



A THESIS REPORT

ON

**आधारः**

**AN OPPORTUNITY CENTER FOR WOMEN**

*'Uplifting Indigenous (Chepang) Women of Nepal'*

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This is to certify that this thesis entitled "**आधार: An Opportunity Center for Women**", at Madi, Chitwan submitted by Ms. Yurika Ban (074BAE248) has been examined and it has been declared successful for the partial fulfillment of the academic requirement towards the completion of the Degree of Bachelor of Architecture.

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## ABSTRACT

This report presents a thesis on the topic of "**Aadhar: An Opportunity Center for Women**", which aims to uplift Indigenous women in Nepal. The Chepang community has been selected as the focus of the study and survey. The project named "Aadhar" aims to provide a platform for women who require empowerment and are severely underrepresented. It seeks to create opportunities for them and help uplift their status, enabling them to understand their own identity.

Nepal is a nation that exhibits promise for advancement, although it does not exist without social disparities. While a certain segment enjoys ample prospects, there are those who are situated beneath the poverty threshold. Likewise, while a particular group of individuals possesses the means to access fundamental human rights, nation's priorities, justice, and amenities, there are others who are dispersed and in search of a livelihood. It is a pronounced gender stereotype and societal concern that continues to pervade numerous communities, despite remaining unacknowledged and underreported. Thus, Gender being one of the factors representing the social disparities in our society, with a highly marginalized ethnic group 'Chepang' being another factor reflecting the need of upliftment and opportunities, holds together the overall objectives of the thesis project.

Despite the fact that women make up more than half of the users of our environments, we have had little effect on the architectural shapes we express. Architecture is moreover social entities which are contributed with socio-cultural belief and shape social relations with the space consequently. The kinds of spaces we have, don't have, or are denied access to can empower us or render us powerless. Spaces can enhance or restrict, nurture or impoverish, supporting the gender values in architectural settings. Throughout the history, gender-neutrality has being problematic since it failed to acknowledge women in architecture and space planning. The proposed project will address issues regarding gender sensitivity in architecture, gendering of space, accommodation and opportunities for marginalized women, skill development, vocational training, informal education, upliftment of local economy and awareness activities that helps in uplifting Indigenous women. The fundamental objective is to build a facility that would enable underprivileged women to be independent and empowered.

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## 1. INTRODUCTION

### 1.1 BACKGROUND

Nepal's demographic profile indicates a higher proportion of women. As per the preliminary results of the National Population Census-2021, the total population of the country is 29 million 192 thousand 480 and of this number 14 million 901 thousand 169 (51.04%) are women and 14 million 291 thousand 311 (48.96%) are men. National Census 2021 shows that the Gender ratio is 95 men per 100 women. In 2020, global gender gap index for Nepal was 0.68 index, according to world data atlas. Global gender gap index of Nepal increased from 0.55 index in 2006 to 0.68 index in 2020 growing at an average annual rate of 1.62%. Despite the fact that Nepal is modernizing and gender roles are shifting, the country's patriarchal society continues to erect impediments to gender equality.

According to UNESCO, Nepal has a literacy rate of 67.91 percent among adults. While the male literacy rate is 78.59%, for females is 59.72%, showing a big gap between the sexes. In comparison with other countries, Nepal comes at the rank of 131 at literacy rate. According to the geographic data analysis, we can still see the Urban-rural gender disparities in literacy as the literacy rates are much higher for urban women than rural women. The literacy rate for urban women aged 15 years and above is 65.8% (men literacy rate- 87%) and for rural women the literacy rate is 39.1% (men literacy rate – 67.2%). Regardless of geographic location or age group, men have higher literacy rates than women. Although, literacy rates are increasing, men's literacy rates are still higher than women's due to unequal access to formal education, enrollment in schooling, and various socio-cultural aspects. (Malla, 2021)

According to the Nepal Labour Force Survey 2017-18, for every 100 males in the working-age population, there are 125 females, but for every 100 employed males, there are only 59 employed females. Out of the total working-age women, only 8.5 million are in the labour force who are either employed or are in search of employment, and only 2.6 million from the total women labour force are employed, according to the report. This shows only 22.5 percent of working-age women are employed. The survey has considered only those who are receiving wage or salary for doing work and making profits for being self-employed as “employed”. So, people employed in subsistence farming and household chores do not fall under the definition of the “employed”. With the majority of women involved in non-profit making and nonwage earning works, the employment ratio of women is very low, according to the Central Bureau of Statistics. (Malla, 2021)

The highest number 14,232 cases of domestic violence have been reported on Nepalese fiscal year 077/078. The finding on the ‘State of Domestic Violence Against Ever Married Women in Nepal’ let out that physical violence increases sharply with age, from 17.7 % among women age 15-24 to 24.8 % among age 30 and above. About 36 percent of women have experienced physical violence on the caste & ethnicity followed by Dalit (31.7%), Janajaties (20.4%) and Brahmin & Chhetri (12.2%). Finding revealed that there is strong relation between experience of domestic violence

and education level. Higher educated women were less exploited from any kinds of domestic violence in comparison to women with low level of education. The experienced of physical violence declines with the increases of education level. About 31% of Women with no education have experienced physical violence, compared with primary (24.5%), secondary (14.3%) and higher education (9.9%). (Malla, 2021)

DHS analysis suggests that almost one fifth of women have experienced some form of violence by intimate partners in the 12 months prior to the survey. (Synthesised report: Women, Work and violence in Myanmar, Nepal and Pakistan). Physical violence was the most cited form of violence followed by emotional and sexual violence by an intimate partner. Analysis of factors associated with the experience of violence indicates that, although place of residence was not associate with the experiences of violence, residence in specific ecological zones was significant with women from terai region, reporting higher odds of experiencing violence compared to other zones.

Majority of women do not feel safe inside their own house. According to a 2019 report by the National Women Commission of Nepal, there were 67 women's shelters across the country, which could accommodate up to 1,772 women and children. The report also stated that the majority of women who seek shelter do so due to domestic violence or other forms of gender-based violence.

## 1.2. STATEMENT OF PROBLEMS

Despite the fact that women make up more than half of the users of our environments, we have had little effect on the socio-economic aspects. The man-made situations which encompass us strengthen conventional patriarchal definitions of women's part in society and men's part in society. The stereotypical social and cultural aspects have conditioned the genders to a natural astigmatism which limits the self-concept, disregarding the choices for ways of living and working. Gender roles and the pressures to conform to these roles for women vary across regions and communities. Indigenous community where the participation of women in educational, social and economic activities is very low in comparison to other communities. The women of Nepal itself, with the marginalized community like chepang is the major focus of problems highlighted on the thesis. The brief highlights on the problems statements which motivates for the propose of the thesis is discussed below;

### 1.2.1. Gender Neutrality in Architecture

Architectural discourse has customarily characterized buildings as craftsmanship objects or technical and structural objects. However, Architecture is moreover social entities which are contributed with social meaning and shape social relations. The process through which we build a space with definite characteristics follows the cultural values, emotional values, social values and also a gender-centric values. The gender values which are responsible for the built environment is either being misconstrued or disregarded. The gender, space and its relation in architecture is

emotionally driven by a monolithic stereotype of women and men. The kinds of spaces we have, don't have, or are denied access to can empower us or render us powerless.

Be it affirmed:

*A basic concept dating back in time suggests that a lady pushing a stroller through a rotating door or a subway turnstile is a 'handicapped' person.*

### **1.2.2. Indigenous Women of Nepal**

Nepal is a country that has long struggled with issues related to gender inequality, particularly in relation to women from marginalized communities. These women often face a range of problems, including discrimination, limited access to education and healthcare, and high rates of poverty and violence. The supporting data address only 1% among Chepang, women are literates. They do not know how to write their own name, and are deprived from basic facilities and human rights. And, there is no doubt that the indigenous community like chepang demands the educational, social and economic opportunities.

### **1.2.3. Economic Dependency of Women**

According to a report by the World Bank, as of 2020, approximately 43% of women in Nepal were economically active, compared to 80% of men. This suggests that a significant percentage of women in Nepal may be economically dependent on men or other sources of financial support. One way the pressure to conform manifests itself is through marital status. For instance, in developed and emerging economies, women who have a spouse or a partner are less likely to be employed in a paid job or be actively looking for one. This can often arise from the economic stability of a partner's income that can reinforce the "male breadwinner" bias in some marital arrangements.

### **1.2.4. Illiteracy Among Women**

Illiteracy among women is a major barrier to gender equality and social and economic development. Women who lack basic literacy skills are often unable to fully participate in their communities or take advantage of opportunities for personal and professional growth. The low literacy rates among women in Nepal can be attributed to various factors, including poverty, cultural and social norms, limited access to education, and gender-based discrimination. These factors can make it difficult for girls and women to attend school or access educational opportunities, leading to lower literacy rates and limited economic opportunities.

### **1.2.5. Domestic Violence and Need of Shelter**

The data analysis by IMC Worldwide (conducted in three countries: Myanmar, Nepal and Pakistan) shows that there is a complicated link between economy and violence. The connections between economic participation and violence appear to be a complex web, with situations when women who make a living are more vulnerable to violence as well. Majority of women do not feel safe inside their own house. According to a 2019 report by the National Women Commission of Nepal, there were 67 women's shelters across the country, which could accommodate up to 1,772

women and children. The report also stated that the majority of women who seek shelter do so due to domestic violence or other forms of gender-based violence.

Be it affirmed:

*Beauvoir in her seminal work (1993) declared that women have been the “second sex” within social structures almost all of history. Women, according to Beauvoir, do not share the same mental, spatial and economic freedoms provided to men in society. Even though women have started to enjoy increasing freedom in modernizing societies, they cannot escape from their traditional roles as mothers and wives.*

### **1.3. PROJECT INTRODUCTION**

*Aadhar*, philosophically representing the meaning ‘Support’ to the women. It basically deals as an organization that provides support and resources to empower women to achieve their full potential. Women's Opportunity Center is basically a community-based center that provides resources and support to women who are seeking to improve their educational, social and economic status. It aims to help women overcome the barriers they face in society, such as gender discrimination, poverty, lack of education, and limited access to resources. The project approaches on creating a better environment for women analyzing the women’s participation in work, violence against women and the provision of education. By providing women with the tools and skills they need to succeed, the center can help improve their lives, as well as the lives of their families and communities.

Women’s opportunity center is the center designed to acknowledge women empowerment and upliftment through a gender sensitive approach. It is a project that contributes to social and architectural discourse by offering educational, economic and social empowerment for women as well as restoring social infrastructure. The center offers a variety of services, including skill based and vocational training, financial education, informal learning environment and access to capital to uplift local economy. The center also offers the shelter for women who are experiencing difficult or challenging circumstances, such as homelessness, domestic violence, or poverty. It provides temporary housing or emergency shelter to women who need a safe and secure place to stay. Additionally, it offers counseling, job training, educational resources, and other forms of support to help women get back on their feet and rebuild their lives.

### **1.4. IMPORTANCE OF PROJECT**

The project reflects the built environment as a need of the community. The process through which we build a space or a built structure, be it the high-rise complex, hospital or an opportunity center, it follows the social, cultural and economic needs which need to be addressed. The project aims for the three basic form of empowerment:

- Economic Empowerment
- Educational Empowerment
- Social Empowerment

The theoretical approach of a project encompasses the architectural process of designing a gendered environment. The project will provide a space to empower women by providing them with a permanent haven for gathering, a safe environment for learning, the opportunity to acquire job skills, manage a business, and fuel the local economy. The project helps us to understand how violence currently shapes women's economic engagement patterns, and ascertain best to address this. The design approach will uncover the complex ways in which earning or generating an income shapes/alters (both positively and negatively) the forms and frequency of violence that women experience, and how this affects their levels of vulnerability. Women's status and activity can be improved through a variety of educational initiatives, which can help them reclaim their own identity and respect as individuals in their communities.

Here are some of the key importance of Women's Opportunity Center:

- **Empowerment:** Women's Opportunity Center provides women with the skills and resources necessary to succeed in their chosen fields, which can help them gain confidence and achieve financial stability.
- **Education:** It offers training and educational opportunities that enable women to develop new skills, gain new knowledge, and expand their horizons.
- **Networking:** It provides a supportive environment where women can meet and connect with other women who share similar goals and aspirations, which can help them build valuable professional networks.
- **Community Building:** It often serves as a hub for women's groups and organizations, providing a place for women to come together to work on common issues and to advocate for women's rights and gender equality.
- **Advocacy:** Women's Opportunity Centers can serve as a platform for advocating for women's rights and promoting gender equality, which can help to raise awareness of the issues that affect women and girls.

## 1.5. PROJECT JUSTIFICATION

The study's main focus will be on providing educational, social and economic empowerment to women in order to reclaim their own identity in the society. In the setting of Nepal, women's literacy and employment rates are extremely low, which is one of the reasons why the opportunity center must be proposed in near future. The best approach for a woman to feel empowered is to increase the participation of women in economic activity.

The Women's Opportunity Center is a crucial project that is justifiable on several grounds. The following are some of the key justifications for the project:



### 1.5.1. Women in Agriculture and Livestock Raising

In the Terai, the majority of women, especially in smallholder agriculture, also contribute substantially to agriculture, both in terms of labor input and decision making. (*Acharya and Bennett, 1981*). Women also play a major role in the livestock raising. Overall, women contribute 70 percent of the labor and up to 26 percent of the farm level decisions in the livestock sub-sector. Care of livestock stall is primarily an activity of women. Thus, the commercialization of agriculture is the foremost things to provide opportunity to the women of Nepal. The project offers the demonstration farming units, tunnel vegetable farming and livestock raising training for the women strongly active in agriculture.

Be it affirmed; *'I am a widow and a mother of 3 daughters. I generate my income for the family by doing farming in tenant basis (Adhiya). Also, I got three goats in my house, as the local ward of Madi had provided one goat for each family.* (Nirmaya Chepang, Pariyakhola Madi).

### 1.5.2. Women's Participation in Work

Based on the 1987 survey of the manufacturing sector, Rana and Shah (1987) concluded that the pattern of women's employment in industries in organized manufacturing is more influenced by the firm's location, size of investment and degree of mechanization than the type of industry. Female employment was concentrated in those industries where the fixed capital investment was lowest, such as textiles, local economy, agriculture etc. The higher the degree of mechanization, the lower the employment of women, which clearly signifies the involvement of women would be on the local level economy.

Be it affirmed; *'I cannot imagine not working, I cannot rely on my husband, he might leave one day and then what would I do? Working gives me confidence and self-esteem.'* (Construction worker, 41, Kathmandu).

### 1.5.3. Shelter for Women

Women from the Terai zone reported higher odds of experiencing violence than women from other zones, according to an analysis of factors associated with experience of violence. The need of temporary and emergency shelter for women is the primary concern in the opportunities shelter. The women will be involved in the economic activities while residing on the shelter helps to sustain the center as well.

Be it affirmed; *"I am divorced and the mother of a ten-year-old boy who currently resides in Nuwakot's 'Sewa House.' I moved to Kathmandu in order to support myself and my son financially. While working at their place, I was subjected to several acts of violence by my landowner. I'm stuck with nowhere to go. I truly need a place to stay for a while, and then I'll start working for my son."* (Victim named Manju Tripathi, National Women Commission, June 2022)

#### **1.5.4. Provision of Education**

Any form of gender inequality and gender-based violence can be fought through education. From formal secondary and higher education level to the informal education for aged group, provision of education empowers women and access them to decision-making positions. The negative consequences of lack of education are visible throughout a woman's life. Economic independence is reflected not only in a woman's capacity to spend, save, acquire property and invest, but also in the freedom to get out of abusive domestic relationships, particularly economic violence.

Be it affirmed; *"I'm going to teach my daughters at a higher level so they won't have to deal with the issues I've been dealing with. I do not know how to write my own name as well."* (Nirmaya Chepang, Pariyakhola Madi)

#### **1.6. OBJECTIVES**

The main objective of the project is to design a 'women's space', a space for women empowerment and upliftment.

The following are the specific objectives to highlight the project:

- To create economic opportunity and rebuild social infrastructure for women
- To engage, educate, enrich and empower women through vocational training and income generating approach
- To design a safe environment for learning, the opportunity to acquire job skills, manage a business, and fuel the local economy.
- To provide shelter for the vulnerable women group

#### **1.7. METHODOLOGY**

The research study is based on an extensive literature survey to understand concepts, opinions, or experiences through qualitative research methodology and case studies. The study will help to get in depth understanding of a subject or to develop fresh research ideas, considering the case study in term of the facilities and program required. Qualitative method has been employed giving the exploratory nature of the study. Content assessments of various private and public spaces for women, as well as related literatures as secondary data, have been used to determine women's space requirements considering gender sensitivity in architecture. The study emphasizes the importance of feminine ideologies and guidelines in the field of architecture understanding spatial perception and socio-cultural construct. Quantitative method has been implied doing primary data collection through survey, case study, observation and interviews. The analytical review of layouts of different spaces have been carried out to examine space provision for women friendly design.

Proposed Methods

- a) Qualitative review on whether the space is gendered or not
- b) literature survey on various grounded ideologies on women’s space
- c) Case studies on gender sensitive design guidelines
- d) Case Studies on required program spaces

The further methodology framework will be as follows:

- Literature Review
- Case Study
- Site analysis
- Program Formation
- Preliminary Design/ conceptual design
- Analysis of Program
- Detail design and drawings

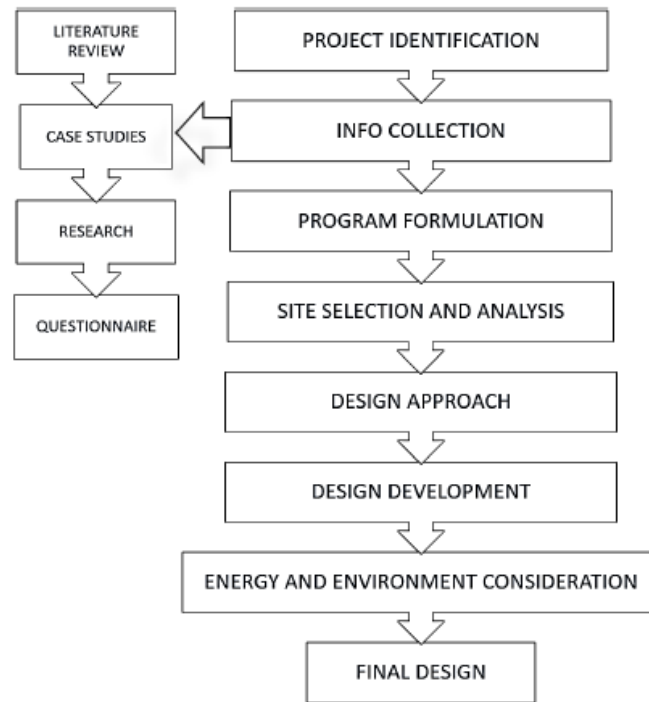


Figure 1 Proposed Methodology for the project

## 2. LITERATURE REVIEW

### 2.1. STATUS OF WOMEN IN NEPAL

In any community, gender equations are more or less linked to cultural legacies. Nepal, as an heir to Hindu religious history, embodies Vedic society's provisions in its current social structure, particularly in terms of gender. Women had the same rights and benefits as men in ancient times, but with the formation of nation states, the number of wars and conflicts increased as a result of territorial expansion and security concerns. As a result, men were viewed as the more martial and militaristic gender, and women were relegated to domestic duties. This progressively seeped into society, and women have been suffering as a result of a lack of basic rights since then. However, the situation is changing as a result of recent political reforms that have allowed women to engage in a variety of economic and social activities that have contributed to their self-sufficiency. (Acharya, 2020)

#### 2.1.1. History

Nepalese society is, by and large, dominated by Hindu ways of thinking, and gender equations are equally influenced by Hindu cultural legacies and equations. In Hinduism, a man without the participation of his wife cannot take part in any religious ritual with perfection. Hari Priya Pathak claims, “Women enjoyed more or less the same status as men during the early Vedic Period. They underwent ‘Upanayan Sanskaar’ (a ceremony to begin with formal education) just like men, were free to choose between higher studies (philosophy and logic) to become ‘Brahmavadini’, or become ‘Sadhyavadhu’ to marry and look after the household and family”.

In the Vedas, women are designated as:

- Aditi, because she is not dependent (Nirukta 4/21)
- Aghnya, for she is not to be hurt (Yajur Veda 8/43)
- Bhrati, for she is large hearted (Yajur Veda 11/64)
- Chandra, because she is happy (Yajur Veda 8/43)
- Devakama, since she is pious. (Atharva Veda 14/1/47)
- Devi, since she is divine (Atharva Veda 14/ 1/45, Yajur Veda 4/23)
- Dhruva, for she is firm (Yajur Veda 11/64)
- Havya, because she is worthy of invocation (Yajur Veda 8/43)
- Ida, for she is worshippable (Yajur Veda 8/43)
- Iyota, because she is illuminating, bright (Yajur Veda 8/43)
- Kamyā, because she is lovable (Yajur Veda 8/43)
- Kshama, for she is tolerant, indulgent, and patient (Atharva Veda 11/1/29)
- Mahi, since she is great (Yajur Veda 8/43)
- Mena, because she deserves respect (Nirukta 3/11/2)
- Nari, for she is not inimical to anyone (Atharva Veda 14/1/59)

- Purandhih, for she is munificent, liberal (Yajur Veda 22/22)
- Ranta, because she is lovely (Yajur Veda 8/43)
- Rtavari, Rtachit, for she is the preserver, forester of truth (Rig Veda 1/41/18)
- Sanjaya, since she is victorious (Rig Veda 10/159/3)
- Sarasvati, since she is scholarly (Yajur Veda 10/84)
- Simhi, since she is courageous (Yajur Veda 5/11)
- Siva, for she is benevolent (Atharva Veda 14/1/64)
- Sivatama, since she is the noblest (Rig Veda 10/85/37)
- Stri, since she is modest (Rig Veda 8/33/9, Nirukta 3/11/2)
- Subhaga, because she is fortunate (Yajur Veda 8/43)
- Subdha, for she is knowledgeable (Atharva Veda 14/175)
- Sumangali, since she is auspicious (Atharva Veda 14/2/26)
- Susheva, for she is pleasant (Atharva Veda 14/1/16)
- Suvarcha, since she is splendid (Atharva Veda 14/4/47)
- Suyama, since she is self disciplined (Atharva Veda 14/1/18)
- Syona, since she is noble (Atharva Veda 14/2/27)
- Virini, since she is mother of brave sons (Rig Veda 10/86/9. 10)
- Vishruta, since she is learned (Yajur Veda 8/43)
- Yashashvati, for she is glorious (Rig Veda 1.79.1)
- Yosha, because she is intermingled with man; she is not separate (Niruke 3/15/1)



*Figure 2 Women in early vedic period*

(Image Source: <https://pragyata.com/wp-content/uploads/2017/06/Women-in-Vedic-Culture.jpg>)

She further writes:

In early Vedic period, the Rig Veda, child marriage is not mentioned. The girl was free to choose her match, and dowry was unknown, except that it was offered if the girl had some physical defect or the bride money was paid if the groom was less qualified (Das 1993, 58). Even widow remarriage was permissible in Vedic period. (Pathak, 2019, p. 229)

Women are frequently referred to as the 'better-half' of men in the Vedic tradition, though the concept is debatable. However, it is undeniable that women and men are on an equal footing. However, in the past, men dominated society and women were treated as second-class citizens or second sex as Beauvoir stated. This equation shifted over time as cultures became more militarized and power-driven, and conflicts became increasingly vital for territorial expansion. Because of the martial nature of wars, heroic men were valued, while women were confined to their houses. Managing families and caring for children became second nature to them. When we examine current Nepalese society, we may see clear divisions in many areas, including politics, economic independence, property rights, and health concerns. Due to the reasons outlined above, it can be confidently assumed that this is an effect of male children's choice in society. Once again, quoting the Vedas, Pathak writes:

But the desire to get a son and not a daughter, (which became very prominent later) is very apparent through the hymns in Rig Veda, in this period too. These hymns invoking gods like Indra, Soma and Varuna during rituals, which were very common during that period, aimed at attaining wealth along with intelligent, valorous, and strong sons and grandsons. (Rg Veda. Part II 3:4:9, 3:6:1, 3:10:3, 3:13:7, 4:3:5, 4:4:11, 5:61:3). This could very well be attributed to the perpetuality of wars and the high demand of male warriors to protect the kingdoms, clans and families (p. 229).

Women have been denied even the most basic rights since the establishment of such a gendered value system. They were constrained to remain content inside the protected boundaries, couldn't speak up against their own men. Women were supposed to take care of the housework, while males were supposed to have a good education and work in official employment to support their families. Women have suffered in patriarchal and oppressive societies around the world, beset by different evils, including caste concerns. Women's positions are associated with a variety of beliefs. Food left over on men's plates is frequently considered permissible for their spouses, although no one's leftover food is absolutely considered consumable for others. Women are pressured to meet standards, even if it means sacrificing their relationship and family in the service of family honor. Women were expected to put their pleasure and world on hold for the sake of their families.

As time and age have altered their goals and value systems, the struggle for gender equality and women empowerment has become the primary concern. Women are today more educated and skilled than in the past, and are capable of leading their families as well as businesses of various sizes. Analyzing history from the Vedic period to the globalization era, women now need enough

education to reclaim their own identity and a sense of economic independence to not rely on males. (Aacharya, 2020)

### **2.1.2. Theoretical Modality**

Feminism is best described as a form of praxis, a political practice that includes both action and theory, and is made up of a variety of practices. However, considering the narratives given of the ways in which inequalities of sex, gender, race, class, and sexuality build society may be the best method to comprehend what comprises the basis of a particular feminist perspective. The distinction drawn between the terms, 'sex' and 'gender,' as well as the importance attributed to them, both descriptively and analytically, frequently defines the foundation of a particular theoretical approach or underlines the emphasis of a practical organization. In the most basic terms, sex—male and female—denotes a biological difference between bodies, whereas gender—masculine and feminine—denotes a socially constructed set of differences. Gender differences, while based on sex differences, are most frequently viewed as socially, culturally, and historically created differences that shift across time and place. (Rendell, 2007)

Feminist theories are presented as a threat to the dominant social order (Saulnier, 1996). Feminist social work practitioners rely on the theory that challenges pathologizing discourses about women that lead to inequality and oppression. Practitioners are asked to critically examine feminist theory in order to provide a suitable fit for a broad range of problems experienced by women (Saulnier, 1996). Van Den Bergh (1995) asserts the importance of socially constructed knowledge. She points at the feminists' concern with consciousness-raising as a form of knowledge production, which includes the life experiences of women. Voice—naming reality is empowering, which brings forward the importance of her last identified idea for social work practitioners—the “link between knowledge and power.” She links those who control society with those who are privileged to establish what is known. It is crucial for social workers to make space for voices that have been marginalized by hierarchies of expertise in order to have a voice. The claim of the third-wave feminism is to go beyond rights and equity, although these are notable challenges in a global world. (Aacharya, 2020, p. 113)

### **2.1.3. Social Status**

Nepal's demographic composition is a panorama of multi-ethnics and multi-culture. Nepal Population Census 2011 (Central Bureau of Statistics [CBS], 2012) has recorded total of 125 castes with over 80 ethnic groups, each having its own spoken language, morals, and values. This is both a strength and a weakness for the country. These societal standards and obligations, as well as their traditions, differ from one ethnic group to the next. In Nepal, traditions are viewed as ancestors' blessings. As a result, Nepal's old population does not fully support and accept the changes in traditions. Furthermore, the fact that Nepal is a developing country exacerbates the problem and obstacles encountered by Nepalese women. The 1990 constitution of Nepal protects all citizens fundamental rights without discrimination based on ethnicity, caste, religion, or sex. It also covers

the right to inherit property. Marriage, divorce, and property rights are all governed by family law. Women's economic alternatives and rights have been significantly hampered by several of the laws.

Across the cultural diversity, the majority of communities in Nepal are patriarchal at a more fundamental level, violence against women and girls persists because of structural gender inequality and discrimination. In 2020, global gender gap index for Nepal was 0.68 index, according to world data atlas. Global gender gap index of Nepal increased from 0.55 index in 2006 to 0.68 index in 2020 growing at an average annual rate of 1.62%. A UNFPA 2020 perception study also revealed that women from lower-caste or religious minority groups, widowed, divorced, or separated women, and women belonging to the hill regions, were significantly more likely to report lifetime experiences of violence. Dalit women face a high degree of exclusion and traditional harmful practices such as Badi, Chaupadi, Kamlari, Deuki As well as child marriage, which are still prevalent in many parts of Nepal despite being formally prohibited (UNCT gender theme group, 2016). Women also face violence related to accusations of witchcraft. There are also other traditional practices like son- preference, stigmatization of widows, seclusion of women (purdah), family violence, and polygamy. Almost half of the population gets married between the age of 14 to 19 years and dowry is the major driven of child marriage as well as a cause of violence against girls and women. (UNCT Gender Theme Group, 2018)

#### **2.1.4. Educational Status**

Education is the first step towards empowering women to pick the path they want to take in life. It is the bedrock of development and plays a critical role in societal advancement. A woman must be knowledgeable, conscious, cooperative, and possess a variety of other attributes that can be developed via education. According to UNESCO, Nepal has a literacy rate of 67.91 percent among adults which is increased from 20.6 % in 1981 to 67.9 % in 2018 growing at an average annual rate of 36.06%. While the male literacy rate is 78.59%, for females is 59.72%, showing a big gap between the sexes. In comparison with other countries, Nepal comes at the rank of 131 at literacy rate. According to the geographic data analysis, we can still see the Urban-rural gender disparities in literacy as the literacy rates are much higher for urban women than rural women. The literacy rate for urban women aged 15 years and above is 65.8% (men literacy rate- 87%) and for rural women the literacy rate is 39.1% (men literacy rate – 67.2%).

However, regardless of geographic location or age group, men have higher literacy rates than women. Although, literacy rates are increasing, men's literacy rates are still higher than women's due to unequal access to formal education, enrollment in schooling, and various socio-cultural aspects. When the educational system as a whole is ineffective and inefficient, students, regardless of gender, do not gain from it. This depicts the general operation of Nepal's educational system. Nonetheless, women and girls remain behind their male counterparts in terms of gender equality. Gender disparities in literacy rates, the fall in women's participation in higher education, gender insensitivity in school classroom practices, the prioritization of sons' education, and economic situations are some of the most prominent difficulties and concerns in education.



At home and in the family, a high premium is placed on sons' education, which neglects girls. This propensity manifests itself in two ways. One, although girls are enrolled, they have less time to study and complete schoolwork at home due to domestic duties. Two, the sons attend private schools while the daughters attend public schools. Private school enrolment is constantly increasing, from 14.2 percent in 2011-2012 to 15.3 percent in 2012-2013 of overall enrollment at the elementary level (grades 1 to 8). (DOE, 2011 and DOE, 2012). However, since 2008, the proportion of girls enrolled in private schools has maintained at 43%. The goal of this review is not to promote private school enrollment, but to shed light on families' perceptions of quality education and their educational preferences for their sons and daughters. (Acharya, 2014)

### **2.1.5. Economic Status**

According to the Nepal Labour Force Survey 2017-18, for every 100 males in the working-age population, there are 125 females, but for every 100 employed males, there are only 59 employed females. The population of working-age (people with age 15 and above) males stands at 9.2 million while that of working-age females stands at 11.53 million. Out of the total working-age women, only 8.5 million are in the labour force who are either employed or are in search of employment, and only 2.6 million from the total women labour force are employed, according to the report. This shows only 22.5 percent of working-age women are employed. The survey has considered only those who are receiving wage or salary for doing work and making profits for being self-employed as “employed”. So, people employed in subsistence farming and household chores do not fall under the definition of the “employed”. With the majority of women involved in non-profit making and nonwage earning works, the employment ratio of women is very low, according to the Central Bureau of Statistics. Also 21.7% of women employed population are involved in home-based work while 9.2% work in the structure attached to work. Average monthly earnings of employed population Women is NPR 13,630 and Men population is NPR 19,464. Around 51% of girls and 22.4% of boys are involved in at least one activity related to household chores, caring for elderly or disabled family members, or childcare. The burden of housework fell mainly on girls: 47.5% of girls are involved in housework compared to 19.2% of boys. 93.3% of women are engaged in unpaid domestic care work (UDCW) on fully employed basis. Analyzing the data from 2010/11 to 2018/19, the percentage of women in international labour migrants is increased from 2.9% to 8.7%. Household ownership of agricultural land which is registered in women’s name is far less in comparison to women. (NLFS 2017/18)

## **2.2. WOMEN EMPOWERMENT**

Empowerment refers to a person's or a community's level of independence and self-determination. This enables people to act on their own authority and represent their own interests in a responsible and self-determined manner. It is the process of growing stronger and more self-assured, particularly in terms of taking charge of one's life and asserting one's rights. Empowerment as action refers to the process of self-empowerment as well as professional support that enables people to overcome their feelings of powerlessness and lack of influence, as well as understand

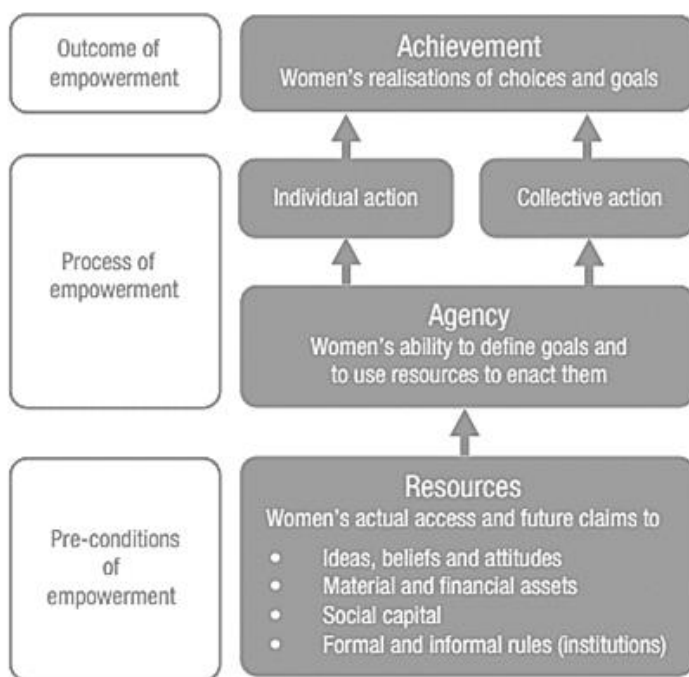
and utilize their resources. Not simply in terms of commodities and economic decisions, but from all sides, empowerment must be considered. Self-reflection is the first step toward greater results from empowerment projects around the world.

