CENTER FOR SELF RILIANCE

A PLACE FOR LEARNING AND SHARING

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1.1 Project brief

Project name: A versatile training centre: A root to rural development

Site location: Shingula, Raipur, Comilla

Client: Sinha Group

Site area: 2,85.000 sft (6 acres)

1.2 Project introduction

Bangladesh has majority of rural areas within its region. Among the developing urban cities , Dhaka acts as the heart of Bangladesh as a developing urban city causing it to be overcrowded. People from all over Bangladesh, the rural areas migrate to Dhaka in order to earn and develop a lifestyle. Due to this event taking place, many questions arise. Why not develop the rural areas? Why not find the source of employment near one's homestead. And to do so, what could be the possible opportunity? A versatile learning centre can bring these possible changes. The concept of versatile learning (community learning centers has been at the fare-font of experiences in the field of formal and non-formal or adult learning. Creating a structure at community level to allow all those who are no longer in primary education or have never been, to meet and go through some learning process, be it literacy, skills, livelihoods etc. The

education, skill they will acquire will lead them to create a sustainable village which will help them to develop in both economic and social sectors. In order to develop a sustainable community, it is important to learn from their local techniques and sources.

1.3 Project Rationale

A versatile learning centre is not just an educational institute; it is a multipurpose structure which aims to unite the community in order to lead it towards development. The main purpose behind this project is to promote the development to the rural areas of Bangladesh. To increase their opportunities, generate economy and distribute knowledge, this project can act like as example and a prototype to guide the rural communities as well. The project is desired from the realization of the need to develop education, opportunities that are available in rural areas. The learning from the past and present, may it be knowledge or resources can lead to a better future.

The project will create awareness among the community about how the resources available in a rural community can be the source of development in architecture, living, economy and social unity.

1.4 Aims and objectives

a. To develop one's own homestead through existing available methods.

b. To establish a system for educating the communities about their local resources, how to treat them and use them.

c. To create a space this can help the community during both in learning process as well as in working process.

d. To create awareness among other rural areas through this project.

e. To develop the communities through the available opportunities and resources.

f. To promote the socio-development.

g. To develop organic, preserve and distribute the knowledge techniques.

h. Encourage community participation.

i. To create a platform of learning as well as social interaction.

j. Mix of activities

k. Encompass improved productivity

l. Increase employment and thus higher income and health.

m. To create a social-hub for knowledge

CHAPTER 2: LITERATURE REVIEW

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2.6 Architectural consideration in Designing a Learning Center

2.1 Understanding Rural and Vernacular architecture

The project aims to develop rural homesteads in Bangladesh with the help of available contextual resources and techniques. This is why understanding of rural and vernacular architecture plays an important role.

"Folk building growing in response to actual needs, fitted into environment by people who knew no better than to fit them with native feeling"-Frank Lloyd Wright.

This statement makes the purpose of rural and vernacular architecture visible.

Vernacular architecture is the category of architecture responding to the culture it belongs. It is a term used to categorize methods of construction which use locally available resources and traditional techniques to address local needs. It may also be termed as folk, native, common, traditional, indigenous and popular architecture. It is the native architecture of a place or a group upholding its culture which evolves over time with the local context . Vernacular architecture tends to evolve over time to reflect the environment, culture and historical context in which it exists. Vernacular architecture reflects the historic, geographic, psychological, environmental, climatic, financial, economic, technological, cultural, typological, traditional, available aspects of its place. Vernacular architecture develops carrying out the theme of the place or group. This field of architecture does not include any professional skillful person on building art rather the people of the place. Mostly the buildings are constructed in the local method of construction. The buildings are made of local and regional resources at a particular

place and time based on local need. This is typically found to mix modest and unpretentious, traditional and modern styles, or a hybrid of several styles. Materials and techniques are based on the skill of the local people and availability.

2.2 Agriculture and Livestock

Agriculture and livestock plays a major role as an economy generator in Bangladesh. Each rural homestead have some common and some special products to contribute in these fields.

2.21 Livestock in Bangladesh

Livestock animals, kept specially on a farm, for economic benefits. In Bangladesh these are generally cattle, buffalo, goat and sheep. Livestock constitute an important part of the wealth of a country, since in addition to draft power and leather, it provides manure, meat and milk to the vast majority of the people.

Livestock resources necessarily encompass animal health care and welfare, quality production factors, and effective rearing to keep pace with expansion of entrepreneurship related to concerned industries. It plays an important role in the agricultural production sphere. Statistics show that about 2.9% of national GDP is covered by the livestock sector, and its annual rate of growth is 5.5%. About 20% of the population of Bangladesh earn their livelihood through work associated with raising cattle and poultry. Draught power for tilling the land, the use of cow

dung as manure and fuel, and animal power for transportation make up a significant portion of the GDP. In addition, hides and skins, bones, offal, feathers, etc, help in earning foreign exchange. Livestock resources also play an important role in the sustenance of landless people. The Government of Bangladesh has given top priority to livestock development in recent years to meet the growing demand for milk, meat and egg production, and to create employment and generate income for the rural poor. To effectively organize the functional aspects of the activities of the government, various institutions and training centers are promoted in order to educate and train the local people for better and healthy production. To encourage the development of livestock resources, the government provides subsidies to farmers who rear crossbred mulch cows. The government also provides subsidies for vaccination and artificial insemination programmers.

