshwater reservoirs.¹¹

¹¹ (Ezban 2016)



Figure 51 The productive landscape images and alternatives¹²

2: Analysis

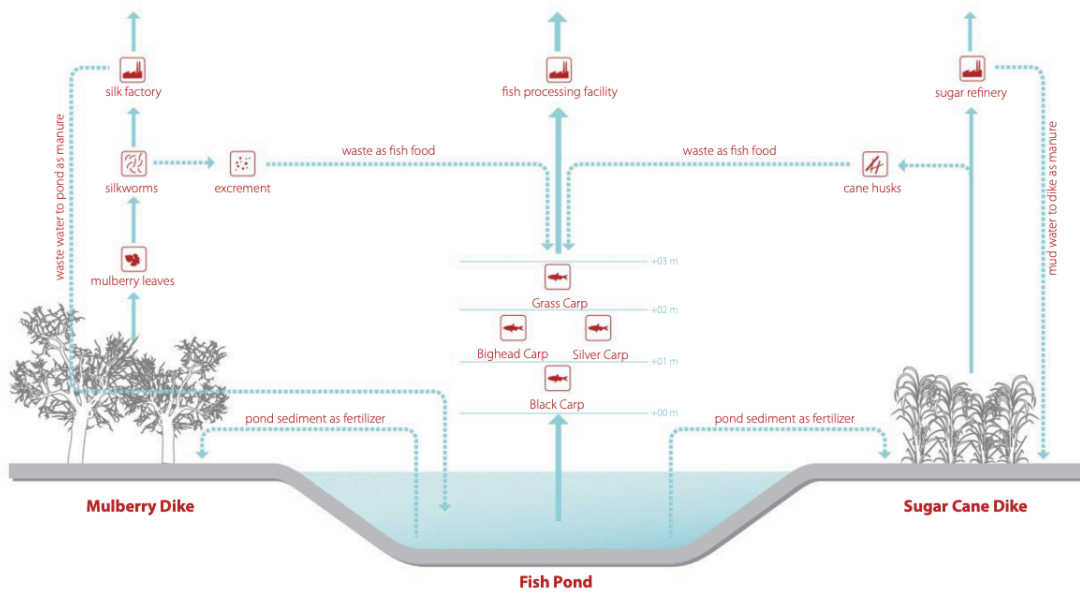


Figure 52 The flow chart info diagram for the ecocycle¹³

¹² (Ezban 2016)

¹³ (Ezban 2016)

Their own strata within the 2.5 meter deep ponds. Mud excavated annually from the bottom of the ponds is spread on top of adjacent dikes to serve as nutrient-rich fertilizer and support the growth of mulberry trees and sugar cane. Leaves of the mulberry trees are harvested as feed for silkworms. The worms excrement returns to the pond as a food for the carp, and the silk is processed in local factories. Sugar cane husks are also returned to the pond as food, while the cane itself is processed in refineries. Wastewater discharge from both silk and sugar processing factories is cycle back to the ponds.

The Dike-Pond System is a constructed ecosystem, the under pins a regional economy. This unique landscape is so pervasive in the region that the fishpond has become a foundational condition for urban expansion in one of the world's most rapidly urbanizing areas.

3: Inference

The integrated ecosystem is a sustainable approach which needs to be modified up to a certain level for the amalgamation of services and context of usage. The sustainability aspect of this landscape is apt for the design proposal at Sualkuchi for the given reason of turning the art form inside out and helping it explore newer horizons for the revitalization of the very same art.

Section 3: Literature case study – Ganga ma ki textile Studio, Uttarakhand, India

1: Introduction

An innovative combination of traditional craft and local materials propels us to rethink how craft is understood

Tucked in the foothills of the Himalayas sits the Ganga Maki Textile Studio – a small ensemble of buildings by Studio Mumbai. In Bhogpur, near Rishikesh, this weaving facility is, like the textiles produced here, handmade, intimate and sensitive. If craft is, as writer Teleri Lloyd-Jones defined, ‘a language of materials, provenance and making’, this building is exemplary. Founding principal Bijoy Jain and his team have innovatively and carefully combined different natural materials to produce a finely textured, functioning facility.

The project, coming two decades after Jain started his practice, shows both continuity and departure from his oeuvre. One of his first major non-residential projects, the design – like his previous buildings – is rooted in craft, place, people and the environment. The scheme sensitively fuses locally harvested bricks and lime, stone and marble from Rajasthan, and Bengali bamboo; likewise, the craftspeople hail from different places: brick masons are local, lime and bamboo workers are from Bengal, stone masons and carpenters from Uttar Pradesh. The departure is in how Jain understands the craft and the restraint the practice has shown in making it consciously visible.

The workshop is a venture by Chiaki Maki, a renowned Japanese textile designer, and Rakesh Singh, a chef turned entrepreneur from the local area. At its heart are four L-shaped studios where weavers and craftspeople make handwoven fabrics and garments. Arranged around a courtyard, the simple rectangular boxes are buttressed on one side by a narrow storage and service space, and on the other by a slightly elevated workspace. The main spaces are made of bricks, finished with lime, covered by asbestos-free cement sheet roofs, and paved with stone floors. Adjacent work areas have stone slab roofs and lime floors. Sumptuously lit, earthy and comfortable, the studios accommodate weavers – mostly men – who sit at their looms in the central, sky-lit area. Women who knit, stitch and spin yarns cozily use the raised workspace.

14

Project specifics

Location > Bhogpur. 30kms from Dehradun, Uttarakhand.

Project size > 1300 square meters

Partners and patrons

Maki Textile Studio, Tokyo

A studio set up in 1990 that is committed to creating hand-woven textiles and working closely and harmoniously with nature to cultivate and source raw materials.

Chiaki Maki

A Rhode Island School of Design graduate, Chiaki Maki is a textile designer and the founder of Maki Textile Studio.

¹⁴ (Borderandfall 2017)

Studio Mumbai

One of India's most innovative architecture firms, based in Mumbai.

Bijoy Jain - The principal architect of the facility, founder and director at Studio Mumbai.

Completion date > ~July 2016



Figure 53 Scaled model of the site¹⁵

¹⁵ (Borderandfall 2017)

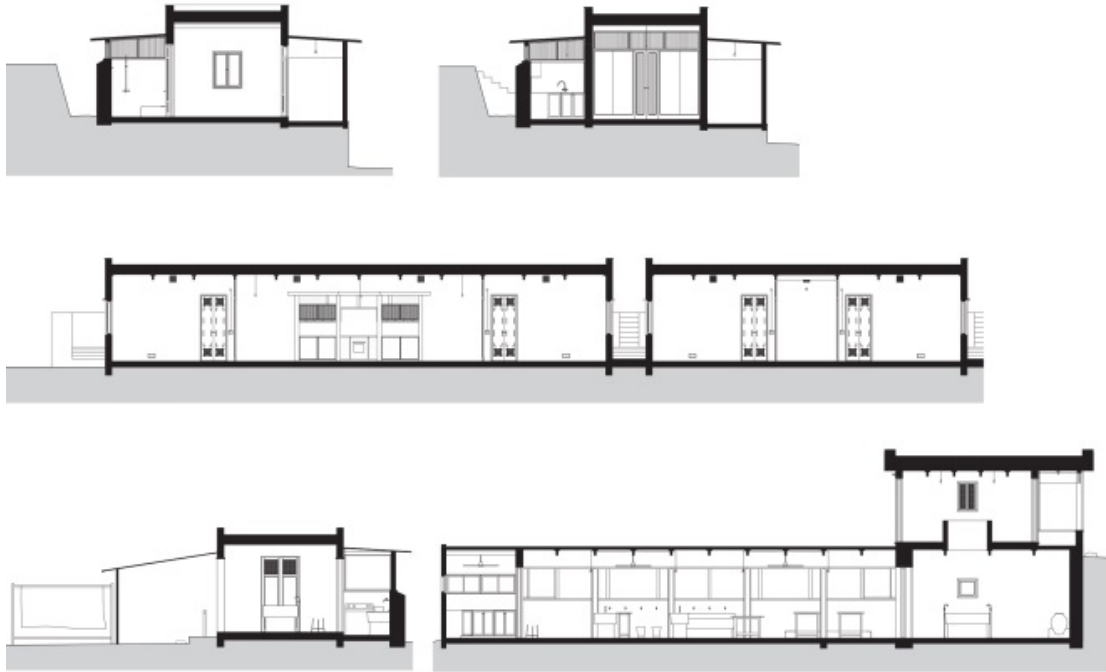


Figure 54 The sections referring to the spaces and their impact¹⁶

Of the four studios, the one designed for Maki is distinctive. Not linked to the others, the structure is built with bamboo frames, plastered with mud mixed with dung and covered by a transparent roof with a bamboo trellis beneath, resembling an eloquent earthen house. It is designed specifically for her use while the others are more collective. Maki's studio accommodates a few looms, with a long, sliced log serving as a table. She develops designs here before they are converted by the weavers into exquisite fabrics in the adjacent workshops.

¹⁶ (Borderandfall 2017)

North of the central courtyard run the blocks housing the dyeing workshop, guest dining and other amenities. Right at the top of the campus sit the owner and guest residences. At the entrance, a gallery invites visitors; this double-height space is covered by a translucent white marble roof that sits atop walls plastered by local craftspeople after they were trained by the Japanese and Swiss artisans who had created samples for the interior and exterior.

This project has gained virtue not because it has used an impressive array of natural materials – nor because it was handmade. It has gained value because of how the materials are used – in keeping with their intrinsic character and purpose. This resonates with Peter Zumthor’s insightful remarks that ‘materials in themselves are not poetic’. ‘They can assume a poetic quality ... only if an architect is able to generate a meaningful situation for them.’ In this sense, the practice’s projects are not spontaneous (as some commentators have romanticized them) but carefully considered and mediated. Intention and aesthetic values permeate all decisions. Collaboration with artisans may lead to unexpected outcomes and infuse an open attitude that prevents predetermination of the final state, without indicating that motivation and innovation have ceased. History of craft is not a story of stagnation but of sensible emergence.

Studio Mumbai’s 1,400m² complex has taken almost four years to complete. Jain’s process of design and construction demands time. Careful sourcing of materials, attention to detail, model making and collaboration is a slow process. Electrical boxes

are customized, door bolts specially fabricated, pathway stones laid one by one. Materials also demand that their life cycles be respected: for instance, lime, when used on roofs, requires a patient tapping of its surfaces so the liquid within rises to seal the perforations. The craftspeople at work explained that a surface area of 10m² requires almost five days to finish. The whole building emanates care and patience.

In this project the process has moved from collaboration to ‘cultivation’, Jain explains. People have not only come together and shared their ideas and skills, but also nourished each other. That is evident in the fluid communication between client, artisan and architect, the level of engagement and the self-reliance that is engendered, he proudly points out.



Figure 55 interiors of the studio

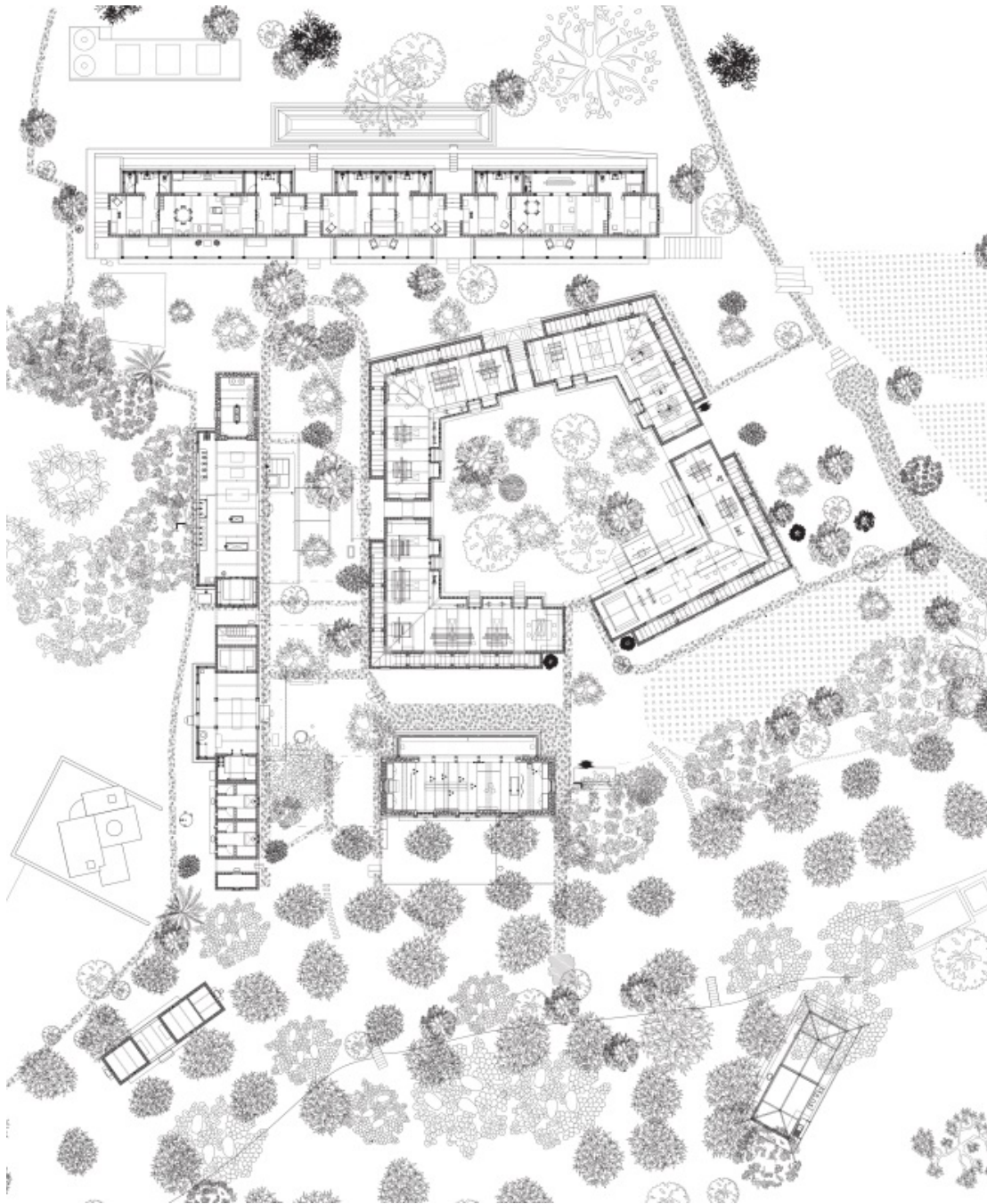


Figure 56 Site plan¹⁷

¹⁷ (TheArchitecturalReview 2017)



Figure 57 Sections referring to the roof scape and congregation spaces¹⁸

2: Analysis

The entire concept of developing it depends on the context and its ecology without any hardcore driven geometry which dictates and falls out of place in the outlook of the entire design.