Empowerment entails not only the right to choose or possess something that meets a certain need or preference, but also the ability to choose and confront something that contradicts established norms and beliefs. This can be demonstrated more clearly using instances such as discovering a better way of life. This is in contrast to the traditional empowerment paradigm, which encourages women to remain economically empowered and civilized.

For women, no country is better developed, and no time better than any other. Despite the fact that some regions are plainly better for them to live in than others, it is not always true that the world's relatively wealthy countries provide better conditions for women than poorer countries. While many countries have legal protections for sexual equality, few governments have passed legislation to safeguard specific employment and marriage rights. Gender equality has remained a crucial problem for women's growth in many developed and developing countries since then. According to a 2015 poll conducted in 38 nations, 65 percent of people around the world raised their voices in support of equal rights. Women with a higher degree were more supportive of gender equality. Women are more likely than males to believe that gender equality is critical. People with a higher education level expressed more support for women's rights. (Acharya, 2020)

### 2.2.1. Women Empowerment: A Process

Women's empowerment is described in the field of development economics as the process by which women gain the capacity to make strategic life decisions in a situation where this capacity was previously denied to them (Kabeer, 1999). The ability to exercise individual choice, according to Kabeer (1999), is built on three interconnected components: **resources**, **agency**, and **achievements**. Resources include expectations and allocations for things, people, and society. The capacity or sense of capability to formulate goals, carry them out, and choose one's own strategic life outcomes is known as agency. The term "achievements" refers to a wide range of results, from better health to equal representation for women in politics. The core premise is that women's empowerment is the process of having resources and employing them in an agentic way to attain certain goals. (Huis et al., 2017)



Source: adapted from Kabeer (1999) and Batliwala (1992).

Figure 3 Women's Empowerment as process: a schematic

### 2.2.2. Women Empowerment: A Theory

The feminist movement has gone through four waves. The first wave of the movement for women's voting rights took place in the late 19th and early 20th centuries. The second wave, which emerged in the 1960s and 1970s, pushed for social and legal equality. The second wave was followed by the third wave, which started in the 1990s. The fourth wave, which started in 2012 and is still going today, discusses women's empowerment. The fourth wave focuses on gendered norms and the marginalization of women in society in an effort to achieve greater gender equality. Fourth-wave feminists support increased representation of these groups in politics and industry and contend that inclusive policies and practices will make society more equal.

### 2.2.3. Women Empowerment: A Framework

Women's empowerment is a process that changes the lives of women and girls from one in which they have little power to one in which their power is increased, according to FVeneKlasen and Miller (2002). The three stages of change that are acknowledged by this framework are **personal, relational, and environmental**.

Changes at the **personal level** take place within the person. This speaks to changes in a woman's perception of herself, her place in society and that of other women, her view of her place in the economy, and her confidence in making decisions and acting in ways that affect both herself and other women.

Changes at the **relational level** take place in the relationships and power relations within the woman's surrounding network. Markets, local governments, and decision-makers are all included in this, as are changes that occur both inside the home and in the community.

Finally, changes at the **environmental level** occur within a larger framework. These adjustments may take the shape of official modifications to the political and legal system or informal adjustments to social norms, attitudes, and societal beliefs. (Lombardini et al., 2017)

Source: Oxfam GB (2017)



Figure 4 Women Empowerment: A framework

#### 2.2.4. Interconnecting with other Frameworks

The empowerment process demonstrates another benefit of the framework based on the three levels of empowerment: how readily it may be applied to other frameworks already in use by practitioners. It specifically looks at synergies between the Gender at Work framework and the Rowlands power structure. Power, according to Rowlands (1997), can be manifested in four ways: **power within, power to, power with, and power over**. Personal self-confidence is viewed as a source of psychological strength in the context of power within, and individual agency, or the capacity to choose and carry out acts, is referred to as power. Power with acknowledges that empowerment is a collaborative process that calls for the cooperation and engagement of organizations and peers. Finally, power over measures the power dynamics between a woman and other people in her household or community, evaluating the strength of the strong over the weak.

It also suggests how these four dimensions of power (within, to, with, over) can interact with the level of change (personal, relational, environmental). As power within and power to refer to changes taking place within the person, they can both be categorized under changes taking place at a personal level. More specifically, power within is described by indicators referring to how a woman perceives herself and other women in the society, while power to is described by indicators relating to a woman's capability to decide actions and carry them out. Power with and power over

are both related to changes in the woman's power relationships with her social network and can be characterized as relational level changes. Indicators of social capital and group participation are used to describe power. Indicators describing the power relationship between the woman and other people (inside the family, community, or groups) are used to characterize power over. (Lombardini et al., 2017)

Table 1 Power and Women Empowerment

**Box 1: Power and women’s empowerment**

Power is at the centre of empowerment, both semantically and in practical terms. Yet power is itself a contested concept. Jo Rowlands (1997: 13) described four types of power, each with implications for women’s empowerment and their ability to advance personal and structural change.

1. Power over – the ability to control others. Changes in the distribution of power are usually met with resistance and can result in new forms of domination and injustice.
2. Power to – the ability to exercise choice and change external conditions. Increasing women’s individual capabilities is necessary if they are to contest and change power hierarchies (i.e. alter others’ power over them).
3. Power with – the power that comes from collective action. Collective action increases women’s solidarity and their ability to contest and change power structures.
4. Power within – increased critical consciousness and self-respect. A women’s awareness of socially constructed identities and hierarchies, and her acceptance of herself and others as equals, are the basis of her desire for personal and structural change.

Source: Adapted from Luttrell and Quiroz (2009) and Rowlands (1997).

Despite increased efforts by the government, non-governmental organizations, and international development agencies to empower women in Nepal, the socio-economic condition of women at the grassroots level has remained unchanged. In Nepal, progress will be difficult until women are treated equally to males in the development process. Gender-based inequities persist in access to healthcare, education, asset ownership, and economic and social mobility. Government and development organizations have concentrated their efforts on empowering women in Nepal in order to improve their status and further the country's economic development. The concept of empowerment is based on enhancing women's decision-making authority at the family, community, and national levels, as well as raising awareness, building capacity, and mobilizing people to overcome unequal relationships. The United Nations International Children's Emergency Fund (UNICEF) has established a broader women's empowerment framework concentrating on five stages of equality to put theory into practice:

- 1) **Welfare:** addressing the basic needs of women without considering the structural causes. At this point women are viewed as passive beneficiaries of welfare benefits. This is the first step toward empowerment.
- 2) **Access:** providing women access to resources such as schooling and micro-credit. Access helps women to progress in meaningful ways.

- 3) **Conscientization:** helping women to recognize the problems caused by existing socio-cultural arrangements, and their roles and rights to deal with inequalities.
- 4) **Participation:** encouraging women to take part in decision-making and working collectively to gain political representation.
- 5) **Control:** the final stage of empowerment where the balance of power between men and women is equal and the contributions of women are fully recognized. At this stage women have the independence to make decisions regarding their bodies, fertility, birth spacing, and the lives of their children. (Mahat, 2003)

### 2.2.6. Women Empowerment Process In Nepal

Women's empowerment in Nepal takes many forms, including "improving access to economic opportunities and resources; strengthening political power through women's organizations, solidarity, and collective action; raising awareness about the symptoms and causes of oppressive religious, economic, cultural, familial, and legal practices; and strengthening women's self-confidence." Economic empowerment entails acquiring ownership of productive resources and empowering women to make financial decisions on their own.

Women in Nepal have long recognized the need to participate in the economic sector as a way to supplement household income and acquire some independence. However, in the industrial sector, these women are mostly limited to low-skilled, repetitive tasks. This is due to a lack of educational and training options, employer biases, and family commitments limiting mobility. Women should have equal rights to employment and comparable compensation for equivalent jobs, according to the Nepalese constitution, however this is uncommon in practice.

The Nepalese government has taken a number of steps to empower women. The government established the Ministry of Women and Social Welfare (MWSW) to support women's problems shortly after the fourth World Conference on Women in Beijing in September 1995. The MWSW is a leading organization that promotes women's empowerment. Strengthening advocacy, coordination, and support for women's groups in other ministries is one of the ministry's roles and responsibilities. The MWSW has defined three goals for women's empowerment: mainstreaming gender, reducing gender inequality, and empowering women in accordance with the Beijing Platform for Action's recommendations.

Meanwhile, non-governmental organizations (NGOs) have become much more active in Nepal, and a number of NGO networks have emerged. Women's empowerment efforts by the government have been minimal. Women's participation in political parties, the National Assembly, and the Local Development Committee is encouraged by the current constitution. Despite the fact that women hold positions at the appropriate levels, their influence on decision-making has remained limited. The constitution, in essence, protects women from sex discrimination and exploitation. Constitutional provisions, on the other hand, are not enforced in practice. (Mahat, 2003)

## List of NGOs working for Women Empowerment in Nepal

- RUWON Nepal
- Women Act- Women Acting for Transformative Change
- Chhuri
- The Women's Foundation Nepal
- WATCH
- Women's Rehabilitation Centre (WOREC)
- Women Empowerment Mission
- Women's Skills Development Organization
- UN Women Nepal
- The Women for Peace and Democracy-Nepal (WPD-Nepal)
- Her Farm Nepal

### 2.3. WOMEN'S SPACE: ACKNOWLEDGING GENDER IN ARCHITECTURE

Architectural discourse has customarily characterized buildings as craftsmanship objects or technical and structural objects. However, Architecture is moreover social entities which are contributed with social meaning and shape social relations. The built environment is a cultural and social artifact. It is shaped by human intention and human perception. Both the process through which we build a space with definite characteristics follows the cultural values, emotional values, social values and also a gender-centric values. The gender values which are responsible for the built environment is either being misconstrued or disregarded. The gender, space and its relation in architecture is emotionally driven by a monolithic stereotype of women and men.

Considering the historical evolution in space and architecture, women are regarded as the cornerstone of authentic society. The societal and cultural approaches on making a space, a place, women are the integral factor leading the spatial connection in the world of architecture and space. The issue of whether space is gendered and, if so, how it is gendered, is a problematic one. Despite the fact that women make up more than half of the users of our environments, we have had little effect on the architectural shapes. The kinds of spaces we have, don't have, or are denied access to can empower us or render us powerless. Spaces can enhance or restrict, nurture or impoverish, supporting the gender values in architectural settings.

Be it affirmed:

“If the constructed and planned environment of the future is to serve the fullness of women's demands, then each woman must become her own architect, that is, she must become conscious of her potential to exercise environmental judgment and make judgments about the character of the spaces in which she lives.” (L.K. Weisman,1999)

### 2.3.1. Gender Barriers Created by Space

The design and use of public places and structures, transit networks, neighborhoods, and housing created a space disregarding the inclusiveness and the gender values. Women's space is reflected and reinforced by discriminatory legislation, government regulations, cultural attitudes, informal behaviors, and a lack of understanding among professionals. Women are thought to have limited involvement with public spaces. The design of public spaces, the spaces outside the house are physically and culturally premediated to keep women restricted from it using it. A basic concept dating back in time suggests that a lady pushing a stroller through a rotating door or a subway turnstile is a 'handicapped' person. There is no consideration of space for women in the outside world. Public venues rarely allow space for newborns to be breastfed or have their diapers changed. The implication towards the design and planning of space is that mothers and children should be at home where they belong. In this case, the gender role serves as the guiding factor for architectural space allocation and planning. The kinds of spaces we have, don't have, or are denied access to can empower us or render us powerless. Spaces can enhance or restrict, nurture or impoverish. We must demand the right to architectural settings which will support the essential needs of all women.



*Figure 5 Lady pushing the stroller in public stairs*

*(Image Source: Gender, Space and Architecture)*



“The type of spaces demanded by the women involved in the Fifth Street takeover poignantly illustrate those places lacking in our lives. Day-care centers, displaced homemakers’ facilities, and women’s resource centers are vitally necessary if we are to eliminate existing and potential barriers to employment for all women. Battered women’s shelters are essential if we are to provide women and their children with a safe refuge from their abusers and a place to rethink their lives, futures, and the welfare of their children. Emergency housing is needed for women runaways and victims of rape. Halfway houses ought to exist for prostitutes, alcoholics, addicts, and prisoners. Shelters for shopping bag ladies are needed as well. We need decentralized and convenient health care facilities for women. We need to build safe and available abortion clinics. Midwife-run birth centers are crucial if we are to have control over our own bodies and restore our ‘birth rights’. These places and spaces represent new architectural settings which reflect both radical changes in our society as well as glaring evidence of women’s oppression and disenfranchisement.” (Weisman, 1999, p.4)

### 2.3.2. Gender and Space: Whether Space is Gendered or Not

'Gender, Space' looks at the gendering of space from a different angle—through its use. Specific locations can be 'sexed' based on the biological sex of the individuals who use them, or gendered based on the 'gender' associated with the many types of activities that take place there. Toilets, for example, are 'sexed' male or female because they are used by men or women, however the household kitchen is gendered feminine because cooking is a socially associated activity with women. However, what about the kitchen of a public restaurant, where the chef, who is usually a man, does the cooking? “The most pervasive representation of gendered space is the paradigm of the ‘separate spheres’, an oppositional and a hierarchical system consisting of a dominant public male realm of production (the city) and a subordinate private female one of reproduction (the home).” (Jane, 2000).



Figure 7 Space based on sex



Figure 8 Social attributes of Women



Figure 6 Male chef in restaurant

(Image Source: <https://thumbs.dreamstime.com/b/nepali-kitchen-women-cooking-traditional-food-l-annapurna-circuit-165777811.jpg>)

It's worth noting that, in addition to being gendered by physical occupation—the distinct ways men and women inhabit space—space is also gendered through portrayal. To provoke analogies to the human body, descriptions of gendered space include terms and pictures that have cultural links with specific genders—for example, soft, curvy interiors are associated with women, whereas phallic towers are associated with men. Gender and space research is an interdisciplinary endeavor. The work of feminists in other domains, such as geography, anthropology, cultural studies, film theory and art history, psychoanalysis, identity politics, and philosophy, has recently inspired those studying gender in architecture. Space, spatial representation, and spatial metaphors are examples of such domains. This is not space as it has traditionally been defined by architecture—the space of architect-designed buildings—but rather space as it is found, as it is used, occupied and transformed through everyday activities. (Jane, 2000).

In defining the dialectical relationship between society and space, the work of Marxist geographers—namely, David Harvey and Edward Soja—is of critical importance in positing that space is socially produced, but that space is also a condition of social production. Spatially, the activity of consumption shows that a ‘woman’s place’ is simultaneously both in the home and in the city, going beyond the bounds of the separate spheres. Women purchase personal stuff as well as household goods which have close everyday touch with urban settings outside the house in this way. Instead of consuming for themselves, it can be argued that female consumers consume in order to reproduce capitalism and also in order to represent male status. In patriarchy, where women’s role can be compared to that of a commodity, places of consumption reinforce such an ideology by representing women as objects of visual consumption in order to sell goods. (Dowling, 1993)

#### 2.4. GENDER SENSITIVITY IN ARCHITECTURE

Gender consideration in the area of architectural planning as well as the broader framework of urban planning, is a relatively new concept. There have been attempts to construct built and unbuilt areas specifically for women users. Within the field of architecture, feminist movements have only existed for around 35 years. Gender studies integration in architecture is a relatively new movement. Gender-based architecture aims to advance cities that serve both men and women equitably. Meeting women's needs, however, becomes essential to advancing sustainable/equitable urban development since "women experience cities differently" (Beall, 1996: 2). Women's concerns have typically been underrepresented in policy and planned development in patriarchal economies like Nepal. Different interdisciplinary approaches to architecture show that both genders have unique spatial experiences. One of the earliest academic fields to propose that gender and location were related and that gender was determined by power relations was anthropology. The work of feminists in other disciplines, such as geography, anthropology, cultural studies, film theory, art history, psychoanalysis, identity politics, and philosophy, has begun to serve as an inspiration for those studying gender in architecture. Space is a tangible good that is shaped by culture and society. This feature of local social and cultural influence is conspicuously absent in the modern world of global architecture.

### 2.4.1. Gender Sensitivity in Architecture: An Overview

Utopian socialist feminists, notably the well-known Charlotte Perkins Gillman, focused on changing the built environment between the 1860s and the 1930s in an effort to enhance the lives of women. Utopian socialist feminists' analyses of the built environment to the conclusion that changing built environments can alter gender relations since they do influence how society constructs gender. It may be expressed with examples of design of housing, work places and spaces for disabled and old women and how it affects behavior of people. The idea has evolved and been used to wider areas and publicly accessible constructed or unbuilt surroundings. Women attempt to adapt the surroundings to suit their needs and requirements, which can be seen and used when developing spaces for architecture and urban planning. Recognizing these facts, a movement to include gender sensitivity in the planning and architectural processes was established long ago. Dr. Jos Boys mentions two feminist movements in architectural practices - first 'Feminist Design Collective, 1978' which split to form 'matrix' in 1980 and 'muf' in 1990s. Evidently taking a feminist perspective, Matrix attempted to incorporate and educate women in the design process, taking into account that they are space users and clients. An attempt is made at spatial mapping. Muf considered Cross disciplinary, combining art and architectural practices interested in 'the relationships between the built and the lived' as a public realm - 'another order of events beneath the visible. The overall scenario results in social and economic disparities being ignored, concealed, and generally regarded with disregard.

Numerous issues that women experience might be resolved with the use of creative design and planning techniques. We find similar types of areas inside houses regardless of their typology. Such areas require maintenance and the provision of care for the family members, which is typically regarded as the responsibility of a woman of the home, whether she is employed or not. Culture, support services, and convenient shopping are not readily available in gated communities. Facilities for child care are not readily located or structured. Due to the fact that a woman's income is still viewed as secondary, homes are typically built or purchased close to her husband's place of employment.

Due to this reason, women have to travel more distances and they are more dependent on public transport system. The inadequacy leads to domestic violence which takes place within these closed environments of 'home'. Such women associate discontent, displeasure and sufferings with this constructed entity, space where battering takes place. All such problems arise due to under-performing architectural products that lack understanding of women's spatial needs and lead to unhealthy society. Jane Jacobs showed how people's everyday activities and needs were being ignored or frustrated by the large scale, single-use, superblock developments so popular in urban renewal.

- **Matrix**

Matrix Feminist Design Co-operative was one of the first architectural organizations worldwide to bring a feminist approach to architecture and the design of the built environment and to challenge patriarchal spatial systems. It was formed in London in 1981. Matrix pursued these objectives through built projects, theoretical analysis, commissioned research and publications, including the book *Making Space: Women and the Man-made Environment*.

The Matrix Feminist Design Cooperative design cooperative was a women-led and multi-racial architectural practice. Set up as a workers' cooperative, it was run using a non-hierarchical management approach, with everyone paid at the same rate. The practice specialised in collaborative ways of working with people, groups and organisations that were traditionally excluded from architectural design processes. Matrix led and took part in many events of the period, including Women and Space at the Architectural Association in 1979, 'Women's Realm' (Feminist Architects' Network, North London Polytechnic 1987) and Alterities, a major international conference in Paris on feminism and architecture in 1999. Some of the built Projects of Matrix are;

- 1993: Pier Training Workshop, Woolwich
- 1992: Essex Women's Refuge
- 1991: Al-Hasaniya, The Moroccan Women's Centre, Trellick Tower, West London
- 1990s: Little Crackle Nursey for Holy Trinity Church Institute, Hackney
- 1988-90: Half Moon Young People's Theatre, Tower Hamlets: conversion of Poplar Town Hall
- 1988-91: Grosvenor Terrace Housing, Southwark new build housing comprising 18 independent living flats for single people
- 1987-88: Pluto Lesbian and Gay Housing Co-operative, Islington: housing conversions
- 1986-88: Jumoke Training Nursery, Southwark London
- 1984-87: Jagonari Educational Resource Centre, Tower Hamlets: new build for Asian women's organisation including crèche and large kitchen.
- 1984-85: Hackney Women's Centre: shop conversion
- 1984-85: Dalston Children's Centre, Hackney: conversion of disused baths

- **Muf**

Muf is a collaborative of artists, architects and urban designers based in London, England which was formed in 1994. They were committed to working in the public realm, at the same time critiquing the private realm (where 'care' and 'feeling' had been confined). muf were strong supporters of flexible working practices, which allowed childcare responsibilities and external teaching commitments to continue. In 1995 muf consisted of two architects, Juliet Bidgood and Liza Fior and an artist, Katherine Clarke, in regular collaboration with urban theorist, Katherine Shonfield.

“When we were selected for the Warsaw art gallery we needed a name to write on the form. Some male architects had nicknamed us ‘the mufia,’ because obviously they found it terrifying that these women were gathering” said Liza Fior.

Some of the Notable projects of Muf are;

- 2005 – Broadway Estate Park, Tilbury – new public area including a dressage arena for horses.[6]
- 2008 – Barking Town Square
- 2010 – British Pavilion, Venice Biennale of Architecture – muf were appointed as artistic directors.
- 2011- Mile End Bridge
- 2011- Altab Ali Park, Whitechapel
- 2016- Wonderlab, The Science Museum
- 2018- Kings Crescent Estate Public Realm
- 2019- Golden Lane Estate Play

#### **2.4.2. Gender And Spatial Perceptions**

Men and women have diverse perspectives on the places they appreciate and use. These perspectives are shaped by their biological disparities, how gender is socially constructed, and prior experiences. Karen Franck identifies seven characteristics of feminine or feminist ways of knowing and understanding:

- a. an underlying connectedness to others, to objects of knowledge, and to the world, and a sensitivity to the connectedness of categories;
- b. a desire for inclusiveness, and a desire to overcome opposing dualities;
- c. a responsibility to respond to the needs of others, represented by an ethic of care':
- d. an acknowledgment of the value of everyday life and experience:
- e. an acceptance of subjectivity as a strategy for knowing, and of feelings as part of knowing:
- f. an acceptance and desire for complexity;
- g. an acceptance of change and a desire for flexibility.

Women's perceptions of constructed and unbuilt environments and their access to public spaces are the subject of numerous studies. To promote women's engagement in the public realm, there have been several initiatives made to construct gender inclusive or women-friendly cities throughout the world. To determine the various demands of women in terms of spaces and their planning, various surveys are conducted. Understanding how women respond to and interpret built and unbuilt areas differently than males is crucial for an architect or urban designer.

### 2.4.3. Literature Case Study- City of Whittlesea

The case-study on different building and built-up spaces of **Community Center** is briefly described under the role and function in the City of Whittlesea, and mainly emphasize on the design elements to be considered for each phase of the project to support gender equitable use.

#### Site Planning

The following site planning principles should be considered:

- The layout of the site should facilitate active street frontage, with clear sightlines to destinations and transition points.
- The site layout should allow for paths and approaches to the building to be inclusive of different modes of transport, e.g. bikes, scooters, mobility aids, walking.
- Provide a direct and easily accessible link between site parking and the facility entry.

#### Concept Design

- The building should have an open and inviting street frontage including a visually prominent and activated entrance.
- Consider the configuration of functions within the building (e.g. training hall, community meeting space) and key transition points. The spaces should maximize accessibility and flexibility for different and concurrent community uses.
- Fences, gates and other physical controls over user's movement (both inside and outside) can be a barrier for people using prams or mobility aids and should only be included in the design where required by regulatory standards, e.g. entrance to licensed Kindergarten spaces.
- Baby changing facilities must be accessible by all genders and age groups. Baby changing facilities must be accessible by all genders. Consider the incorporation of a family change room and provision of baby change tables in all unisex accessible toilets.
- Consider the inclusion of a unisex 'Changing Place' toilet in addition to standard accessible toilet inclusions. This will maximize opportunities for community participation for people with disabilities, and people with caring responsibilities. Incorporate baby changing facilities into all public accessible toilets.
- The inclusion of a child-friendly/breakaway space adjacent to and visible from multipurpose halls and meeting spaces will enhance usability and inclusiveness for people caring for children.
- Internal building design and wall surfaces should allow for art displays to help activate and give character and a welcoming feeling to the facility.
- Clear sightlines must be maintained throughout the site and building, allowing users to easily see each other, making the place or space feel safer and more active.

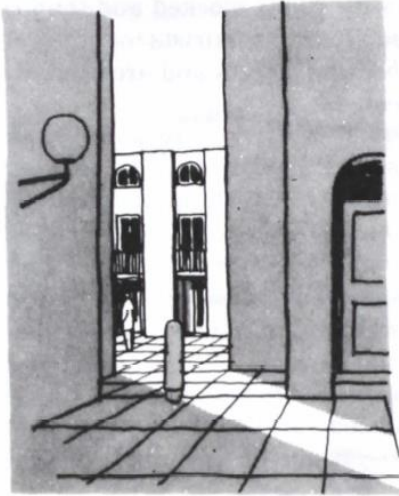
- The building and surrounds must allow for passive surveillance to increase safety (i.e. both perceived and actual). Consider the placement of windows internally and externally to increase passive surveillance of surrounding areas.
- Breastfeeding is welcome in all City of Whittlesea buildings. A community centre should include a breastfeeding friendly space that provides some level of privacy without being segregated or set far away from communal areas. Include appropriate furniture and access to a sink/basin.
- Avoid the creation of potential hiding places within the building (for example- through sequential internal lockable spaces). Avoid hiding places externally – enclose all voids / openings.

### **Detailed Design and Documentation**

- Paths and doorways should be of sufficient width and appropriate surfacing to accommodate prams (including double-width prams) and mobility aids. Include automated sliding doors externally and internally (where required at major transition points/ thoroughfares) to minimize reliance on operating swing doors for pram users.
- Sufficient racks must be provided for parking/locking bikes and scooters adjacent to the main entrance and within sight of building users. Consider provision of weather protection for bike-parking facilities.
- Noise levels in open foyer areas in larger facilities should be minimized through design, i.e. in the choice of wall and floor furnishings, acoustic treatments and the shape of larger spaces. Avoid excessive use of hard reflective surfaces and finishes.
- The entry and/or reception area should create a welcoming environment that easily orients the user to different functions within the building. Signage and passive wayfinding aspects should be clear and use simple language. In areas with known high levels of cultural diversity, consider translating key signage into community languages.
- Lighting design must ensure that the facility and surrounds are easily navigable at night with signage clearly visible and connections between places clearly defined.

## Gender Sensitivity in Architecture: Insights

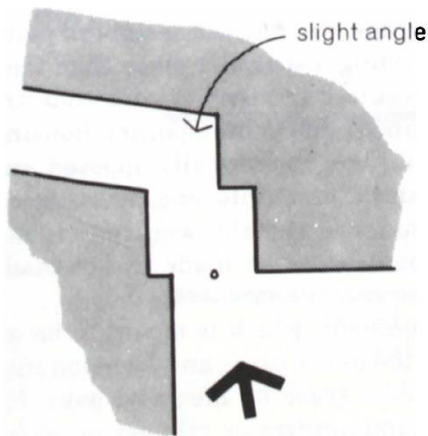
Creating an Ideal Home Environment: Insights from 'Making Space; Women and the Man-made Environment'



*No woman is invited by a blind alley; from An Introduction to Housing Layout*



*Inviting corners simultaneously mark territory symbolically to keep people out; from An Introduction to Housing Layout*



It says to us "come in, this might lead somewhere, there may be an exit".

*Slight angular turning on sharp corner space creates symbolic territory; from An Introduction to Housing Layout*

"Upon entering the mews proper there is still a change in direction leading...? It is the sense of mystery about what lies around the corner which causes a visitor to question his right to be there- symbolic territory."



## 2.5.LITERATURE REVIEW ON CHEPANG COMMUNITY

*“Chepang toil not, neither do they spin, they pay no taxes, acknowledge no allegiance, but living upon wild fruits and the produce of the chase are won’t to say that the Rajah is lord of the cultivated country as they are of the unredeemed waste”* (Hodgson, 1848:650).

The National Foundation for Development of Indigenous Nationalities Act, 2002 was promulgated by the Government of Nepal, identifying and recognizing 59 indigenous nationalities in Nepal. The 59 indigenous communities have been further divided into five divisions by the Nepal Federation of Indigenous Nationalities (NEFIN), including endangered, extremely marginalized, marginalized, disadvantaged, and advantaged groups (NEFIN, 2013). The Chepang community is one of the most marginalized ethnic groups in Nepal, and it is mostly found in the districts of Chitwan, Dhading, Gorkha, Makawanpur, Lamjung, and Tanahu. Chepang has 68,399 residents, or 0.26 percent of all the people in Nepal, according to the Population Census of 2011. (CBS, 2012). They are dispersed among 54 VDCs, which include the neighboring districts of Chitwan (38%), Makawanpur (37%), Dhading (19%), Gorkha (6.5%), and, to a lesser extent, Lamjung and Tanahun. The Chepang people live mostly by hunting, gathering wild roots, fishing, and practicing traditional farming close to woods (Gurung 1995; Ellis 2000).

Chepang are considered to be the youngest communities to begin agriculture in Nepal (HMG, 1974). The Chepang are known for inhabiting hills with challenging physiography (Rai 1985; Thapaliya 1987). Their ancestral homes are located between 500 and 1500 meters above sea level on steep slopes in the Mahabharat and Churia range. However, Chepang communities can now be located as low as 500 meters above sea level. In the Chepang community, two types of agriculture are practiced: the first is their traditional slash-and-burn farming, and the second is terrace farming on permanent agricultural land. Caughley et al. (1971) claim that Chepang began living an agricultural lifestyle relatively recently, or about 120 years ago; prior to that, they lived partially in caves and woodlands. A year's worth of maize production is barely enough for six months (Gurung, 1995). In recent years, Chepang has also begun small-scale commercial vegetable production. The main obstacle to their agricultural practice is the absence of an irrigation facility (Gharti-Magar 2005). Other issues restricting food production include a lack of land with challenging topography, inadequate land management, and their traditional way of life.

### 2.5.1. Ethnic Group

Nepal Federation of Indigenous Nationalities (NEFIN) has listed Chepang within a highly marginalized ethnic group on the basis of its literacy rate, housing land, land holdings, occupation, language, education level (graduate and above) and population size (CBS, 2001). Chepang is mother tongue associated ethnic group listed on 18th number on the basis of its number of speakers

in government census 2001. They have a common priest and place where the whole clans worship their gods. Though Chepangs have so many clans they do not write them after their name. Instead, they write their cast, namely, Chepang or Praja. In the case of Praja, it is said that after the introduction of Panchayat System in 2017 B.S. by the late King Mahendra, the Chepangs first acquired the status of 'Praja' (meaning 'subject') by the king thinking that they were being loyal to the king. But the government recognized them as 'Chepang' within one of ethnic groups. They claim to be the indigenous tribe of the regions they inhabit.

### **2.5.2. Occupation and Food Culture**

The traditional occupations of Chepang were hunting, fishing and gathering yams from the jungle. They used to hunt wild animals and birds. They still have varieties of knowledge of hunting in the jungle. As Caughley et al. (1969) noted that archery was their major weaponry; clearing and burning was their primitive method of agriculture; bat hunting in chiuri (basla butiracia) tree and fishing were their major practices. Some of them still can communicate with whistle using ingressive airstreams mechanism. They can identify more than 30 different types of fish. Chepangs used to have various techniques of fishing. The next important occupation is collecting yams from the jungle. Most of Chepang people in the hills still survive by gathering wild yams. Nowadays along with hunting, fishing and gathering yam, some Chepang people are found to have started bee keeping nearby their houses.

They are expert in bamboo crafting. Yasai (Indian butter tree) is another significant tree for Chepang to survive. They make butter from the nuts of yasai. They sell honey, bamboo craft and yasai to the plains. Some of Chepang people plant the seasonal harvest like yuchha (Lamb's quarter), aim (fox millet), mal kaguno (pearl millet) and sanga (barn yard millet). This is done with their primitive method of agriculture like clearing and burning. Chepang people mostly cultivate maize, sesame, cowpea, finger millet, black gram, broom corn millet, buckwheat and rice bean in their Khoriya plots. This is done with almost no tillage and agricultural inputs. Production of these crops is very low and further made negligible by the encroachment of monkeys, birds and other animals. As the crops get ready for harvest, they make a temporary cottage shelter near the field. A member of the family should go to the Khoriya every day; stay during the day to watch and chase away the visiting birds and animals. Among these pests, monkeys (Rhesus macaque) are the most prevalent to raid these staple crops. They are the most difficult pest because of their deftness and intelligence. If these are not controlled, they cause damages to the crops. Nowadays they plant corn and daal as well. They have started farming like planting paddy, millet, maize, wheat, etc.

### 2.5.3. Literacy

Many Chepang cannot read and write due to a lack of education beyond elementary school, and this illiteracy stands in contrast to the great gains Nepal has been making in reducing illiteracy. The most of Chepangs are still preliterate. The Chepang literacy rate is found to be low in compared with the national literacy rate. Chepang community is deprived of the basic human needs such as food and shelter. Low literacy rate with approximately 23% of the total population, little knowledge of health issues such as Safe Motherhood and early marriage has made them more prone to poor health. Data shows that only 40% Chepang have access to primary health care services while only 25% receives basic health services from the health posts (NCA, 2009).