About 40 percent of the total populations in Bangladesh are living below the poverty line in severe hardship. Both growth oriented and target oriented programmers are required to be simultaneously promoted for eradication of their poverty. This task can be successfully accomplished through the development of livestock sub-sector in various homestead which this aims to fulfill.

2.22 Livestock education and training

Livestock education and training formal institutional instructions in the field of diagnosis, prophylaxis and treatment of diseases of farm animals, such as cattle, sheep, goats, etc and husbandry practices for profitable rearing of these animals. Livestock training involves development of skills in all types of management practices of farm animals.

Training In the livestock sector, different categories of training are imparted which are contiguous to the nature of activities of field veterinarians, auxiliary staff and farmers. DLS, NGOs and other organizations conduct these trainings.

The Directorate of Livestock Services administers several training institutes. These include Officers Training Institute (OTI), Veterinary Training Institutes (VTI) and Livestock Training Institutes (LTI). These institutions offer the following types of training:

Basic training for officers This short training is conducted in the OTI for entry level livestock officers. Training elements consist of introduction of policies of GOB, internal resource development, local government and decentralization of power, public administration, government rules, personnel management, office management, policy making, project formulation and management, etc.

In the two VTIs the following training courses are offered to auxiliary staff:

Comprehensive livestock training This is offered by VTIs as in-service training to DLS's staff such as compounders, livestock assistants, field assistants and fodder/artificial inseminators for about 12 months. This training scheme aims at developing a cadre of support staff for carrying

out specialized activities like laboratory techniques, vaccination, compounding, fodder extension, and artificial insemination.

Refreshers course for auxiliary staff This is a short, 2-3 week in-service training course designed to update the knowledge of auxiliary staff on the use of crop by-products, urea treated straw, extension of exotic varieties of fodder, etc.

Contact farmers training This is organized mostly by two LTIs for training of farmers (2-3 weeks) selected to act as contact farmers. The trained farmers work as linkmen between extension agents and ordinary farmers.

Poultry farmers training (12 weeks duration) Conducted through DLS managed poultry farms which aim at updating the knowledge and skills of farmers already practicing fowl/duck production, or farmers possessing basic skills and capabilities to establish mini farms; special preference is given to women.

Training by NGOs: Most NGOs engaged in livestock activities also conduct week long courses for interested or registered farmers on poultry vaccination, cattle rearing, artificial insemination, etc. Some NGOs also produce para-vets through 3-months long training courses.

Training by youth training centres Around nine Youth Training Centres of the country also conduct 3 months training courses for unemployed youths on livestock production practices. These are designed to create self-employment and offer courses on poultry/dairy rearing, fattening of beef cattle, rearing of goats, primary treatment of livestock diseases, and

production practices including vaccination. Similar types of trainings are also offered by the Rural Development Academy, Bogra, and Milk Vita.

These various types of training can be provided in local homesteads through training centers for vast development of communities and their techniques.

2.23 Agriculture in Bangladesh

On the other hand, Agriculture is the largest employment sector in Bangladesh. As of 2016, it employs 47% of the total labor force and comprises 16% of the country's GDP. The performance of this sector has an overwhelming impact on major macroeconomic objectives like employment generation, poverty alleviation, human resources development and food security.

2.24 Cropping pattern

Cropping pattern A spatial and temporal arrangement of crops within a cropping year, largely determined by physical, biological, and socio-economic factors. There are three cropping seasons (Rabi, Kharif-I or Pre-Kharif, and Kharif-II) during a year in Bangladesh. Since rice is the major crop, it dominates the cropping patterns of Bangladesh. Depending on the land type, soil characteristics, and water availability, rice cropping may be single, double, or triple. In general, double or triple rice cropping is practiced in high land areas. In medium lowlands, mixed cropping of Aus and broadcast Aman is a common practice, while in deeply flooded lands, single cropping of broadcast Aman (deepwater rice) in Kharif, or Boro in Rabi, is the common practice. Non-rice crops are generally grown as a sequential or intercrop with rice. Most non-

rice crops are dryland crops, although some crops like jute (Deshi type), millets (Kaon), and sugarcane can tolerate some degree of submergence at later stages of growth. Jute is grown in the Kharif-I season, competes with Boro Aus for land, and is considered a substitute crop for Boro Aus in cropping patterns. The dry (Rabi) season crops included in cropping patterns may be early, middle, or late, depending upon land types, recessions of floods, and dates of harvests of the preceding crops.