¹⁸ (TheArchitecturalReview 2017)

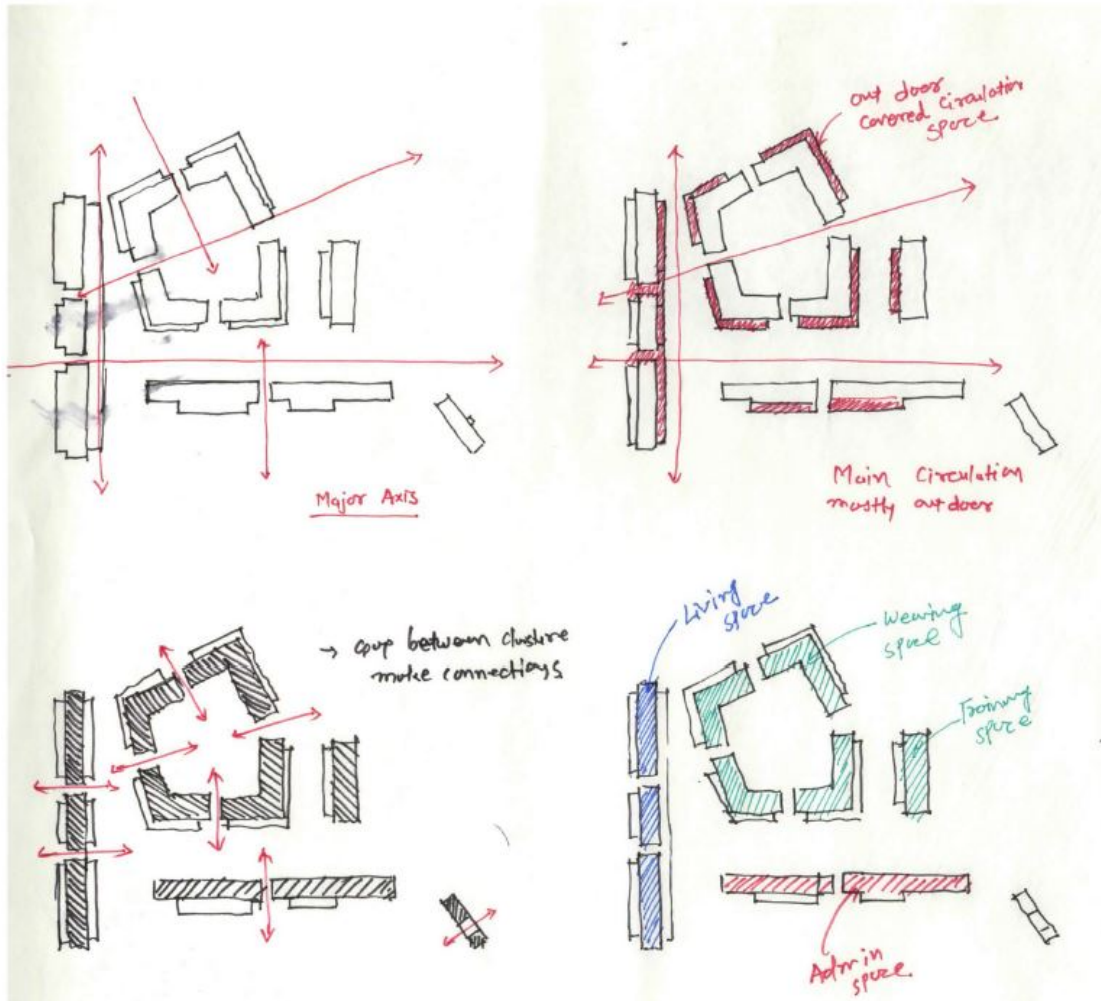


Figure 58 Self inferred diagrams

Section 4: Literature case study – Khamir Artisans village, Kutch, Gujarat, India

1: Introduction

Kachchh, commonly written as "Kutch," is the largest district in India and is located in Gujarat state. It is a mosaic of diverse landscapes, people, and cultures that together create a distinct identity that is unmistakable to those who come here. The district is surrounded by ocean on one side, and the Rann of Kachchh, a vast salt

desert, on the other. Once a major trade hub of the Indus Valley delta, Kachchh has long been a melting pot defined by fluid boundaries. It is a meeting point of people, cultures, faiths, languages, and traditions across a diversity of ecosystems and terrains. A place that is constantly changing, yet feels curiously unchanged.

Kachchh is inhabited by a wide range of communities and cultures, many of whom settled here centuries ago following migrations out of Rajasthan, Sindh, Afghanistan and present day Iran. Many of these communities were nomadic pastoralists, and some remain so though the population has largely settled within the last century. The people of Kachchh belong to a range of different faiths and traditions – most visibly Hinduism, Islam, and Jainism. They speak Kachchhi (a Sindhi dialect that harkens back to the Kachchhi roots of that region), Gujarati, and Hindi. However, these by no means capture the ethnic and tribal sub identities that reflect India's complex social structures. The movement of people across this land has given it a long history of sectarian diversity and peaceful coexistence.

Khamir operates out of a unique campus in Kukma, Kachchh. Located 15 kilometers from Bhuj, the campus is a space for artisans, resource groups and institutions, buyers, suppliers and craft lovers from around the world to gather under one roof to exchange ideas, collaborate and learn. The space is always alive with potters creating clay masterpieces or imaginative textiles being woven by resident weavers.

The Campus was established in 2007 with the support of the Government of Gujarat and the Confederation of Indian Industries. It was designed by Professor Neelkanth

Chaya of CEPT University, Ahmedabad. The campus was constructed using sustainable, earth based construction technologies such as wattle and daub, rammed earth, and stabilized earth blocks. Construction was overseen by Hunnarshala, a Bhuj-based organization that develops building technologies to construct disaster-safe, ecologically friendly and sustainable buildings.¹⁹



Figure 59 The artisan village workshop area

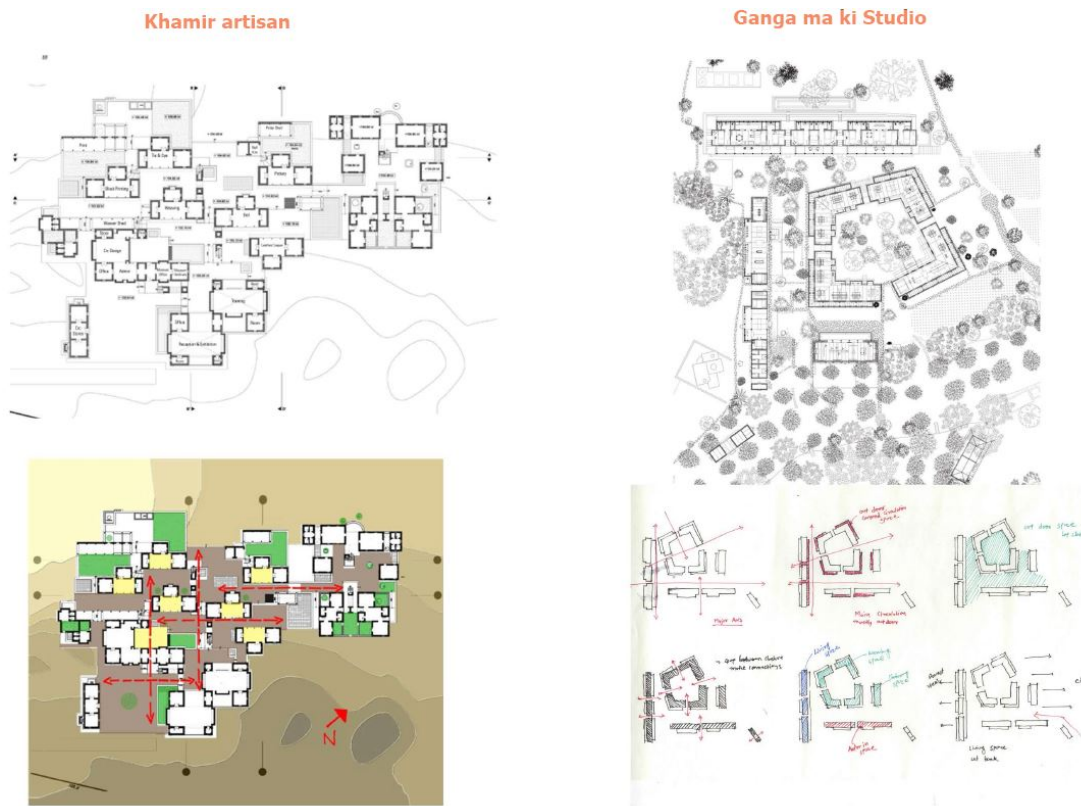
¹⁹ (Khamir 2005)



Figure 60 Plan of Khamir artisan village²⁰

Section 5: Compiled analysis

The analysis of both the case studies has brought forth the design concerns based on context and climate studies, certain contextual outlooks are to be used to bring about a different depth of character of the building. The usage of multiple axes and forming congregational spaces is a priority for the institutional aspect of the facility. Though the asymmetry of axes brings forth new explorations of space formations which can be intriguing and possibly better.



As seen here in the image above the functionality is achieved with scattering and deconstructing the congregational space or by segregating it into a huge mass. Likely in simple terms Khamir has small pockets of green spaces and they function better for

seclusion and teaching for the space definition. While Ganga maki Studio has one huge green space which is used by all and which helps for a versatile space definition.

Concluding the analysis at the note of creating multiple axes and pockets of spaces as it amalgamates with the Gandhi memorial’s design concepts and forms a unified site design.

Section 6: Program Derivation

The program depends on the variety of functions derived from precedents of this thesis.

The program has been amalgamated and derived from 2 precedents namely

The handloom industry and institute revival

The ecological farm for silk worms

| Issues | Possible Solution |
|---|--|
| Sale of cheap imitations in market | Use of silk mark by sellers and verification by buyers |
| Limited information about rights | Information centre |
| Lack of market acumen | Training in marketing and distribution |
| Access only to local markets or middlemen | Connect them to international fairs |
| Low or minimum profit margins | Direct sale without middlemen through shops within |
| No weaving space for those who want to restart the bussiness | Provide weaving space |
| Raw material costs high | Use raw material which made in institute itself |
| Don't have platform to learn diferent patterns and new technology | Rooms with comuters and exhibition spaces |

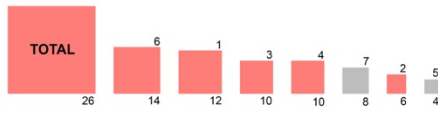
Figure 63 Addressing the issues seen and observed on site