The data address only 1% among Chepang, women are literates. Chepang women lack access to essential healthcare and educational opportunities, and they also lack basic educational opportunities. The majority of them are unable to deal with people, thus they are nevertheless left in the household, said Hari Bd Praja. Although Chitwan was declared 100 percent literate district, there are still many children in remote villages who do not have access to education past primary level. Being very rugged and steep mountainous, physical terrain of the territory there are found a small number of schools. The children have to walk from four to five hours a day to reach their nearby school. The schools within the Chepang villages have been running with weak economic condition and less trained teachers. The drop out is found to be high. The adult education programs of the government and NGOs are not found to be so much effective in Chepang society.

*“I wanted to study but I could not because there were no schools at our place that teach up to that level, now I am a mother of three children and I do not know how to write my own name”*

– *Nirmaya Chepang (Madi Chitwan)*

*“We do not have the kind of earning to provide for accommodation, food and stationery if we send our children to town schools for further study.”*

- *Dhan Bd. Chepang (Madi Chitwan)*

*“Chepang women are deprived of basic education, basic health facilities and need opportunity to uplift their living standard. They are still left behind the household, most of them are not able to deal with people. They are afraid by the social consequences. So, marking your words, the opportunity must be provided to chepang women because they need it.”*

- *Hari Bd. Praja, Chairperson of Rakshirang Gaaupalika ward no. 5*

*He also adds, “Empowering Women can Uplift the Whole Community.”*

#### **2.5.4. Economic Characteristics of Chepang People of Chitwan Madi, Pariyakhola**

Chepang people's lifestyle and economic activities are among the issues, which have been accounted from very early period of Chepang study. In this part of discussion, some of such issues are taken into consideration to figure out their background characteristics like structure of houses, household assets and amenities, use of forest food products, etc. Some of these characteristics are presented in Table below. Chepang people generally reside in small traditional houses. Table 1 show that every house of Chepang is made of floor with mud. 84.96 percent of houses have their walls made of wooden planks, 3.97 percent have stone walls and 10.07 percent have wall of tin. 79.24 percent of the houses have roof of dry grass i.e; thatch and 20.76 percent have tin as a roofing material. Thus, it can be seen when it comes to floor construction, there is complete homogeneity with mud floor, walls are a mixed of stone and wooden and roof is the most heterogeneous structures in houses ranging from dry grass to tin. Livestock are the important household asset and wealth in the rural areas. Generally reared livestock in Chepang communities are cattle, buffalos, poultry, goat, pig along with ducks and pigeon. Table 2 speaks that on an average, each Chepang house has 5.43 cattle, 0.73 buffalos, 13.62 poultry birds, 0.44 pigs and 14.09 goats. Every household has a maximum of 20 cattle with a range of 20, 4 buffalos, 35 poultry birds, 10 pig and 45 goats. It is found that Chepang people are livestock growers with good contribution in their household economy and diet.

Household assets indicate the general prosperity of the individual household. Chepang communities, in general are lagging behind in all those household facilities due to their poverty, illiteracy, backwardness and poor social services. In the Chepang communities, only 27.35 percent Chepang have electricity, 0.85 percent have television, 58.12 percent have mobile phones, and 0.43 percent have motor bike, and non-have motor-vehicle, freeze and computer. Chepang communities originally are highly dependent on the wild edibles to supplement their diet. Before they started farming, they were totally dependent on forest products at different forms like githa, vyakur, wild root and fruits, prey from hunting; which shows their proximity to forest for survival. After they came in sedentary farming, their dependence on forest has reduced but as a customary practice they go to jungle in lean seasons. Table 4 shows the same community is dependent on the different forest products differently. More than 90 percent of Chepang households depend on different types of forest products on varying degrees.

Mostly the man of the family is involved in economic activities in chepang community. Analyzing the data collected, every chepang women are involved in household chores. Around 75% of women are involved in agriculture, 60% in animal husbandry, 45% in construction work, 15% in job or employment and only 10% are involved in small scale business like kirana pasal.

The Chepang women of Chitwan Madi demands skill-oriented training for their livelihood. In order to feed their family and provide them with a better lifestyle, they want to be economically independent. Namita Praja said she wanted to learn tailoring and added that she wasn't aware about training provided by the rural municipality. Manju Chepang, 14 years old chepang girl wish to complete her study and get a better job to support her family. Likewise, Nirmaya Chepang was

interested in commercial farming and shared that the seeds distributed by the rural municipality were of low quality. Training on commercial farming could benefit them, she added.

*Table 3 Materials used in Housing*

DESCRIPTION	PARTICULAR	PERCENT
Floor	Mud	100
Wall	Stone	3.97
	Wooden Planks	84.96
	Tin	10.07
Roof	Thatch	79.24
	Tin	20.76

*Table 2 Number of Livestock in a Household*

Description	Average Number	Maximum No
Cattle	5.43	20
Buffalo	0.72	4
Poultry	13.62	35
Pig	0.44	10
Goat	14.09	45

*Table 5 Availability of Household Amenities*

Description	Particular	Percent
Electricity	Yes	27.35
	No	72.65
Television	Yes	0.85
	No	99.15
Mobile Phone	Yes	58.12
	No	41.88
Motorbike	Yes	0.43
	No	99.57
Motorcar	No	100
Refrigerator	No	100

*Table 4 Dependence on Forest Products*

Description	Particular	Percent
Collection of Edibles	Yes	91.3
	No	8.97
Githa-Vayakur	Yes	85.90
	No	14.10
Wild Fruits	Yes	44.87
	No	55.13
Chiuri	Yes	64.96
	No	35.04
Prey	Yes	5.13
	No	94.87

*Table 6 Women's Involvement in Economic Activities*

Activities	Percent
Household	100
Agriculture	75
Animal Husbandry	60
Job/ Employment	15
Construction work	45
Small Business	10

## 2.6.LITERATURE REVIEW ON VOCATIONAL TRAINING CENTRE

The society moved from agriculture to industry or from nomadism to civilization, and architecture does not stop this transformation, because it has the potential for development and changing, so that it with the evolving natural, cosmic forms and environment. Architecture is a dynamic element, such as the other cultural manifestations of peoples, civilizations, their arts, techniques and sciences, because some heritage functions have changed. So that, architecture cannot remain static.

Meanwhile, vocational training centers should keep pace with these different design and technological breakthroughs. Besides, they must represent a new vision in contemporary design which will more effectively affect the nation's renaissance. The vocational training centers, which include many different disciplines to raise local and international communities, are one of the landmarks of the city, because its heritage style, distinctive handicraft industries, the professional and technical services provided by these centers, which must keep up contemporary design developments. This will contribute for next generation to look forward in advanced arts and traditional handicrafts.

Vocational training centers aim to contribute of the professional development of local, regional and international communities in professional and technical fields between different countries. In addition, they help students and graduates for work as a link between various professional companies and society, through communication with cultural and professional institutions. As well as they build relationships with various national, regional and international institutions to provide training programs designed to meet their needs and to benefit from the experience of other international bodies in the training programs. The role of architecture and design in the preparation of these centers to match with international standards, produce, operate according to the required framework and achieve the highest efficiency in production.

### 2.6.1. Workshops: Spaces For Creatives

Workforce education is referred to as technical and vocational education which leads to university degrees, certificate programs, and short-term courses to prepare students and participants for jobs. Vocational training centers are the main spaces of the workshops because they are creative environments designed for the creative activities offered by these centers. Creative spaces can be luxurious, fun, structural, bright, colorful, organized, elegant, or otherwise designed to stimulate participants to creativity and production.

### 2.6.2. Learning Transformation

[Spaces which are transforming communities into Innovation Hubs]

This transformation of planning and design of vocational centers is not a complete architectural transformation as much as a behavioral transformation. Most of these types of spaces still contain static walls, despite, the types of social cooperation and learning activities which occur within

these walls must change. Learning environments provide students and trainers with a practical and social way to design and innovate major projects and products. These environments deeply and creatively support the blending of science, technology, engineering, art and mathematics, which was the basic philosophy of technical and vocational education programs.

### **2.6.3. Flexibility, Changeability, Adaptability**

Designing vocational training centers to accommodate this wide range of activities can be difficult. Accurate research and planning attempts are extremely important in designing a learning environment supportive of multiple learning objectives, despite, the principle of planning which lies in many successful vocational learning spaces and contemporary learning technology is flexibility. When exploring the spatial aspects of such spaces, a set of considerations for workshop space, allowing flexibility between small individual tasks and complex large projects. The learning environment must be simple to change and adaptable quickly, which may increase mobility to the highest level of development.

### **2.6.4. Transformation From Static Spaces to Dynamic Spaces**

Vocational education is the foundation of development in societies despite suffers from community neglect. Vocational training is one of the most important pillars of human resources development, especially after the industrial and technological revolution witnessed by the world in various fields and the development of work to reduce the human effort, so the need for skilled labor and technicians in various fields of the labor market is necessary to benefit from these techniques. The vocational training centers represent a unique type of art industries; therefore, they require distinctive elements in architectural and design spaces.

Some designers support the traditional design to highlight these crafts and the arts. on the other hand, others prefer towards modern designs. Meanwhile, the modern era is characterized by dynamic on the technology, its applications and advanced mechanisms, which affected the fields and systems of science. Therefore, different knowledge has been reflected on the field of architecture. The parameters are now very fast and even amazing. The design of interior design [changes, renews, moves], as it continues to change as a feature of the times. The changes may occur as a design movement or occur because of a new technological. These vital concepts must be reconciled between stability and dynamism in vocational training centers, in addition, it should be integrated into internal spaces

### **2.6.5. The Relationship Between Human, Concept and Identity Of The Place**

It is important to focus on the relationship between human and space to search for the concept, identity and genius of the place. The philosopher [Elizabeth Grosz] poses a question in his 1995 book, [Writing in Space, Time and Perversion], on whether architecture can rethink the exterior, in terms of surfaces, activity and movement rather than stability. This is confirmed by vocational training centers on the importance of the relationship between employment, trainees and the identity of the place which is reflected on society.

### **2.6.6. Interior Architecture of Vocational Training Centers**

The design and management of training programs for vocational, technical education, training for professions, modern fields in engineering, medical, informatics, agricultural and technical fields require specialized equipment from interior spaces to receive customers and training rooms according to the various activities offered by these centers. The number of training rooms should also be commensurate with the activities carried out by these centers, as well as the design of halls, corridors, entrances, customer service fairs, exhibitions to display trainees' products, cultural spaces and other services. Meanwhile, the clearly defined exit places of the obstacles, the design of ceilings, floors, lighting, materials suitable to deal with the designer to reach the idea of design and functional centers to achieve the desired goals.

### **2.6.7. Design Standards for Vocational Training Centers**

- It must to evaluate the performance of the vocational training centers in terms of adherence to the overall quality standards of the message, planning, interior design, leadership, management, training process, training staff and trainees Services.
- The importance of design concept for the vocational training center through the contemporary trends which include digital trends and the use of modern technology methods. In addition, it will make the space a common and interactive work space for trainees to achieve more effective results.
- Designers must take care of the training center which preserves the heritage of the community.
- The vocational training center must suitable the training activities to design the theoretical and practical training rooms, in addition, set up the necessary equipment and tools in the space.
- Design of these centers should consider the diversity of students in terms of age of young people, the elderly and people with special needs when designing spaces workshops and training activities.
- The vocational training center must contain all the services which facilitate the process of the participant training to stimulate them of the production and sell their product.
- The design must provide dynamic showrooms in a variety of technological methods to present the results of the training of professional products and craftsmanship for participants, as well as regional, national and international exhibitions.
- The design must be an open space without any obstacles in an interactive working environment consisting of classrooms, laboratories, workshops, art rooms, music, cosmetics, blacksmiths and many other professional fields.
- The vocational training center must enhance the functional aspects of the size of spaces, halls, traffic corridors, health and safety standards, integration of environmental strategies in the construction system of various workshop halls and training spaces such as natural ventilation.



- It must establish a multi-activity center as a community interaction area, a visitor center, a testing area for local building materials and a vocational training facility.
- Vocational education can be expected from employers if the labour market is largely informal with a small manufacturing sector to fill the gap between educated and employable.
- We must enhance the employability of youth through demand-driven, competency based, modular vocational courses.

Table 7 Vocational Training Center Spaces Requirement

Vocational Training Centers Spaces	
Lobby and Reception	Main cores/ waiting areas/ lobby/ toilets/others
Youth Educational	Classroom/ computer labs/ crafts rooms/ toilets/ services/ storage/ corridors/ factory for equipment
Educational	Classroom/ lecture halls/ staff rooms/ computer labs/ studding areas/ wood workshops/ metal workshops/ corridors/ shops/ storage/ services
Services	Multi-purpose hall/ cafeteria/ clinic/ conference hall/ toilets
Administration	Admission office, registration, offices, exhibition-showroom/ customers services/ library /kitchenette

## 2.7.LITERATURE REVIEW ON SHELTER FOR WOMEN

The literature review focuses on data about design ideas for women's shelters that aid in creating a better environment for women's physical safety and psychological welfare. It also demonstrates the design components that should be taken into account while creating a women-friendly facility.

### 2.7.1. Layout And Planning

Design and layout play a key role in developing an appropriate Women's Center. The effectiveness of having a better experience and addressing women's requirements is maximized by carefully taking them into account. End Violence Against Women Organization (2012) lists three key factors to take into account while designing the shelter: the size of the shelter, the requirements of the women who will use it, and the services that will be offered. First, it's important to estimate how many women will evaluate the facility and how long they will remain in order to build and implement a thoughtful and unique center design.

The number of rooms and spaces required for users and facilities in the center can be estimated with the help of this thought process and computation. The size of the family, including the typical number and age of children who might stay in the shelter with their moms, should also be taken into account while designing the rooms. For instance, shelter units in Sydney, Australia, have a detachable wall separating two rooms so that women with children can be accommodated by taking down the wall and connecting the two rooms (Weeks & Oberin, 2004).

According to the End Violence Against Women Organization (2012), the center should have spaces that allow for individual privacy, expression, reflection, as well as group activities. Secondly, the center and its surroundings should be designed to meet the needs of women and aid them in recovering from their traumatic experiences of violence. The shelter should also include ample space and storage for each woman's personal belongings, as well as a separate bedroom for each mother and her children and a bathroom shared by no more than two units.

### 2.7.2. Colors

Colors significantly influence how we feel and respond in a variety of situations. According to Kurt Goldstein and numerous others (2008), there is a strong connection between colors and people's psychological systems. Warm colors like red, orange, and earth can exacerbate stress and anger, while cool colors like blue and green can provide serenity and comfort while stimulating the mind, body, and conscience. Colors have the power to change a person's psychology and health. High-intensity hues or patterns should be avoided inside the center, according to Samantha Donnelly (2020), as they may lead traumatized individuals to become distressed. According to study, picking colors for the shelter's interior that are cool toned and low intensity helps the ladies feel better psychologically. keeping women in areas that are green and blue speeds their healing.

### **2.7.3. Safety**

The facility must offer physical protection from outside threats as well as a real and perceived sense of safety for the women who are housed there without producing a safe environment. The sensation of safety can be increased by taking into account a variety of factors. According to Samantha Donnelly's book from 2020, controlling views via the opening and utilizing daylight both help to improve people's feelings of safety and wellbeing. For women in danger or going through trauma recovery, having too much visual access might be unsettling even while the link to the outside world is helpful. Views of the outside and access to daylight encourage wellness. A sense of connection between the inside and outside is created by strategically placing rooms, skylights, and windows to optimize natural light, boost views of the outdoors, and maintain a sense of security. A well-planned, logical layout of the rooms and the circulation of people is another design factor that directly affects the impression of safety.

### **2.7.4. Lighting**

Lighting is one of the interior design components that can affect a person's mood and state of mind. The choice of color temperature and the level of light have an immediate impact on people's emotions and behavior. According to Samantha Donnelly (2020), warmer yellow-toned light is ideal for creating a cozy, peaceful atmosphere, whereas cooler blue-toned light is great for carrying out duties.

### **2.7.5. Sense Of Home**

The physical and mental health of those who have experienced abuse can be greatly impacted by a sense of community. It's difficult to picture the horrible feelings that women who were in need of a shelter and a nice atmosphere went through as a result of conflict and family breakdown. However, a person's house is typically a secure and tranquil setting where they can also store precious items and memories. What we can call home is a location that makes people feel safe and where they can always turn when they need to feel welcomed and safe. People in need and feeling scared will be assisted and given a sense of welcome that sense of home, hope and warmth.

## **2.8. DEMONSTRATION FARM**

A demonstration farm, or model farm, is a farm which is used primarily to research or demonstrate various agricultural techniques, with any economic gains being an added bonus. Many demonstration farms not only have crops, but may also have various types of livestock. Various techniques for feeding and bedding are tested on these farms. Farms that are used to teach agricultural techniques and technologies – known as demonstration farms – are a smart investment that can help accelerate the adoption of game-changing innovations. Farmers can learn new ways of doing things without having to do it on their farms.

Demonstration farms are used to teach various agricultural techniques and technologies, showcase new or improved crops. They also serve as a venue to research and test new methods alongside traditional ones. Their sizes can vary widely, ranging from small to big farms. Depending on what's being tested or showcased, the demonstration farm could have different types of crops and

crop varieties, livestock or poultry breeds, fertilizer treatments or technology, such as drip irrigation. They are often owned and operated by universities, government or private research institutions, private industries or agriculture focused start-ups and non-governmental organizations.

The importance of demonstration farms was first recognized over a century ago by agriculturalist Seaman Knapp. He believed in the philosophy of teaching through demonstration. He's credited as the father of demonstration farms which are used around the world in countries ranging from the US to Israel, Ghana and Nigeria. These farms could also help with the uptake of new concepts that are transforming agriculture including precision agriculture – a farm management system that ensures soils and crops receive exactly what they need for optimal growth and productivity. Or conservation agriculture – a sustainable agriculture production system comprised of three linked principles; minimal soil disturbance, mixing and rotating crops and keeping the soils covered as much as possible.

The concept of demonstration farm has highly been accepted worldwide for example; the US Department of Agriculture recently funded statewide demonstration farms to showcase soil health practices and related cropping system comparisons, in Israel, a centre for agricultural development has trained over 270,000 people from 132 countries in its various courses, 70% of which use demonstration agricultural farms. Also in Nepal there have been practicing demonstration farm like Phoolbari.

There are 6 simple steps to follow when designing a demonstration event, starting from a clear definition of the objectives and ending with a good evaluation and follow-up. Throughout, this guide offers concrete tip and tricks and provides specific tools to support the design of the demonstration farm.

- Demo objectives and target groups
- Demonstration farm
- Demo set-up
- Promotion Practices
- Learning and facilitation methods
- Evaluation and follow-up

### 2.8.1. Motivations and Needs of Demonstration Farm

- **Knowledge co-creation:** It aim to create (new) knowledge, by profiting from the knowledge pool of the existing and new technological innovations in agriculture.
- **Innovation adoption:** Demos help the transfer of new opportunities, novelties or practical experience that can be used directly on farms. These innovations can emerge from research, business (related to product sales) or pioneer farmers and give farmers the confidence to make a grounded decision on the usefulness of the demonstrated practices or innovations for their own farm.

- **Problem solving:** It creates useful platform to link extension to the needs of local farmers. We can demonstrate solutions to farmers’ problems, for example related to reducing farm labour or how to grow crops in a changing climate, or we can validate conducted research and innovations under local conditions and tailor them to the farmers’ needs.
- **Training:** Demos serve as a platform for skills enhancement and capacity building, thus enabling practical implementation of innovative practices on the farm.
- **Networking:** Demonstration farm can be used as network event to gather all people involved in the programme, network or project. They can contribute to the strengthening and development of collaboration and boost possible partnership for cooperative problem solutions, both national and international. Also, the social aspect of networking, being able to meet other farmers, is very attractive to some participants.
- **Research implementation:** On-farm demo events can act as a platform to transfer knowledge on applied research results to agricultural practice. Innovations and practices can be trialled, compared or validated in ‘real’ farm conditions.
- **Policy implementation:** It generates an opportunity to inform farmers on new legislation and policy regulations and to provide specific practices and examples on how they are able to implement them on their farms.

## 2.9.COMMERCIAL FARMING IN NEPAL

Nepal has shown a growing inclination towards commercial farming in rural areas as a means to improve its economic prospects. Agriculture is the backbone of Nepal's economy, employing around 65% of the country's population and contributing to over 30% of its GDP. Commercial farming in rural areas has the potential to create jobs, generate income, and reduce poverty.

The government of Nepal has taken several steps to promote commercial farming in rural areas. One of the key initiatives is the Agricultural Development Strategy (ADS), which was launched in 2015. The ADS aims to increase agricultural productivity and commercialization through the promotion of market-oriented agriculture and the development of agricultural infrastructure. The government has also been promoting public-private partnerships (PPPs) to encourage investment in the agricultural sector. This has resulted in the establishment of agro-processing industries, such as tea factories, sugar mills, and vegetable processing plants, in rural areas. In addition, there has been an increasing trend among farmers to adopt modern farming techniques and technologies, such as the use of improved seeds, fertilizers, and irrigation systems. This has led to higher yields and improved quality of produce, making it more marketable and profitable.

### 2.9.1. Commercial Farming Techniques

Nepal's agriculture sector is a significant contributor to its economy, employing a large portion of its population. Commercial farming techniques have been adopted to increase production and meet the demand for food in the country. Here are some of the commercial farming techniques used in Nepal:

- a) **Greenhouse farming:** This is a technique that involves growing crops in a controlled environment to protect them from harsh weather conditions, pests, and diseases. Greenhouses are commonly used in Nepal to grow vegetables like tomatoes, cucumbers, and capsicum.
- b) **Organic farming:** This is a technique that involves using natural methods to grow crops without the use of chemical fertilizers and pesticides. Organic farming is gaining popularity in Nepal due to the increasing demand for organic produce in the international market.
- c) **Irrigation farming:** This is a technique that involves providing water to crops through irrigation systems such as canals, wells, and pumps. Irrigation farming is essential in Nepal, where most of the agricultural land is rain-fed.
- d) **Integrated Pest Management (IPM):** This is a technique that involves using a combination of methods to control pests and diseases in crops. IPM involves the use of natural predators, crop rotation, and the use of organic pesticides.
- e) **High-density planting:** This is a technique that involves planting crops closer together to increase the yield per unit area. High-density planting is commonly used in orchards to increase the yield of fruits such as apples, pears, and cherries.
- f) **Drip irrigation:** This is a technique that involves providing water to crops through a network of pipes with small holes that allow water to drip slowly onto the soil. Drip irrigation is commonly used in areas with water scarcity to conserve water and increase the efficiency of irrigation.

### 2.9.2. Farming Plot Size

The plot size for commercial farming can vary depending on several factors such as the type of crop, farming technique, location, and market demand. In general, commercial farming requires a larger plot size than subsistence farming, as the goal is to produce crops for sale and profit rather than for personal consumption.

In Nepal, the plot size for commercial farming can range from a few hectares to several hundred hectares, depending on the crop and the location. The plot size for commercial farming can also vary depending on the farming technique used. For example, high-density planting can require a smaller plot size as they involve planting crops closer together to increase yield per unit area. In contrast, open-field farming, which is commonly used for crops such as rice and wheat, may require a larger plot size.

It is important to note that the plot size for commercial farming may not necessarily be fixed and can change depending on market demand and changes in farming techniques. Farmers may also choose to lease or purchase additional land as their farming operations expand.

## 2.10. FISH FARMING IN CHITWAN

The Government of Nepal gives priority on food security and poverty alleviation through developing various sectors of agriculture including fisheries and aquaculture. Nepal is an agricultural country having 66 percent people directly engaged in farming. Aquaculture and fishery is one of the fastest growing agriculture subsectors in Nepal. The current total national fish production is 104,623 Mt of which 20 % is contributed by capture fisheries while 80% is from aquaculture. Fisheries sector contributes about 1.83% in Agricultural Gross Domestic Production and 0.44% in Gross Domestic Production. History of Nepalese aquaculture is very short however; catching fish from nature is being practiced since ancient time.

Fish farming work entails feeding the fish every day and routine pond maintenance. Farmers add powdered rice husk (Dhuto), the caked remnants of mustard after it has been pressed for oil (pinaa), and chemical fertilizers like diammonium phosphate (DAP) and urea, a nitrogen fertilizer. These fertilizers are important in stimulating aquatic plant growth and thus dissolved oxygen content within the ponds. Almost all farmers within Madi municipality cultivate the same six types of fish, all within the carp family: Silver carp, Bighead carp, Grass carp, Common carp, Rohu and Naini or mrigal carp. Carp are well-suited to cultivation in stagnant water (Kepenyés & Varadi 1984). I was also told that those six types of fish form an “ecosystem” within the fish ponds.

Bhujel, Shrestha, Pant & Buranom (2008) focus on women’s involvement in aquaculture in Chitwan, Nepal, but less so on perceptions of climate change or climate-related risks. In the project, 26 women farmers were provided training to dig one fish pond each but left to choose how large to dig their pond, which type of fish to stock it with, and at what point to harvest.

As the pilot project expanded, the project noted the creation of five women’s groups in the area and stronger relationships between community leaders, government extension officers, and academic researchers. The study also noted that once ponds are constructed, women need spend less time and effort than they would tending other forms of livestock. The study also cites the benefit of integrating small scale fish production with vegetable gardens. The pond water can irrigate the vegetables and store irrigation water during the dry season, and vegetable waste are used to fertilize the ponds, reducing the need for external fertilizers. Some women in the original pilot study shifted from subsistence to commercial fish farming, often either expanding the size of the pond or cultivating high value species like freshwater prawns, which can be sold directly to hotels or restaurants.



(Source: National Fisheries and Aquaculture Program)

Table 9 Small-scale Household Aquaculture

<b>Small-scale household aquaculture</b>
<ul style="list-style-type: none"> <li>•Family/House hold pond (&lt; 200 m2)</li> <li>•A subsystem of household farming</li> <li>•60-70% fish produced goes for family consumption</li> <li>•30-40% for sale and supplemental income</li> </ul>

Table 8 Types of Fish Farming Pond

<b>Types of Fish Farming Pond</b>
Nursery Pond: 0.01 – 0.05 ha
Rearing Tank: 0.05 – 0.1 ha with depth: 1.5-2.0 m
Stocking Pond: 1-2 ha with depth: 2.5-3.0 m

### 2.11. GOAT FARMING

Goat Houses should be well ventilated with free access of sunlight particularly during winter. Proper ventilation and good drainage are another important criteria for housing of goats. The purpose of ventilation is to provide the desired amount of fresh air, without drafts, to all parts of the shelter; to maintain temperatures within desired limits; and to maintain ammonia levels below specified levels. Ventilation is of utmost importance to maintain a desirable interior temperature of 28 to 30°C. If the animals cannot get rid of heat because the surrounding temperature is too high (above 30°C), they eat less and therefore produce less. It is, therefore, necessary to make the shed sufficiently high and make sure, there are openings for ventilation in the roof or walls. Hence height of roof of the goat shed should be 3 m at the periphery and 3.5 m at the center for proper ventilation.

The orientation of the shed is another important factor depending on the climate. In dry arid region one can prevent the entry of sunlight inside the shed for preventing heating up of stall too much by placing the longitudinal axis of the goat shed east – west. On the contrary in humid and high rainfall area, if one wants to keep floor of the shed dry and disease free, he would construct goat shed with long axis in north – south direction for allowing of sunlight to enter inside the shed sufficiently to keep the house warm and dry.

The roof provides protection from sun and rain and can be of a shed, gable or modified gable style. Slope is important in removing rain and thatched roofs need a greater slope than iron sheeting. A greater slope is also beneficial in areas with high rainfall. The roof should be light, waterproof with sufficient overhang to prevent rain from blowing in. A high roof encourages air movement but is more likely to be damaged by strong winds. A roof vent can assist in proper ventilation. Roofs can be constructed by GI sheet, asbestos, tiles, grass/bushes, wood depending on production system, material availability and climate.

The floor could either be packed earth, concrete or slatted. Packed earth or concrete floors should have a slope of about 5 % for good drainage. Raised platforms where goats can lie above the floor and away from manure and urine are beneficial. Slatted floors should be raised about 1-1.5 meters above ground level to facilitate easy cleaning and collecting of dung and urine. The gap between



the slats should be 1.4 to 1.6 cm to allow easy passage of fecal material and guarantee safe footing for the animals. Newborn and young should not be put on slatted floors.

A raised, slatted floor in tropical and subtropical areas has the following advantages:

- No need of bedding
- Allows manure, urine and debris to drop through the slatted floor, thus removing a major source of disease and parasite infestation
- Requires less labor to clean and maintain
- Remains relatively dry and clean
- Reduced space requirements
- Manure is easily collected for fertilizer use or for sale
- Allows air to pass through the slats increasing ventilation and comfort in hot weather.

**Space requirement for the goats:**

*Table 10 Space requirement for the goats:*

Age of goats	Covered area	Open paddock
0 to 3 Months	0.2-0.25	0.4-0.5
3 to 6 Months	0.5-0.75	1.0-1.5
6 to 12 Months	0.75-1.0	1.5-2.0
Adult Goats	1.5	3.0
Pregnant and lactating goats	1.5-2.0	3.0-4.0
Bucks	1.5-2.0	3.0-4.0

*(Source: Housing Design & layout for Ideal Commercial Goat Farm for Indian Sub Continents. Pashudhan Prahree.2022)*

## 2.12. MATERIALS STUDY: BAMBOO

### ‘‘गास बास कपास’’

One treasured plant that can feed you, build you a house, and give you a variety of things to wear and utilize is bamboo.

While considering the building materials used in the Terai region of Nepal, particularly in Madi Chitwan, bamboo has been utilized extensively. Bamboo was used as the primary building and structural material for the recently constructed hotels and resorts in Chitwan. It reflects Nepalese culture, traditions, and connections to the country's economy.

Acharya (1975) wrote a sensible feasibility study of bamboo as the basis of cottage industry expansion in central Nepal without attempting specific identification. He used the three categories into which bamboo species are most commonly grouped in Nepali: bans, nigalo, and malingo. These three groups probably constituted a more rational taxonomy at that time than the official genera. The importance of bamboos in the rural economy of Nepal can hardly be overemphasized. They are in great demand by farmers both for fodder and for the many other uses to which they can be put, and in many parts of the country practically every farm will have several clumps of bamboo. They are planted near buildings and on small areas of land which are for various reasons unsuitable for agriculture, such as gulleys, steep slopes and rocky sites. So far they have been planted mainly by individual farmers on their own land, but there is no reason why they should not be used on a larger scale in community forestry plantations.

From the point of view of utilisation the important bamboos can be broadly divided into four categories: large construction species; large multipurpose species; small low quality weaving species which can easily be cultivated; and small high-quality weaving species which cannot be cultivated outside the temperate forests:

- a) The first category is typified by *Bambusa nutans* (*Seto bans*). The culm walls are thick and strong, but inflexible and brittle so of less use for weaving. Poles are used for carrying the dead and shoots are never eaten.
- b) The second category is typified by *Dendrocalamus hamiltonii* (*Dhanu bans, Choya bans, Guliyo Tama bans*). The culm walls are thin and flexible and good for weaving, but not strong or rigid enough for many constructional purposes. The large leaves however make good fodder and the new shoots are very palatable for human consumption.
- c) The third category is typified by *Drepanostachyum intermedium* (*Nigalo*). The small culms have no constructional value, but are superior to those of the larger genera for weaving. While they are not the highest quality bamboos they can readily be cultivated at lower altitudes and represent a good compromise between quality and availability. The shoots are not palatable.
- d) The fourth category includes several other more exacting *Drepanostachyum* species and *Arundinaria maling*. They produce the highest quality weaving material and also

palatable shoots. The *Drepanostachyum* species are commonly known as ‘*malingo*’ or more properly ‘*malinge nigalo*’. (Jackson, 1987)

Bamboo uses at different ages

- a) <30 days it is good for eating tama
- b) 6-9 months for weaving baskets (doko, dalo, kokro, namlo, nanglo)
- c) 2-3 years for bamboo boards or laminations
- d) 3-6 years for construction of houses and bridges
- e) >6 years bamboo gradually loses strength up to 12 years old (Adhikari, N)

### 2.12.1. Use and Dimensions of Bamboo Structure

Table 11 Use and Dimensions of Bamboo Structure

Use	Desirable Dimensions and Qualities
Pillar for shelter or drying rack	Outside diameter more than 15 cm, wall more than 3 cm
Roof beam or truss	Diameter 10-15 cm, wall more than 2 cm, straightness
Thatch roof supporting lattice	Wall less than 3 cm, diameter 7-15 cm, straightness
Fence post	Diameter more than 10 cm, durability
Fencing rail (split)	Wall less than 2 cm, splitting ability
Flooring/ ceiling (split)	As for thatch lattice
Wall panelling (split)	As for thatch lattice

(Source: Jackson, 1987)

### 2.12.2. Construction Of Bamboo

- a) Foundation
  - Bamboo in direct ground contact
  - Bamboo on rock or preformed concrete footings
  - Bamboo incorporated into concrete footings
  - Composite bamboo/concrete columns
  - Bamboo reinforced concrete
  - Bamboo piles

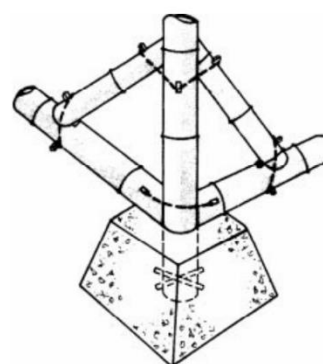


Figure 6: Single post footing (after Banclara, 1990)

**Bamboo piles:** Bamboo piles have been used successfully to stabilize soft soils and reduce building settlement. In the example cited (Stulz, 1983), treated split bamboo piles 8m long and 80 to 90mm in diameter were filled with coconut coir strands wrapped with jute. The sections were then tied with wire. After installation of the piles at 2m center by drop hammer, the area was covered with a 2.5m surcharge of sandy material

**Floors:** The floor of a bamboo building may be at ground level, and therefore consist only of compacted earth, with or without a covering of bamboo matting. However, the preferred solution is to raise the floor above the ground creating a stilt type of construction. This improves comfort and hygiene and can provide a covered storage area below the floor. A minimum ground to floor distance of 500mm is recommended to allow for inspection (Janssen, 1995). When the floor is elevated, it becomes an integral part of the structural framework of the building. The floor will comprise: structural bamboo elements bamboo decking.