In rain fed dry land areas, growing of drought-tolerant, short-duration crop species has been an important feature. Although high crop yields have been difficult to obtain, traditional cropping patterns usually exhibit a high degree of stability. Another important feature is the extensive use of mixed cropping and intercropping of annual crops. These practices provide farmers with opportunities for harvesting diverse crops from the same land, increasing total land productivity, and maintaining and improving soil fertility through the use of legumes. Boro, Aus, jute, maize, barley, and chickpea are the most important rain fed dry land crops. When more than two crops are included in the pattern, mixed cropping, intercropping, or relay cropping are practiced.

A large number of cropping patterns are generally practiced in Bangladesh, depending on the crop production environment which is greatly influenced by land type, soil texture, flooding regimes, rainfall (amount and distribution) and resource base of the farmers.

Technology used in agriculture Application of skills, tools and machines for agricultural purposes is a universal phenomenon. Agricultural technologies affect and are affected by the society that uses them, and the importance of technological development can only be

evaluated after consideration of a variety of social and technical factors. Agricultural operations in Bangladesh are more of the traditional rural type and are profoundly affected by local conditions of weather, soils, water, pests and diseases, and by land tenure systems. Most agricultural lands are fragmented and the farmers do not generally use as such modern implements. The indigenous technology practiced by the farmers of this subcontinent for centuries, in some form, are still in use in rural agriculture.

2.25 Technology used in agriculture

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Animal and Mechanical Power In agriculture, power is required to perform different operations like ploughing, sowing, irrigation, intercultural operations, harvesting, threshing, cleaning, sorting, processing etc. This power is obtained from human, animal and mechanical sources.

Mechanical power: With the introduction of animal for agricultural operations, the burden and drudgery of human being has been reduced considerably. Humans still have to apply their own energy to get the work done by animals and also for doing many agricultural operations. The use of mechanical power in agriculture further reduced human drudgery and released many agricultural laborers to other attractive jobs requiring less muscle power. In fact, the use of mechanical power has revolutionized agricultural operations and output per worker has increased tremendously. Today's world population could not be fed without the application of mechanical power in agriculture. From the middle of the nineteen eighties, the use of power tillers (two-wheel tractors), usually with a capacity of 8 kw, has increased considerably in Bangladesh. It is now possible to prepare land required for multiple cropping in time because of these implements.

Land preparation is one of the most intensive power-consuming operations and on an average, about 40 percent of the total energy input in agriculture is used for this purpose.

The use of various modern methods is increasing rapidly since their inception. Ground water irrigation covers more than twice the area of surface water irrigation. Groundwater irrigation has witnessed a significant expansion in the last two decades.

2.26 Agricultural machinery

Machinery for land preparation It includes all sorts of hand tools, equipment and accessories that are used in agricultural farms for land preparation, at the initial stages of crop production. Use of machinery depends on the type of soil and soil conditions, sources of power, socio-economic conditions of farmers etc. A single crop often needs different kinds of machinery at different stages of its growth. Land preparation is the first and most important stage in the crop production process. In Bangladesh several kinds of traditional, improved, and imported machineries are used for this purpose. Following are the different kinds of land preparation machinery generally used for cultivating major crops by Bangladeshi farmers:

Spade (kodal) This is the most ancient agricultural implement abundantly available in Bangladesh. It has two parts a steel blade for cutting soil, and a wooden handle for operation. There are different sizes and shapes of spades available in different regions of Bangladesh. Spades are generally made by village blacksmiths and in small workshops in towns. Farmers use spade for seedbed preparation, weeding, cutting and removing soil, making dikes, and other household activities. The length, width and thickness of the blade generally ranges from 25-30, 20-25 and 1-3 cm respectively. The weight varies from 2 kg to 3.25 kg. It is used in small plots where cultivation with country plough is difficult.

Fig01 Tillage using Indigenous country plough

Indigenous country plough (langal) A very old implement used by the farmers for many centuries for land preparation. There are several local names, such as Nankol, Nahal, Akkoing, Bangla langal, Shiami langal etc. It is perhaps the most widely used implement in Bangladesh. There are more than 100 kinds of country ploughs. It has three different parts: (i) bottom and handle, (ii) beam, and (iii) share. The plough bottom and the handle is made from a single piece of wood. However, in some regions the bottom and handle are made separately and then fixed together. The plough bottom may be wider or narrower depending upon the soil condition and size of bullock.

The plough is generally 1.9-2.0 meter in length, 5.0-7.5 cm in width, and 3.75-5.0 cm in thickness. The ploughshare is made of steel of about 21-345 cm in length, 2.5-11.5 cm in width and 0.32-3.0 cm in thickness. The country plough can cut soil but cannot invert it. The capacity of a country plough is about 0.16-0.2 ha/day. Some improved types of country ploughs are being used in many parts of the country nowadays.

Single animal drawn plough (mohisher langal) Similar to the country plough in construction, but it is operated by a single bullock or buffalo. The tying arrangement of the plough to the neckharness is also different. The neckharness, commonly known as joal, is a beam, generally made from 1.25-1.6 metre long bamboo or wood, and is used in both types of ploughs. There are several sizes and shapes of neckharnesses. It is used mostly in the Sylhet region.