The program derivation starts with the issues to be addressed and accordingly

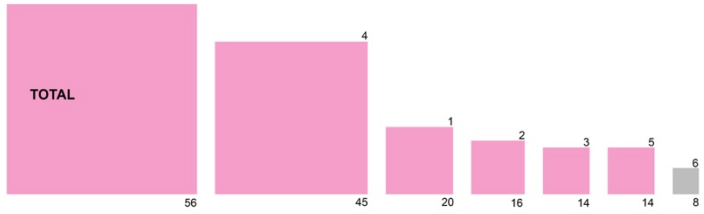
Table 1

| Handloom Centre : For Weavers of Saulkuchi | | | | |
|--|---|------------------------------------|---------------|--|
| No. | Spaces | Occupancy | Area in sq.m. | Description |
| 1 | Administration | | | |
| 1.1 | Entrance | 50 | 160 | Main entry of the building |
| 1.2 | Reception | 4 | 40 | |
| 1.3 | Director's cabin with attached toilet | 6 | 100 | Head of the institute who handles the institute |
| 1.4 | Staff area | 12 staff + 8 faculty | 100 | Persons who manages the institute |
| 1.5 | Pantry | - | 20 | |
| 1.6 | Collobrative wing | | 200 | Brands, Designers and international compny's offices |
| 1.7 | Toilets | male: 2 female: 2 | 60 | |
| | Total | | 680 | |
| 2 | Weaving | | | |
| 2.1 | Dyeing area | 50 | 400 | Silk purchased from market and dyes in desired colour |
| 2.2 | Warping area | 80 | 250 | Silk loaded on spinning wheel, transfers into spindles and warping process [consists warping and winding machines] |
| 2.3 | Design lab | 20 | 200 | To explore new designs using computer |
| 2.4 | Handloom sheds / Workshop area | 200 | 2000 | work area for weaving with jacquard looms |
| 2.5 | Storage space | - | 200 | Yarn depot, to store raw material and machinery |
| 2.6 | Toilets | male: 3 female: 3 | 70 | |
| | Total | | 3120 | |
| 3 | Design and Training | | | |
| 3.1 | Information centre | 10 | 50 | Collective to understand rights and different scheams |
| 3.2 | Handloom sheds / Workshop area / Classroom | 25 students+ weavers | 250 | Learning area for weaving with jacquard looms Training production, marketing and distribution with computers |
| 3.3 | Design lab | 10 | 100 | To design different patterns on computer |
| 3.4 | Chemistry lab | 10 | 100 | For experiments |
| 3.5 | Development wing | 15 | 200 | People working continuously on expanding and promoting their products |
| 3.6 | Multipurpose hall | 80 | 100 | For seminars, discussions, new technology introduction, etc. |
| 3.7 | Toilets | male: 3 female: 3 | 70 | |
| | Total | | 870 | |
| 4 | Public spaces | | | |
| 4.1 | Exhibition space | - | 300 | Exhibit their different designs and works with different display areas |
| 4.2 | Souvenir shops | - | 400 | |
| 4.3 | Silk products shops | - | 600 | |
| 4.4 | Toilets | male: 2 female: 2 | 50 | |
| 4.5 | Food court + Kitchen | - | 200 | |
| | Total | | 1550 | |
| 5 | Open spaces | | | |
| 5.1 | Entry plaza | | 100 | |
| 5.2 | Middle court connected with gandhi Memorial | | 300 | |
| 5.3 | Central zone | | 600 | |
| 5.4 | Silk Worm Farm | | 4000 | |
| | Total | | 5000 | |
| 6 | Guest house | | | |
| 6.1 | Living Spaces | | 1500 | |
| 6.2 | Nacassary Spaces | | 200 | |
| 6.3 | Service Spaces | | 100 | |
| | Total | | 1800 | |
| 6 | Parking and Service | | | |
| 6.1 | Service | - | 200 | |
| 6.2 | Parking space | four wheeler: 150 two wheeler: 200 | 1500 | |
| | Total | | 1700 | |
| | Total Area of Spaces | | 14,620 | |

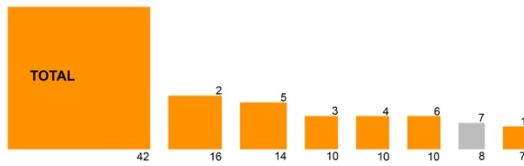
1 ADMINISTRATION



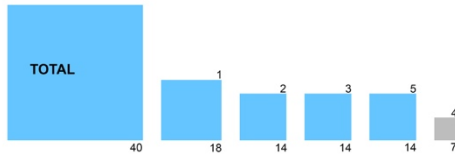
2 WEAVING



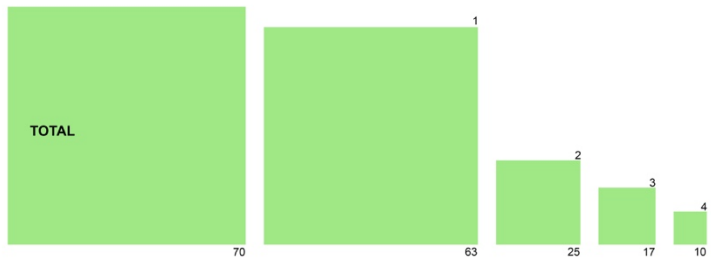
3 TRAINING AND DESIGN



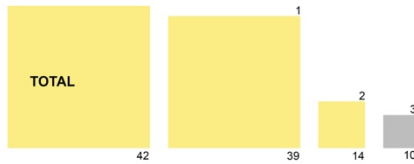
4 PUBLIC SPACE



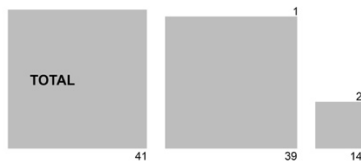
5 OPEN SPACES



6 LIVING SPACE



7 SERVICE SPACES



NUMBER ON TABLE
1
10
LENGTH OF SQUARE
METRIC SCALE :- 1 : 30

The image below shows the zoning diagrams of the site which facilitate both the programs appropriately.

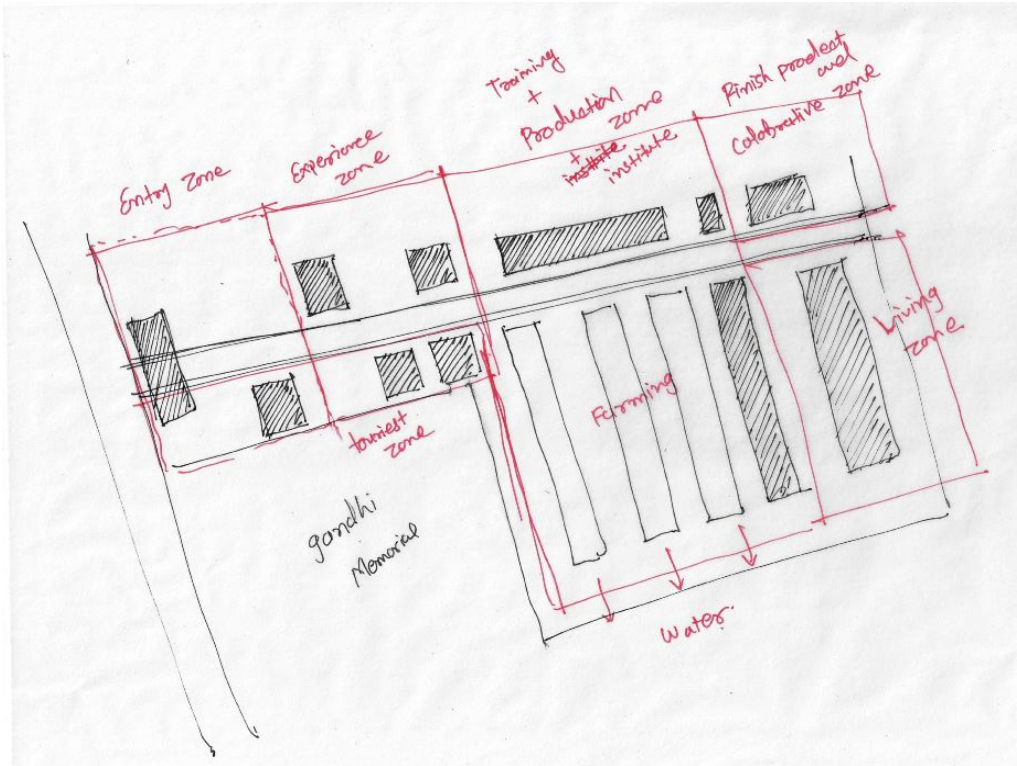


Figure 64 On site program and space imposition

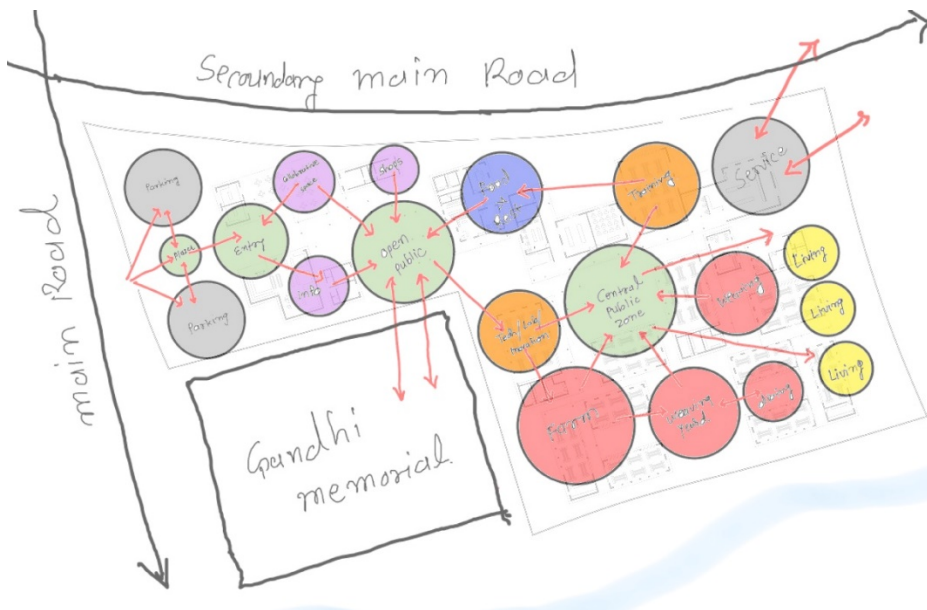


Figure 65 Initial level zoning

Chapter 5: Conceptual ideas & Design concerns

Section 1: Preliminary ideas

1: Diagrams for conceptual ideas

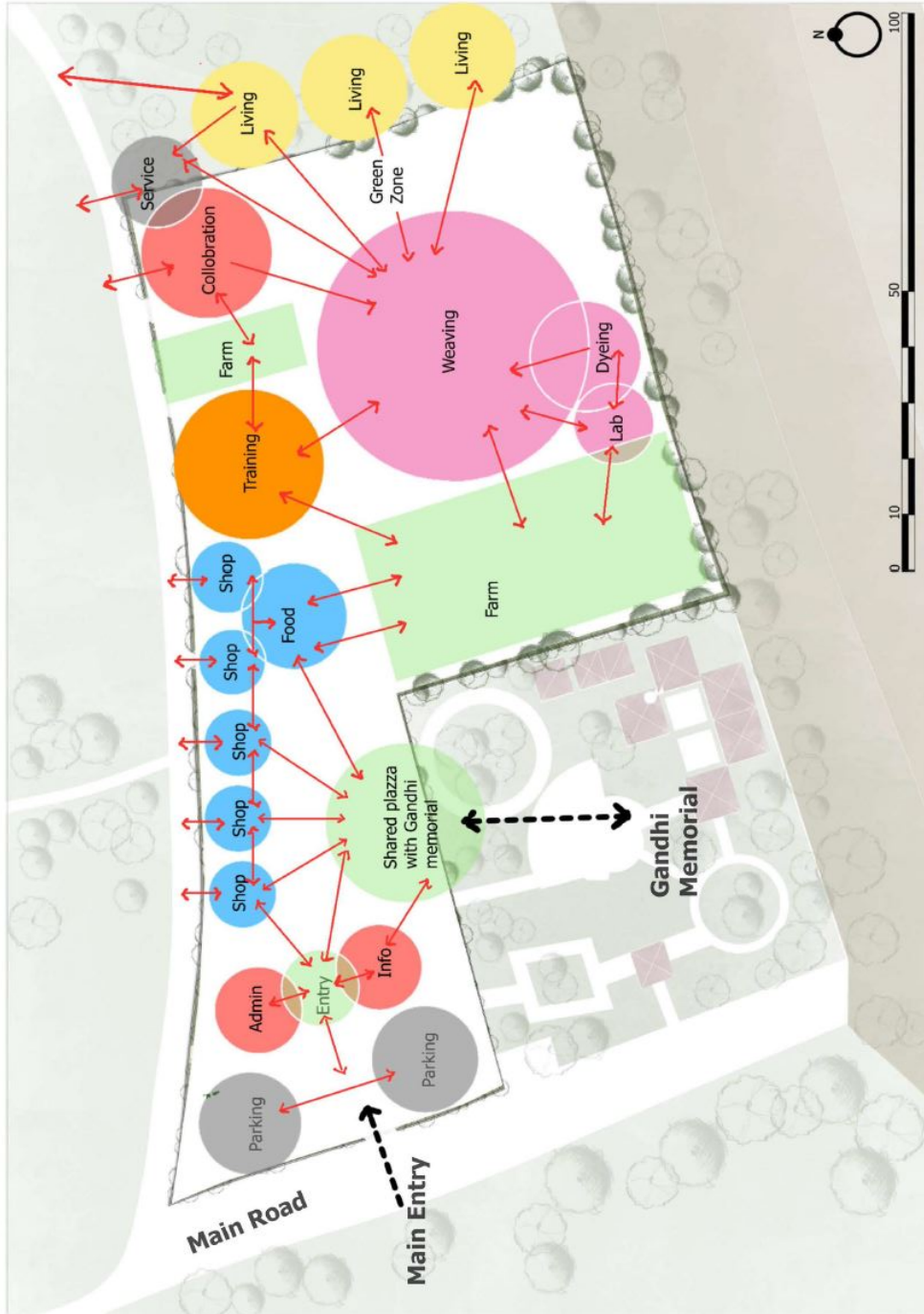


Figure 66 Zoning diagram of the conceptual planning



Figure 67 Conceptual master plan

The planning has been devised on the existing conditions and the incorporation of the Gandhi memorial on site. The complimentary design concerns were to properly engulf both the built masses so as to function and look as one. The Gandhi memorial as seen in the site study chapter was designed as Charles Correa designed Sabarmati ashram. The principles of designed multiple axes in harmony to form congregational spaces or green spaces alternately are fundamentals of Louis Kahn design principles.