**Floor decking:** Bamboo floor decking can take one of the following forms:

- Small bamboo
- culms Split bamboo
- Flattened bamboo (bamboo boards)
- Bamboo mats
- Bamboo panels
- Bamboo parquette

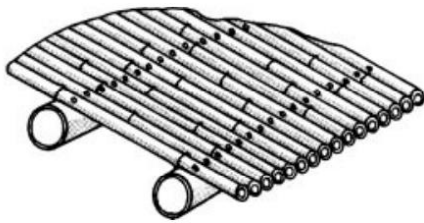


Figure 9 Split bamboo floor decking

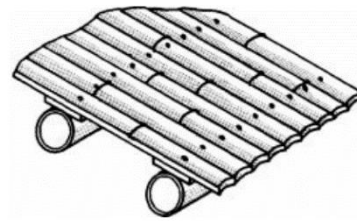


Figure 10 BambooCane Floor Decking (after Janssen, 1995)

**Walls:** The most extensive use of bamboo in construction is for walls and partitions. The major elements of a bamboo wall (posts and beams) generally constitute part of the structural framework. As such they are required to carry the self-weight of the building and also loadings imposed by the occupants, the weather and, occasionally, earthquakes. The infill structure can be:

- Whole or halved vertical or horizontal bamboo
- culms, with or without bamboo mats
- Split or flattened bamboo, with mats and/or plaster
- Bajareque
- Wattle (wattle and daub, lath and plaster, quincha)
- Woven bamboo, with or without plaster
- Bamboo panels

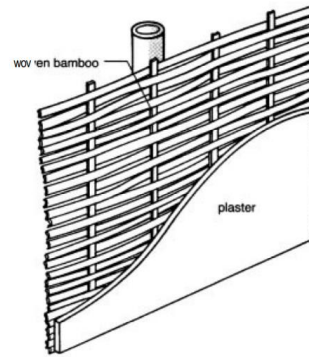
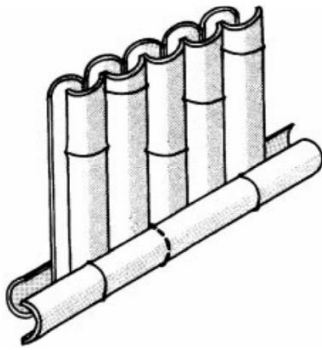
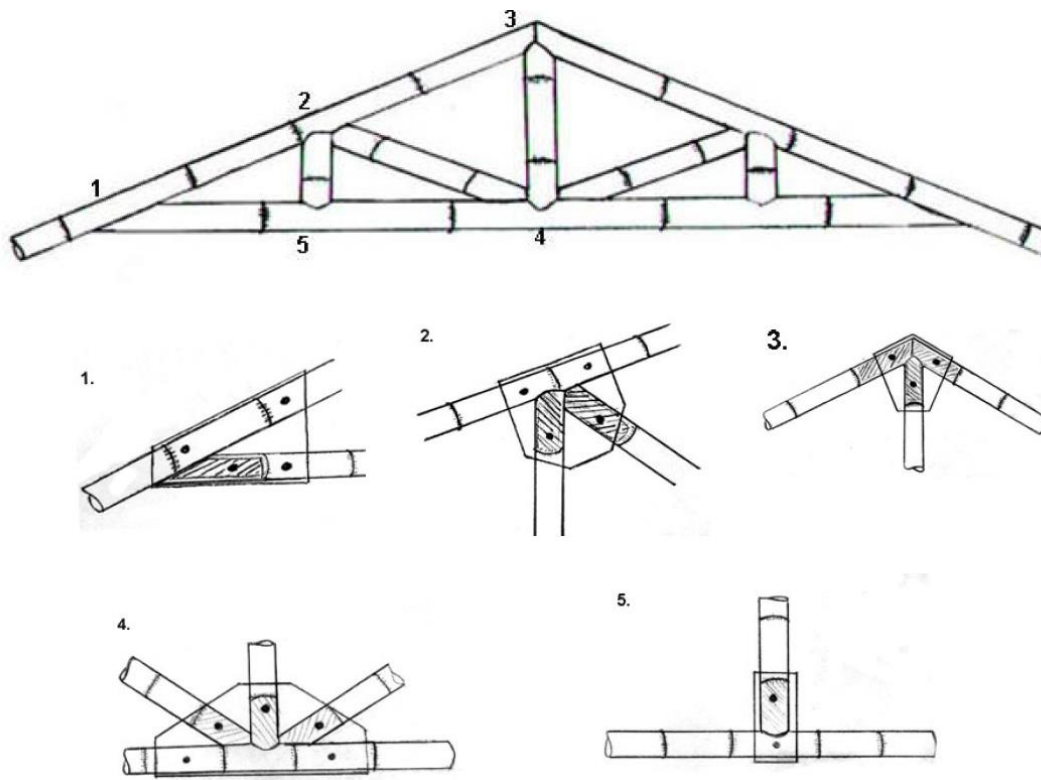


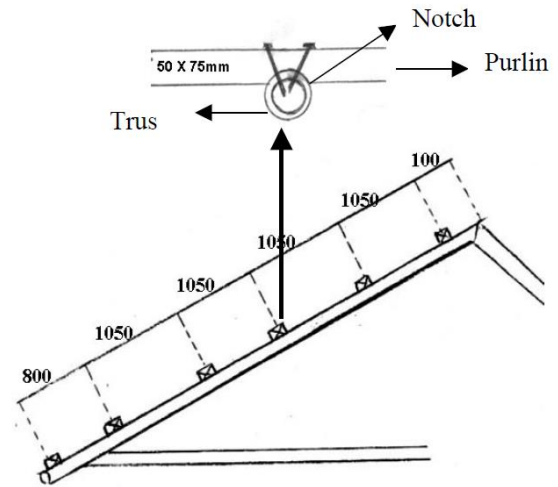
Figure 11: Quincha wall construction (after Siopongco et al. 1987)

Figure 12: Wall of vertical halved culms (after Bandara, 1990)

Roof: The bamboo structure of a roof can comprise “cut” components - purlins, rafters and laths or battens, or triangulated (trussed) assemblies. Bamboo, in a variety of forms, is also used as a roof covering and for ceilings. The simplest form of roof comprises a bamboo ridge purlin and eaves beams, supported on the perimeter posts. Bamboo Trusses offer a number of advantages over traditional forms of construction, including more economic and efficient use of materials, the ability to span larger distances, the use of shorter components (counteracting effects of bow, crook and taper) and the use of prefabrication.



- The dimensions of a truss may vary with the width of the building. In any case the total base length should be equal to the width of the building. Moreover, the dimensions of other members of a truss depend upon the pitch or angle of the truss. Generally, the height of the trusses is 1/4 to 1/6 of the total length of the trusses.
- Purlins are important to support the roof covering. They are laid down at right angle to the truss. It is possible to use half-culm or smaller diameter round bamboo (30-40mm) or wood as purlins.



**Bridges:**

**Queen post truss bridge:** using compound members (four culms per chord) and a combination of wire lashing and steel pins, a 15m span prototype bridge was constructed comprising two modified queen post trusses. The bridge supported a load of 1.6 tonnes with only slight damage to the deck and some of the pinned joints (Kumpe, 1937).

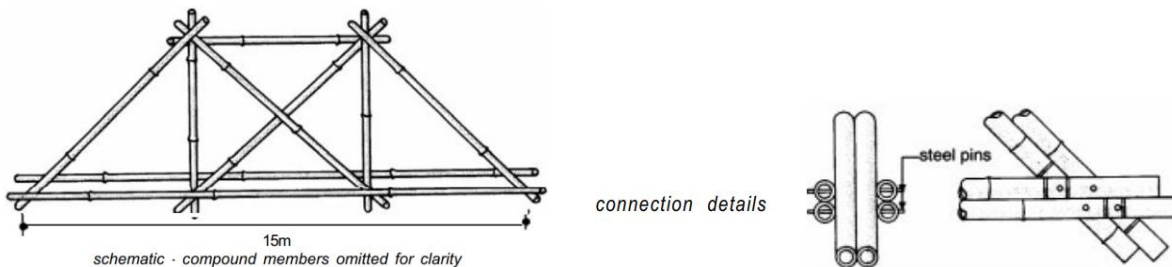


Figure 13: Queen post truss bridge (after Janssen/Kumpe, 1982)

**Joints Details**

**Gusset plates:** plywood or solid timber side plates, applied to joint assemblies in trusses for example, and fixed with either bolts or bamboo pegs, show improved stiffness and strength when compared with traditional jointing methods (Janssen, 1995, Punhani et al. 1989)

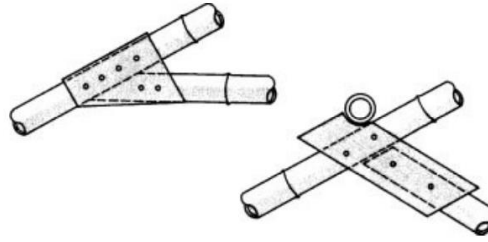


Figure 14: Gusset plated joints (alter Mishra et al. 1991 and Janssen, 1995)

**Filled Joints:** The inner surfaces of the culms to be joined are cleaned with a wire brush. A gap filling resin is used to bond a wooden plug inside the culms. Holes can then be drilled and the assembly bolted together. Cement mortar can be used in place of a timber plug, in which case the bolts are placed before the mortar is poured. Either system can be used in conjunction with steel or plywood gusset plates

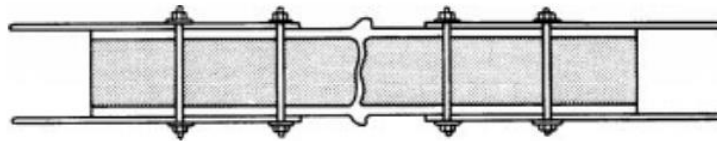


Figure 15: Filled joint (after Mofisco et al. 1995)

2.12.3. Design considerations

Janssen (1995), has conducted a research with the field practitioner in mind and, as such, his design approach is very simple. Accordingly, it is possibly best suited to simple constructions. Janssen has shown that a relationship exists between density and permissible stress which forms the basis of the following table:

	Allowable long-term stress (N/mm <sup>2</sup> ) per unif volume (kg/m <sup>3</sup> )		
	Axial compression (no buckling)	Bending	Sheaf
Air dry	0.013	0.020	0.003
Green	0.01 1	0.015	-

For example, if green bamboo has a density of 600kg/m<sup>3</sup>, the allowable stress in bending would be 0.015 x 600 = 9N/mm<sup>2</sup>.

Rajput et al. (1994) considered sixteen species and derived minimum long-term safe working stresses for the green condition as summarized in the tables below:

- Group A - Bambusa giaucescenes (syn. B. nana), Dendrocaiamus strictus, Oxytenanthera abyssinica
- Group B - Bambusa balcooa, B. pallida, B. nutans, B. tuids, B auriculata, B. burmanica, Cephaiostachyum pefgfaciie, Melocanna baccifera, Thyrosostachys oliveri



- Group C - Bambusa ventricosa, B. vulgaris, B. bambos (syn. B. arundinaceae), Dendrocaiumus longispathus

	Safe long-term stress (N/mm <sup>2</sup> )		
	Bending	Stiffness	Compression
Group A	17.2	1,960	9.8
Group B	12.3	1,370	8.3
Group C	7.4	680	6.9

2.12.4. **Bamboo Plantation**

The amount of space needed for a bamboo plantation on the bank of a river will depend on several factors, including the type of bamboo species being grown, the planting density, and the topography of the land. Generally, bamboo plants can grow in a range of soil types, but they prefer fertile, well-draining soil with high moisture content. In terms of planting density, bamboo can be planted in rows with a spacing of around 2 to 5 meters between plants, depending on the species and the desired density of the plantation. The topography of the land is also an important factor to consider. Bamboo plants require a steady supply of water, and therefore, it is ideal to plant them in areas close to a water source such as a river. However, the plantation should be located at a safe distance from the riverbank to prevent soil erosion and avoid flooding during heavy rains. In general, a bamboo plantation on the bank of a river will require enough space to accommodate the desired number of plants, with appropriate spacing between them. Additionally, the plantation should be planned in a way that ensures the safety of the bamboo plants and the surrounding environment.

2.13. **MATERIAL: COMPRESSED STABILIZED EARTH BLOCK**

Compressed Stabilized Earth Blocks is a sustainable building material that is made by compressing and stabilizing a mixture of soil, cement, and water into blocks. CSEBs are an eco-friendly alternative to traditional building materials such as concrete, bricks, or stones.

CSEBs have several advantages over traditional building materials. First, they are made from locally available materials, which reduces transportation costs and carbon emissions. Second, CSEBs are energy-efficient, as they have low thermal conductivity, which means they can help to keep buildings cool in hot climates and warm in cold climates. Third, CSEBs have excellent acoustic insulation properties, which can reduce noise pollution inside buildings.

CSEBs are also cost-effective and easy to manufacture, making them a popular choice for sustainable building projects in developing countries. They can be produced using manual or semi-automatic machines and can be made in various sizes and shapes, depending on the building design. Overall, CSEBs are a sustainable building material that offers several advantages over traditional building materials. They can help to reduce environmental impact, energy consumption, and construction costs while providing safe and comfortable buildings.



**General materials used in CSEB blocks:**

- **Soil:** The soil used in CSEBs should be free from contaminants, such as organic matter, roots, and rocks. The ideal soil composition for CSEBs is a mix of sand, silt, and clay, with a clay content ranging from 5% to 30%.
- **Cement:** Cement is used to stabilize the soil and improve the strength and durability of the CSEBs. The cement content in CSEBs can vary from 3% to 10% of the total block weight, depending on the soil quality and the required strength of the blocks.
- **Water:** Water is added to the soil-cement mixture to facilitate compaction and curing. The amount of water added should be sufficient to achieve the desired level of moisture content for the soil.
- **Additives:** Other additives such as fly ash, lime, and pozzolanic materials can be added to the soil-cement mixture to improve the quality and properties of the CSEBs. These additives can improve the strength, durability, and thermal properties of the blocks.

The standard size of CSEB made out of Aurum 3000 shall be are as follows:

Types	Length (mm)	Breadth (mm)	Height (mm)
Plain full block	240	240	90
U block	240	240	90
Special blocks			
Half block single insert	240	120	90
Full block single insert	240	240	90
Full block double insert	240	240	90

*(Source: Shrestha, 2012)*

**2.14. BIO-GAS PRODUCTION AND MANURE PRODUCTION**

Biogas is a renewable energy source that is produced through the anaerobic digestion of organic materials, such as animal manure. Goat manure is rich in organic matter and nutrients, making it an ideal feedstock for biogas production. The manure can be collected, mixed with water to create a slurry, and then added to a biogas digester. Inside the digester, bacteria break down the organic matter in the manure and produce methane gas, which can be captured and used as a fuel source.

The amount of biogas that can be produced from 100 goats will depend on factors such as the size and efficiency of the digester, the quality of the manure, and the conditions inside the digester. However, it is possible to estimate the potential biogas production using standard calculations based on the amount of manure produced by each goat and the methane yield of the manure. Overall, biogas production from goat manure can provide a sustainable and renewable source of energy while also reducing waste and improving environmental sustainability.

The manure extraction from a goat which has a body weight of 20–40 kg is approximately 0.32–0.625 kg per a day, equivalent to about 0.3 tons per year.

The size of a biogas unit depends on several factors, which are:

1. The amount and type of organic waste to be disposed in the digester
2. The objective of treating the organic waste (the production of energy and/or organic fertilizer)
3. Demand of natural gas and consumption pattern
4. On-site nature of the soil and the level of ground water
5. Air temperature in the region and wind direction throughout the different seasons
6. The training level of the staff on farm and home regarding operation of biogas units

The amount of manure fed into a digester each day has an important effect on its operation. This is measured by volume added in relation to the volume of the digester, but the actual quantity fed to the digester also depends on the temperature at which the digester is maintained. In order to determine the unit size of a biogas unit, the following mathematical equation must be achieved:

$$\text{Digester size (m}^3\text{)} = \text{Daily feed-in (m}^3 \text{ day}^{-1}\text{)} \times \text{Retention time (day)}$$

## 2.15. DESIGN CONSIDERATION ON DIFFERENT SPACES

### 2.15.1. Design Consideration on Studio or Training Spaces

#### A. Freedom and Flexibility of Space

For ideal working environment – large ventilated rooms, with high ceiling and transitional areas such as courtyard, or open to sky spaces should be well appreciated in the studios and work areas. The link between indoor and outdoor space should be maintained as far as possible.

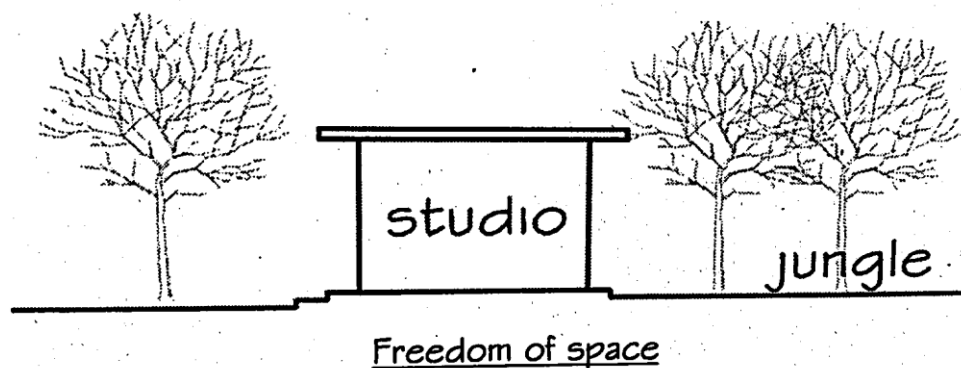


Figure 16 Freedom and Flexibility of space

B. Visual Environments

Studios must have good amount of natural daylight, with high level windows equal to at least 25-30% of the floor area. Roof lighting is also preferred. Windows should have daylight control. Artificial light should be used in absence of natural daylight, where detail work and displayed images are to be focused. Lighting should be done in such a way that it doesnot produce any glare.

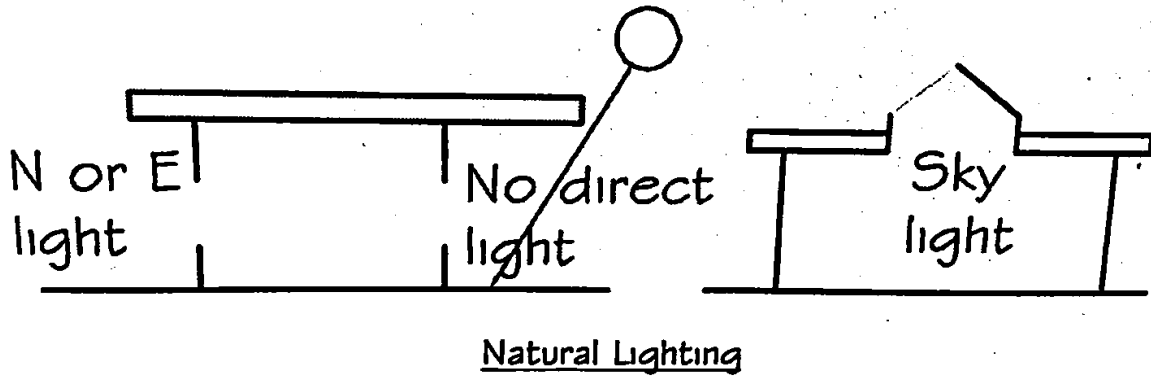


Figure 17 Provision of Natural Lighting

C. Buffer Zones

It is possible that noise producing workspace can affect the other. So buffers are created by additions of walls or vegetations.

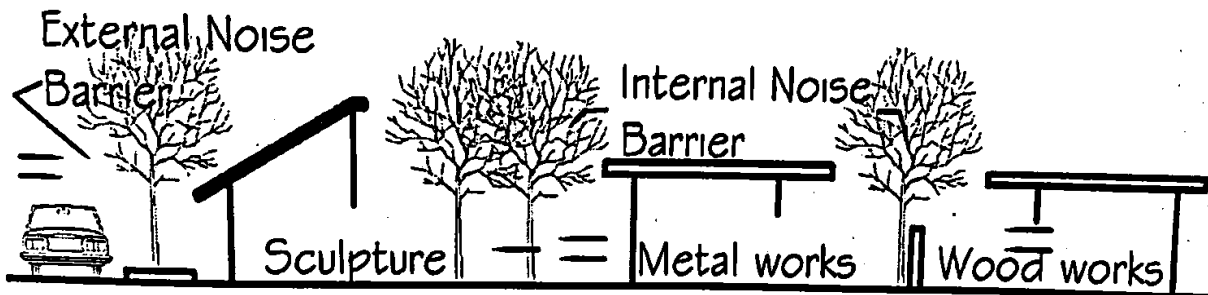


Figure 18 Buffer Zone

D. Locating Space with Respective to Activities

Spaces should be provided according to functional requirement. Work which requires huge machinery or supply of materials should be placed on the ground floor.

### E. Safety Measures

Fire hazardous activities should be separated and isolated from other activities.

### F. Thermal Comfort

A workspace should be thermally, mentally and physically comfortable. Thermal comforts can also be gained by application of passive techniques. Use of proper ventilation, growing vegetation as shading devices, using double glazing can be the solutions.

### G. Space Inter- Relation

Spaces should be inter related- studios, gallery, café, outdoor space should be interesting and inter- related. Need of transition and communication space is also needed, as one cannot sit alone for a long time.

#### f.Space inter-relation:

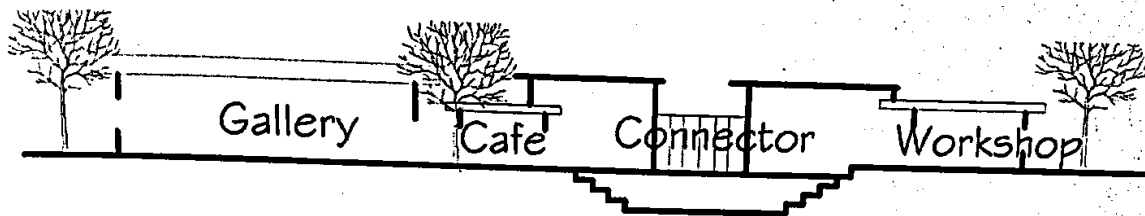


Figure 19 Interaction of Work and Recreational Spaces

### 2.15.2. DESIGN OF MULTI- FUNCTIONAL WORKSPACE

- Generally, a multi field workspace consists of three basic units of accommodation:
  - Workspace area: includes various workspace such as machine room, planning and designing,
  - Storage area for the raw material, finished work, storage space for the tools and small moveable equipments', worker's belonging
  - Service and amenities: Such as staff room, locker room and wash room
- The flow of sequence should be uninterrupted and carefully arranged such as in and out of the raw material from the store, to the workspace, to the finished store and out.
- The space provided should have comfortable working environment with thermal comfort, illumination, scale of furniture and fittings
- The workspaces mainly dealing with the machinery items, the construction of the building should be so as to allow admission of any sorts of machinery.

## Workspace for the individual and group work

General considerations:

- Peaceful environment
- Outdoor setting
- Space planning
- Safety measures
- Locating workspace with respect to activities
- Buffer space between work spaces
- Lighting

Workspace calculation:

The following criteria were taken into consideration for calculating the per place workspace for any field activity:

- Individual workspace area + circulation about area
- Areas for common activities + circulation areas
- Work spaces for tools + temporary work store + Area for work space

*Table 12 Workspace Calculation of Workshop*

Field of activity	Area per place in sq.m
Wood working	4.7
Metal working	5.3
Electricity and electronics	3.3
Spinning and weaving	7.2
Ceramics	5.0
Leather work	3.9
Masonry	3.1

### 2.15.3. DESIGN CONSIDERATION OF OFFICE SPACES

#### General Space requirements

The general requirements for office spaces can vary depending on the type of business and industry. However, some common requirements include:

- Adequate Space: The office space should be large enough to accommodate all employees, equipment, and furniture comfortably.
- Lighting: The lighting should be sufficient to allow employees to work comfortably without straining their eyes. Natural lighting is ideal, but artificial lighting should also be considered.

- **Temperature Control:** The office space should be adequately heated or cooled to ensure the comfort of employees.
- **Ventilation:** The office should have proper ventilation to maintain fresh air and prevent the buildup of harmful chemicals and bacteria
- **Ergonomic Furniture:** The office furniture should be designed to provide ergonomic support and reduce the risk of musculoskeletal injuries.
- **Accessibility:** The office space should be easily accessible for employees, visitors, and people with disabilities.
- **Safety and Security:** The office space should be designed to ensure the safety and security of employees, equipment, and confidential information.
- **Technology:** The office should have the necessary technology infrastructure, such as high-speed internet, telephone lines, and electrical outlets, to support the business's operations
- **Storage:** The office should have adequate storage space for files, documents, and office supplies.
- **Amenities:** The office should have access to amenities such as restrooms, break rooms, and kitchen facilities for employees

#### 2.15.4. DESIGN CONSIDERATION OF CAFETERIA

The cafeteria of a service-oriented building, such as opportunity center should be designed to accommodate the needs of its users while also providing a comfortable and welcoming environment. Here are some key considerations for designing a cafeteria in a service-oriented building:

- **Capacity:** The cafeteria should be able to accommodate the maximum number of users at peak times, including staff, visitors, and patients or students.
- **Seating Arrangements:** The seating arrangement should be flexible and provide options for individuals or groups of different sizes. The seating should also be comfortable and ergonomic.
- **Food Storage and Preparation:** The cafeteria should have appropriate facilities for storing and preparing food, including refrigeration, cooking equipment, and dishwashing facilities.
- **Food Service Stations:** The cafeteria should be organized into different food service stations, such as a salad bar, hot food station, and beverage station, to improve efficiency and user experience.
- **Health and Safety:** The cafeteria should comply with health and safety regulations, such as food safety guidelines and proper sanitation practices.

- **Aesthetics and Atmosphere:** The cafeteria should have a pleasant and welcoming atmosphere, with appropriate lighting, colors, and decor. It should also provide access to natural light and outdoor views, if possible.
- **Accessibility:** The cafeteria should be accessible for users with disabilities, with appropriate accommodations such as wheelchair ramps and accessible seating
- Store - cold store/dry store
- Administration (manager’s office, meeting room, staff’s room, changing room etc)
- Service entry
- Other spaces (meeting hall, conference room, children's play area etc)

Table 13 Planning considerations in restaurant

Tables	Seats	Waiter service (m2/seat)	Self-service (m2/seat)
Square	4	1.25	1.25
Rectangular	4	1.10	1.20
Rectangular	6	1.05	1.10
Rectangular	8	1.05	1.05 1.05

2.15.5. PARKING FACILITY

Parking facility has become an important consideration in design of any building complex. Other than pedestrians, or people coming by public vehicles, people visit on their vehicles which may be bicycle, motorcycle, car, van or other for which parking needs to be provided. Parking, if not designed properly and sufficiently becomes a big issue and problem. For design and planning of parking, vehicular dimensions, turning radius, guiding signs etc. is important.

Different types of parking layout are:

- 0 degree or parallel parking to road - entry and exit to parking area are difficult, suitable to narrow streets. (One way traffic)
- 30degree parking - easy entry and exit and used where large parking spaces can be provided, one way traffic
- 45degree parking - good entry and exit, normal type of layout and small space used, one way traffic; approx. 23m<sup>2</sup>
- 60degree parking - often used, good entry and exit can be achieved, less area; approx. 23m<sup>2</sup>
- 90degree parking - sharp turn needed and used for compact planning, one or two-way traffic; approx. 20 m<sup>2</sup>

Table 14: Parking Dimension of Different Vehicles

Vehicle type	Average length (m)	Average width (m)	parking space (m <sup>2</sup> )
Car	5.0	2.0	10.0
Bus	15.0	2.8	42.0
Auto rickshaws	3.0	1.8	5.3
Motorized Two-wheelers	2.0	1.0	2.0
Bicycle	2.0	0.5	1.0

(Source: Munshi, 2018)

Table 15 Turning radius required for different vehicles

Types of vehicles	Length (m)	Width (m)	Height(m)	Turning circle radius (m)
Motor cycle	2.20	0.70	1.00	1.00
Car (standard)	4.70	1.75	1.50	5.00
Bus (standard)	11.40	2.50	3.30	6.50

(Source: Munshi, 2018)

### 3. NATIONAL CASE STUDY



### 3.1. TEWA COMPLEX

#### 3.1.1. Introduction



*Figure 20 Tewa Complex, Source Author Yureka*

Tewa Complex is the expression of Nepali spirit that is built with an objective to empower the suppressed Nepalese rural women. Layout of different spatial components in the contextual setup creates an environment that breathes positive energy. Nepalese Traditional Architecture with contemporary comprehension of spaces thus becomes a basis to develop a comfortable environment for the locals.

Tewa means, “support” in Nepali. It refers to the kind of support used to prop up leaning walls and buildings before they are rebuilt. Its Founder Rita Thapa initiated Tewa in September 1995. With its formal registration at the Chief District Office, Lalitpur, of the Government of Nepal, and the Social Welfare Council in April 1996, Tewa was formally established (Tewa -Philanthropy for Equitable Justice and Peace, 2020). Tewa's philosophy is to develop community philanthropy, both in terms of minimizing social costs incurred in rapid transition, for self-reliant development, and for the empowerment of emerging groups of women in Nepal. With this philosophy in mind Tewa does local fund-raising, gives grants to women's groups from all over Nepal, and strengthens the human resources of Nepal through various programs.

- Location: Dhapakhel, Lalitpur
- Architect: Saroj Pradhan

- Building type: center for empowerment of women
- Building usage: semi-public
- Built up area: around 16 ropanis of land

### **3.1.2. Building Components in Tewa Complex**

- Guard house
- Rental shops (Upahar)
- Administration block (Tewa)
- Guest houses (Anandi)
- Multi-purpose Community-hall (Jamghat)
- Library • Cafeteria (Santoshi)
- Training hall (Aadhaar)
- Open- air theatre (Rangamanch)

### **3.1.3. Architecture and Planning Zoning**

- Public Zone: cafeteria, parking, Rental shops (upahar)
- Semi-public Zone: administration, library, training hall, multi-purpose hall, open- air theatre,
- Private Zone: Dormitories and Guest houses (Anandi)

When we enter from the road, it leads to the main surface parking and to administration block. The scattered building blocks yet connect through different levels in contours can be seen. The spaces have been arranged around the main block Tewa (Administration), with landscape in between. The south- east gate is the main entrance to the complex leads to surface parking. There are four main blocks:

- building for rental purpose on the eastern side:
- dormitory block on the northern side
- main block that lies at the Centre of the site
- cafeteria on the south- west

### **A. Tewa (Administrative Block)**

- The portico acts as transition space and a welcoming entrance.
- Two exits in the building, one to the beautiful landscaping zone and cafeteria; next to the back of the cafeteria
- Training room on the upper floors with each floor area of 548.8 sq.ft and staff offices.
- Micro-finance as an empowerment means, also grant making and various fund raising programs

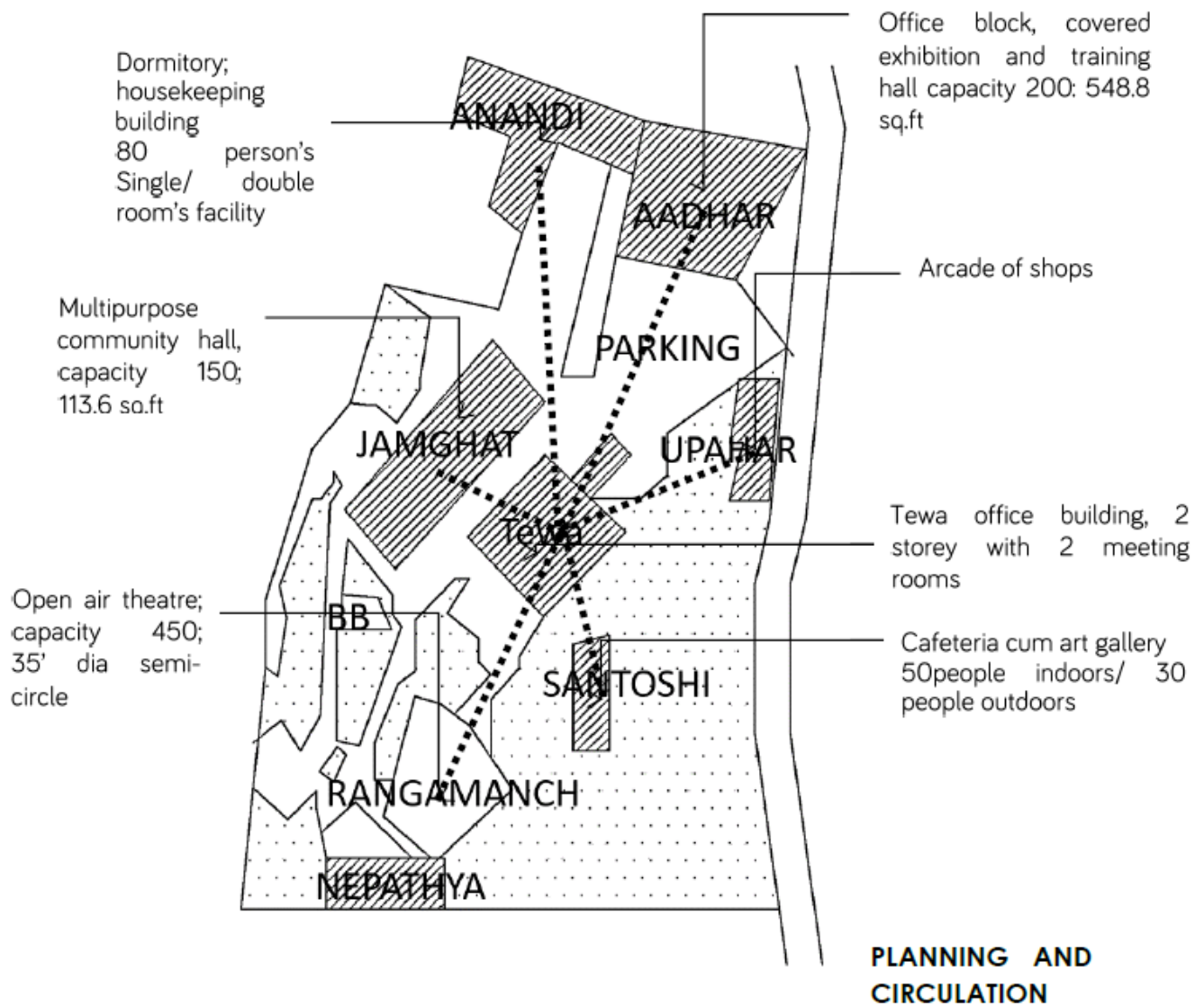


Figure 21 Planning and Circulation of Tewa Complex

### B. Santoshi (Cafeteria)

- Patio at its entrance with mesmerizing panoramic views; steel pergolas
- Dining area; seatings for four persons @ one table
- Horizontal wooden beams on its ceiling gives traditional architectural interiors
- Main entrance from north and Reception on the left-hand side
- Kitchen at south-east corner where there is separate exit from kitchen

### C. Aadhar (Multipurpose block)

- Multi-purpose and Training Hall
- Five-storey building block consisting;
- Kamala Hall – Ground Floor
- Board Room – First Floor
- Nagarik Aawaj – Second Floor
- Dip Yogini Officel –Third Floor
- Aadhar Hall – Last Floor

### D. Aanandi (Dormitory Block)

- 3 Aanandi block; Aanandi 1, Aanandi 2 and Aanandi 3
- accommodation unit consisting single and double bedrooms
- garden space in front of it
- Overall units holds 80 persons
- Presence of single unit for Mentor or guest willing to stay privately.