Fig.02 Land leveling by Ladder or Moi

Ladder (moi) The ladder, also locally named as chongha, chongham, hapta, septa, dolon, dolna, hatta, keyai, basoi etc, is used to level the ploughed land and also to break soil clods after cultivation. Often it is used to cover crop seeds after broadcasting. The construction of ladder is very simple; a village carpenter makes it from bamboo, but in some places it is made from hard wood. It is drawn by a pair of bullocks or buffaloes. The ladder is connected to the ends of the neckharness with ropes during operation.

Mallet (mugur) The main purpose of mugur is to break the large soil clods when breaking of clods by laddering is not satisfactory. It is also known as uja, kurish, shappaya etc. It is generally made of bamboo or wood.

Fig.03 Tillage by Power tiller

Power tiller An engine-operated soil tilling unit. During the sixties power tillers were first imported from Japan on a limited scale. Since the late eighties, however power tillers have been gaining popularity in Bangladesh due to the acute shortage of animal power in cultivation. There are about 100,000 power tillers now in use in Bangladesh. A single axle, two wheeled, 7-12 hp power tiller can cultivate about 1 ha of land per day. At present, power tillers are imported mainly from China. Some local manufacturers have started to make power tillers recently.

Hydro tiller It consists of a rotary tilling unit, a pontoon and an engine. The machine is suitable for cultivating marshy land where a power tiller cannot be operated. It can cultivate about 1 ha of land/day.

Tractor A self propelled machine which is used for cultivation, carrying loads, hulling, etc. It is powered by a diesel engine of 40-60 hp. It can work both in running and stationery conditions. At stationery condition it delivers power to the machine with a shaft called power take off (PTO) shaft. Pulleys, hydraulic system and drawbar are empowered through PTO shaft. Tractors are categorized according to their structure and the type of job they perform, such as 2-wheeled, 3-wheeled, 4-wheeled etc.

Machinery for seeding, planting and intercultural operation Although seeding, planting and intercultural operations are mostly done manually by Bangladeshi farmers, certain devices are used for reducing cost of production and improving yields.

Fig.04 Paddy seedlings are transplanted by traditional methods

Since ancient times seed sowing and planting operations have been accomplished mainly by traditional manual methods. In dry field conditions paddy seed is randomly broadcast by hand. Under wet field conditions paddy seedlings are transplanted randomly in puddle land. However, for line transplanting, laborers' use a graduated wooden stick called Kyme as a guide.

In transplanting, farmers firstly sow rice seeds in a small plot and grow seedlings for 3-4 weeks. Then they uproot the seedlings and transplant them in a puddle field. Other grain crops such as wheat, maize, pulses etc are cultivated in dry field conditions. However, herbs, shrubs, bushes, and trees are always cultivated through the manual planting method.

- Modern seeding and planting machinery

(i) Seed drill: consists of a wheel, a hopper, two furrow openers, a press wheel and a handle. The furrow openers open the furrows and seeds are dropped into the furrow from the hopper and subsequently covered with the soil by the press wheel attached behind the furrow openers. This seed drill is used to sow seeds in lines at equal distances facilitating the use of hand hoe or rotary weedier to save labor as well as quantity of seeds. The capacity is about 0.4 ha/man-day.

(ii) BRRI drum seeder: made of light weight tubing and sheet metal. It has 8 rows, 18 to 25 cm apart. This machine successfully sows sprouted paddy seeds in lines on a puddle land. It is a new concept over traditional transplanting. This machine seeds paddy in neat rows which can be conveniently weeded with push type mechanical weeders. It permits uniform seeding of fairly low seed rates of 50-100 kg/ha. The capacity is about 0.1 ha/man-day.

(iii) BRRI manual rice transplanter: consists of a seedling tray, a handle with seedling pickers and wooden skid. It can transplant paddy seedling raised by special (dapog) method on trays or polyethylene sheets. It can also be used for weeding. There are provisions of 6 rows at 20 cm apart. The capacity is about 0.14 ha/man-day.

- Weedier

Four categories of weeders are generally used in Bangladesh (i) Nirani, (ii) Achra (Rake), (iii) Hand hoe, and (iv) Rotary weeder. (i) Since ancient times nirani has been in use to control weeds. It has several local names, such as Seni kachi, niri kachi, senipachoon, pashri, kurmi, khurpi, pachoon, dahuki, pushri, punja, tengi, tengari, douti, tanakodal, etc. A man can operate

a nirani with his hand in dry land. It consists mainly of a steel blade and a wooden handle. The size and shape of nirani depend on soil conditions and technique of the local blacksmiths of specific region. (ii) Rake or Achra is used in controlling, thinning and loosening of soil crust of land having seedlings of about 1-2 weeks. It is also known as bidha, bindha, nangala, nangula, hatnangula etc. The main part of achra is made of wood or bamboo. Iron or bamboo nails are fixed to the main wooden part. It is generally 1.5-2.0 metres in length. (iii) A hand hoe consists of a front wheel of about 25 cm in diameter, 2-3 hoes, and a wooden handle. The wheel and the hoes are made of steel. It is suitable for weeding in dry field conditions. (iv) A rotary weeder is also known as the Japanese Rice Weeder. It consists of a tray and one or two rows of spikes attached to a wooden or iron rotor. The weight of a Japanese weeder varies from 3-5 kg. This type of weeder is used in wet field conditions. It can be used in row crop cultivation.