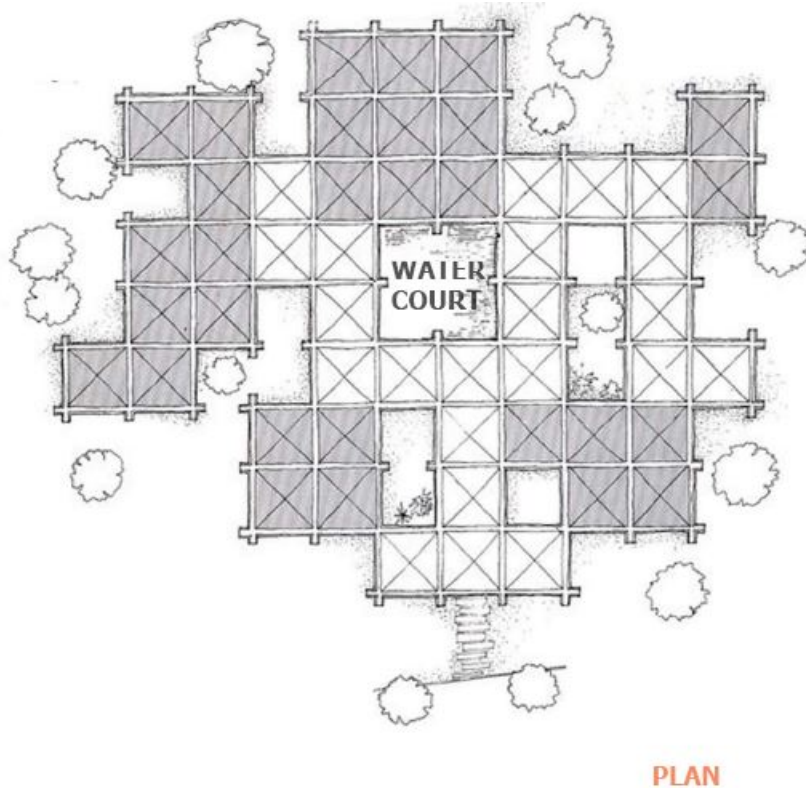


Figure 68 Conceptual cluster plan of courtyard and shed

The secondary street seen in the plan refers to the development of future installations of commercial shops and developing the street with commercialization in mind.

The shops would cater to the tourist needs and the regular artisans needs of food, articles and miscellaneous shopping other than the one available inside the facility.

The concern here is not to just focus on the facility boundaries but to expand and work upon all adjacent factors as well.

Here at the Gandhi memorial people come to spend time in cool breeze and calm weather and beautiful sceneries which becomes a selling point of the site and tourists thereafter. The appropriate way to tackle the given climatic scenario

The Handloom Shed

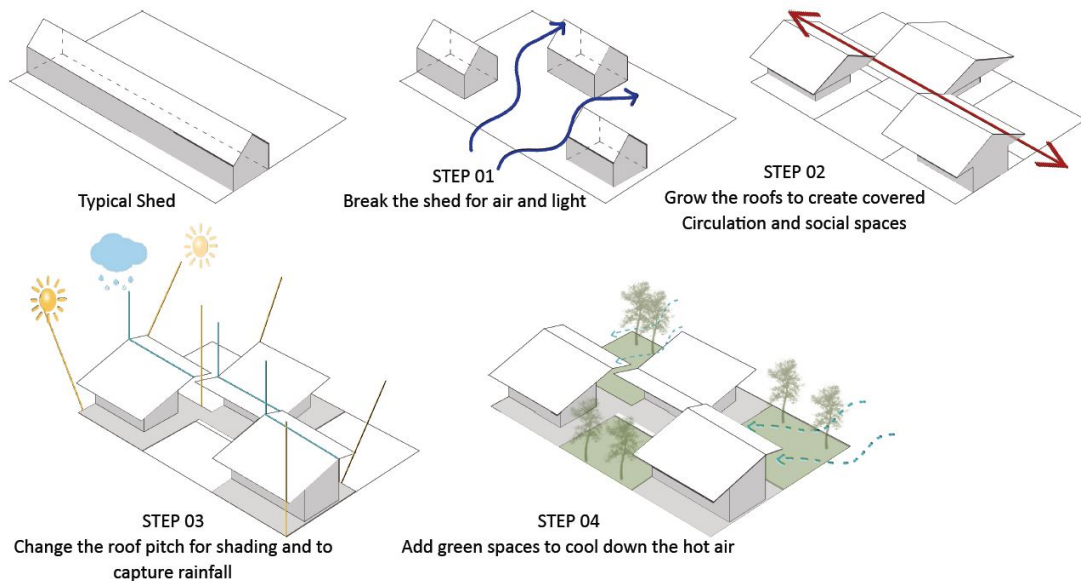


Figure 69 The concept for the modular shed

Climate responsive architecture

The climate - Tropical

- High humidity
- High annual precipitation
- Solar radiation

Design strategies - Sun shading devices

- Building orientation
- Maximum ventilation
- Choice of material
- Use of local materials

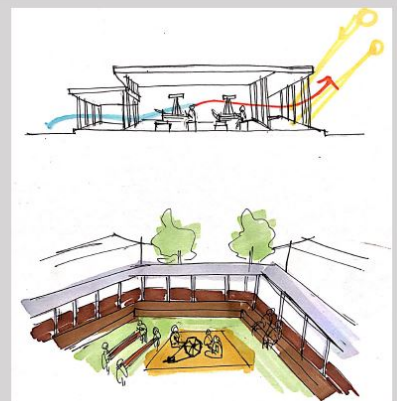


Figure 70 the climate responsive techniques for Sualkuchi

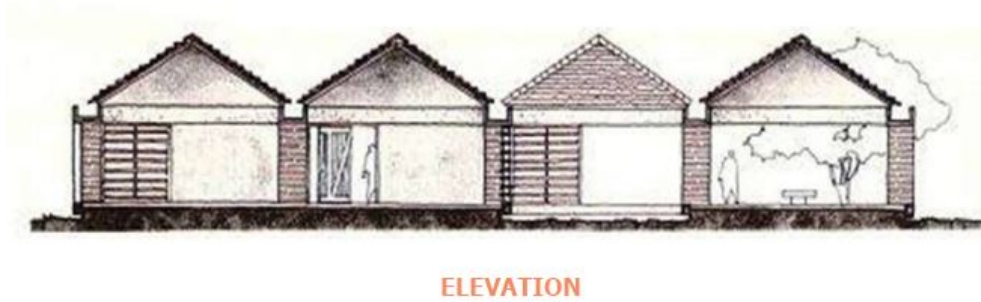
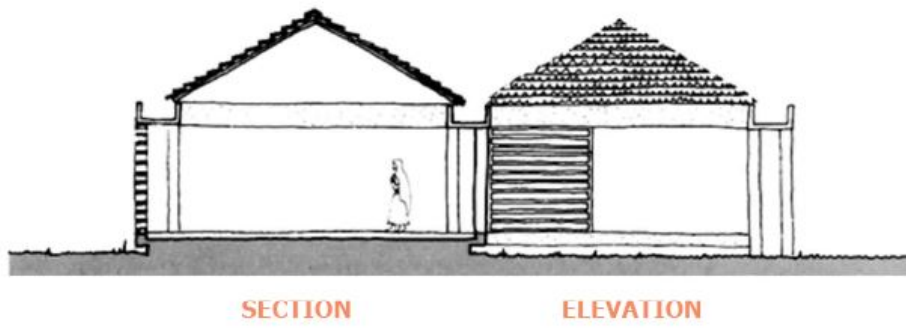


Figure 71 Conceptual elevations in ref to courtyards

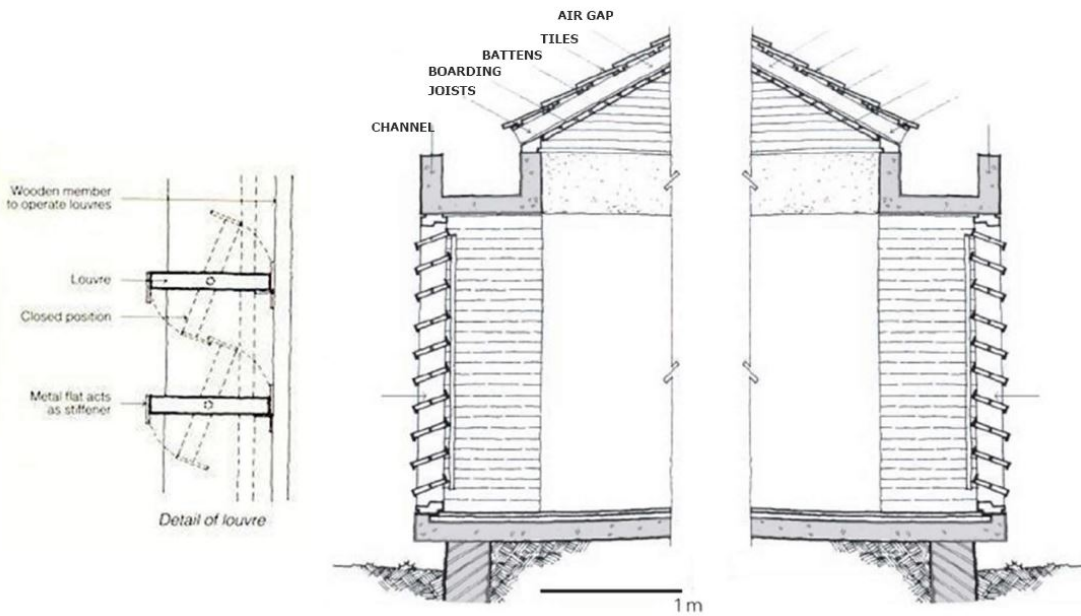


Figure 72 Conceptual working detail of the sheds

As the section suggests the use of concrete channels for rain water harvesting, as the context and climate study dictates the usage of less strength materials than concrete would result in the failure of sustainability and longevity.

2: Initial sketches & Design process



Figure 73 Secondary concept in line with the initial concept

Each shed will have only 6 looms which is efficient space to weavers to work. Less numbers of looms will produce less noise and create healthy environment to work. Sliding folding doors and rotatable fins will help to gain more light and ventilation

SHED PLAN

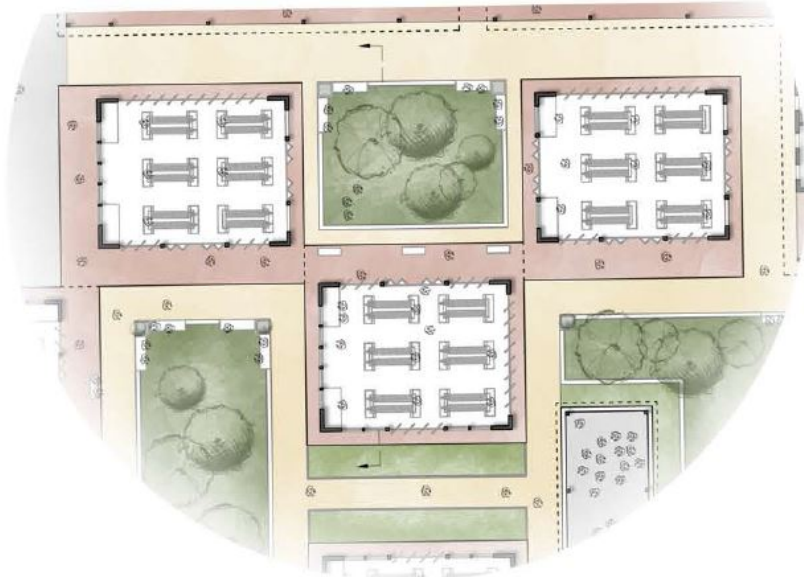
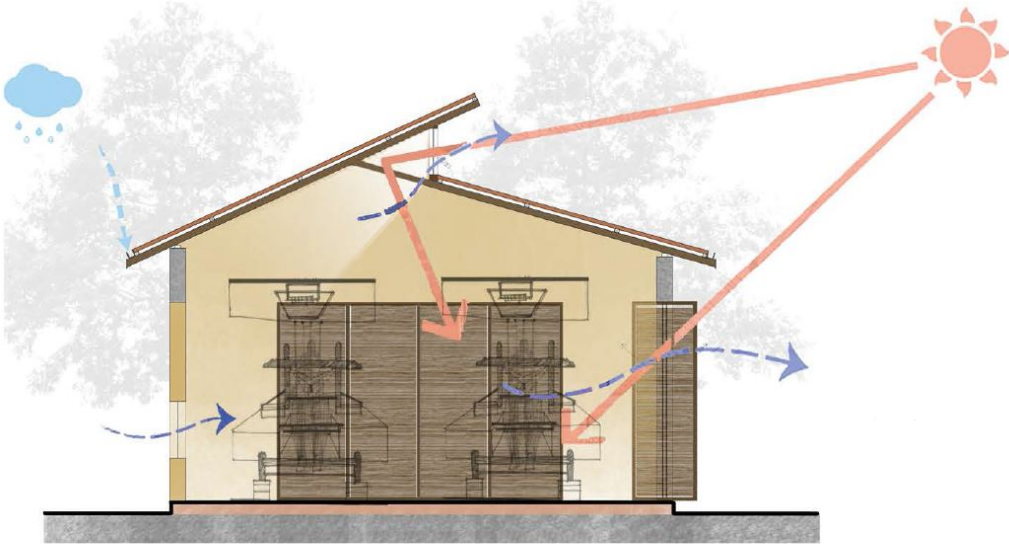


Figure 74 The cluster plan for the shed



CONCEPT BUILDING

Figure 75 The sectional cut of the shed for wind and light circulation

Bamboo mesh on southern facades will cool down the hot air which enters to the shed and provide ventilation. Filtered air and light will come from south side. Sliding folding doors and rotating fins will bring northern light into the shed. Green space between sheds will act as a buffer for temperature and as an interactive space.