Figure 22 Dormitory Block

### E. Open Air Theater\_ Rangamanch

- Public space\_ South west part of the site
- Private zone
- Use of contours; functionally seating arrangements \_ capacity 450 people
- Fan form seating arrangements; aisle on its middle
- Referred to the standards
- Back stage area@ 120 sq/ft with toilets

### F. Community Hall\_ Jamghat

- North east part of the rental block
- Adequate lighting\_ presence of large windows
- Spill out outdoor area with panora

### G. Finding and Inferences

- Planning of buildings accordance with the contour, proper planning with respect to contour
- Contours has been used as seating space for open theatre.
- Adequate lighting in the spaces.
- Entrance of the buildings are focused with portico or garden outside.
- Canteen is far from exhibition hall and dormitory block, difficulty during rainy season.
- There is not enough space for outdoor gathering.

### 3.1.4. Mapping Gender Sensitivity

Spaces can enhance or restrict, nurture or impoverish. The kinds of spaces we have, don't have, or are denied access to can empower us or render us powerless. Despite the fact that women make up more than half of the users of our environments, we have had little effect on the architectural shapes we express. Where legislation and financing for new places for women does exist, it is mostly the consequence of women's activism, women's movement organizations like Tewa, and the efforts of the tiny but growing number of feminists in the field of empowerment.

The case study and observations are to understand how a built-up structure working in the field of women empowerment affects its ability to be inclusive, safe, welcoming, and respectful of all women kind and how it is necessary for taking gender equity in the built structure and facilities mainly consider for women. Poorly thought-out designs can disproportionately affect women and girls by supporting their exclusion from communal places and activities, either directly or indirectly while an inclusive design encourages participation from people of all ages and genders.

Tewa Complex being the platform of women empowerment focuses on the inclusive and gender equitable design guidelines following every aspect and parameter. The welcoming environment creating a sense of inclusion where we, the women can belong is the notable ideas of the design. The perfect blending of landscape and built structures inclusion for all age group, from children to elderly and for differently abled groups and gender emphasize the justifiable constituents while designing and planning. The spaces maximize accessibility and flexibility for different and concurrent community uses.

Amina Shrestha, a member of Tewa, claims that everyone who attends leadership development, skill-improving trainings, fundraising, and meetings compliments on feeling like a home, connecting to the built environment. There are three residential blocks namely 'Aadhar' residing dormitory units, common meeting rooms and bedrooms are all women friendly and inclusive. As the buildings follow a contour, different ramps are provided to connect one building to another, and different level variations can also be seen connecting one level to another level of buildings. The entire building structure and design, which incorporates traditional Newari architectural elements, blends perfectly with the surrounding surroundings, and all of the social utilities located within, creates a lively, inclusive setting.

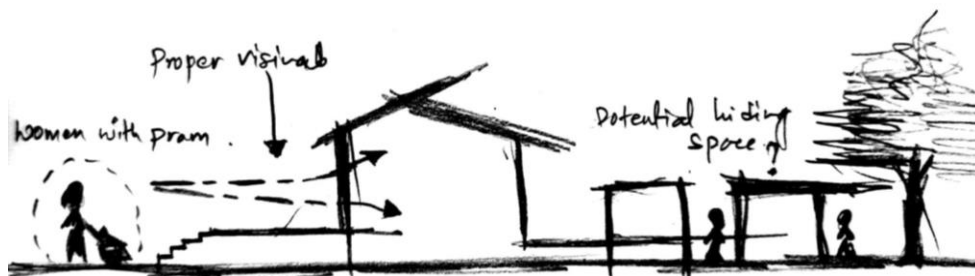


Figure 23 Mapping gender sensitivity

Table 16 Observations on gender sensitive guidelines ( Tewa Complex)

<b>Parameters</b>	<b>Observations</b>
Active street facade	Since locals control the majority of the region, it has a vibrant atmosphere with wide entrances to complex.
Visually prominent and activated entrance	Anyone feels welcome while entering into the complex.
Sense of Inclusion	Design prioritizes inclusion, taking into account all age groups, genders, and people with disabilities.
Direct and easily accessible link	Direct connection to the roads and sufficient parking are both provided.
Women’s Restroom	There is adequate space and standard for women’s restroom.
Baby Changing Facilities	Although the restrooms do not entirely provide baby changing facilities, the area inside the building is accommodating enough for any mother's chores.
Inclusion of a child-friendly/breakaway space	There is proper space design specially for children which is visible from multipurpose halls and meeting spaces. Additionally, we can find landscape that takes children into considerations. Next to the cafeteria is a play area for kids.
Breastfeeding friendly space (lactation room)	Nursing or lactation rooms are not mentioned. However, there are many places inside the complex that are appropriate to breastfeeding.
Gender friendly indoor furniture	Its entire interior is gender-and child-friendly.
Space orientation	The spaces maximize accessibility and flexibility for different and concurrent community uses.
Inclusive of different modes of transport	Inclusion of various forms of transportation, such as strollers and baby carriages, inside the complex.
Negative space or Hiding space	No negative spaces are seen. All areas, including those used for agriculture and landscaping, are fully used.



## 3.2. VOCATIONAL & SKILL DEVELOPMENT TRAINING CENTER

### 3.2.1. Introduction

The current vocational and skill development training center, known as the Labor Supply Center, was established to raise the standard of living of those living below the poverty line by generating opportunities for self-employment and employment abroad and by developing appropriate skills for those with growing skill levels as a result of the prevalence of poverty in the nation. Although this center for skill development and vocational training only offered a small amount of instruction during the first six months of operation, it now offers regular six-month programs in plumbing, welding, motorcycle repair, electrical connection, and electronics repair.



Figure 25 Vocational Training Blocks

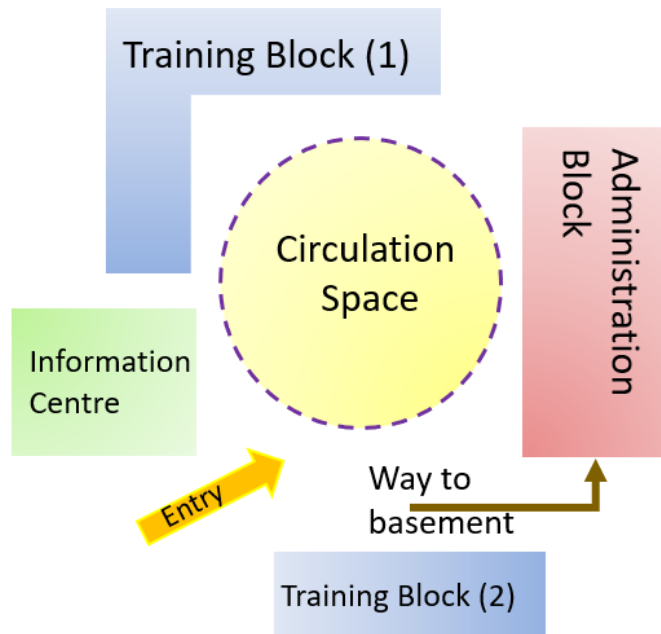


Figure 24 Admin Block

- Location-Bhaisepati, Lalitpur
- Building Type- Governmental Building
- Objectives- Self-employment
- Targeted Trainee Group- Nepali Citizen, Age 18 – 40

### 3.2.2. PROGRAMS

- Regular (6 months and upgrading training)
- Young Self-employed Training (Basic, 3 Months)
- Traditional short-term training (7 Days)



**TRAINING INCLUDED**

- electrical connection,
- plumbing,
- motorcycle repair,
- harvesting sewing,
- hair makeup,
- House keeping
- Electronics and mobile repair,
- Advance and basic tailoring
- Security guard
- Tile and marble fitting
- Welding

Figure 26 Spatial Planning

Two training buildings, an information center, and a brand-new administration building make up the training facility. Training Block 1 comprises of instruction that does not involve the use of heavy lab supplies and equipment, whereas Training Block 2 consists of training that does. A spacious open area for circulation separates the building components and creates a courtyard. On the administrative building, there is both open-air and underground parking. There are also meeting rooms and training rooms in the recently built administrative block. The information center unit handles all the information from registration to trainee selection. The training blocks and information unit are of two-stories building while the admin block is of four-stories. There is a waffle slab in the conference hall which can be used as multi-functional hall.



Figure 29 Mechanical Workshop



Figure 27 Multifunctional Hall



Figure 28 Training Room



### 3.2.3. Interference and Analysis

- contemporary trends; Doesn't follow modern technology methods
- theoretical and practical training rooms, setting up the necessary equipment and tools
- Inclusivity in design considering age, race and gender
- services to facilitate the process of the participant training
- lacks dynamic exhibition space
- open space without any obstacles in an interactive working environment
- functional aspects of the size of spaces, halls, traffic corridors, health and safety standards in new building only
- No environmental strategies in the construction system
- employability through demand-driven, competency based, modular vocational courses.

Table 17 Analysis of Vocational and skill development training center, Bhaisepati

Spatial Character	Architectural Character	Activity
Spontaneous flow of spaces arranged around a central courtyard circulation	Contemporary expression E.g.- RCC structure, Corridor design etc.	Building blocks differentiated on the basis of purpose

Table 18 Positive and Negative Aspects Analysis

Positive Aspects	Negative Aspects
Creates lot of Employment	Lacks proper maintenance
Poverty Eradication	No Accommodation unit
Large Multi-functional Hall	No provision of Food for Trainee
Adequate Machineries for training	Small Training room
Building inclusive for Disable	Lacks Washroom for Disable
Provision of Parking	Long legal procedure



Figure 30 Training Center

## 4. INTERNATIONAL CASE STUDY

### 4.1. WOMEN'S OPPORTUNITY CENTER IN RWANDA

Women for Women International (WfWI) is a global NGO that has supported the construction of the Women's Opportunity Center, to be opened shortly, in Kayonza Rwanda. The Center, design by Sharon Davis Design, is an environmentally friendly, multi-use facility that will become a support mechanism for the education of women and the support and advancement of the community in the region. The WOC is an element of WfWI's mission to address poverty and the effects of genocide through education and self-empowerment. The facility is part community gathering space, part education center where women can attain job training and learn new skills, and use services to find employment or start their own businesses.

- Location: Kayonza, Rwanda
- Architect/Firm: Sharon Davis Design
- Building type: center for empowerment of women
- Site area: 2200 sq. m.
- Construction ended– 2012 (took 2 years to complete)



Figure 32 women's opportunity center in Rwanda



Figure 31 Classroom area of Women's Opportunity Center

#### 4.1.1. Design Objectives

The WOC encourages **self-sufficiency, self-employment and self-empowerment**. Using education and community as a tool to develop this attitude is one of WfWI's strategy for addressing poverty-stricken regions that may be recovering from political upheaval and genocides. It is a way to restabilize the lives of people and the region's community. This particular facility will affect over 28,000 women in the region. The breadth of the WOC's is anticipated to extend beyond its facility walls. WfWI has seen an economic ripple effect occur in the implementation of similar programs in Rwanda. Women who participate in the WOC spread their new skills into the

community, creating positive exponential effects on women's self-empowerment and self-sufficiency in the region. The goal of WOR is to be financially independent through a multi-use approach: renting space to partner organizations, creating market and retail space for local small businesses, storage and workspace for lease, event space, demonstration farm, and lodging and restaurant services for tourists.

### **Facilities Include**

- class rooms – where certain group of women are provided free education
- guest lodgings – as a services for tourists
- a demonstration farm – cooled by green roof and retained earth walls
- a marketplace, where women sell products, they have made on site.

The demonstration farm, a Commercial Integrated Farming Initiative, teaches women to produce income from the land, such as: raising livestock, storing and processing food. A further and integral objective of WOC was to involve as many stakeholders as possible, with recognition of the value of partnerships and community-based knowledge, especially within a region where resources are scarce and access to materials/tools/equipment and infrastructure is limited.

### **4.1.3. Conceptual Planning And Development**

#### **Planning**

- Organizing Principle: Rwandan vernacular village
- A series of human- scaled pavilions clustered to create security and community

#### **Building Forms**

- Circular forms used
- Perforated brick walls that allow for passive cooling and solar shading, along maintaining sense of privacy.

What should architecture look like when it is designed specifically for women? That was the challenge that architect Sharon Davis took on not in her hometown of New York, but in the village of Kayonza, Rwanda. Here, the architecture had to address more than the lack of a safe gathering place for Rwandan women — it also had to create economic opportunity and a solid social infrastructure.

“I imagined the women I had met in one-room wood huts coming to a center for 300 women,” said Davis. She knew the design had to be inviting, like a safe haven, rather than intimidating. The concept of the site, then, was to create a type of village. A series of low-rise pavilions were built in a circular pattern, with classrooms at the heart of the site. A farmers market, community space, gardens, and guest lodgings are all located on the outer edges of the circle. Davis found inspiration

in the historic King’s Palace in southern Rwanda “with thatched and woven buildings and small circular spaces within a larger site.”



Figure 33 Women's Opportunity Center of Rwanda, Master Plan

#### 4.1.2. Materials Used

The facility was designed with the implementation of standard, local materials utilized in an experimental way. The principal material is clay brick, crafted by women who will benefit from the WOC. The 450,000 clay bricks needed for the construction were made at the center by local women, using a durable manual press method which we adapted from local building techniques. Gaps in the brickwork would bring in air and light. The roofs were designed to accommodate a rainwater collection system. The two-acre facility is designed with local sustainable functions, including solar power generation, rainwater harvesting, biogas fuel for cooking, and composting toilets. Sharon Davis Design notes, "we hope to encourage local experimentation, so that community restoration becomes more integrated, resourceful, and environmentally conscious".

#### 4.1.4. Inferences

- Planning done so as to cater the needs of the users
- Plaza: as a market showcase; space for the interaction of the users with the local people
- Simple form giving clear and pure spaces
- Human scale building design

#### 4.1.5. Comparative Analysis

Table 19 Comparative Analysis of Tewa Complex and Women's Opportunity Center

Parameters	Tewa Complex	Women's opportunity Centre
Area	8139.79 sq. m	2200 sq. m
Architect	Saroj Pradhan	Sharon Davis
Facilities Included	Multi-purpose Hall, Administration Unit, Training Hall, Dormitory Blocks, Cafeteria, Conference Hall, Rentable Shops, Open Area Theatre, Guard Room, Parking Children Play Area	Classroom Area, Demonstration Block, Partner Room, Conference Room, Admin Block, Rentable Market, Guest Lodge, Staff Lodge Farm Area, Gathering Space, Kitchen and Cafeteria
Architecture	Contemporary Newari Architecture	Vernacular Architecture
Connectivity	Building blocks are connected by the contour landscaping and design	Perfect connection with indoor and outdoor environment
Landscaping	Perfect blending Landscaping on contour	Landscaping done
Gender Sensitivity	Design is gender sensitive.	Active and inviting approach on gender sensitivity
Open Spaces	Open spaces used as dabali, landscaping and farming space	Open spaces used as gathering space and demonstration farming.
Light and Ventilation	Natural lights and active air circulation	Natural lights and Ventilation due to gaps between bricks



## 4.2. FARMED EDUCATION CENTRE

### 2.1. Introduction



*Figure 34 Farmed Education Centre, Cotswold UK*

Timothy Tasker Architects has completed FarmED, a sustainable farming education centre at Honeydale Farm in the Cotswolds, UK. The 1,266 sq m project – comprising three timber barn-like buildings arranged around a central courtyard – works to educate communities on the role of regenerative farming in combatting climate change. The buildings and courtyard – modelled on traditional Cotswolds farmsteads – were mapped out using the golden ratio to create harmonious proportions, while their orientation and pitched roofs were designed to shelter and protect the centre from strong winds. Paved paths beneath deep eaves connect the three buildings which open onto the wildflower meadow in the courtyard.

- Location- Cotswold, United Kingdom
- Lead Architects: Timothy Tasker
- Building Type- Sustainable
- Year: 2021
- Area - 107 acre

## **.2.2. Objectives**

FarmED was established as a demonstration farm to show how regenerative farming techniques can combat climate change, and to educate communities, farmers, and governing bodies about sustainable farming methods.

## **.2.3. Conceptual Development**

- The U-shaped development comprises three long timber barn-like buildings arranged around a central courtyard, modeled on the traditional farmsteads of the Cotswolds region.
- The buildings and courtyard were mapped out using the golden ratio to create harmonious proportions
- Orientation and pitched roofs are designed to shelter and protect the centre from strong valley winds.

### **Facilities**

- major blocks
- Large Dinning Hall- Catering Kitchen & central pizza oven
- Micro-dairy & tractor store
- Conference
- Learning Centre

## **4.2.4. Sustainable Approach**

- Sustainably sourced local larch was used for both the internal and external cladding, saving approximately 15 tonnes of carbon when compared to typical masonry and plaster construction.
- Over 17 tonnes of carbon was saved by using natural sheep's wool insulation instead of Rockwool.
- The roofs are clad with zinc which is natural, self-healing material with a 95% recycled content make-up
- Air source heat pumps powered by an onsite solar array provide heat for all three buildings.
- underfloor heating utilizes the benefits of low-grade heat recovery
- Passive ventilation with automated openable roof panels,
- Effective recycling and cleaning of rainwater from the roofs and the surrounding landscape.

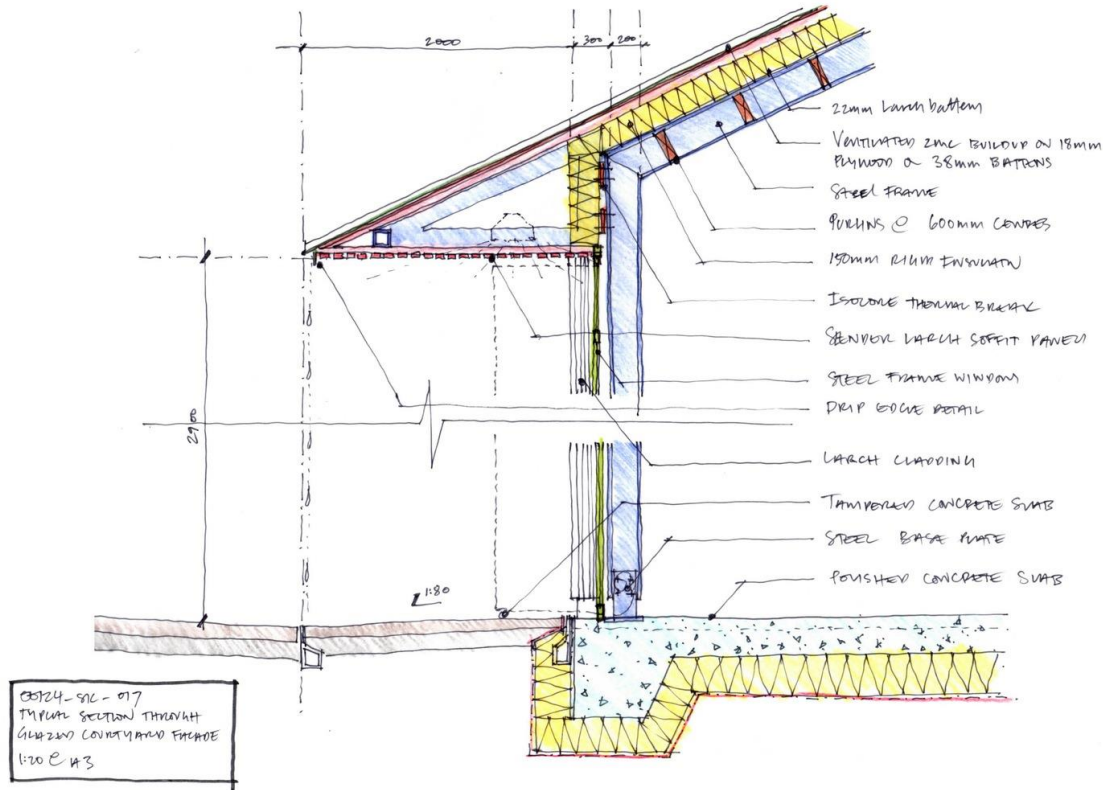


Figure 35 Detail Section of wall

**2.1. Inferences And Analysis**

- Climatic consideration on design approach
- Sustainable and energy efficient building aspects
- Vernacular building design
- Perfect consideration of Golden Ratio on design planning
- Farmed center as the demonstration farm

Spatial Character	Architectural Character	Activity
Spontaneous flow of spaces arranged around a central courtyard	Vernacular expression E.g.- pitched roofs, local larch wooden cladding etc.	sustainable farming and energy efficient design approach



## 5. PROGRAM FORMULATION

In order to achieve the ultimate transformation and meet the desire objectives of the project, the program spaces are established to equip with the opportunities and skills necessary for the women to act as the spark for a change in the community. All the program space has been named according to the women designated in vedas as per the literature done;

- 1) Admin Block – Virini; she is mother of brave sons (Rig Veda 10/86/9. 10)
- 2) Skills and Training Block – Aditi; she is not dependent (Nirukta 4/21)
- 3) Classroom Block – Sarasvati; she is scholarly (Yajur Veda 10/84)
- 4) Farming Area – Aghnya; she is not to be hurt (Yajur Veda 8/43)
- 5) Shelter Block – Suyama; she is self-disciplined (Atharva Veda 14/1/18)
- 6) Cafeteria Block – Susheva; she is pleasant (Atharva Veda 14/1/16)
- 7) Guest Lodging – Mahi; she is great (Yajur Veda 8/43)

### 5.1. Analysis of Programs

- **Skill development Training:** The majority of women who participated in the interviews expressed a desire for skill-oriented training in various areas such as tailoring, weaving, construction, commercial agriculture, and livestock rearing, among others. Given the widespread use of pottery in the terai region, a pottery workshop has also been established to cater to this demand. In addition, workshops on bamboo crafts, fish farming, and other areas have been provided based on the specific needs and requests of the local women.
- **Feminization of Agriculture:** The majority of the women who were interviewed are engaged in agriculture, but find that their current level of involvement is insufficient for their sustenance. To address this issue, the project has implemented a demonstration farming initiative covering approximately 5000 square meters, which utilizes modern agricultural techniques to promote commercial viability.
- **Shelter:** I have observed a number of women who find themselves without viable options, and are consequently engaged in domestic labor across multiple households. These women are in search of a place of refuge, where they may not only reside, but also participate in various economic ventures to enhance their skills and improve their circumstances.
- **Social Empowerment:** The social empowerment strategy was implemented via an environmental level program, encompassing exhibition spaces, office spaces, and advanced training opportunities. The provision of guest lodging within the project serves to facilitate the necessary social exposure for women. It is important to note that the primary objective of the initiative is not to isolate women, but rather to integrate them into society.

Table 20 Program Space Area Calculation of Admin Block

<b>ADMIN BLOCK</b> <b>“Virini”</b>					
<b>DESCRIPTIONS</b>	<b>No. of Unit</b>	<b>Area per Unit (m<sup>2</sup>)</b>	<b>No. of person</b>	<b>Area per person (m<sup>2</sup>)</b>	<b>Total Area(m<sup>2</sup>)</b>
Information desk/ Enquiry	1	18			18 m2
Great lobby	1		100	0.5	50 m2
Waiting Lounge	1		50	0.5	25 m2
Program Director's Office (training & admin/ economy/ shelter & services)	3	18			54 m2
Program Secretary	3	10			30 m2
Managing Director’s Office	1	30			30 m2
Managing Secretary	1	12			12 m2
Officers Cabinet	4	4			16 m2
Finance Manager	1	12			12 m2
Account section	1	27			27 m2
Private Meeting Hall	1		30	2	58 m2
Children Roaming Area	1		10	2.5	25 m2
Storage	1	16			16 m2
Lactation Room	1	12			12 m2
Workplace Day Care	1	36	18	2	36 m2
Pantry	1	12			12 m2
Female Restroom	5 w/c	2			30 m2
Male Restroom	3 urinal/ 1 w/c	2			10 m2
Unisex Restroom	1	4.5			4.5 m2
<b>Multi-Purpose Hall</b>					
Hall Area	1				280 m <sup>2</sup>
Seating Area	1		150	0.75	120 m <sup>2</sup>
Stage Area	1	30			30 m <sup>2</sup>
Store	1	12			12 m <sup>2</sup>

Table 21 Program Space Area Calculation of Classroom Block

<b>CLASSROOM BLOCK</b>					
<b>“Sarasvati”</b>					
<b>DESCRIPTIONS</b>	<b>No. of Unit</b>	<b>Area per Unit (m<sup>2</sup>)</b>	<b>No. of person</b>	<b>Area per person (m<sup>2</sup>)</b>	<b>Total Area(m<sup>2</sup>)</b>
<b>Non-formal Classroom Block</b>	1				<b>315 m<sup>2</sup></b>
a. Seating Areas			100	2	231 m <sup>2</sup>
b. Stage platform area	1				84 m <sup>2</sup>
<b>Circulation Area</b>					<b>327 m<sup>2</sup></b>

Table 22 Program Space Area Calculation of Shelter Block

<b>SHELTER UNIT</b>					
<b>“Suyama”</b>					
<b>DESCRIPTIONS</b>	<b>No. of Unit</b>	<b>Area per Unit (m<sup>2</sup>)</b>	<b>No. of person</b>	<b>Area per person (m<sup>2</sup>)</b>	<b>Total Area(m<sup>2</sup>)</b>
<b>1. Mother with children</b>	4 (combined room)	60			<b>240 m<sup>2</sup></b>
a. Bed Room	2	20	2 mother @ 1 bedroom		40 m <sup>2</sup>
b. Pantry Room	1	16			16 m <sup>2</sup>
<b>2. Single Women</b>	7	60	6 @ 1 bedroom		420 m <sup>2</sup>
<b>3. Toilet Area (1)</b>	2	58			126 m <sup>2</sup>
a. w/c	8	2			16 m <sup>2</sup>
b. Bathroom	6	3.2			19.2 m <sup>2</sup>
c. Laundry Area	2	10			20 m <sup>2</sup>
<b>4. Toilet area (2)</b>	2	18			36 m <sup>2</sup>
a. w/c	6	2			12 m <sup>2</sup>
b. Bathroom	2	3.2			6.4 m <sup>2</sup>
5. Warden Room	1	18	1		18 m <sup>2</sup>
6. Staff Room	2	18	4		36 m <sup>2</sup>
7. Store + Lobby	1	25			25 m <sup>2</sup>
8. Counselling Unit	1	38			38 m <sup>2</sup>
9. Infirmary	1	28			28 m <sup>2</sup>

10. Waiting Lounge	1	30			30 m <sup>2</sup>
11. Store Room	2	12			24 m <sup>2</sup>

Table 23 Program Space Area Calculation of Guest Lodging

GUEST LODGING "Mahi"					
DESCRIPTIONS	No. of Unit	Area per Unit (m <sup>2</sup> )	No. of person	Area per person (m <sup>2</sup> )	Total Area(m <sup>2</sup> )
<b>Accommodation Unit</b>	18	33.5	36 - 75		<b>603 m<sup>2</sup></b>
a. Bedroom area		29.5	2 - 4		29.5 m <sup>2</sup>
b. Attached Bathroom		4			4 m <sup>2</sup>
<b>Store Room</b>	2	7			14 m <sup>2</sup>

Table 24 Program Space Area Calculation of Cafeteria Block

CAFETERIA "Susheva"					
DESCRIPTIONS	No. of Unit	Area per Unit (m <sup>2</sup> )	No. of person	Area per person (m <sup>2</sup> )	Total Area(m <sup>2</sup> )
a. Billing Counter	1	6			6 m <sup>2</sup>
b. Indoor Dining Hall	1		50	2	92 m <sup>2</sup>
c. Serving Counter	1	12			12 m <sup>2</sup>
d. Cooking Area	1	18			18 m <sup>2</sup>
e. Store	1	10			10 m <sup>2</sup>
f. Wash Area	1	10			10 m <sup>2</sup>
g. Utensil Area	1	8			8 m <sup>2</sup>
i. Rest Rooms	2	2			4 m <sup>2</sup>
j. Staff unit	1	8			8 m <sup>2</sup>
k. Semi-open dining	1				327 m <sup>2</sup>
				<b>Total</b>	<b>663 m<sup>2</sup></b>

Table 25 Program Space Area Calculation of Training Block

<b>TRAINING BLOCK</b> <b>“Aditi”</b>					
<b>DESCRIPTIONS</b>	<b>No. of unit</b>	<b>Area per unit (m<sup>2</sup>)</b>	<b>No. of person</b>	<b>Area per person (m<sup>2</sup>)</b>	<b>AREA</b>
Lecture room	5	28	24	1	140 m2
Tailoring Studio Room	1		24	1.5	50 m2
Pottery Studio Room	1		20	2	50 m2
Bamboo Workshop	1		24	2	72 m2
Construction Workshop	1		24	2	72 m2
Teacher’s Room	1	18			18 m2
Flexible Learning space	1				55 m2
Store Room	2	15			30 m2
Restroom for Disable	2	3.5			7 m2
Female Restroom	3 w/c	20			20 m2
Male Restroom	2 w/c	2			4 m2
Craft unit (candle/ Incense)	1		24	2	55 m2
Machine room	1	20			20 m2
Prepared items Store Room	1	16			16 m2
Garment Unit	1		24	1.5	48 m2
Computer Lab	1		18	1.5	48 m2

Table 26 Area Calculation of Farming Land

<b>FARMING AREA</b> <b>“Aghnya”</b>	
Agricultural land	3810 m <sup>2</sup>
Demonstration Land	1000 m <sup>2</sup>
Store House (4 nos. @ 45 m <sup>2</sup> )	180 m <sup>2</sup>

Table 28 Area Calculation of Fish Pond

<b>FISH POND</b>	
1. Fish Pond (a)	320 m <sup>2</sup>
2. Fish Pond (b)	460 m <sup>2</sup>
3. Fish Pond (c)	300 m <sup>2</sup>

Table 27 Calculation of Area for Goat

<p><b>Goat Farming: Calculation for 50 females and 4 males</b></p> <p>Ratio of Female to male goat = 20: 1</p> <p>Every year 85% of female give birth: 42.5</p> <p>Consider out of 42.5 (85% of female goat), 50% gives birth to twins = 42</p> <p style="text-align: right;">50% gives birth to single = 21.25</p> <p style="text-align: right;">Total birth = 63.75 ~ 64</p> <p style="text-align: center;">Consider, Young male birth = 32</p> <p style="text-align: center;">Young Female birth= 32</p>
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Table 28 Program Space Area Calculation of Goat Shed

Goat	Area per goat	Nos.	Total Area
Adult Female	1.5 sq. m	50	75 m2
Adult Male	2.0 sq. m	4	8 m2
Young Female	0.75 sq. m	32	24 m2
Young Male	0.75 sq. m	32	24 m2
Store Room	15%	1	20 m2
<b>Total</b>			<b>150 m2</b>

**CALCULATIONS:**

**Total Site Area – 25,436 sq. m (50 ropanis)**

**Ground Coverage – 6269 sq. m (25% of site area)**

**Built up Area – 10,457 sq. m**

**FAR – 2.5**

## 6. SITE INFORMATION

### 6.1. SITE SELECTION

The Chepang community, one of the most marginalized ethnic groups in Nepal is mostly found in the districts of Chitwan, Dhading, Gorkha, Makawanpur. They are dispersed among 54 VDCs, which include the neighboring districts of Chitwan (38%), Makawanpur (37%), Dhading (19%), Gorkha (6.5%), and, to a lesser extent, Lamjung and Tanahun. The highly populated district of chepang ethnic group is Chitwan, which can be easily reachable from Makwanpur district as well. Considering the fact where most chepang are found in Chitwan district, the site chosen for the thesis lies on Madi Nagarpalika of Chitwan, where chepang (population- 1162) are found on the outskirts of rivers of kusumkhola and pariyakhola connecting Chitwan national park areas. The site lies corresponding to Chitwan national park area, which is also considered as buffer zone. The site is easily accessible from the Bharatpur Airport by a well-maintained 45 km long route that connects to it.