- Pest control devices

(i) Pichkary- An indigenous implement generally used for applying insecticides manually. It is made of bamboo. The piston is a bamboo stick and at one end of the stick a piece of rag is wound around. This acts as the piston head. Farmers can easily make a pichkary.

(ii) Sprayer- Several types of sprayers are used in Bangladesh, the Knapsack type being the most common. A sprayer consists of a liquid tank, a pressure chamber, and a nozzle. The liquid tank may contain about 10 litre of spray material.

(iii) Rat trap (Idurer fand) There are several types and categories of rat traps in Bangladesh.

Fig.05 Traditional irrigation method

Irrigation Machinery Both traditional and modern irrigation equipment coexist in Bangladesh. These devices supply irrigation water from various sources, such as dug wells, rivers, beels, hoars, canals, ponds, shallow tube wells and deep tube wells. Irrigation devices/pumps may be grouped in the following categories:

Traditional water lift

(i) Counter poise-bucket lift (Duf)- This device consists of a long bamboo pole pivoted as a lever on two posts. It is locally known as Tara, duf, kerka, etc. A weight, usually a large stone, is fixed to the shorter end of the pole. This weight serves as a counterpoise to a bucket suspended by a rope or a rod attached to the long arm of the lever. A man pulls down the rope or rod until the bucket is immersed in the water of a dug well. The bucket is then drawn up by the counter weight. Dug wells are usually made by hand tools such as spades, shovels etc by manual

laborers' following a traditional method. Centrifugal pumps are also employed to lift water from these types of wells.

(ii) Swing basket (Seuti)- The swing basket is one of the ancient water lifts. It has several local names, such as Seuti, heot, sechni, ucha, hocho, uchi, shayot, uri, dobki, heith, hichuni, Ichuni, lui, duri, jhajra, dobka etc. It consists of a basket or shovel-like scoop to which ropes are attached. Two persons stand facing each other and swing the basket to fill water. The basket is raised and water thus lifted is discharged into the field. It is generally used for lifting water from surface water sources.

(iii) Doon- A manually operated boat shaped trough closed at one end and open at the other. Other local names are Donga, Kunda, Kon, Junt, etc. The closed end of the trough is lifted with a rope to a long pole, which is pivoted as a lever on a post. A weight is fixed to the shorter end of the lever. The open end is hinged to discharge point. Water is lifted by the counter weight on the lever. It is mainly used for lifting water from surface water sources.

- Improved pumps-

(i) Diaphragm pump- This pump was developed by the Agricultural Engineering Division of Bangladesh rice research institute (BRRI) in 1977. The pump is made primarily of two suction chambers each of 35 cm sq in size made from steel sheets. It is locally known as Baqui Pump.

(ii) Reciprocating pump or Tara pump- The device is a shallow well suction pump and constructed almost entirely of cast iron.

(iii) Treadle pump (Dheki Pump)- A shallow tube well suction pump. The pump head is a twin cylinder made of steel sheet; the plungers are molded PVC cup seals; the check valves are simple flap valves made of rubber. The pumps superstructure is made of bamboo and is normally installed with PVC tube well (3.75 cm dia).

(iv) Rower pump- This pump was introduced in 1979 by the Mennonite Central Committee (MCC) and the Mirpur Agricultural Workshop and Training School (MAWTS). The Rower pump is mainly a manually operated reciprocating pump.

- Modern pumps-

(i) Power pump- Mostly of the centrifugal type and consists mainly of one stationery part called casing and one rotary part called impeller. During operation the impeller sucks water into the casing along the centre of the impeller and delivers water along the periphery of the impeller by the centrifugal force of rotation. In Bangladesh various kinds of power operated pumps are currently being used. Among them the one used for pumping water from surface water sources (pond, river, beel etc) is known as the low lift pump (LLP).

The other form of power pump in use is the shallow tube well; it consists of a pipe made of steel or PVC and a well point forced into the ground by driving the pipe with some suitable means.

Deep tube wells are constructed like shallow tube wells but their depth is greater than that of shallow tube wells. The depth of deep tube wells depends on the hydro-geological characteristics of a particular formation. They are generally 45-100 meters in depth.

Harvesting, threshing, drying and cleaning machinery Harvesting, threshing, drying and winnowing of crops in Bangladesh are still done with traditional devices. However, modern threshing implements are becoming increasingly popular for certain crop varieties.

Traditional harvesting Sickle is the only implement used to harvest both rice and wheat crops. It has been used throughout the ages in Bangladesh. It is variously known as Kachi, Kanchi, Chari, Chakrey, Kaicha etc. It has two parts: (i) a slightly curved serrated blade made of mild steel, and (ii) a handle made of wood.