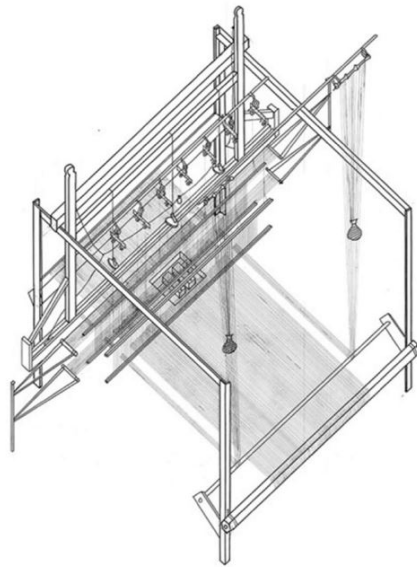
Chapter 6: Process of Designing

Section 1: Design Derivations from the activity of weaving.

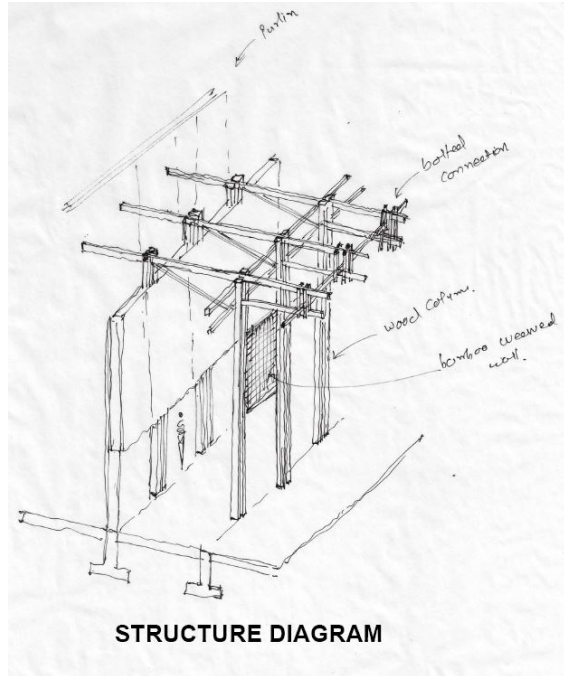
The process of weaving is at the core of this design, as the user defines a space and its functions. The design is driven by the process of weaving. As many of the design philosophies dictate that a structure is always designed from part to whole, the process of weaving has been taken apart from piece to piece and put together with diversity in scale, proportion and margins. The putting together of these parts is what would create the space for weaving, by weaving. The derivations are self-derived experimented and worked out for the best optimum utility to that of the weaver. As the end user is a weaver in a given context, the design changes are vernacular and simplistic and holistic for the users. The previously discussed process of weaving (Chapter 3: Weaving industry) which are the basis of all the concept derivations to be discussed in this chapter. The chapter 3 of this report focuses on the research and understanding of the entire process and flow of work. While based on them and certain design concerns are incorporated and explained here forth.

1: Structural element: Loggia structure

Keeping in mind that these members of structure could be constructed by the artisans themselves also, the members were majorly kept in design proximity that of the core members of a handloom, As shown in below images.



HANDLOOM



STRUCTURE DIAGRAM

Figure 76 The devised structure

Figure 77 The handloom for ref.

The first element designed and inspired from the reed of a loom, where the fabric is held back by its end wrapped on a stick (simpler terms). The possibility of resting it on multiple surfaces and bringing forth forms and artistic views were explored in variations.

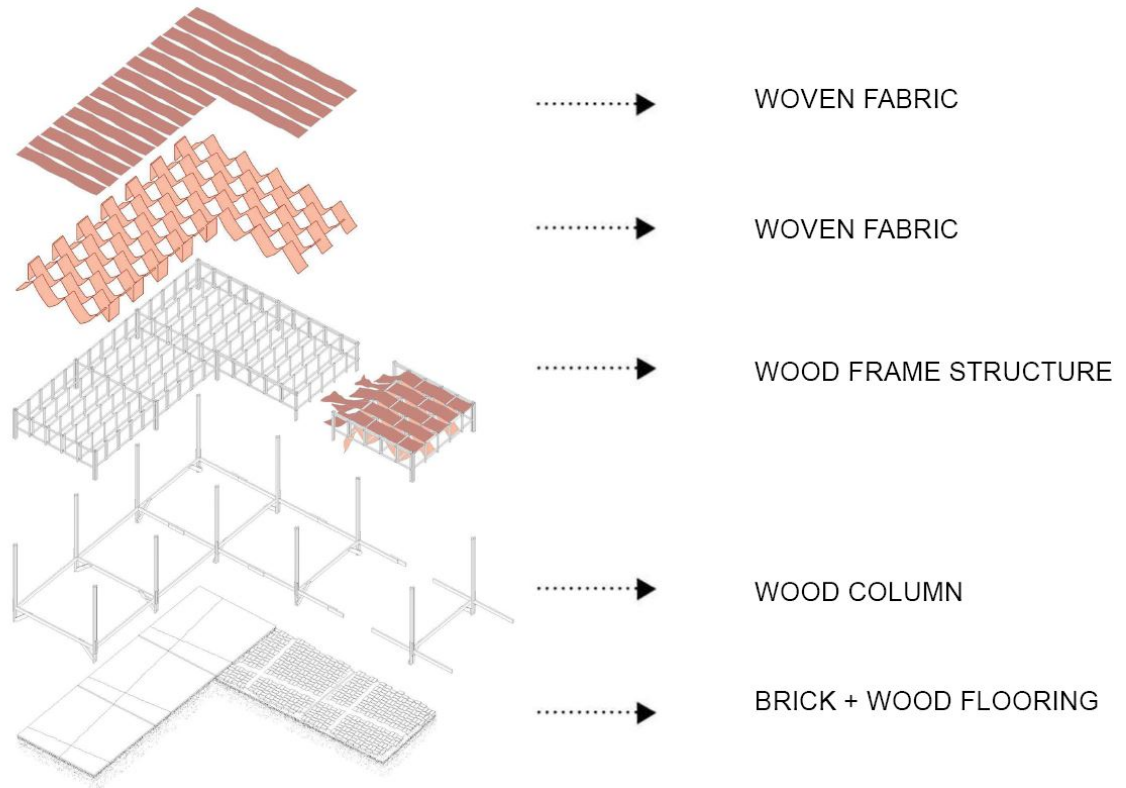


Figure 78 The exploded axonometric view of the loggia structure

Then with the final iteration was to use repetition and geometric folds to bring forth the beauty of colors and patterns with repetition. The final output was designed in respect to other structural members as well.

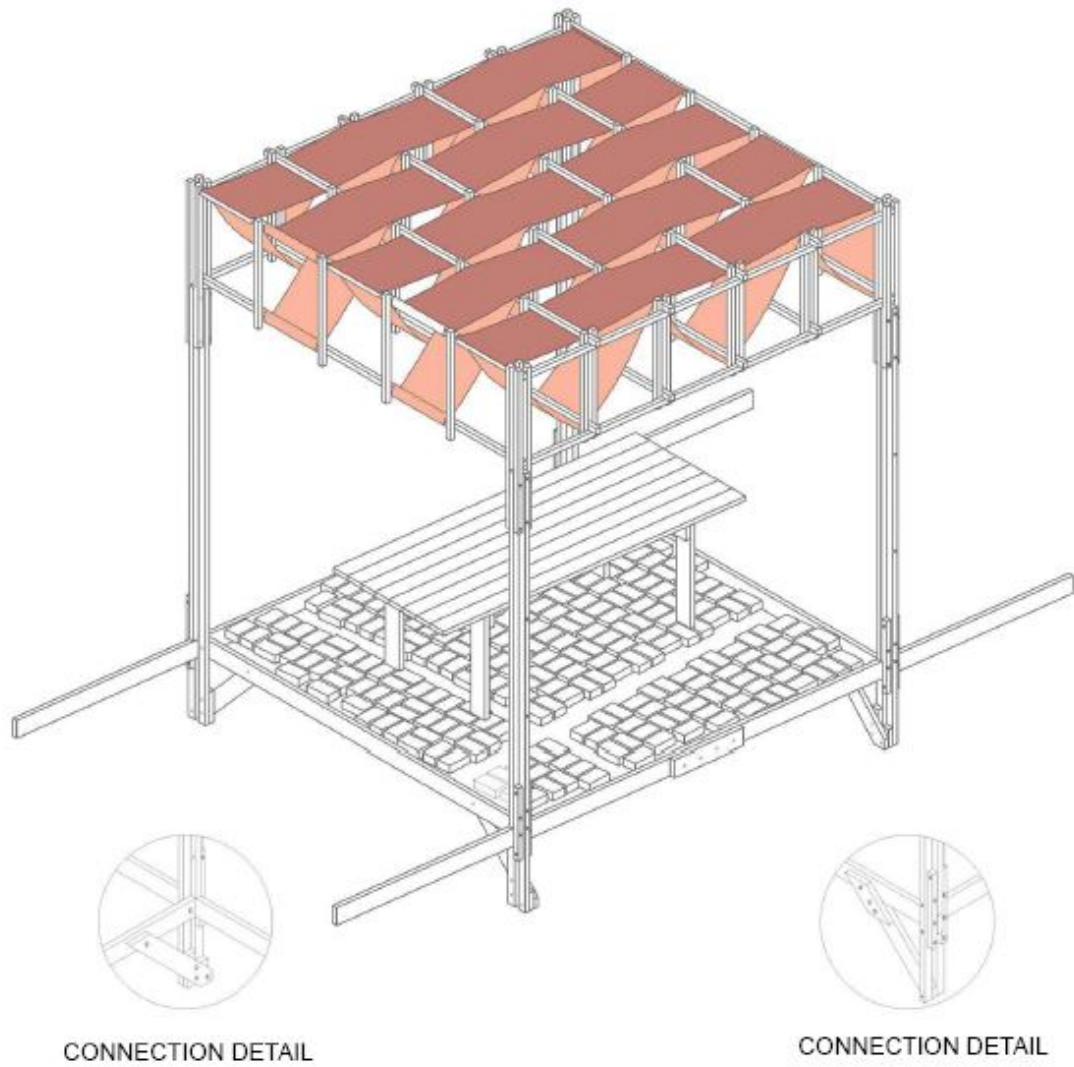
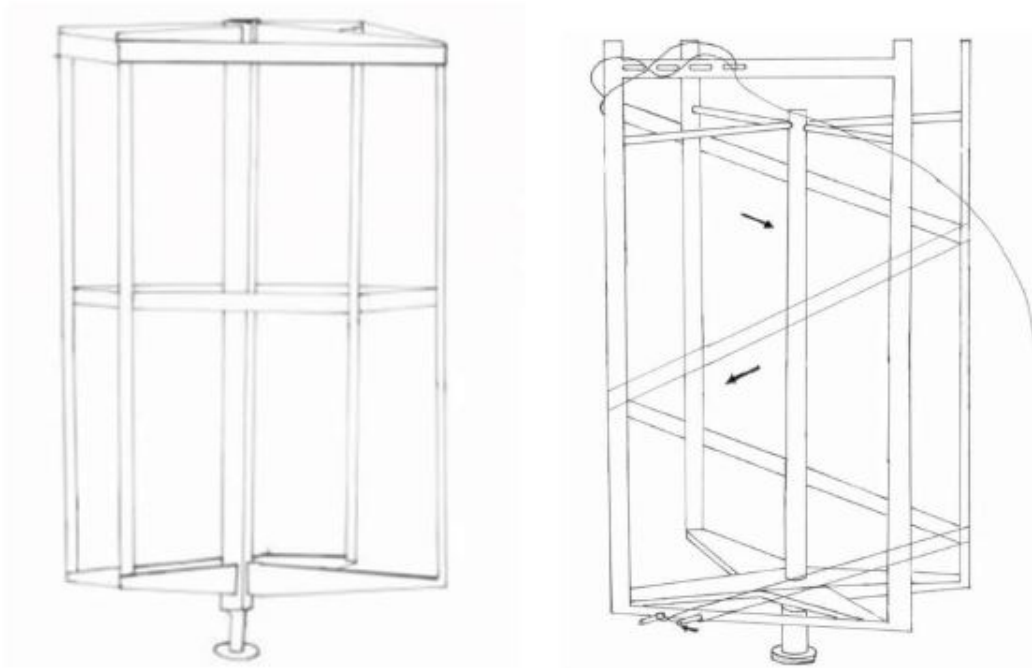


Figure 79 the detail view of the structure under the loggia

2: Structural element: Pivot doors and wall panels

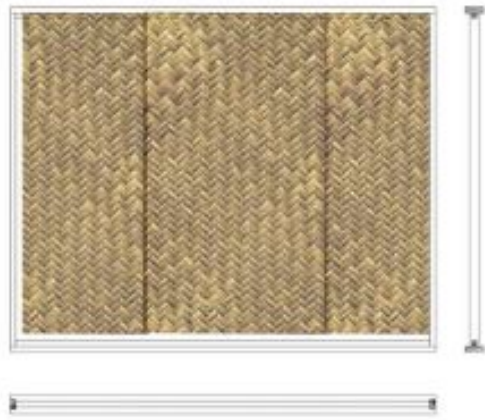
The door panels were inspired from the bamboo weaving floor mats, which are normally used in villages as chhatai (Floor mat or carpet). The similar usage is seen in Japanese floor mats where the floor mats are actually a component of the floor rather than like a rug or carpet. The strength of this member is normally very less thus is never used in the vertical plane, but the structure designed here is reinforced weaving techniques with better permeability and strength to withstand conventional weather conditions. The panel details are in the diagram below.