Madi is a municipality in Chitwan District of Nepal. Former four village development committee serially from East to West Ayodhyapuri, Kalyanpur, Baghauda, and Gardi are politically merged to form Madi municipality. Geologically, Madi is a valley with north facing Churevabar and remaining surrounded with Shomeshwar Mountain. It is known for several ancient religious sites. Pandavas were here in their 12 years exile. There is a village named after them, Pandava Nagar in western Madi. This is also the sacred place for Hindus as the Sage Valmiki lived here thousands years ago

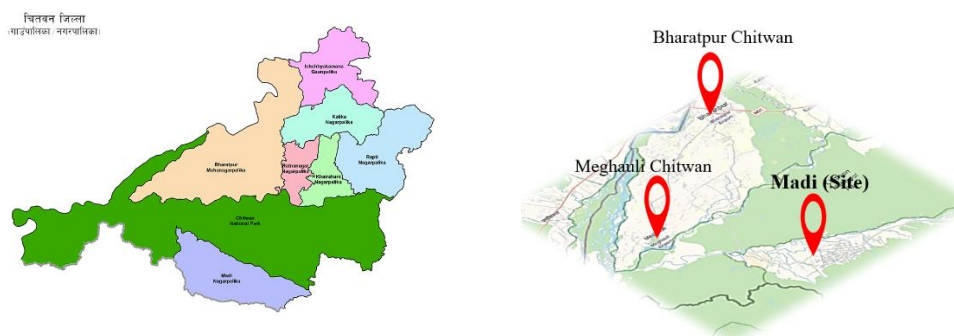
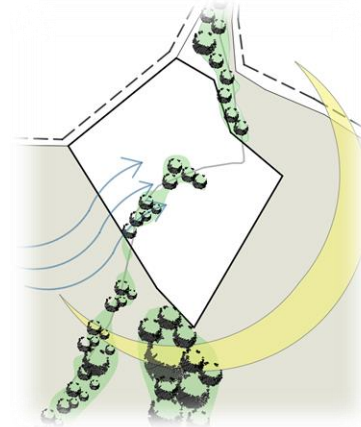
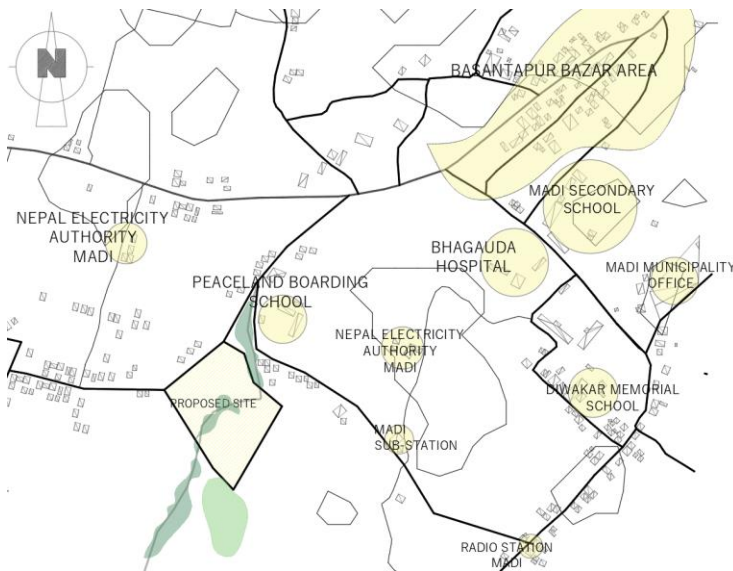


Figure 36 Map of Chitwan District

## 6.5.SITE INFORMATION

- Location- Madi, Chitwan
- Targeted Community – Chepang (Around 150 Houses in Pariyakhola and 100 Houses in Kusumkhola)
- Land Topography – Plain
- Site Area – 50 Ropani
- Climatic Condition - Tropical monsoon climate with high humidity
- Site Surrounding- Residential, Commercial, Institutional, Governmental and Agricultural Zone
- Travel Distance- 45 km from Narayanghat



### A. SITE LOCATION

- Site is located in Madi Municipality of Chitwan District.
- The site context is basically semi-urban type with residential building, agricultural lands and market place.
- The proposed site lies on the roadside connecting the main highway of Madi region.
- It is near to the chepang basti of Pariyakhola (around 1 km) and Kusumkhola (around 8 km)

### B. GENERAL DATA

- Area: 50 ropanies
- Coordinates: 27°26'3.22"N and 84°22'19.88"E
- Orientation: North



C. VEGETATION

- Site near to the varieties of vegetation
- Presence of agricultural land

D. INFRASTRUCTURES

- Access road: 13 m wide road at north connecting the main highway of madi region
- Available services: electricity, telecommunication, water supply, drainage services

E. MANMADE AND CULTURAL FACTORS

- Basantapur Bazaar area which is the key commercial zone of Madi is on the eastern side
- Eastern Site facilitates more governmental and institutional buildings like Nepal Electricity Authority, Peace-land Boarding School, Bhagauda Hospital, Madi Municipality, Madi secondary School, Divakar Memorial School, Radio Station Madi and Madi Sub-Station.
- Presence of open agricultural land all around in southern and western territory
- Residential settlement on the road axis along Northern side

F. CLIMATE

- Climate: humid subtropical monsoon influenced climate (Cwa)
- Humidity: High throughout the year
- Average annual temperature: 90°F (ranging from 76°F in January to 101°F in may)
- Average rainfall: 114.2in, with a minimum of 0.3in in December and a maximum of 33.9in in July.
- Local wind: SW

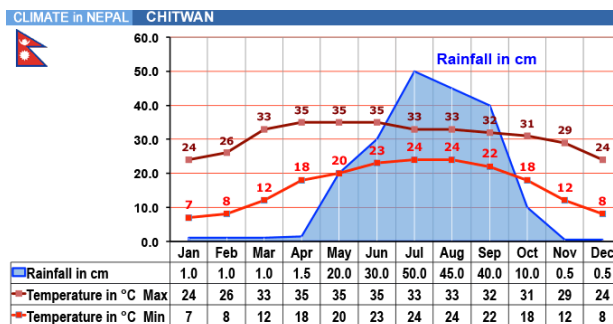


Figure 37 Climatic Data of Chitwan Madi

6.6.SWOT ANALYSIS

Table 29 SWOT Analysis

STRENGTH	WEAKNESS	OPPORTUNITY	THREAT
Natural setting Plain Terrain Excellent views Peaceful and quiet surrounding	Construction on cultivable land Private land Authority Dispute	Proximity Flourished Tourism Availability of local materials Local participation	Buffer Zone Proximity to National Park Area

## 6.7.SITE JUSTIFICATION

Since, the thesis is the proposed prototype of empowerment center for the upliftment of chepang women, the site selected for the project is at Madi Chitwan where there is large number of chepang community. The project's chosen location, Madi Chitwan, is a region with a high concentration of Chepang who live in substandard conditions. The Chepang population in the Madi region lacks access to basic services like healthcare, education, and infrastructure. The majority of women lack access to basic healthcare facilities, which contributes to their high morality rate. They don't have a fundamental understanding of the opportunities and human rights protected by the Nepali government. I went to three different locations to choose the site where the Chepang community resides. Out of all the areas I've gone, neither national or local authority has taken the chepang women and their community of Madi into consideration. They are discovered to be squatters residing on the periphery of national park areas, and as such they have no control over the land.

As stated in Kathmandu post on July 20, 2020; Dan Bahadur Praja Chepang, a resident at a squatter settlement in Kusumkhola in Madi, was on his way back home from Kirtanpur around 5 in the evening on Saturday. As he approached the settlement, he saw around 20 people riding on seven elephants enter the settlement, which was an unusual sight for him. “As I got closer I saw houses on fire. They had torched my house and my uncle’s and vandalised other houses too,” said the 20-year-old Dan Bahadur.

The women in the chepang community have endured a great deal of suffering as a result of all the vandalism and strife between them. Since then, they have been handling all of their family's tasks. They are required to provide food for their family, raise all of the kids, and perform all household chores on their own. As one of the woman said “ *hamile liyera naaada samma chulo ma aago ni baldaina*”.

29-year-old Nirmaya Chepang of Pariyakhola Madi, works as a day labourer is the sole breadwinner for her family of five. She is eight months pregnant and even bleeds from her mouth. But without working all day, her family will go hungry. “If I don’t work in the field, my family will go hungry,” Belimaya said. The family survives on plant leaves on days she does not find work. They have no land of their own and after her husband’s illness, Belimaya has been shouldering all responsibilities.



Figure 40 Chepang Women of Pariyakhola



Figure 38 Living condition of Chepang people



Figure 39 Typical house of Chepang

Source: Author Yurika Ban

### 6.8.COMPARATIVE ANALYSIS OF VISITED SITE

For the purpose of choosing the potential site, three sites in the districts of Makwanpur and Chitwan were explored. The proposed location for the thesis is Madi Chitwan, which has been chosen based on needs and proximity. Comparatively, upliftment and empowerment is necessary for the chepang women of Madi Chitwan, which inspires and motivates for the proposed objectives of the thesis.

Table 30 Analysis for Site Selection

<b>Rakshirang Gaupalika, Manohari</b>	<b>Pariyakhola, Kusumkhola Madi</b>	<b>Lotthar Chitwan</b>
80% of the population are chepang.	90 % of the population are chepang	60 % of the population are chepang
Landform- Hilly terrain with difficult roadway network	Landform- Plain terrain with well-maintained roadway network	Landform- Hilly Terrain with median roadway network
Authority given to Chepang: The chairperson of ward no. 5 is chepang, Mr. Hari Bd. Praja.	No Authority is given to Chepang community members.	Fair authority is given to chepang community for economic involvement and upliftment.
Many Chepang Women are involved in commercial agriculture and skill-oriented program like tailoring, weaving etc	Very little Chepang Women are involved in commercial agriculture and skill-oriented program like tailoring, weaving etc	Many Chepang Women are involved in commercial agriculture and skill-oriented program like tailoring, weaving, restaurant, small business etc
Informal education program (praudh shikshya) has already been provided to chepang women.	No provision of Informal educational program (praudh shikshya) for chepang women.	Informal education program (praudh shikshya) has already been provided to chepang women.
On-going construction of Chepang Cultural Center	There has recently been proposing the pathway to chepang community with electricity and water supply.	On-going proposal of various economic activities facilitating chepang community.
Have sufficient land for Agriculture i.e; maize, millet etc	No sufficient land for Agriculture i.e; maize, millet etc	Have provided land for Agriculture i.e; maize, millet etc
Additional occupation- Bee-keeping, Animal Husbandry, Job and employment, etc.	Additional occupation- Animal Husbandry, collection of gittha vyaakur, labor work etc.	Additional occupation- Bee-keeping, Animal Husbandry, Job and employment, restaurant, weaving etc.

## 7. CONCEPT DEVELOPMENT

### 7.1. DESIGN INSPIRATION

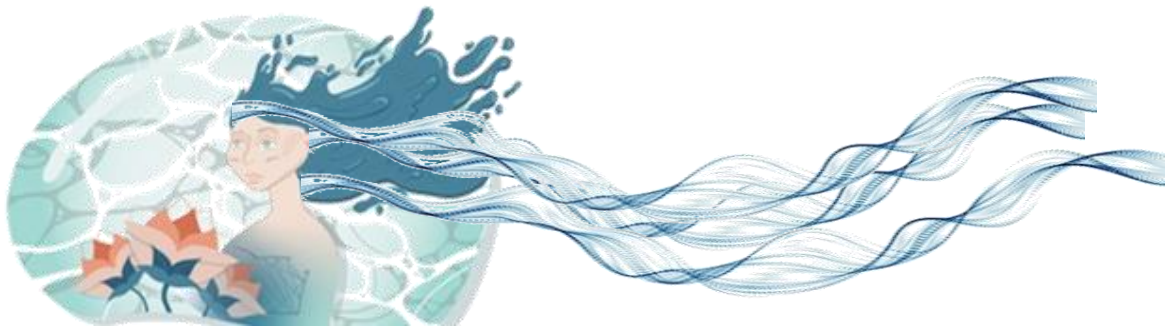
***“A key part of everything we did was to make the language and practice of architecture more transparent and accessible to non-experts.”***

*- Dr Jos Boys*

In a manifesto written at its inception in 1981, founders of the Matrix wrote: “Consciously or otherwise, designers work in accordance with a set of ideas about how society operates, who or what is valued, who does what and who goes where. Through lived experience, women have a different perspective of their environment from the men who created it. Because there is no ‘women’s tradition’ in building design, we want to explore the new possibilities that the recent change in women’s lives and expectations have opened up.

The project best defines the richness of the multiple ways through opportunity as a program model and gender as the challenge in the architectural world. It addresses the literature defining gender bias on space and public realm, the interconnectedness between sex and gender, and the role of indigenous community. The main factor responsible to conceptualize the project is the user experience and the need of the community itself.

The perfect inspiration that we all can relate when we thinking about women is ‘**nature**’. The way nature’s every perspective deal with the feminine perception, inspires me to choose one of the natural forms as my conceptual approach. While thinking about the natural form, I took an inspiration from my site itself. There is a small river flowing along the site, which I represent as my conceptual planning approach. The river in Hindu mythology is represented as ‘maa ganga’, a goddess and a mother at the same time. They call her Maa Ganga (mother Ganga) with respect and regard her as the ideal mother because she embraces, nurtures, forgives, and shows everyone unconditional love.



*Figure 41 Representing Women as Nature and River*

## 7.2. DESIGN PHILOSOPHY

River: A Philosophy of Change

*“No man ever steps in the same river twice, for it's not the same river and he's not the same man.”*  
 - Heraclitus

One of the life’s most powerful ironies is that the only constant in life is change. This is best described by the Philosopher Heraclitus in 5<sup>th</sup> century BC saying, you can never step in same river twice. Because neither the river nor you are the same. Here I’m trying to represent the river as a ‘CHANGE’ embracing the framework and process of women empowerment. The change from being into the dungeon, the change from being the underrepresented, the change from being the one seeking their own identity to the change of seeking the opportunities and being a perfect mixture of empowered and skilled women in the society. The project addresses the change through the framework of empowerment in three level:

- Personal Level Change
- Relational Level Change
- Environmental Level Change

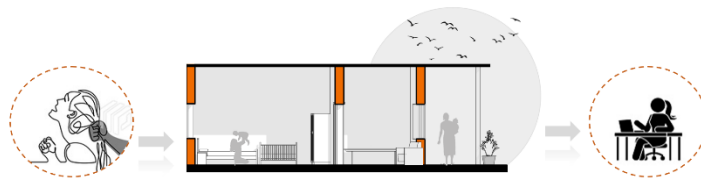


Figure 42 Personal Level Change



Figure 43 Relational Level Change



Figure 44 Environmental level Change

## 7.2. DESIGN DEVELOPMENT

### 7.2.1. CONCEPTUAL FORM

#### Representing a Women’s Circle of Life

Women's lives are often represented as a circular loop, symbolizing the never-ending nature of their household chores and responsibilities. From taking care of children to managing the household, cooking, cleaning, and doing laundry, the list of daily tasks seems endless. The representation of women's lives as a circular loop with no edges is both a reflection of the reality of many women's lives and a commentary on the societal expectations placed upon them. The loop suggests that the cycle of domestic work and responsibility continues indefinitely, with no end in sight.

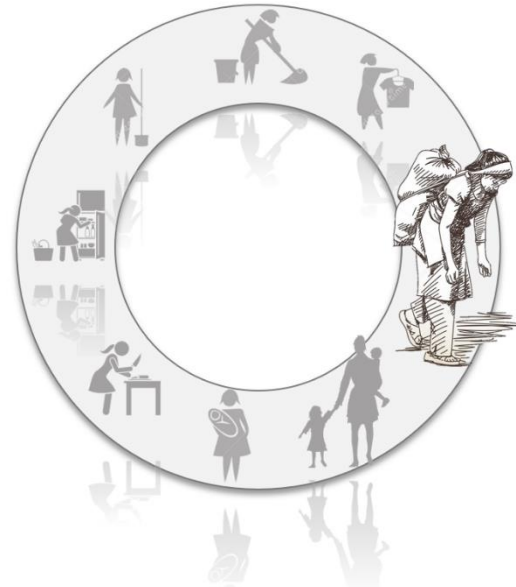


Figure 45 Women's circle of life

#### Breaking the Circle of Life

The symbol of a circle being broken into two semi-circles, and placed in a way that represents the continuation of the journey without being limited to the constant loop of a circle, is a powerful representation of the change in women's empowerment. The conceptual approach embodied in this symbol emphasizes the philosophy of breaking free from the restrictive loop of gender norms and societal expectations, without abandoning the journey of self-discovery and growth.

By breaking the circle, women are able to redefine their roles in society and challenge the status quo. This symbol represents the idea that women are no longer confined to a pre-determined path and can now forge their own paths in life, creating a new narrative for themselves and others. The placement of the semi-circles in a way that allows for the continuation of the journey also represents the idea that the path to empowerment is an ongoing process, with no final destination or endpoint just like the flow of river.

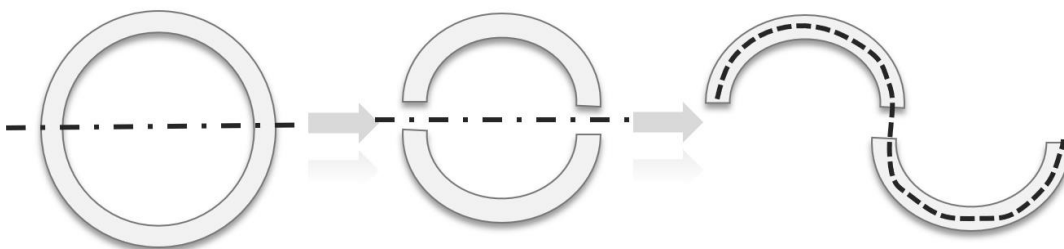


Figure 46 Breaking the Circle of Life



### 7.2.2. EXTRACTION OF FORM

In accordance with the guiding principles of the form that symbolizes the life cycle of women, I am endeavoring to replicate the abstract representation by drawing inspiration from the natural elements that are significant to the Chepang way of life as well as the features of the site itself. This approach is intended to provide a more detailed and nuanced understanding of the planning process, as it seeks to capture the essence of macro-environment in the design.

- **Extraction of Circular Building form from the Trees**

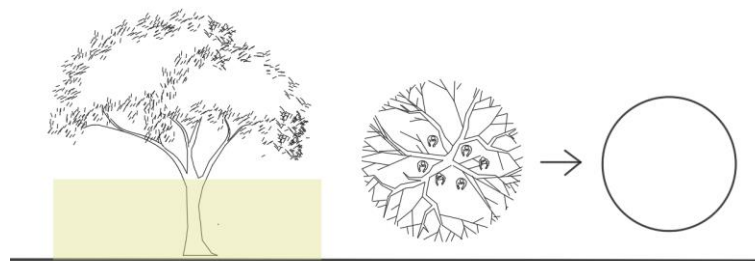


Figure 47 Tree as the conceptual approach

- **Extraction of Curve form from the River**



Figure 49 Flowing River

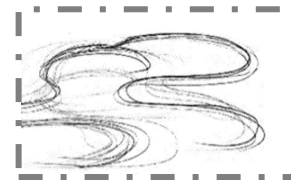


Figure 48 Abstract Curve

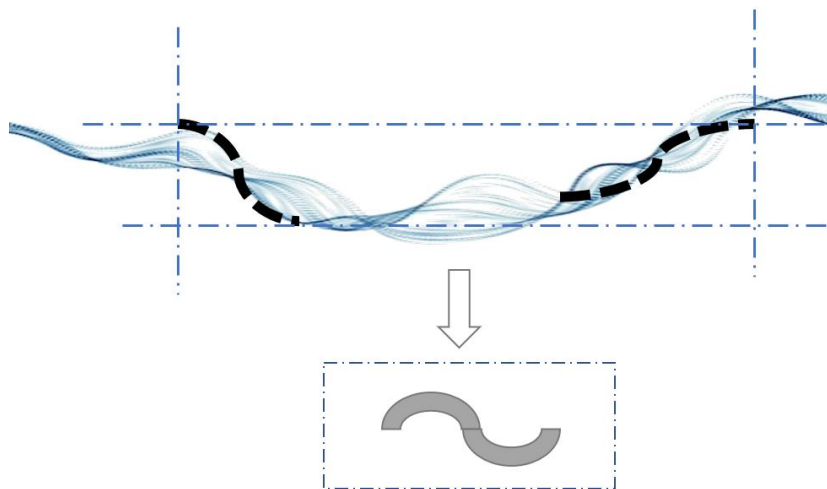


Figure 50 Extracting Curve form from the River

## 7.4. CONCEPTUAL PLANNING

### Chepang Community Settlement Pattern

The Chepang community traditionally lived a nomadic life, in the forests and hills of Nepal. For centuries, they relied on hunting, gathering, and subsistence farming to survive. They had a deep spiritual connection with nature and used to live below the trees for many years back.

After certain years of modernization in residential architecture and the government strict policies on conservation lands, they moved to the bank of rivers and lived there in unauthorized ways following the organic settlement pattern. They were given small plots of land and encouraged to adopt modern agriculture practices.

Over time, they follow the commercialization techniques and were able to accumulate certain wealth to build houses made of wood, mud, or brick. Chepang community is the only community which is in the verge of development, adopting all the modernized ways of living to have quality of life. It is the community who seek for a change and are flexible to adopt the built environment.

Thus, the design development follows the organic settlement pattern resembling the buildings along the side of river and living environment under the trees.

Here, two natural form is considered through the design development:

- 1) Tree
- 2) River

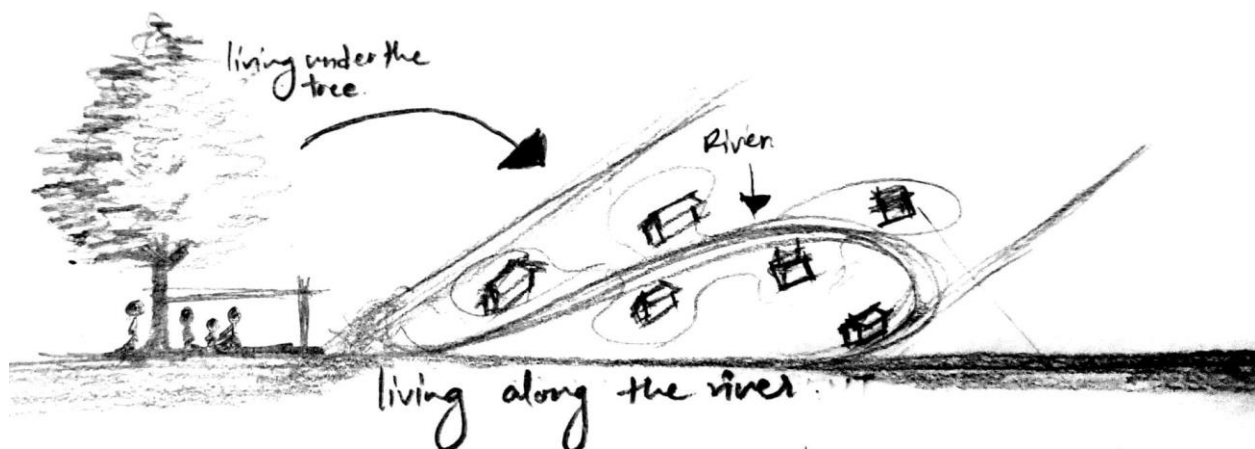


Figure 51 Chepang community settlement pattern



- **Organic Settlement pattern along the bank of River**



Figure 52 Organic Settlement pattern along the Pariyakhola

- **Cluster planning pattern extracted from the tress cluster**

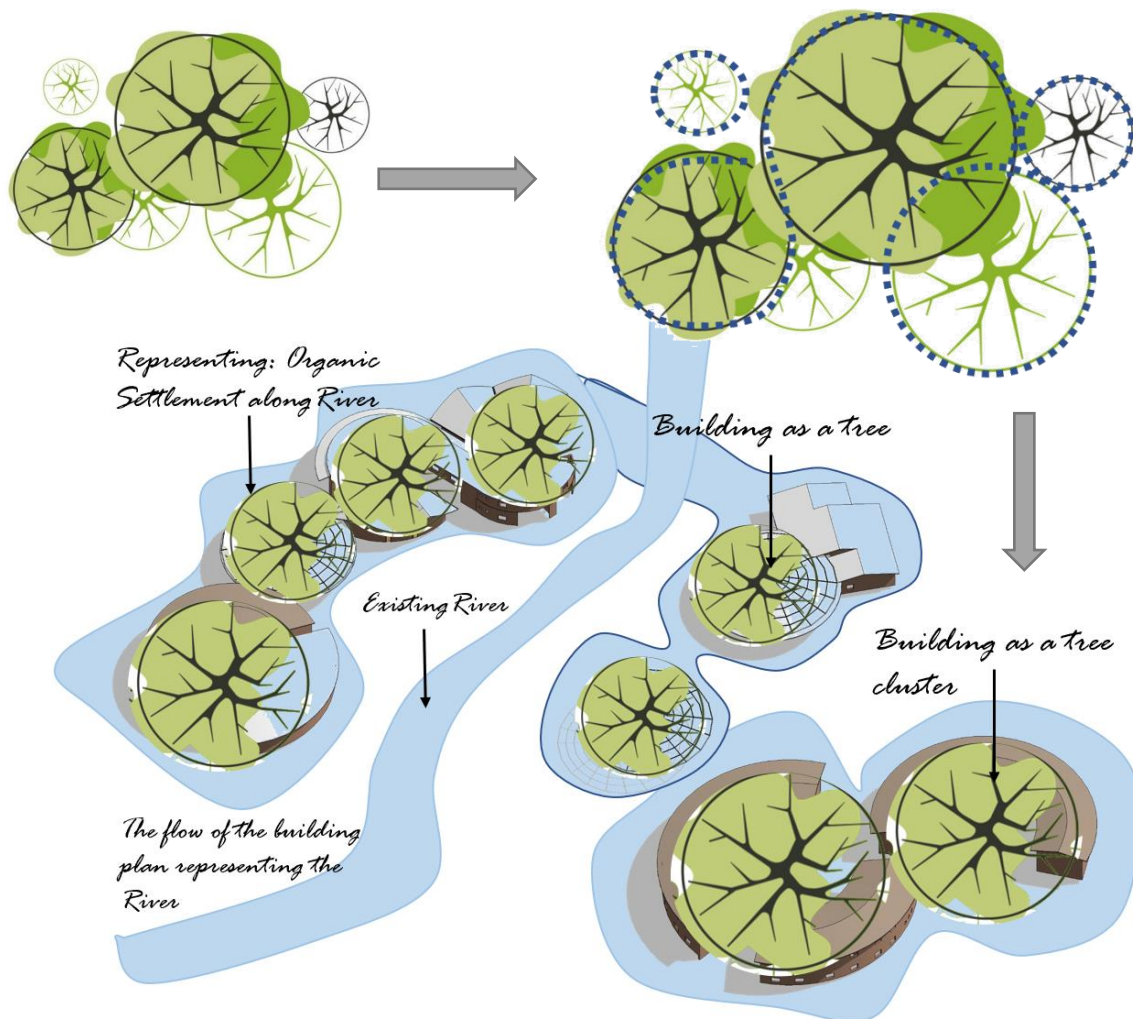


Figure 53 Planning representing the cluster of trees along with the flow of river

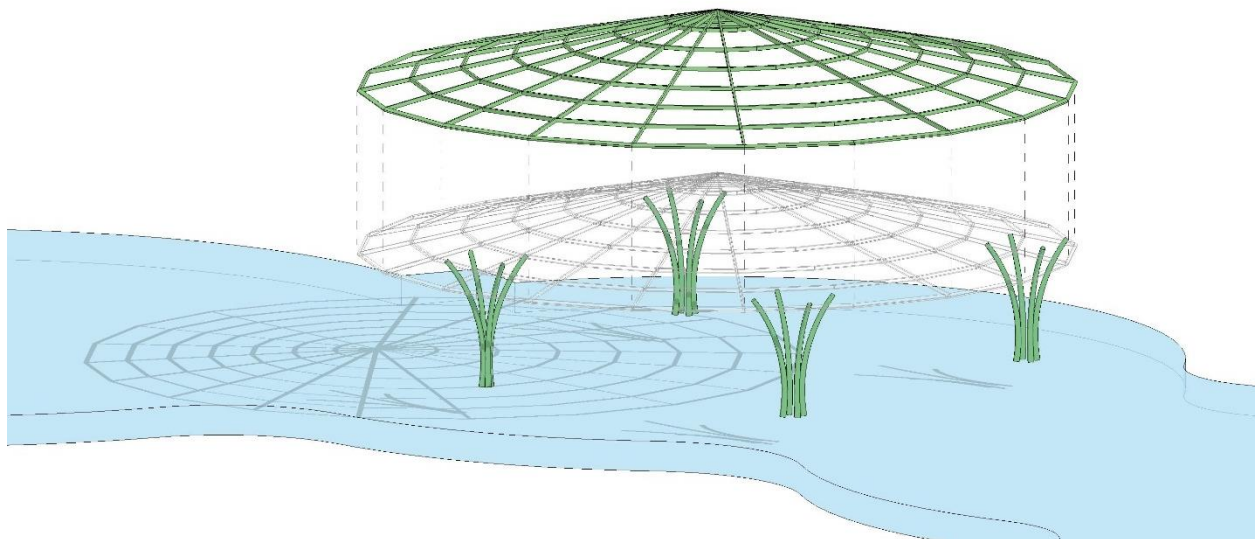
The concept of building form extracted from the flow of rivers and tree clusters involves using the natural patterns and shapes found in these natural features to inform the design and layout of buildings. The idea is to create a harmonious relationship between the built environment and the natural environment, integrating the two in a way that is both visually appealing and functional.

When it comes to the flow of rivers, building forms can be inspired by the way the water moves and interacts with the surrounding landscape. For example, a building could be designed to mimic the gentle curves and meanders of a river. This can create a sense of fluidity and movement in the building design, which can be particularly effective in structures that are located near or on the water.

Similarly, tree clusters can inspire building forms that are more organic and irregular in shape. By studying the way that trees grow and form clusters, an architect can create building layouts that are more free-form and natural, rather than the traditional box shapes that dominate much of modern architecture.

Overall, building form extracted from the flow of rivers and tree clusters represents a new approach to architecture and design that places a greater emphasis on the natural world. By drawing inspiration from the patterns and shapes found in nature, we can create buildings that are not only aesthetically pleasing, but also more in tune with the surrounding environment.

Here, the building's roof resembles with the tree with column structure representing as a tree's supporting stem and the planning representing the fluidity of the river is well-interpreted through the plinth.



*Figure 54 Conceptual representation of the project*

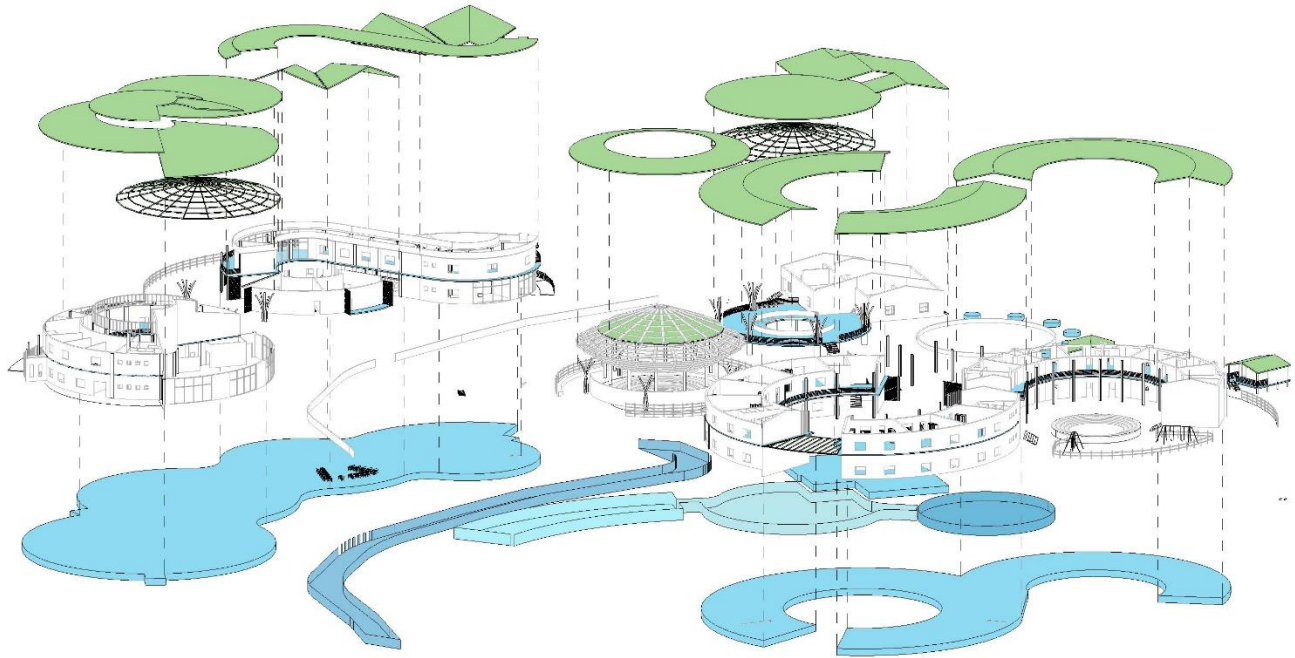


Figure 55 Graphical representation of conceptual approach on project



Figure 56 3D view of the Project



## 7.5. ZONING

Zoning refers to the process of dividing the proposed area on the basis of functional approach. Here river following through the site divides the public zones from private and semi-public zones. In the case of a project where a river separates the public and private zones, the planning is taken into consideration witnessing the physical barriers presented by the river and how they can be used to guide the use of the land.