Fig.06 Traditional harvesting

Dao is another tool made of steel used for various jobs such as cutting of jute, bamboo, sugarcane, etc, and for cleaning bushes. It is also locally known as haisa, shole, bagi, seni-dao, jat.

Modern harvesting A reaper or mower is a power-operated harvesting machine. These are generally used to cut grass in large government farms. However, a mower only cut and lays down the crop in rows in the field. Afterwards, the mowed crop is collected manually and carried to the threshing floor.

Traditional threshing : (i) Molon- It is not a machine, but a widely used method of separating grains from the stalk of a plant in rural Bangladesh. Here, two to four cows/bullocks are tied together and made to walk over the harvested crop in a circular path.

Hand beating is another method of traditional threshing in Bangladesh. Farmers use a metal drum or wooden plank or a bamboo platform to beat bundles of crop. Grains are separated by the beating action.

Fig.07.1.Using domestic animals

Fig.07.2. Beating on the bamboo platform

Fig.07.3. With the help of Pedal Thresher

Fig.07.4. With the help of Power Thresher

- Different methods of Threshing: Modern threshing

(i) Pedal threshers- The pedal thresher consists of a triangular metal frame, where a threshing drum, a crank, and two gears are assembled. The threshing drum is mainly made of wood where spikes of mild steel wires are engraved in rows. Threshing is accomplished with these spikes. The threshing drum is attached to a shaft with a bush and a bearing. The operator stands behind the thresher and holds the bundle of paddy over the threshing drum so that panicles remain on the threshing drum. While rotating the operator make the threshing drum to rotate clockwise using the pedal. The spikes separate the grain from the rice plants. (ii) BRRI open drum power thresher- An improvised version of the pedal thresher powered by a small diesel engine. This machine is especially suitable for female workers. The length of the drum is

about 1.5 meter. Three to four persons can work together and can thresh about 400-500 kg paddy/hr. (iii) Power thresher- Both threshing and winnowing action is accomplished through a power operated thresher consisting a metal frame, a threshing drum, a blower assembly and a cleaning assembly.

Traditional drying In Bangladesh crop drying is generally accomplished through the traditional sun drying method in home yards or open fields.

Mechanical drying : (i) The BRRI batch dryer is made of brick, woven jute, and bamboo, with an electrical gear built and assembled locally. Pot furnaces burning rice husks are used as heating element. The capacity is about 1000 kg in 8 hours. An electric fan is used to control air flow and temperature (about 45°C) by adjusting the tiles above the furnace. Hot air of relatively low humidity passes through the grain bed evaporating moisture and warming the grain. The unit is quite effective for seed drying.

Fig.08 Drying through Traditional Method

(ii) BRRI SRR-1 dryer consists of two bamboo-made hollow cylinders (Dole), a 1000-watt electric heater, a blower, and a 0.5 hp motor. It can dry about 1000 kg of wet paddy in 60 hours.

(iii) The commercial dryer is a fully mechanical drying unit where hot air is passed through wet grain kept in a bed or bin.

Fig.09 Traditional winnowing by Kula

- Traditional winnowing

(i) Kula is the most common winnowing implement traditionally used in rural Bangladesh. It is generally made from woven bamboo splits.

(ii) Chalon is generally made from woven bamboo splits like a kula but it is circular in structure and its platform is perforated.

(iii) Hand operated winnower is becoming popular among farmers. A man can clean 300-400 kg of paddy per hour. It can be operated even in bad weather conditions. A hand-operated winnowing machine consists of a hopper, a blower, a frame, and an outlet.

(iv) A power winnower consists of a power source, an oscillating screen, and a blower. The power source may be an engine, or a motor. It is mainly used in farms, rice mills, and seed industries.

Postharvest processing machine and storage structure : Postharvest processing machinery include those tools and machines which are used for shaping up agricultural products into consumable forms.

Parboiling : The process of parboiling of paddy consists of two activities- soaking and steaming. In rural Bangladesh women usually do the job. After being soaked in clay or aluminium pots or drums, the soaked paddy is partially filled with water and placed over a traditional furnace in earthen pots or drums. The pot is then heated and the paddy is parboiled with boiling water for 30-45 minutes.

In commercial rice mills, rice parboiling includes both soaking and steaming. The following structures/ machineries are used: (i) A brick-built soaking tank, 5-10 ton capacity. In the soaking process, the paddy is kept in a submerged condition in it for 24-48 hours. During steaming, the soaked paddy is exposed to steam heat treatment for 15-20 minutes in steaming chambers.

Milling includes the operations of hulling, polishing and whitening of rice grain. Hulling involves removing the husk from the paddy without removing the bran from the endosperm. Polishing and whitening, however involves the separation of bran from rice endosperm and providing a shining appearance. About 67% of clean rice is obtained after completion of the milling process. Different traditional and modern milling machineries are now being used in Bangladesh.