VERTICAL WARP FREAM

Figure 80 diagram for ref.

The image above is the base inspiration for the panels and doors.



FRAME IN ELEVATION



FRAME AXON

Figure 81 diagram for door panels

The bamboo weave patterns are kept vertical and woven to bring closely packed wooden sticks together for enhanced strength. The panel is mounted on a traditional wooden door frame thus it remains simplistic to use and artistic at the same time. As the art of bamboo weaving is widespread and easy to adapt too, the element is vernacular also.



A VILLAGERS
MAKING BAMBOO
MAT

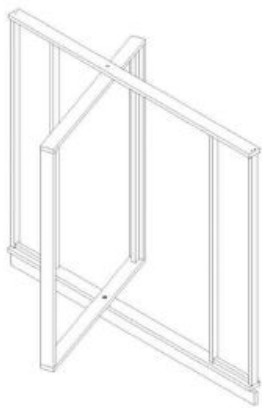


Figure 82 bamboo mat making process

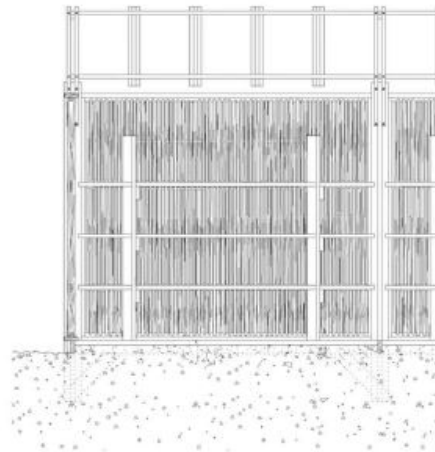


HAND MADE BAMBOO MATS

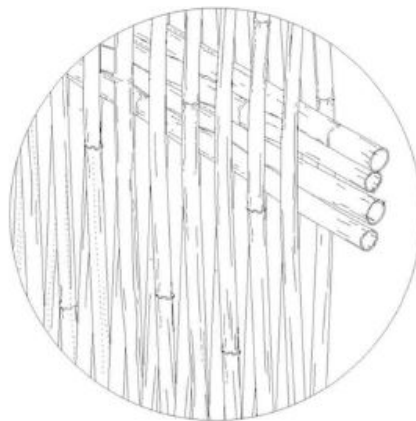
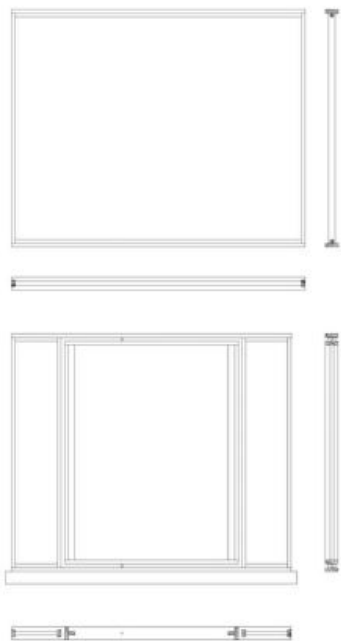
Figure 83 patterns normally used for bamboo weaving



DOOR STRUCTURE



DOOR FREAM INFILL



DOOR FREAM INFILL

Figure 84 Detail description of door bamboo design

3: Material selection for all elements

The materials for all the elements were narrowed down to the vernacular materials of building construction in Sualkuchi. The materials which were used to make most of the wall panels and loggia can be procured by artisans or normal layman people as well, no special contractor or truck loads of material is required.

Even though the entirety of the institute is under the vernacular materials governance the certain strength building services require is a necessity and wouldn't be sufficed by mere wall panels, thus the rooms which have the shear wall hold the building services.

The plinth was a consideration again in reference to the inferences derived from live studies conducted on site. The plinth would be vernacular material composed with least to minimum intervention of concrete in the construction. The reason why the users dislike the idea of having modern flooring tiles is that the ceramic flooring which they have in the villages holds philosophical value and sentimental value towards nature. As they justify their dialogues with a bit of scientific backing they say "The earth has a different feeling of energy surge when we sit down to weave".

The inference derived here isn't based on beliefs and philosophy but the psychological effect these minor changes have on the user, the psychological effect of materials on humans is studied in depth by Natalie in Claremont Mckenna College

The impact of materials on human psyche can't be fathomed and based on the inferences mentioned in the book, the materials haven't been changed to the maximum possibility.

4: Design process of the training institute

The training institute is derived from Ganga Maa ki textile studio and the conventional used handloom spaces. The spaces are to be designed with buffer distance because they even act as multipurpose usage, the circulation space, buffer and presentation. All are institutional as well as marketing the goods produced.

The spatial organization of the institute is inspired from ashram like spaces, because it is believed that weaving is a form of art and art is created in peaceful Zen like environment. As Zen like environment is hard to achieve in an urban fabric a middle ground to both chaotic urban style and Zen like peace is achieved by ashram like spaces seen in abundance in localities outside Sualkuchi, Assam.



Figure 85 Institute plan

The courtyard spaces are designed as discussed in the Chapter 5: Conceptual ideas

The views of the buffer space utilized in multiple ways are in Chapter 6; Section 2

The variation in the circulation spaces is based on the function orientation of adjoining spaces in a way to compliment them for better circulation and feasibility.

As the weaving process moves further the process isn't confined to enclosed spaces, it spills out in to courtyards and adjoining spaces. The space of circulation is utilized here in reference to the ways the weavers would adjust in a minimalistic manner.

Here the natural concern which bothers most designers is the convenience of providing more space for more activities and utilizing more and more land for the mere function of dyeing.

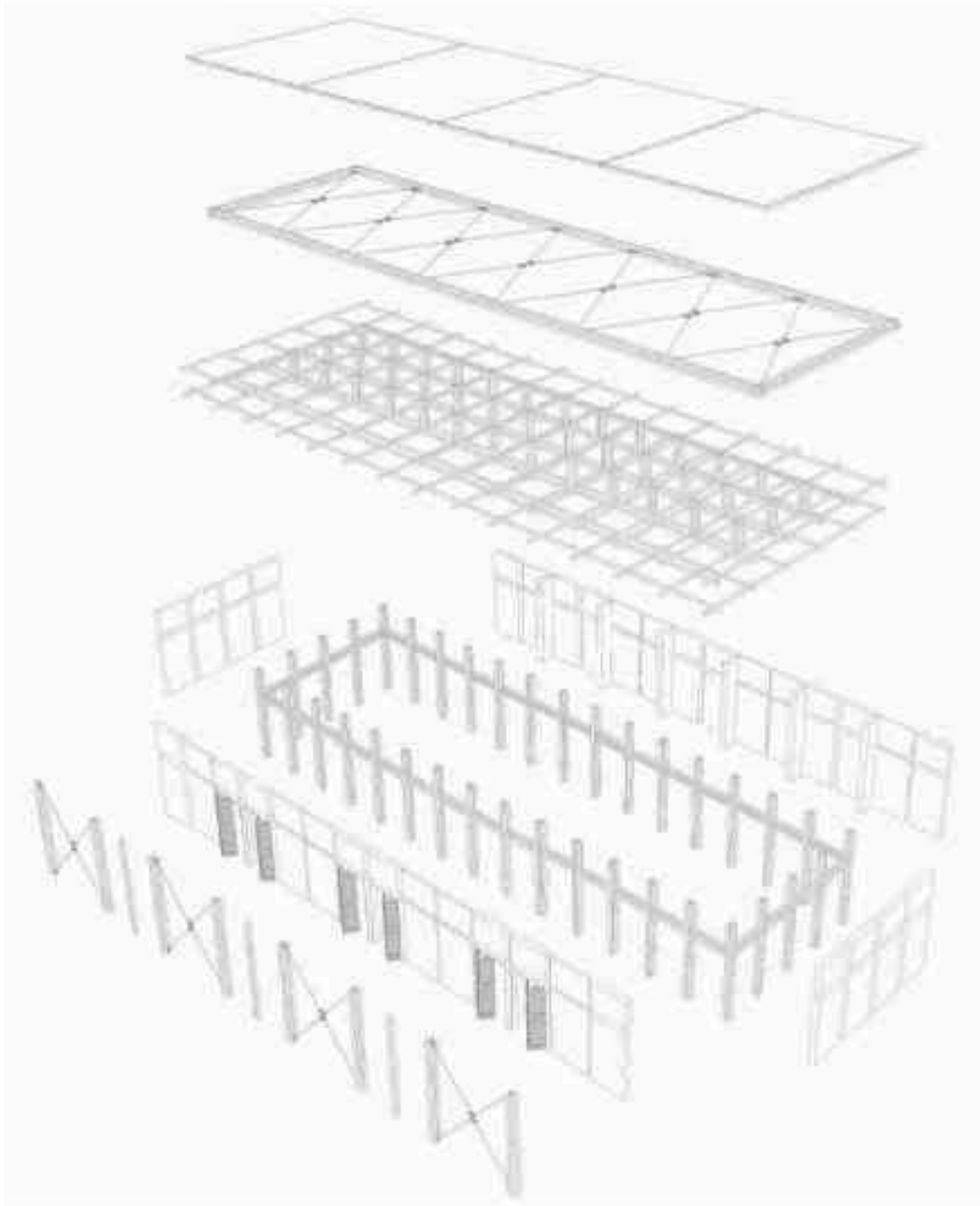


Figure 86 Exploded axonal view for component visuals

The aspect of this urban fabric is that they have less land and the weavers are brought about to work in a minimalistic manner, the changes advised by increase in space is indeed a good conclusion, but the inference derived by the case studies and live studies conducted on site have shed light upon the matter that change isn't much

appreciated by the weavers themselves, for in their words “ We are creatures of habit and don’t want to deviate from a certain way of living and working, because it changes our mindset, thus affecting the art we practice”.

The close pack homely streets are a must to feel the ethos of the city with open ended streets the long lawns the zest of the entire fabric would be lost.

5: Design process of the adjoining areas (Agricultural and accommodation)

The agricultural fields as shown in the plan are to be used for water conservation and crop cultivation, the crops would majorly be for silk worm cultivation. As the need for secondary crops would also be seen in near future with reference to global warming and water shortage. The design incorporated a water conservatory canal, which would serve as both normal canal for water relief from storm water drains of the terrain and as a reservoir for crop cultivation.