The public zone includes the facilities like Admin block along with the multi-purpose hall, exhibition unit and Training blocks. While, the semi-public zones include the facilities like Cafeteria, Learning unit, Demonstration farm and livestock rearing. Likewise, the private zones includes the shelter units and guest lodging. The zoning plan is well-considered to connect the different zones resembling the flow of the river, such as building a bridge or pedestrian walkway across the river.

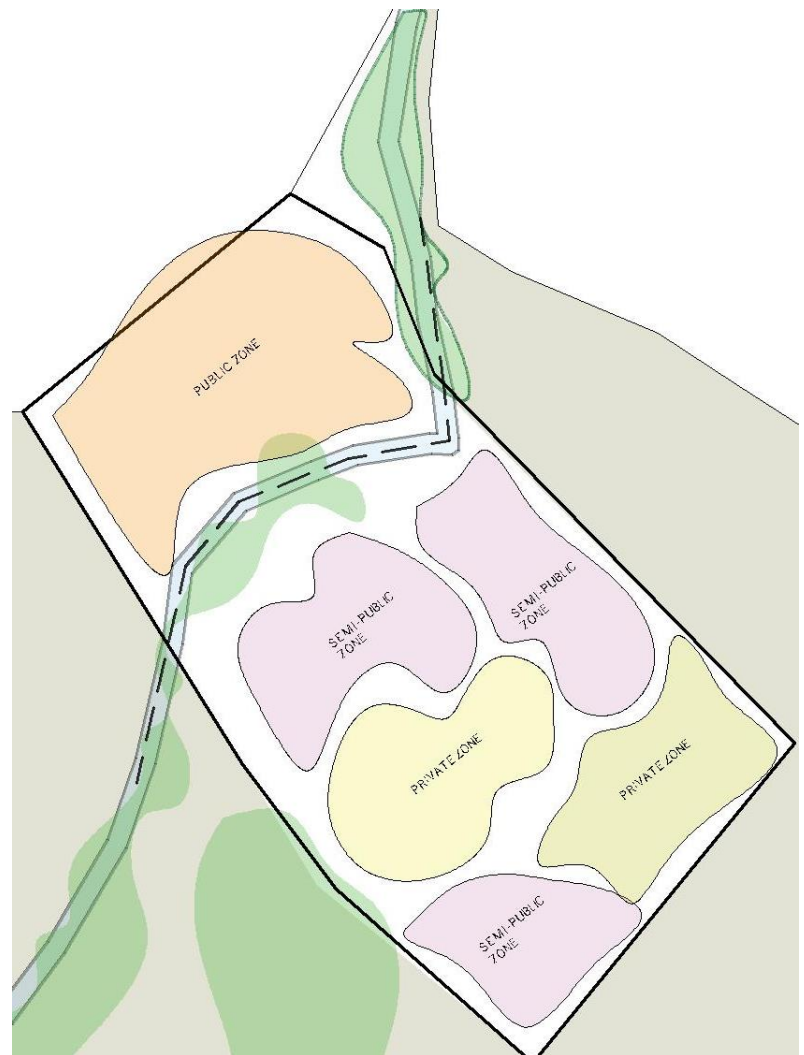


Figure 57 Pubic, Semi-public and Private Zoning

### Zoning Following the Framework of Empowerment Process:

- 1) **Personal Level change Zone** – The zone where women are provided with basic needs and facilities, along with the personal involvement opportunities: Dormitory unit, Agriculture land, Farming
- 2) **Relational Level Change Zone**- The zone where women co-relate with other women through different medium: Learning Unit, Training Blocks, Cafeteria
- 3) **Environmental Level Change Zone**- The zone which represents social exposure to the surrounding: the Admin Block, Exhibition spaces, Guest Accommodation

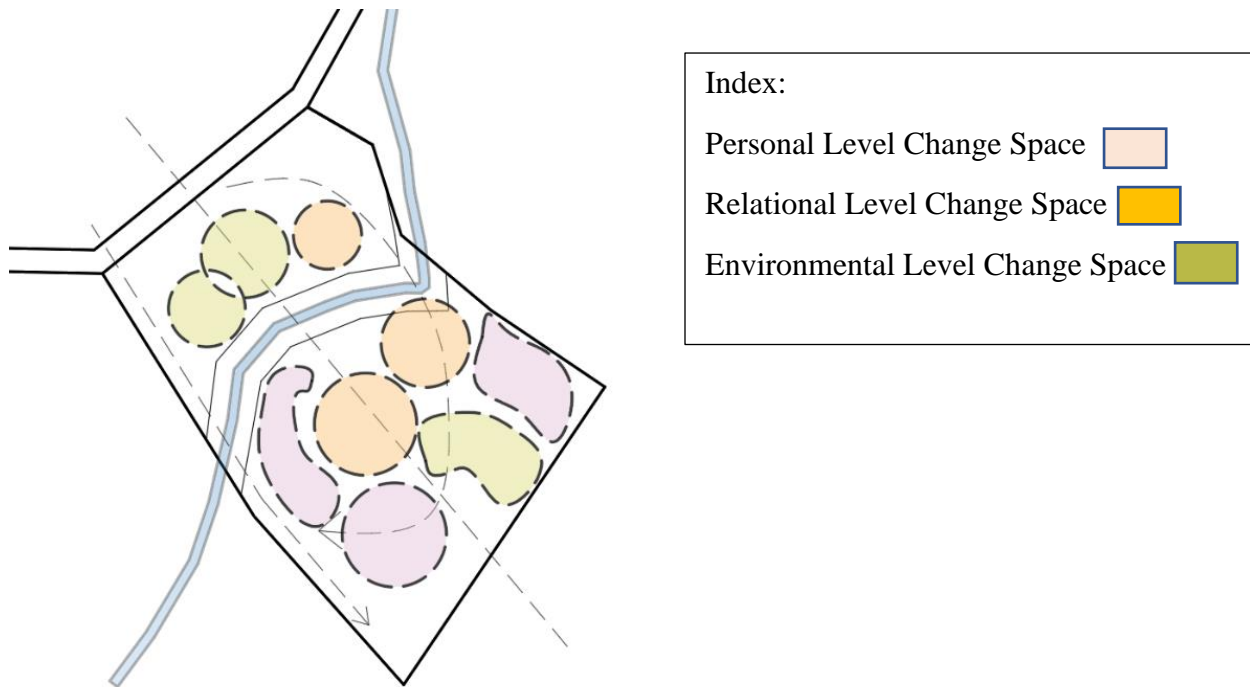


Figure 58 Zoning following Empowerment process

## 7.6. SPATIAL PLANNING

- Extrovert Planning Approach:** Extrovert spatial planning aims to create a sense of community and social connectedness, by designing spaces that promote interaction and engagement with the surrounding environment. It promotes an outward-looking approach to urban development, with a focus on creating spaces that connect people to their surroundings, rather than isolating them. The public zoning is designed following the prospect of extrovert planning. The active façade with glass cladding and open terrace interacting with the community and motivating them to be involved in the activities is the foremost concept of extrovert planning. It also includes designing public spaces like the exhibition spaces, training units, market spaces that are more open, accessible, and inviting, with a variety of amenities and activities to attract people.
- Introvert Planning Approach**

The Introvert Planning Approach is applied in building design to create spaces that are comfortable, functional, and reflective of the needs and values of the individuals who will use them. The planning approach is mainly done in shelter units and guest lodging. It prefers the indirect linkage with the public facilities to create more secured and private zones.

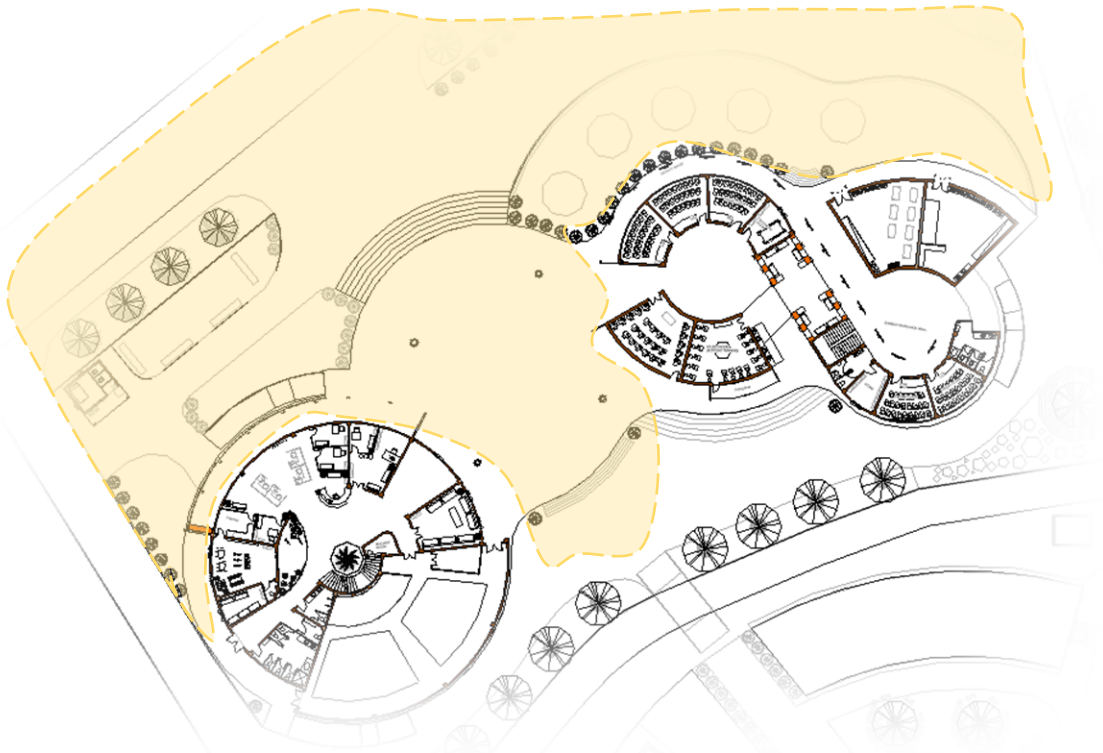


Figure 59 Extrovert Planning: Outward Planning of Building in public zone

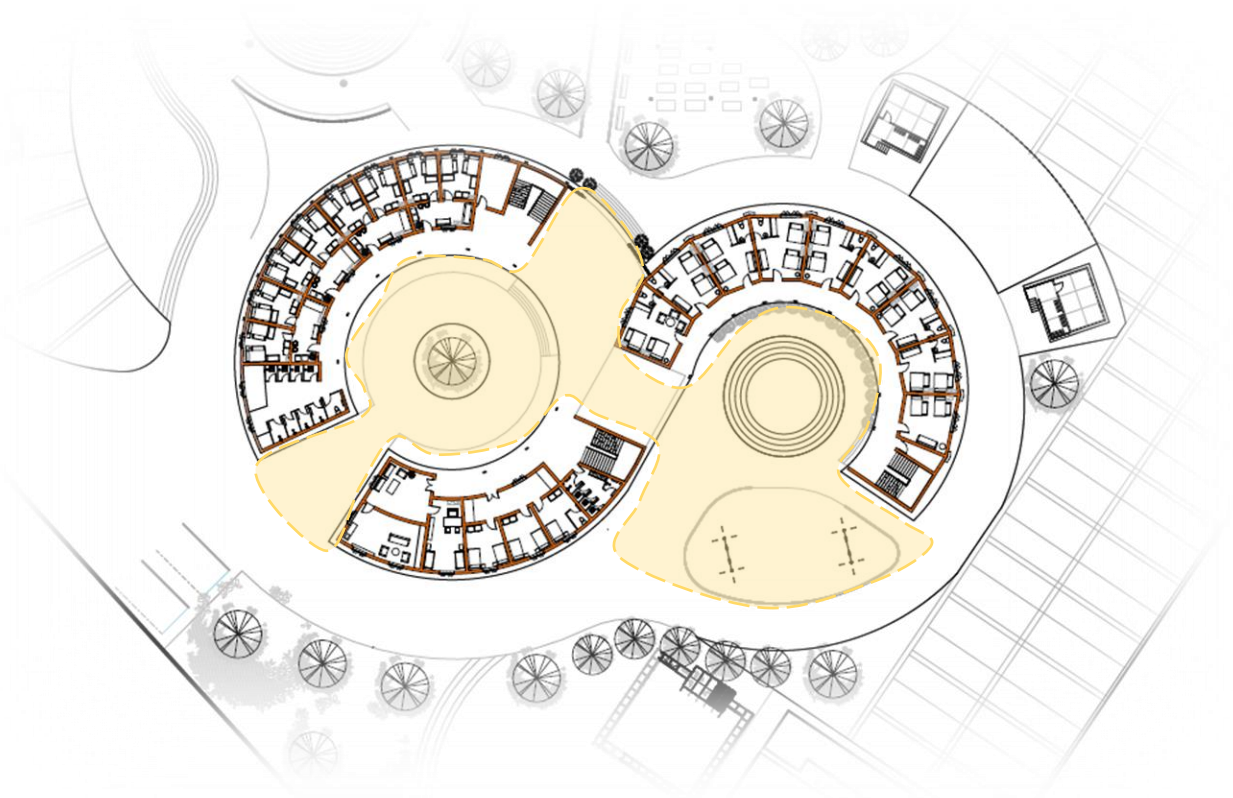


Figure 60 Introvert Planning: Courtyard Housing



## 8. MASTER PLAN



Figure 61 Master Plan

## 8.1. ADMIN BLOCK

### A. INTRODUCTION

The admin block is a crucial component of the opportunity center, serving as the central hub for managing day-to-day operations. It is designed to provide a range of services and amenities, including administrative support, financial management, workplace childcare facilities, co-working spaces, conference, library and multipurpose halls with washroom services for all. The general section of the admin block serves as the primary point of contact for visitors and staff, while the financial section handles financial matters such as budgeting, accounting, and payroll. The children section provides safe and stimulating childcare facilities, while the working section offers a range of private and communal workspaces for employees, connecting with the open spaces and outdoor environment. The conference hall and multipurpose hall are versatile spaces that can be used for a variety of events. The conference hall is used for the private meetings, and funding programs. The multi-purpose hall accommodates around 100-150 people in general. The space provided in multi-purpose hall can be used for various purpose including the seminars, workshops, exhibition spaces and rental spaces as well.



Figure 62 Admin Block



Figure 63 Rendered Image showing Training block and Admin Block



## B. FORM DEVELOPMENT

The dominating elevated double roof of Terai region of Nepal is a unique architectural feature that reflects the social, cultural and climatic influences of the region. A conceptual approach to this design feature would involve understanding the underlying social status in the community that contributed to its program development.

The elevated double roof the admin block dominates the whole built-up structure with the perfect circular shape. The roof reflects the socio-cultural significance of the house in Nepali society. Houses in the Terai region are not just a place to live but are also a symbol of social status and prestige. The double roof design is therefore used to make the house look larger and more impressive, thereby enhancing the social status of the occupants.

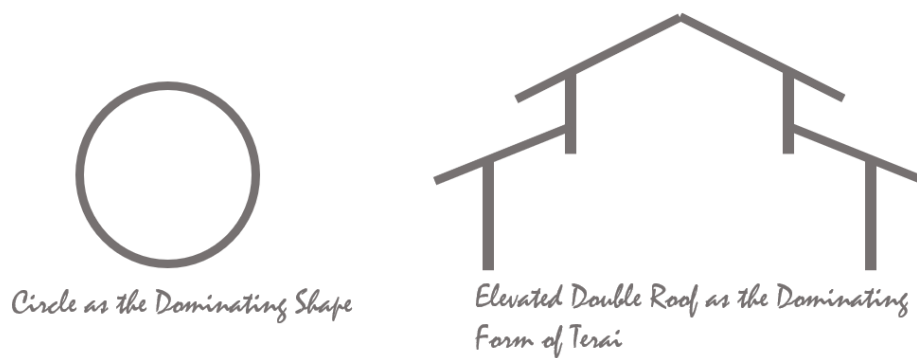
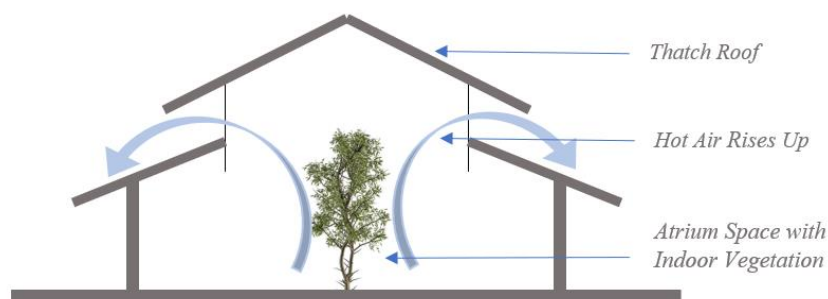


Figure 64 Form development of Admin block

## C. DESIGN CONSIDERATION

- Climate Responsive Design:** The air gap is provided between the two layer of roofing which can be used to create vertical air flow, to regulate the temperature and humidity levels inside a building. As hot air rises, it will escape through the top of the air gap, drawing in cooler air from below.



- **Active Street Façade:** One of the gender sensitive design parameter is the active street façade which is well mentained in case of Admin block. The admin block is the first communicative built-structure for any project thus, the sense of place with active and welcoming facade have to be achived in the admin block. The use of glass cladding and *baltali* space in ground level contribute to an active street facade and improve visibility. Glass allows natural light to enter the building, creating a bright and inviting atmosphere, while also enabling people on the street to see into the building and vice versa. This can help to create a sense of openness and transparency, which justify the empowering space theory of the project.
- **Transparency and Freedom of Movement:** Transparency and freedom of movement in a building are the significant design consideration for ensuring a safe and inclusive environment, particularly in terms of gender sensitivity. This involves designing the building's vertical and horizontal space flow to provide proper visibility while minimizing the potential for hiding spaces.

Horizontal space flow comprises the open floor plans, wide corridors, and using glass walls to allow natural light to pass through and enhance visibility. It facilitate smooth movement and ease of access, allowing individuals to move around freely without any barriers or obstacles.

Vertical space flow, with clear lines of sight between different levels and spaces is seen in the admin block. Stairwells and elevators should be centrally located and well-lit, with no hidden corners or alcoves that could be used for illicit purposes.



*Figure 65 Rendered Image showing Transparency and Visibility*

## 8.3. TRAINING BLOCK

### A. INTRODUCTION

Training block is provided to develop skills and encourage economic activities, especially among women. The programs facilitate by the training block create a positive impact at personal, relational, and environmental levels, empowering women to take charge of their lives and make a significant contribution to the local economy.

This training block is designed to help women develop and enhance their skills through various skill-oriented training, studio, and workshop sessions. The programs included in the training blocks are Tailoring studio, small level garment and cuisine workshop, Bamboo workshop, Construction materials workshop (might be the manufacture techniques of CSEB block used in the building as well) , Pottery studio, Candel and Insence making studio, supporting theory classes and computer lab and library.

The skill-oriented training programs in this block are designed to provide women with practical knowledge and training in various fields. These programs will cover a wide range of topics, including entrepreneurship, marketing, financial management, and product development. The objective of these training programs is to help women acquire the necessary skills and knowledge to become successful entrepreneurs or to start their own business ventures.



*Figure 66 Training Block Orthographic view*

## B. FORM DEVELOPMENT

Training block reflects the ‘Change in women’ through the program space provided following the framework of women empowerment. The philosophy behind the ‘change’ mechanism of river inspire the form of the block. The use a flowing curved design mimic the meandering path of a river. It create a sense of movement and fluidity, which can help to communicate the idea of change and progress. The fluidity inspire the indoor and outdoor connectivity in the block which is the foremost requirement for any training facilities provided.

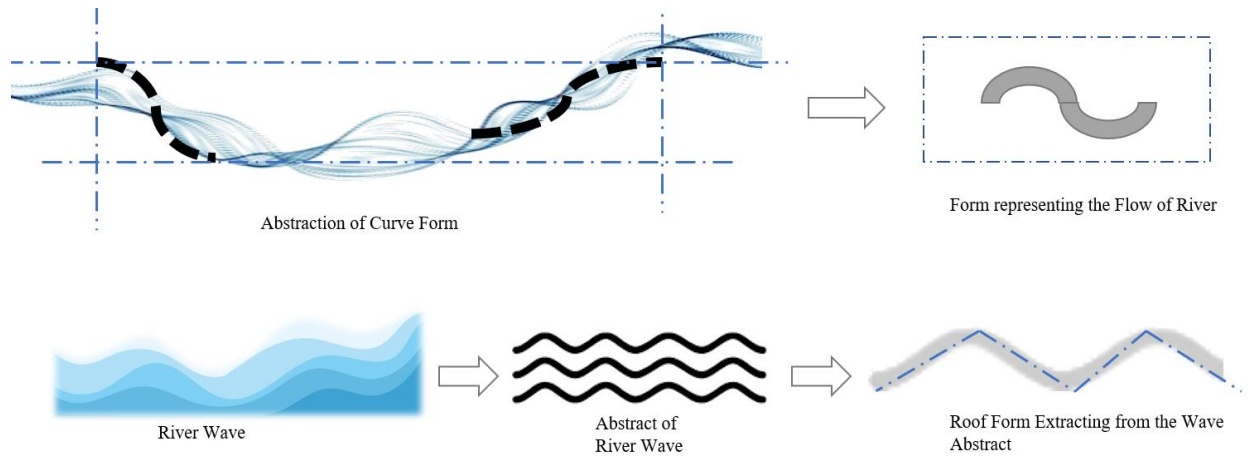


Figure 67 Form Development of Training Block

## C. DESIGN CONSIDERATION

- Freedom and Flexibility of Space:** The proper working environment is designed with large ventilated rooms, with high ceiling and transitional areas such as courtyard, or open to sky spaces. The link between indoor and outdoor space should be maintained as far as possible. The studio rooms are provided with sufficient spaces for the capacity of 15-25 person per session.

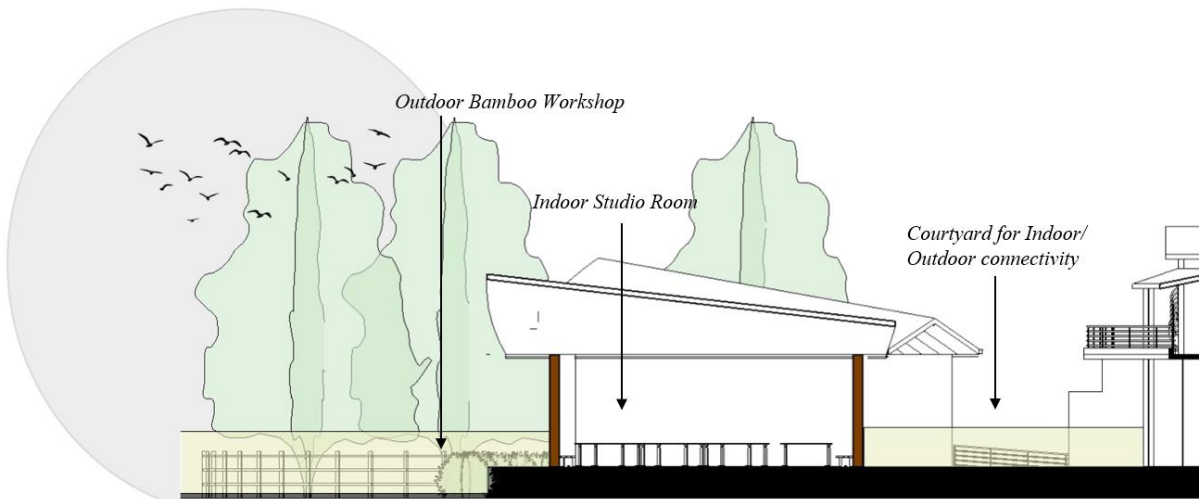


Figure 68 Section of studio block

- Visual Environments:** Studios rooms in the training blocks are provided with indirect roof light and necessary artificial lighting in case of detail workshop program like weaving and tailoring. The theory class is provided with high glass windows equal to at least 20-50% of the floor area, to create a welcoming environment through visibility as well.

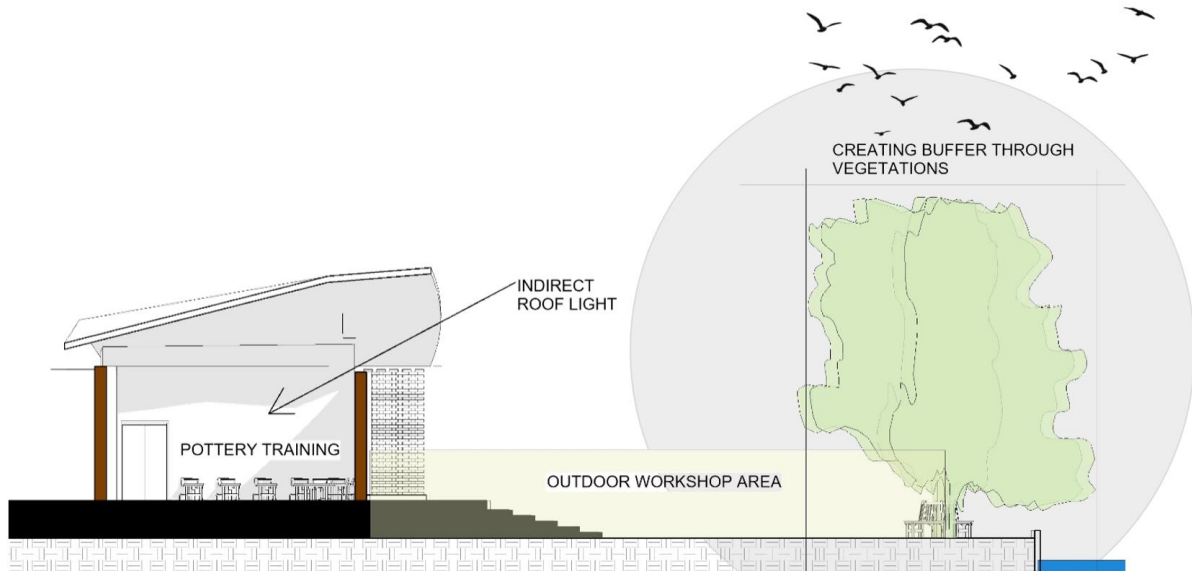


Figure 69 Section through Pottery Studio

- Buffer Zones:** Noise producing through various workspace might affect the other units as well. Therefore, buffers are created by additions of walls or vegetations nearby the outdoor workspace.



## 8.4 SHELTER UNIT

### A. INTRODUCTION

A shelter unit is a type of housing structure that is designed to provide accommodation for people who are in need, especially for those women group who are deprived, vulnerable, or marginalized. It can be temporary or permanent, and can provide various levels of support depending on the needs of the residents.

The shelter unit consists of two building blocks, one of which is designated for accommodation for deprived women, while the other serves as guest accommodation during training sessions. The building block for accommodation for deprived women can be used as a temporary or permanent residence, depending on the individual's circumstances.

The shelter unit provides a safe and secure environment for residents, with amenities such as sleeping units, bathrooms, laundry space and communal spaces socializing. The sleeping unit is further categorised providing ground floor room for women with children which accommodate 16 mother including their children and first floor rooms for single women which accommodate 42 women.

The guest accommodation block is designed to provide a comfortable and welcoming space for visitors during training sessions. The total capacity of the guest shelter is around 35 to 50 visitors. The shelter is also provided with the counseling and infirmary unit for the women who needs proper counselling and health support. Staff room and warden room are aslo provided in the ground floor of the shelter block.

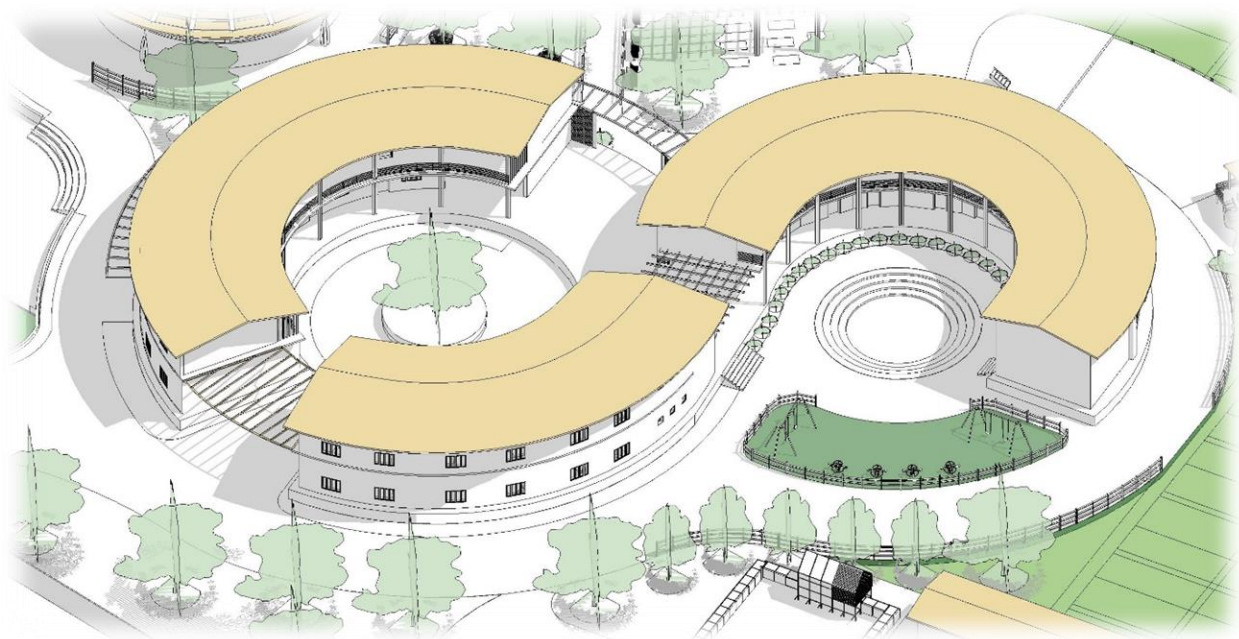


Figure 70 Orthographic 3D view of Shelter Block

## B. ACCOMODATION UNIT

Two Single bed is provided in each room for mother and children. Two room is conncted with pantry and children play area adjacent to the corridor space in ground floor. Total of six beds are provided in each room for single women in first floor with minimal furniture.