- Traditional milling

Of the traditional rice milling devices, Dheki is widely used in rural Bangladesh. It is made of wood. Usually women operate this device. Its capacity is only about 30 to 40 kg of clean rice/day. Another device, morter and pastle, locally known variously as gail, siagail, chung, urungain, sum-gahin etc, is made of a solid cylindrical wooden beam of about 1.5 metre long and 5 cm in diameter, with a iron ring fixed at one end and a wooden morter. It is also widely used in rural areas for making pressed rice (Chira) and rice powder for cakes.

Fig.10 Rice milling through traditional method

Doloin, another manually operated centrifugal husking device, has two segments. The upper part is a hopper made of woven bamboo, the bottom of which is fitted with a cone-shaped disc. The lower part is almost similar in shape, while the top is fitted with a disc similar to that of the upper part. These discs are provided with small pieces of wooden bars radially arranged in order to provide friction. Grains are poured in the hopper and become dehusked by the frictional discs. Doloin is generally found in Chittagong Hilly areas.

- Modern milling

(i) Small Engle berg hullers- About 85% hullers are of this type and 70-75% of the total paddy in Bangladesh are processed by this milling system. The Engle berg huller consists of a cylindrical rotor fitted in a housing. The bottom half of the housing is fitted with a slotted sheet called sieve. The rotor is driven by a motor or an engine with a suitable drive arrangement.

(ii) Large Engle berg rice mills employ a slightly improved system for rice processing. These rice mills have neither a paddy cleaner nor a rice grader.

(iii) Mini automatic rice mill has the salient features of a modern rice mill and consists of a pair of rubber rollers for shelling (dehusking), a husk aspirator for separating the husk, a paddy separator to separate paddy during shelling operation, and a polisher to polish the brown rice.

(iv) Large automatic rice mills- use modern techniques for rice processing. The paddy is pre-cleaned before soaking at high temperature and parboiled under pressure by steaming. Then paddy is dried in a dryer and husked by rubber roll sheller, or disc hullers. The unhusked paddy is separated from the brown rice by a paddy separator and is recycled back to the huller.

Fig.11 Processing of oil seeds traditional method

Processing of oil seeds: Bangladesh produces about 0.47 million tons of oil seeds. The oil seeds are processed by existing bullock ghanis and mechanical oil expellers. These units are dispersed all over Bangladesh.

(i) Bullock ghani- is found in remote villages. It is made of wood and operated by a bullock or cow moving around a circular path. It is locally known as Kalur ghani, teler gach, etc. A bullock ghani crushes about 5 kg of mustard seeds in 4-5 hours.

(ii) Power ghani- looks like a traditional bullock ghani, but its components are made of steel and powered by an engine or a mortor.

(iii) Mechanical oil expellers- these are generally found in towns, bazars and urban areas. Traditional bullock ghanis are gradually disappearing with the introduction of power mechanical oil expellers. They are made of an iron screw press powered by a motor or engine connected by a belt.

Processing of pulses is done with a stone disc (Jata) which consists of two stone discs. The bottom disc is fixed but the upper disc is rotated manually over the bottom disc with a wooden

handle. The upper disc has an opening through which unhusked pulse seeds are poured. The husked pulse seeds come out through the periphery of the disc.

Sugarcane crusher consists of a wooden frame and three rollers made of solid cylindrical iron. Among the rollers, one is the driver while other two are the driven rollers. The driver roller is operated by a pair of buffaloes or two pair of bullocks or a diesel engine installed in a suitable power transmission arrangement.

Storage structure : In rural households, crop grains are stored mainly in traditional structures such as Dole, Matka, Berr, Kuthi, Gola, gunny bags etc. However, godowns and silos are used for short and long-term storage by government and private institutions. Of the traditional storage structures, the most commonly used one at the household level is bamboo containers or Dole. It is made from bamboo splits that are cylindrical, about 0.5-1.0 m in diameter. Farmers can store 240-250 kg of paddy in a Dole which is usually kept on a bamboo platform. It has several regional names such as dooli, lai, kalloom, berang, berr, auri, ugar etc.

Fig.12 Traditional methods of crop grains storage

Gola is a large rectangular or cylindrical container constructed over a bamboo platform. Generally, rich farmers construct golas to store their paddy. It is also locally known as Varar, Zabar, Mora, Motka, Auri etc.

Matka or a large earthen pot looks like a large pitcher made of clay. In one such container farmers can store 40-50 kg of paddy.

Gunny bag or Chhala made from woven jute is widely used for transportation, marketing and storage of grains everywhere in Bangladesh. Even in government godowns, grains are stored in gunny bags for short and long term storage.

Mud bin or Kuthi is also made of mud and is generally larger than matka. It may be rectangular or cylindrical in shape. Farmers can store about 100-500 kg of paddy in it.

Godown It is mainly a brick built-house containing enough ventilation and moisture reducing devices. The capacity of a godown varies from 500-1000 m tons of grains. There are about 750 godowns to preserve nearly 0.6 million m tons of food grain in Bangladesh.