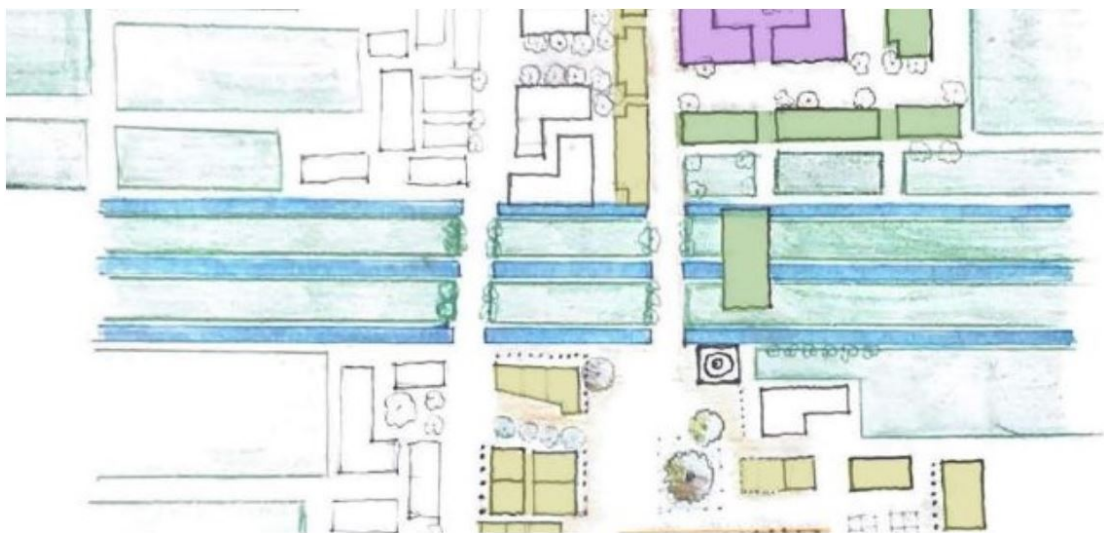


Figure 87 Canal layout with indication for the farming areas

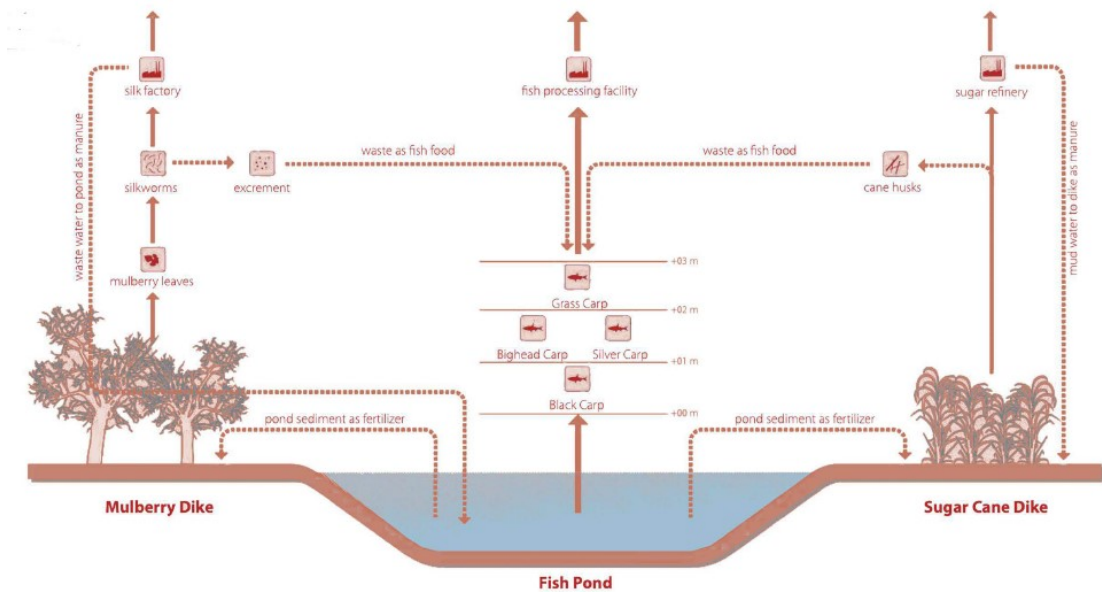


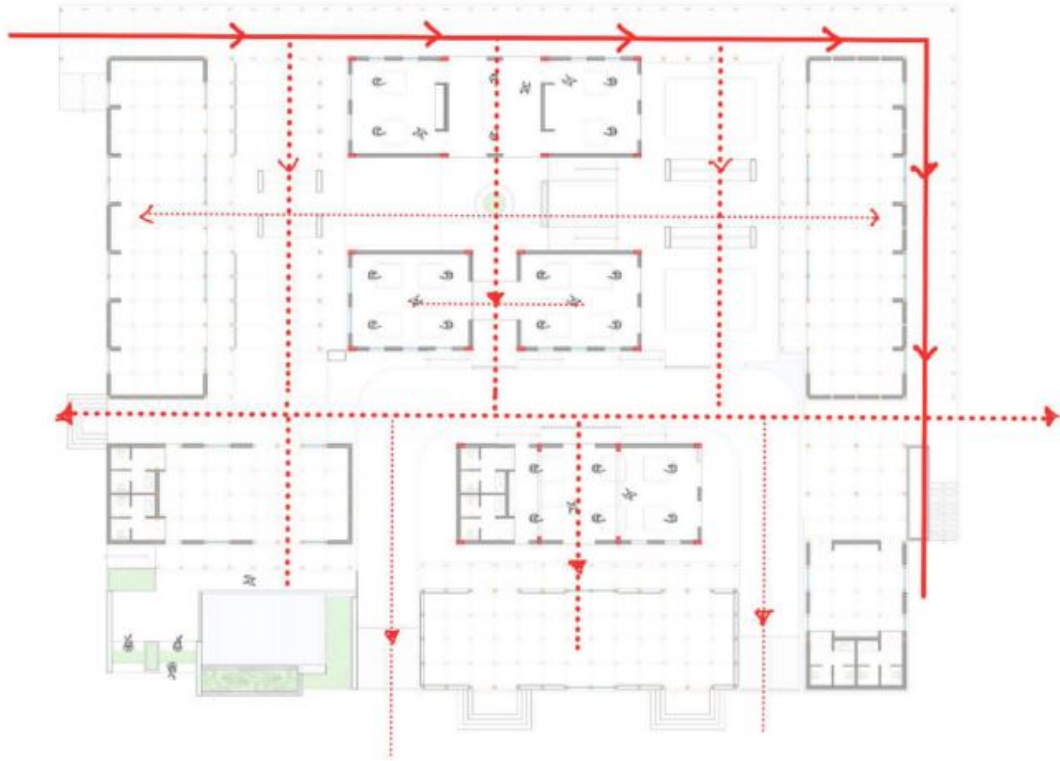
Figure 88 The diagrammatic explanation of the canal usage for agriculture

The idea originated from visiting the site and seeing the need for rain water harvesting and crop cultivation techniques. The actual canal would branch out and open into two canal width reservoirs which would help in water cleaning filtering and storing clean water. As most of the water surface run off water the primary means of filtering are very basic. The water would be controlled by the local farmers and the institute.

6: Design process of the circulation

The circulation and grid formation of the spaces was inspired by Gandhi ashram where they have courtyards which offer multiple utilitarian options. The core zest of streets of Sualkuchi and the grid formation of the Gandhi ashram was put together in a manner where the circulation of vehicles could be restricted and

pedestrian circulation could be promoted so as to maximize the visual impact of the building unit on the user and viewer equally.



Human Circulation

Figure 89 The circulation plan for the pedestrian vs. vehicular



Emergency Vehicular Circulation

Figure 90 The vehicular access for emergency purposes

The emergency circulation doesn't at all interfere with or obstruct the basic circulation of the pedestrian

Section 2: Design considerations for urban fabric.

The considerations for the urban fabric were to modify the streetscape for better lighting and amenities. The context of the site is mainly mix use building. The mix use typology varies from:

- Household
- Household and Grocery (shop)
- Household and Garage (workshop)
- Household and boutique (artisan shop)
- Commercial (all shops)
- Institutional (School and tuitions)
- Temples (religious)

The varied typologies have an upside of multiple users and multiple amenities are available. The variety of users helps with the market growth of the micro level of this urban fabric.

The urban fabric would be uplifted with this institute and its subsidiary arrangements. The changes in the context aren't huge thus the institute would amalgamate and provide consistent and potential growth to the micro level urban fabric being addressed here. The context currently lacks a lot of potential which would be brought about from this institute and branch out into the adjacent businesses.

1: Silk Urbanism: Social interaction and circulation



Figure 91 The plan for the social interaction via pedestrian circulation

The plan here would depict all the circulation patterns existing over-laid with designed pathways and circulation paths.

The plan has main streets which permeate through the internal streets as well thus forming a network, even though small and simple network but efficient.

2: Silk Urbanism: Social interaction and circulation

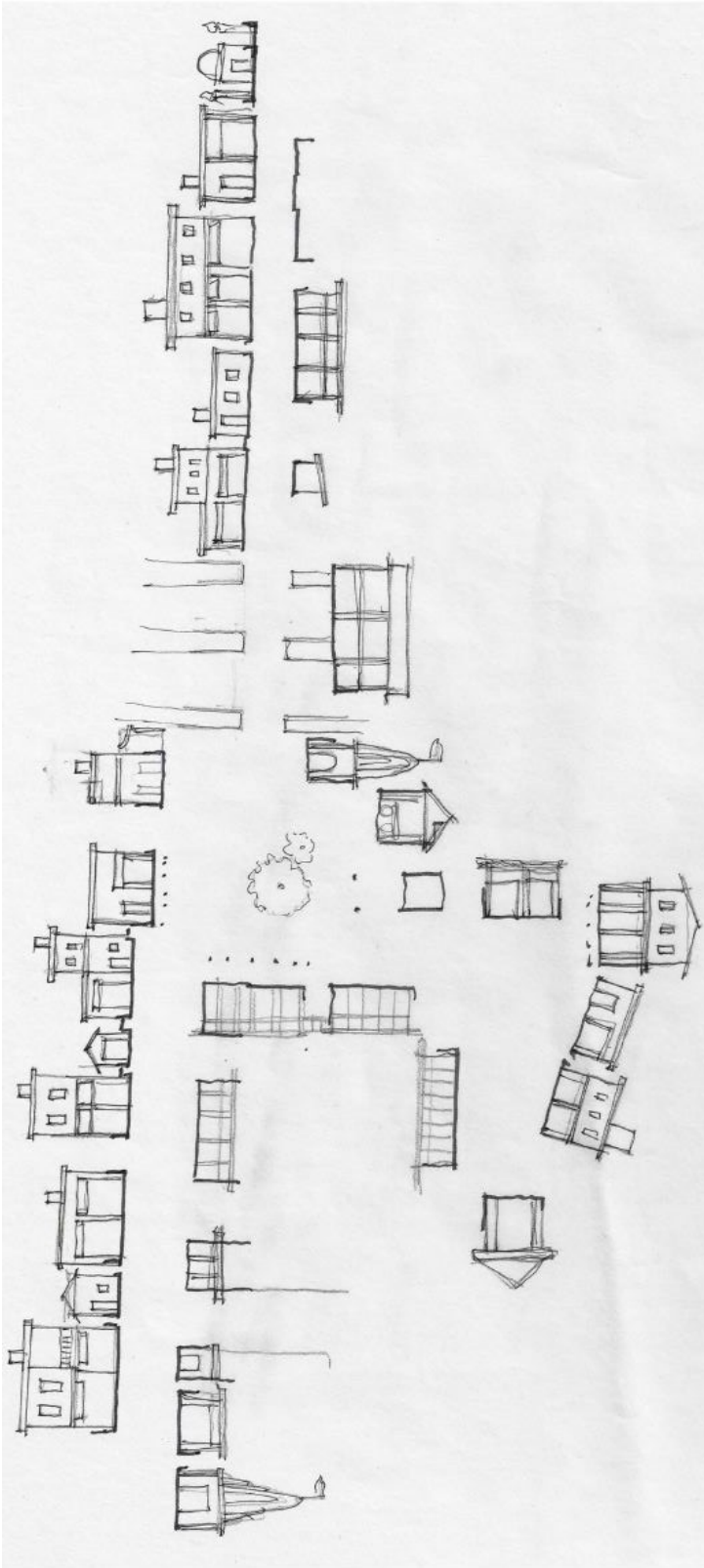


Figure 92 Heritage mapping layout via facades

The plan here is mapped by the variations in the façade seen and documented for the sole purpose of defining the heritage of the area.

The plan here even shows the info graphic representation of the facades seen in the streets and typologies

3: Silk Urbanism: Economy and Typologies

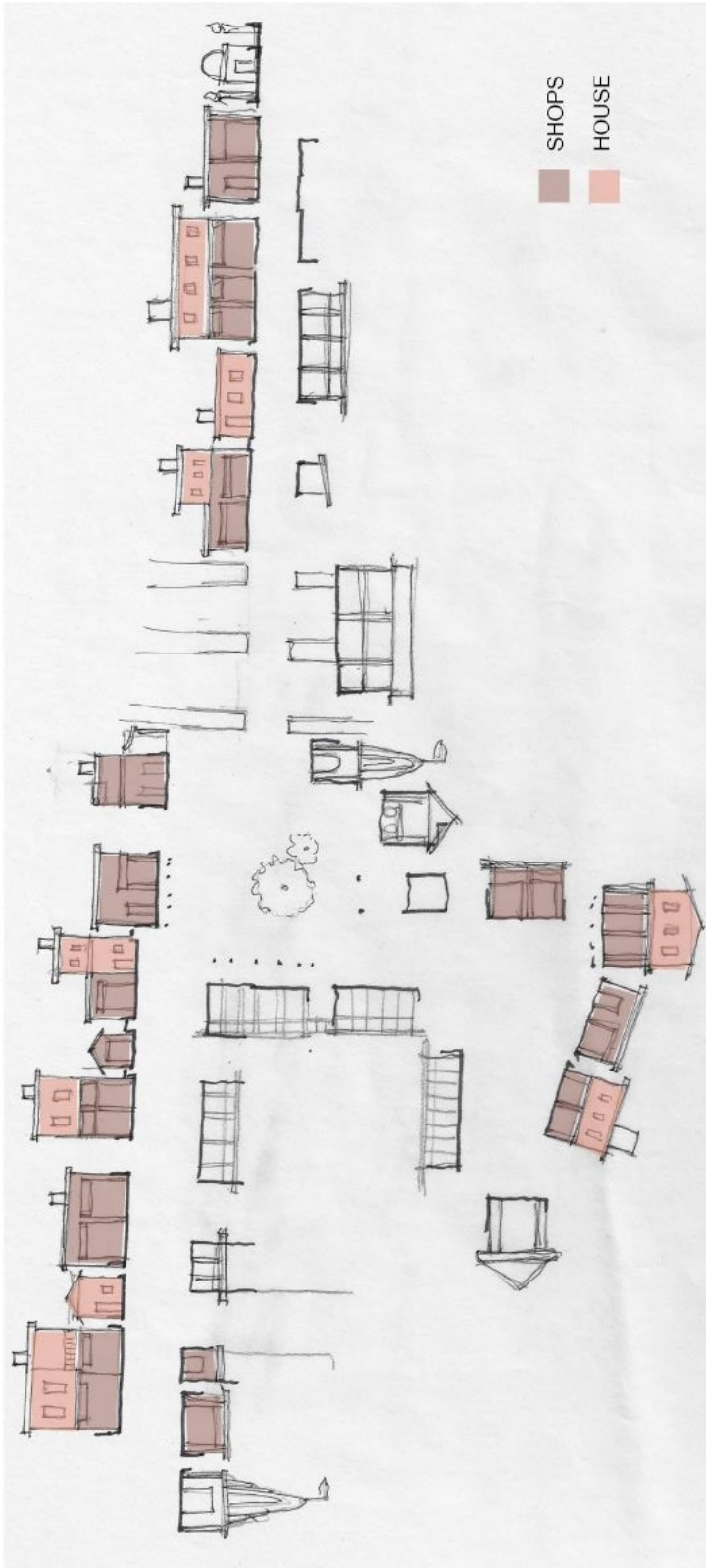


Figure 93 The info graphic representation of the economy and typologies

The plan here showcases the typologies and bifurcates them in the category of residential space and commercial/shop spaces.