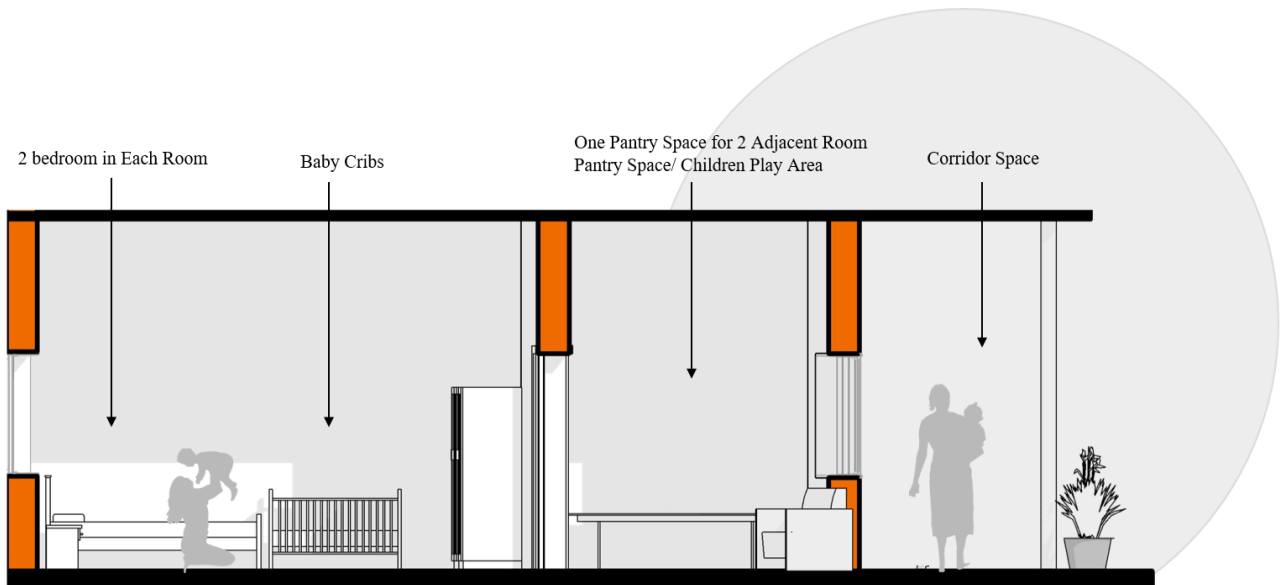


Figure 71 Sectional view of Accommodation Unit with children in Ground Floor

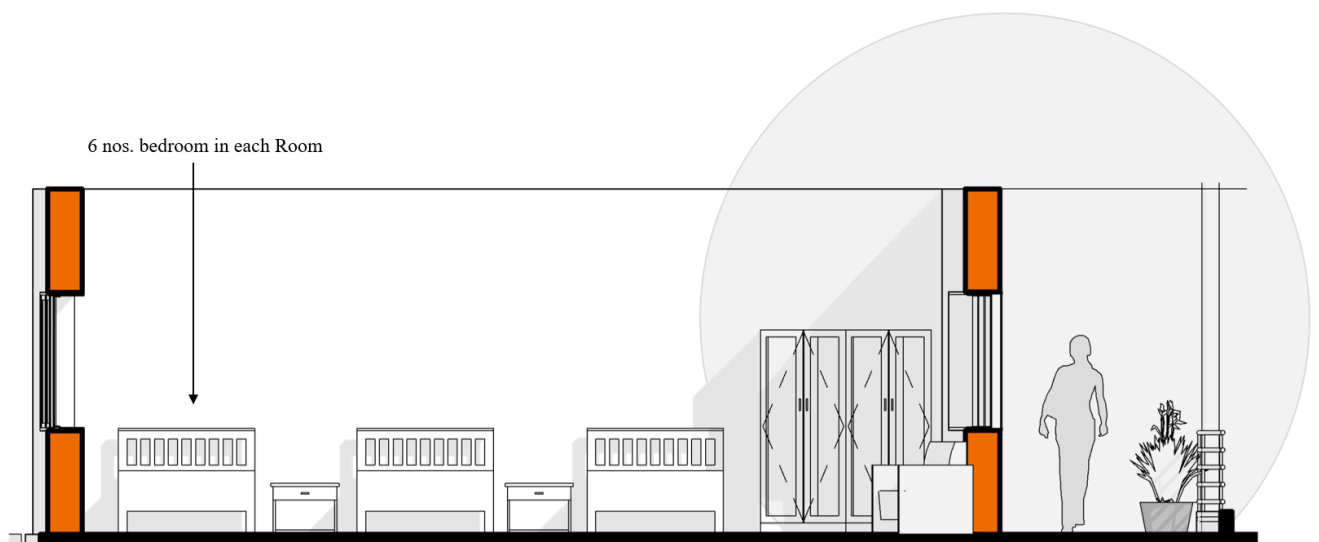


Figure 72 Sectional View of Accommodation Unit for Single Women in First Floor

## 8.5. INFORMAL LEARNING BLOCK

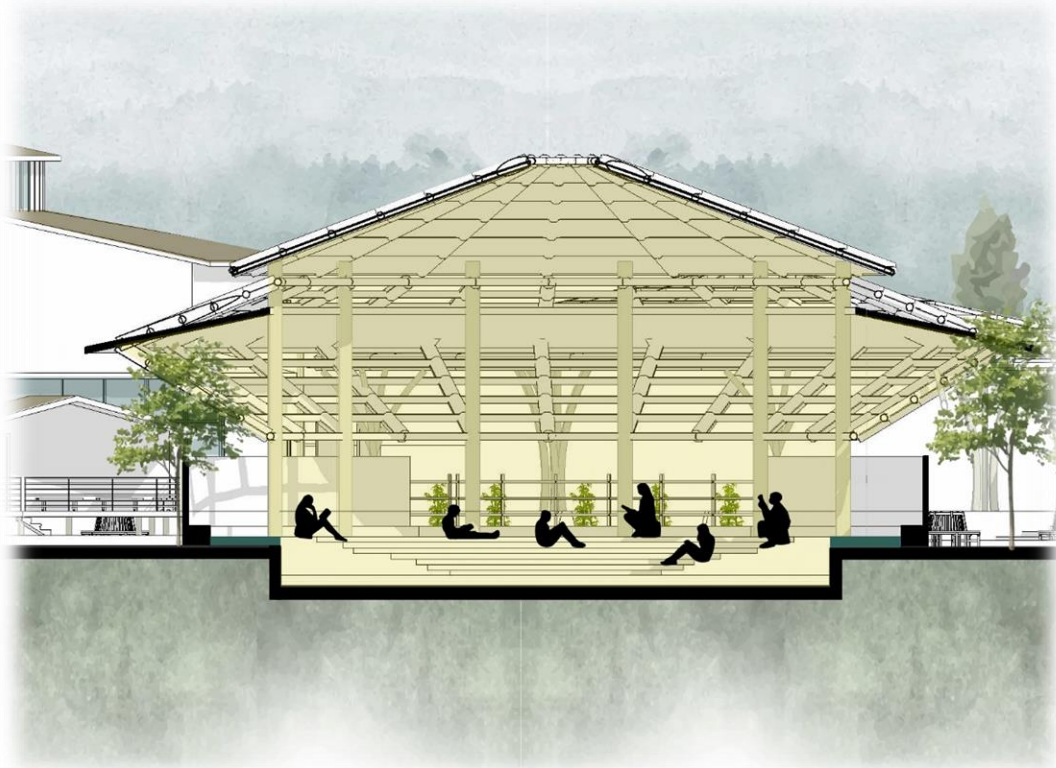
### A. INTRODUCTION

The Informal Learning Block is a semi-open built structure that features a bamboo pavilion where women can gather to learn and connect with each other. This unique structure is designed to create a sense of connection between the women and the materials used in its construction, which in turn inspires and uplifts them to learn.

The bamboo pavilion is an essential feature of the Informal Learning Block, providing a welcoming and open space for women to gather, relax and learn. It encourages the focal axis of the Opportunity center creating a hierarchy in between.

The Informal Learning Block is designed to promote informal learning opportunities for women, such as mentoring, peer learning and hands-on training. By creating a space that is both inspiring and comfortable, women are encouraged to explore new ideas and engage in activities that enhance their skills and knowledge.

The Informal Learning Block is a traditional way of learning approach to creating a learning environment that is both accessible and empowering for women. It highlights the importance of sustainable and eco-friendly materials, to resonate with the indigenous women group.



*Figure 73 3d view of Informal Learning Block*



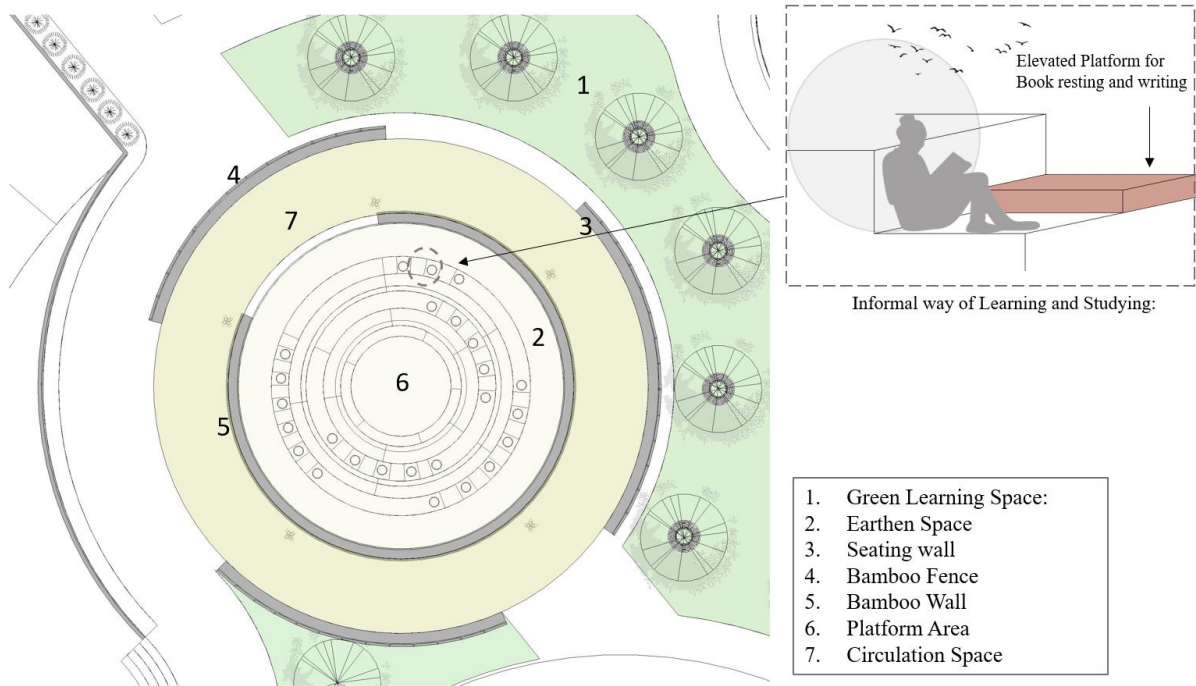


Figure 74 Ground Floor Plan of Informal Learning center

## B. DESIGN CONSIDERATION

The conceptual approach of informal learning block is inspired from the early Vedic way of education where women were free to choose between higher studies (philosophy and logic) to become ‘*Brahmavadini*’, or become ‘*Sadhyavadhu*’ to marry and look after the household and family.

The learning concept is inspired from the early education system named as “*Gurukul System*”. The system was based on the concept of imparting holistic education to students, including moral, ethical, and spiritual values in addition to academic knowledge. Likewise, women’s perception of learning directly relates to the gurukul way of learning, often in an outdoor setting, often sitting under a tree or in a courtyard. They are required to live a simple and disciplined life, and are free to perform various household chores along with their learning techniques. The learning techniques is often imparted through oral teachings, and the students were expected to memorize and recite the lessons.

The circular form is inspired from the early gurukul huts which were circular in form. The design approach of learning block imparts the connection with nature with semi open structure, replicating the conceptual idea of being under the tree and learning.



Figure 76 Early Gurukul Hut Structure



Figure 75 Informal Learning Block 3d

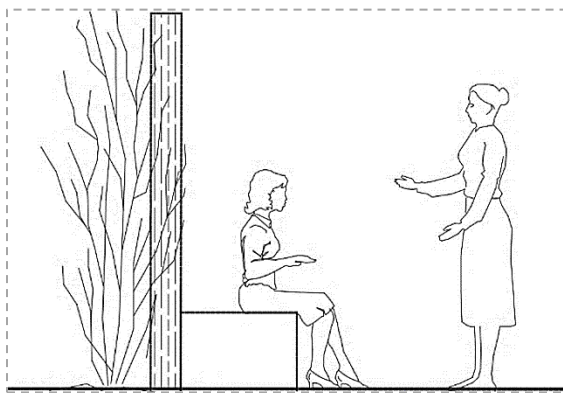
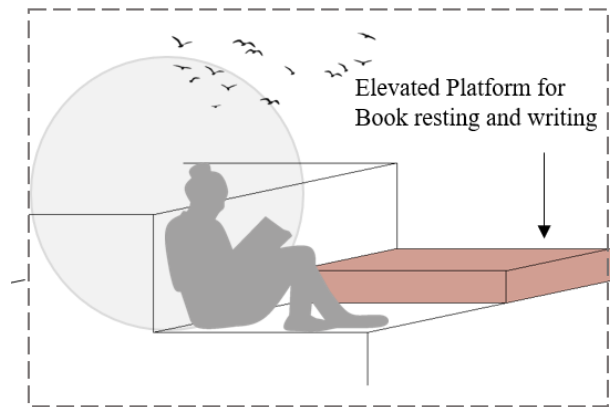


Figure 78 Informal way of Learning and interacting



Informal way of Learning and Studying:

Figure 77 Graphical representation of informal space of learning

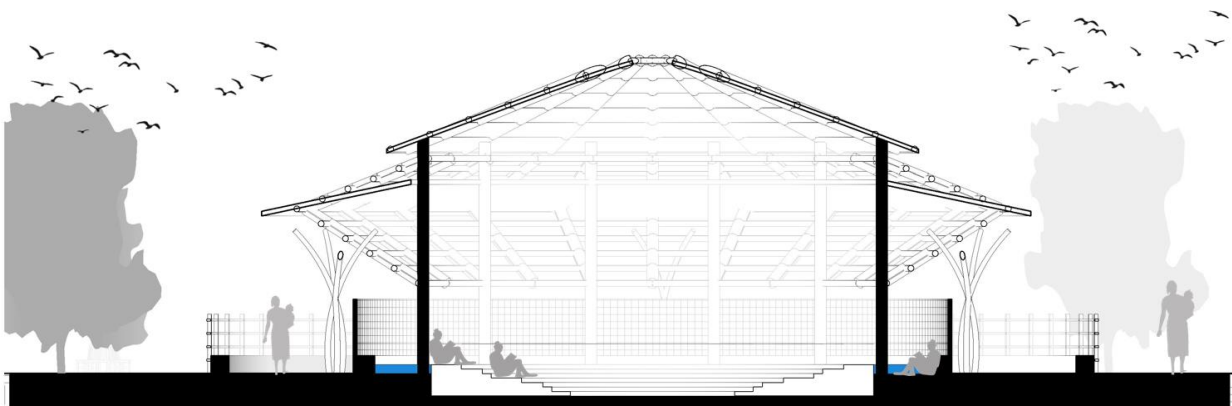


Figure 79 Sectional View of Learning Unit

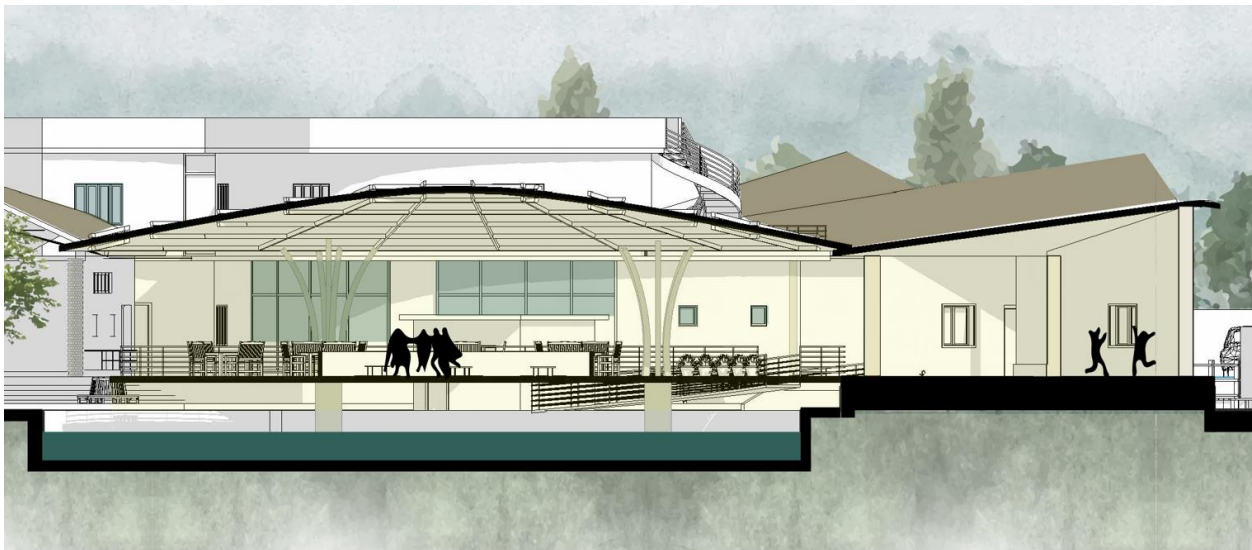
## 8.6. CAFETERIA BLOCK

### A. INTRODUCTION

Cafeteria holds the primary design concept of not only eating and serving the needs but also the divine connection with the environment around. No man ever enjoys eating inside the blank box walls serving only food. It is a nature of people to prefer dining in a more visually appealing setting that enhances the overall dining experience.

The idea behind the construction of dining space above the fish pond is to create a space that not only provides food and drink but also offers a comfortable and pleasant environment for people to relax and socialize in. The project emphasizes social empowerment, recognizing that spaces that are connected to natural surroundings have a psychological impact on us, and can contribute to our sense of empowerment.

The placement of the cafeteria above the fish pond is significant because it takes advantage of the temperature-regulating properties of water. Water has a high thermal mass, which means that it can absorb and store heat energy, releasing it slowly over time. This property helps to regulate the temperature of the air around the pond, creating a cooler and more comfortable environment, which is the perfect balance for terai region climate.



*Figure 80 3D View of Cafeteria Block*

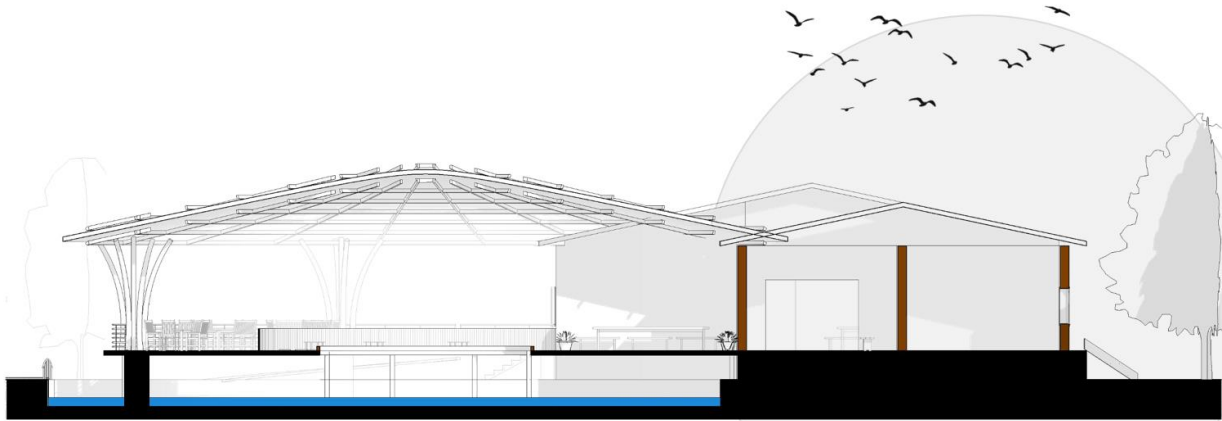


Figure 81 Sectional view of Cafeteria



Figure 82 Seating Area in Cafeteria

The seating area in the cafeteria is divided into two categories: table seating and sitting on the floor with bamboo and wood furniture. The table seating area is equipped with bamboo tables and chairs for visitors and residents who prefer to eat while sitting at a table. The tables are arranged in a spacious manner to allow for easy movement and accessibility.

On the other hand, the sitting on the floor area is separated with bamboo stacked wall. Low wooden table with seating mat 'gundri' is provided in a dining space. Visitors/trainee can sit on mats placed on the floor, surrounded by the natural ambiance of the bamboo and wood décor. This area provides a more relaxed and informal seating option who prefer a traditional dining experience.



## 9. STRUCTURE

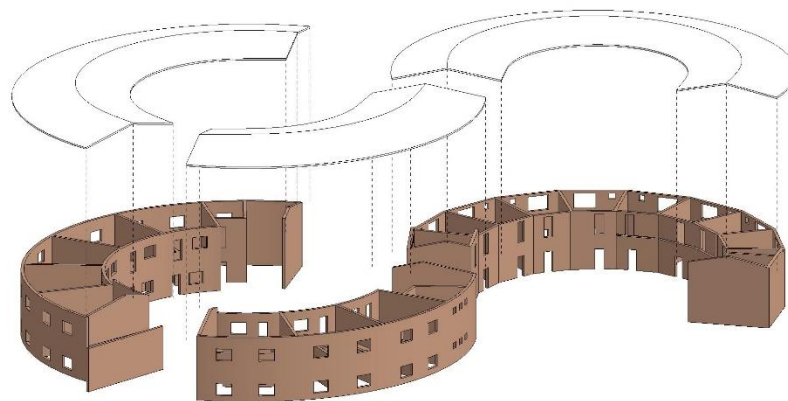
The structure used in this project is a mixed system that combines both load-bearing and frame structure. The use of bamboo construction has been the conceptual approach towards the vernacular architecture and eco-friendly design approach. The mixed structural approach is chosen to reflect the change and adaptability of the project's concept. It embraces the changes from the vernacular to modern and to sustainable and eco-friendly materials. The foremost concept of the project “Change” is well-interpreted in term of structural advancement as well.

Load-bearing structures are used in shelter block, where the bearing wall material used is CSEB block. Frame structures are used in Admin block and Training Block which consist of vertical and horizontal members connected together to create a rigid frame that resists lateral forces.

The mixed structure system used in this project allows for flexibility in design and construction while maintaining the strength and stability required for a safe and durable building. It also reflects the changing needs and preferences of society towards more sustainable and eco-friendly building practices.



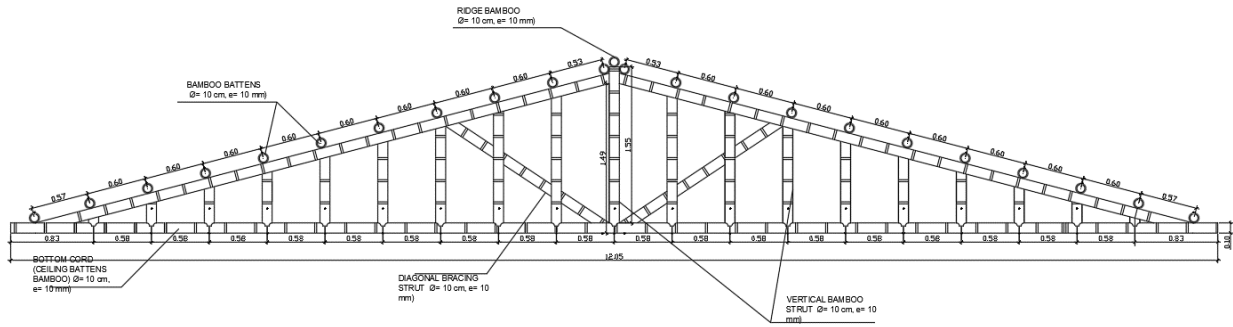
*Figure 83 Frame structure system of the project*



*Figure 84 Shelter Unit: Load Bearing Structure*

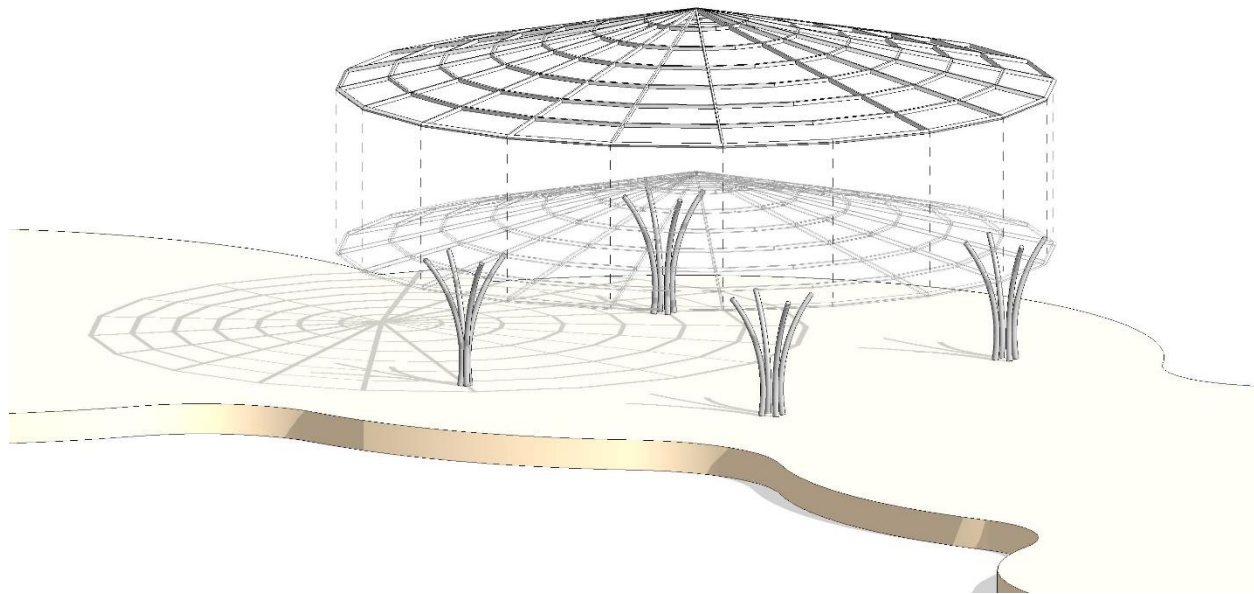
### 9.1. BAMBOO TRUSS CONSTRUCTION DETAILS

The structural members used in the bamboo truss is formed by bamboo joists composed of two bamboo pieces of diameter 10cm and thickness 1 cm. The main beams is formed by the union of 4 bamboo pieces of diameter 10 cm, thickness 1 cm. They are joined with 1/2" bolts. The joists are supported on the main beams, and 1 inch thick x 6 inch wide wooden or (steel in case needed) boarding is placed on them. As final finishing, light weight roofing material, which is thatch is placed. For the union of joists and bamboo slabs, 1/2" threaded rods 35 cm long with nuts and washers sides are used on the both sides.



## 9.2. BAMBOO COLUMN DETAIL

Bamboo has countless uses and may take on a variety of intriguing shapes when mixed with creative thinking. It is a straight, slightly tapered pole in its original state. But there are various ways, we can shape it to produce dynamic and fluid structures.



The bend structure of bamboo is the challenging form itself. There are different techniques to create curved structures using bamboo. The adopted techniques for the bend structure of bamboo is described below:

- **Rup-Rup Technique**

The cylindrical shape of whole, hollow bamboo poles makes shaping and curving difficult, yet it is possible with the rup-rup technique. In order to create the desired shape, v-shaped cuts are made along the bamboo pole's axis wherever they are required.

The structural integrity of the complete poles is reduced to simply the portion that has not been cut, which is just a split, as a result of the cutting of the wall culm. The two or more full-bamboo poles are bundled together as needed for structural members to ensure structural integrity. To ensure there is no moment in the bundle, they are bolted together using bamboo pins and threaded rods.

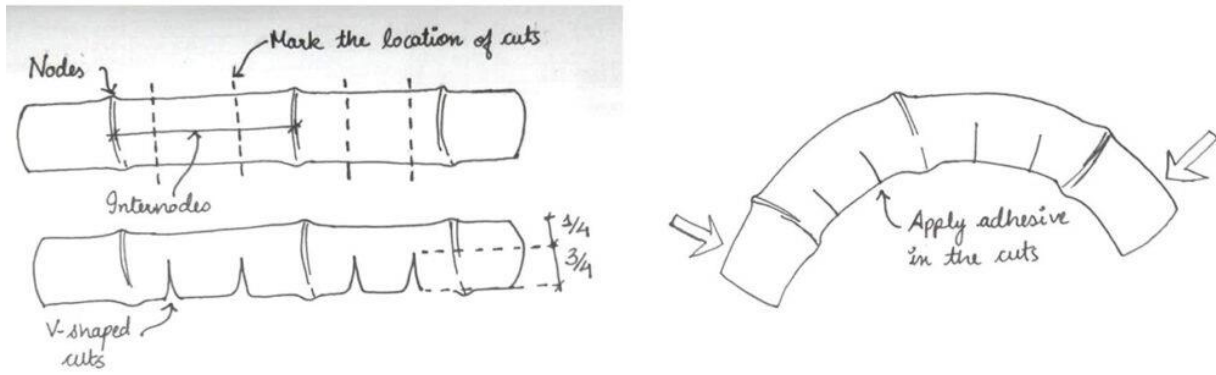


Image Source: <https://bamboou.com/wp-content/uploads/2022/04/3-WAYS-TO-CREATE-CURVED-STRUCTURES-USING-BAMBOO-5-1024x341.jpg>

Figure 90 Adopted rup-rup techniques

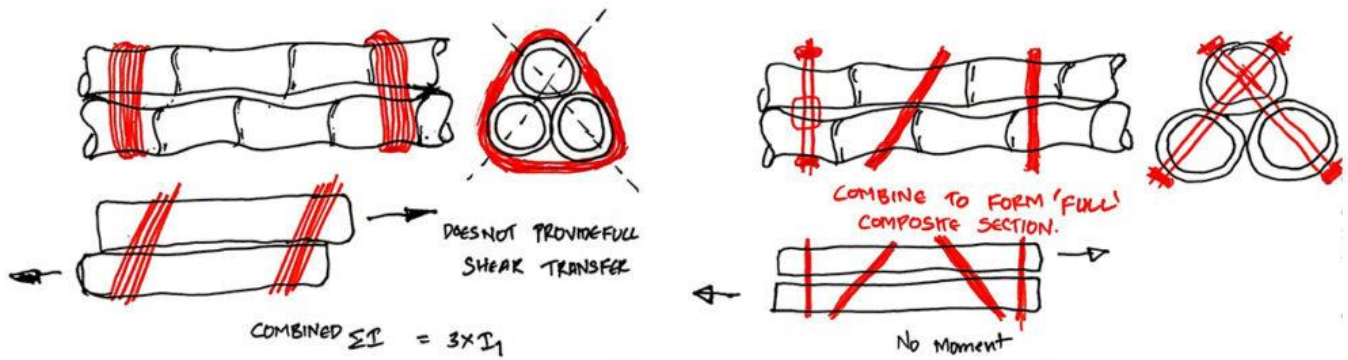


Image Source: <https://bamboou.com/wp-content/uploads/2022/04/3-WAYS-TO-CREATE-CURVED-STRUCTURES-USING-BAMBOO-6-1024x341.jpg>

Figure 91 Bamboo Column Construction Technique

Rup-rup<sup>1</sup> technique is used to make elements like structural arches, ridge members for roofs, furniture, and decorative elements like railings. *Dendrocalamus asper* locally known as Bambu petung and *Gigantochloa apus* locally known as Bambu tali are commonly used for the structural elements and *Bambusa Blumeana* locally known as Bambu duri for furniture and decorative elements.

<sup>1</sup> Furthermore, there are 3 techniques we to create curved structures using bamboo. These are: Rup Rup, Split Members and Lidi Bundles techniques.



## 10. SERVICES

### 10.1. Water Supply Calculation

Program	Users	LPHD	Total LPHD	Water Needed(l)
Admin Block	Staffs - 15	45	675	875
	Visitors - 20	10	200	
Multipurpose Hall	Visitors - 150	15	2250	2250
Training Block	Trainee- 150	15	2250	2250
Shelter Block	Women- 65	100	6500	6500
Cafeteria	Resident – 65	100	6500	9500
	Visitors – 50	60	3000	
Demand				21,375
				21.37 Cu. M
20 % for Emergency				4.274
<b>Total Demand per day</b>				<b>25.64</b>
<b>Total demand per week</b>				<b>179.48</b>

### 10.2. Waste Water Management

Detention time (t) = 3 days

Quantity of waste (Q) = 75-80% of water use = 11m<sup>3</sup>

Volume (V) = Q x t = 33 m<sup>3</sup>

Taking height of each tank = 1.5m, L = 2B; L= 6.5m, B= 3.5m

Again, based on I.S. 2470 (Part I & II), for up to 150 users, 1 soak pit is required and its size is as follow:

Diameter (D) = 5.0m and

Depth (H) = 2.75m The black water from septic tank will be treated and used to water the in house plants.

### 10.3. Calculation of Water Tank

Total Water Consumption per day = 27800L = 28 m<sup>3</sup> approx.

Size of water tank = 28 x 3 (safety factor) = 84 m<sup>3</sup>

Firefighting requirement (NBC) = 50 m<sup>3</sup>

Total Underground tank =  $84+50 = 134 \text{ m}^3 = 8 \times 5 \times 3.5 \text{ m}^3$

Water for underground tank = 40% municipality supply  
 + 40% deep boring + 20% rain water harvesting

### 10.3. Calculation for Septic Tank

Calculation for Septic Tank

Total no. of users = 446

Volume of septic tank required =  $37.88 \text{ m}^3$

Hence, No. of Septic Tank = 1

Volume of septic tank =  $37.88 \text{ m}^3$

Assuming height of septic tank = 3m

$L \times B \times H = 37.88 \text{ m}^3$

$3B \times B \times 3 = 37.88 \text{ m}^3$

$B = 2.1\text{m}, L = 3 \times 2.1 = 6.3\text{m}$

Septic Tank Size =  $6.3\text{m} \times 2.1\text{m} \times 3\text{m}$

Size of soak pit = 6x sp.6 (Sp.6 = Dia. 5m and depth 2.75) from standard

### 10.4. Rainwater Harvesting Collection

Volume for rain water collection = 20% of  $134 \text{ m}^3 = 26.8 \text{ m}^3$

Size of water tank =  $26.8 \times 3$  (safety factor) =  $80.4 \text{ m}^3$  (approx.  $81 \text{ m}^3 = 9 \times 3 \times 3 \text{ m}^3$ )

Annual rainfall = 1.62 m ('Average Monthly Rainfall in Bhaktapur, Nepal (Millimeter)')

Runoff coefficient = 0.75 ('Table 1 . Coefficient of Runoff for Different Roof Types')

The BS 8515 2009 states that the capacity of the rainwater harvesting storage tank must be the least of 5% of the annual rainwater yield.

5% of the annual rainwater yield =  $80.4 \text{ m}^3$  (approx.  $81 \text{ m}^3$ )

Annual rainwater Harvesting Potential =  $80.4 \text{ m}^3 / 5\% = 1608 \text{ m}^3$

or,  $1.62 \times 0.75 \times$  catchment area of roof =  $1608 \text{ m}^3$

Catchment Area of roof =  $1323.45 \text{ m}^2$

1. 3D Views



Figure 92 Front view of the center with Training and Admin Block



Figure 93 Training Block 3d View with active façade





Figure 94 Bamboo Pavilion Exhibition Space



Figure 95 Front Elevation of Training Block





Figure 96 Picture showing the river flowing in the site and the macro-environment



Figure 97 Shelter Block with Children Play Area





Figure 98 3d view of the center



Figure 99 3d view of the central learning block





*Figure 100 Transparent and visible indoor-outdoor environment*



*Figure 101 Design provoking the feeling of being safe and watched*





Figure 102 Avoiding Blind Alley in the design



Figure 103 Crop store house (Machang)





Figure 104 Final Thesis Model





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*“It is a trial version of ending gender stereotype and empowering those women from the scratch who have recently been entering into the world where gender equality is still a battleground, be it in architecture or in real life.”*

- Author, Yurika Ban



**13. ANNEX**

1. FINAL SHEETS: THEORY (1-9)
2. FINAL SHEETS: DRAWINGS (AR 01 – AR 17)