4: Silk Urbanism: Raw materials

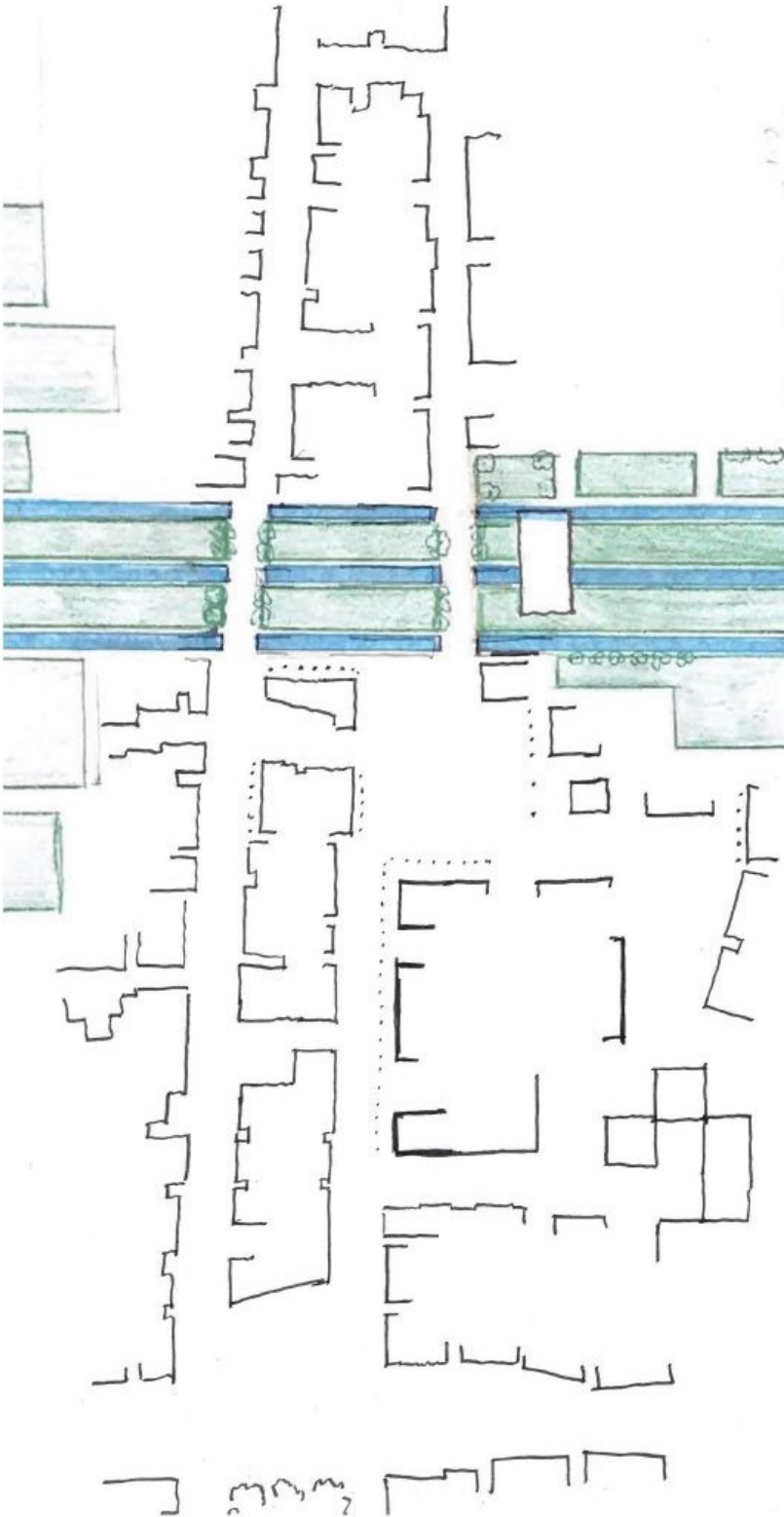


Figure 94 The plan for the indication of raw materials

The plan here showcases the availability of the materials for agriculture year round. The agriculture canal reservoirs are details discussed in the Chapter 6.1.5

5: Silk Urbanism: Social interaction and circulation

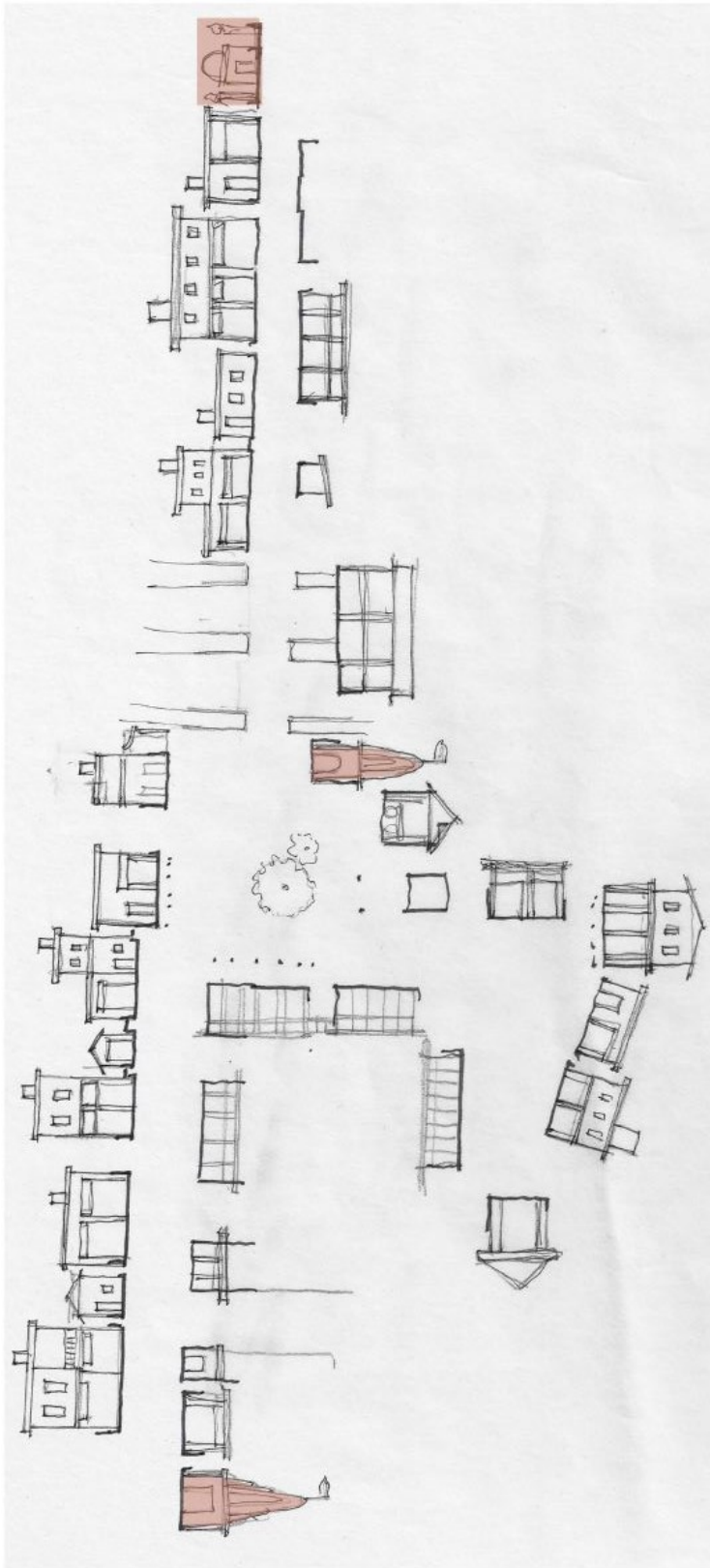


Figure 95 The info graphic plan for pilgrim spots in context

The plan showcases the religious diversity seen in this context.

The temples of varied deities indicate that the neighborhood of this area is rich in culture and secular.

The courtyard or lawns provided in the master plan have a unique impact on the fabric with endless possibilities as shown below.



WEEKEND MARKET

Figure 96 diagram for the weekend market scenario

The weekend market as depicted in image would be beneficial for the local businesses



COMMUNITY GATHERING

Figure 97 Image for the community gathering space

The space is enlivened rather than left out and forgotten by adding a few street furniture pieces.



CULTURAL PERFORMANCE

Figure 98 image for the cultural activities

As discussed in the cultural variety of the urban fabric, the variety of festivals would promote more socio dependency and brotherhood in the people.



VILLAGE FÊTE

Figure 99 image for the festival times

The image shows the endless possibilities for the context during socio cultural activities and which promote business as well.

Chapter 6: Final design drawings

Section 1: Plans, elevations & sections.

The Sections which were materialized during conceptual stage have been brought forth with finer detailing and changes to support the design process and design.

The sections for the institute are shown below:



Figure 100 Sections 1 & 2 through the institute



Figure 101 Sections 3& 4 through the institute

The master plan below showcases the amalgamation of all points' in totality
The design as seen isn't confined to the institute only it branches out towards
proposed areas other than institutional activities to agricultural and residential
workshops.



Figure 102 The master plan



Figure 103 The main view of the site and context

Section 2: Views

The sketches below showcase some of the key areas of the designed institute or context.



Figure 104 The view under the loggia structure

The image above emphasizes the basic beauty of repetition of module and in proportion to the street scale adjacent to the façade.



Figure 105 The view of the multipurpose area

The image above has the sizing and setting activity taking place in the multipurpose area (courtyard). The space was conceived with the notion of multiple uses, which was achieved in the final stage.



Figure 106 Courtyard to working space sketch

The multipurpose area – courtyard is adjacent to the working areas where the work spaces open up in the courtyard to have spill over activities and extended work space.



Figure 107 The multipurpose area - drying of yarn

The image above is the depiction of the handloom panels above human height level which were to be suspended at a height for acting as a roof element and convenience with the flexibility of the space underneath it, as the panels are movable they function flawlessly and aid the multipurpose area in function and aesthetics.



Figure 108 The sketch for farm area

The farm area as discussed earlier in the design process would be visually conceived as this in the later stage.



Figure 109 The 3D view of the entry street

The entrance to the institute street is the amalgamation of common amenities, temple, school, shops and the institute.

The view of the street gives us an idea of the scale and height matrix proportions of the varied typologies of the context.

Bibliography

- AssamInfo. n.d. *Sualkuchi - Manchester of Assam*.
<http://www.assaminfo.com/tourist-places/32/sualkuchi.htm>.
- Borderandfall. 2017. *Border and Fall - Ganga ma ki studio progressive weaving*.
<http://www.borderandfall.com/studio-mumbai-ganga-maki-progressive-weaving-studio>.
- Ezban, Michael. 2016. *Vandergroot ezban studio*.
<https://www.vandergootezbanstudio.com/Working-Water>.
- ezban, Micheal. n.d. "Working water- productive landscape."
- Khamir. 2005. *Khamir artisan village* . <http://www.khamir.org/about/kachhh>.
- Nature. 2009. *Rethinking origins of silk*. 6.
<https://www.nature.com/news/2009/090217/full/457945a.html>.
- Pinterest. n.d. *Discover ideas about indian sarees* .
<https://i.pinimg.com/originals/1f/35/c1/1f35c119bcc0b0ca71b8143f502c4eb6.jpg>.
- Sarees, Parinita. n.d. *Parinita saree- silk preoduction process*.
<https://www.parinita.co.in/blogs/articles/mulberry-silk-production-people-processes>.
- TheArchitecturalReview. 2017. *Ganga Maki Textile Studio by Studio Mumbai*: . 6.
<https://www.architectural-review.com/buildings/ganga-maki-textile-studio-by-studio-mumbai-craft-is-not-a-story-of-stagnation-but-of-sensible-emergence/10016442.article>.