Silo is a modern storage structure used generally government procurement institutions. Silos are used mainly for bulk storage of imported grains. These are equipped with modern emptying and filling devices.

Rice by-product processing machinery/technology By-product processing machinery/technology includes all sorts of hand tools, implements, containers and indigenous method which are used to make different food items from the crop grains.

Chida making technology/machinery : The process of chida making is done according to an age old method in Bangladesh. Freshly harvested paddy (without husking) is heated in a pan for 5-10 minutes. Then the hot paddy grains are allowed to undergo high compressive stress. Indigenous dhekis and Sia-gails are generally used to impart such vigorous compression through pounding or hammering action. As a result, hot paddy grains become deformed into thin-flat shaped chips. The modern chida mill consists of a rotating bowl and a rotating roller. Both the bowl and the roller are made of cast iron.

Mudi or puffed rice is another valuable rice by-product for human consumption. Paddy is heated for 15-20 minutes, and then soaked in water for about 24 hours. The soaked paddy is then parboiled, dried, and milled in a conventional rice mill. Mudi makers mix about 1/2 kg of common salt solution per 100 kg of milled rice. The milled rice thus obtained is heated again in an iron pan for 10-15 minutes through continuous stirring with a cluster of bamboo sticks. Sand is also heated on a separate clay pot. At the time when the sand as well as the milled rice attains the expected temperature, the heated milled rice is quickly put into the container with heated sand. Women take the container of heated sand out of the furnace and hold it with her hands and starts swinging. Because of the swinging action, the heated milled rice gets swollen and bursts into larger shapes which are known as mudi.

Rice powder for cake making The milled rice is soaked into water for 2-3 hours. After being soaked, it is put in a perforated container. The rice is then pounded with Dheki until it becomes rice powder. The rice powder thus obtained is mixed with water in different proportions for

different kinds of rice cakes. There are about 100 different kinds of rice cakes that are prepared from rice powder in Bangladesh.

Rural transportation machinery : Different devices are used to carry or transport goods or materials in rural areas. Since modern transportation is virtually absent in remote villages, the rural people still use old-age methods or devices. Traditionally, farm workers carry harvested crops to the threshing floor on their heads. A man can carry about 50-60 kg with this manual method. Other devices or vehicles that are used for carriage are as follows:

- Bahuk : It is mainly made of bamboo split and is specially made to carry goods on the shoulder in rural areas where road communication is poor. The device is usually 1.5-2.0 metre in length and 3-6 cm in breadth. A man can carry a 50-70 kg load up to a distance of 3-5 km.
- Animal cart (Garur gadi): Animal cart or ox-cart is generally used for carrying crops from fields, and transporting, carrying fertiliser, seeds, and agricultural products for marketing. It consists of two wheels made of wood, a bamboo platform, and a yoke. It is locally known as garur-gadi or mohiser-gadi, depending on the type of draught animal. The platform is usually 100-130 cm wide and 5-6 meter long, and can carry 500-1500 kg goods to a distance of 15-20 km.
- Cattle/Buffalo cart used for crop grains transportation

Push cart (Thela gadi) It looks like an ox-cart, but is operated by the pull and push action of laborers. Usually, 3-4 persons are engaged in operating the cart. A pushcart can carry a 500-1500 kg load to a distance of 5-10 km.

- Horse cart (Ghodar gadi): In some rural areas horse carts are still in use. It consists of a wooden platform and two wooden wheels fitted to an axle. The length of the horse cart is about 4.5 meters. It is pulled by a horse and can carry a 400-500 kg load to a distance of about 5-6 km.

- Rickshaw van (Van gadi) : With the development of road communication, animal-carts started disappearing gradually from rural Bangladesh and are being replaced by the mechanical carrier locally known as van gadi. Rickshaw vans are now the main transport medium in many rural areas due to their speed. A man can pull 500-1500 kg of goods to a distance of up to 30 km/day using a rickshaw van. [Mohammad A Baqui]

2.27 Farm inputs and implements

Farm inputs and implements Irrigation water, as well as inputs like seeds, fertilizers, labor, and pesticides are the physical determinants of crop production. Balanced application of these inputs can only ensure higher output from a crop at the farm level. Because seeds are the basic inputs, research and extension services are involved in developing and supplying good quality seeds of high yielding varieties of crops. A good number of high yielding varieties of rice, wheat, maize, jute, sugarcane, pulses, oilseeds, tuber crops, and vegetables have so far been

developed and released for farm level use. Generally, farmers are used to keeping their own seeds. Although Bangladesh agricultural development corporation (BADC), a public sector organization, was once solely responsible for the supply of certified seeds, it could hardly supply more than 5 percent of the total requirement. Consequently the private sector is now involved in the seed business.

Along with high yielding crop varieties, use of irrigation water input started to show an increase from the mid-60s. Area under irrigation has been increasing progressively. More than 30 percent of the net-cropped area has been brought under irrigation so far.

Fertilizer is another important input for crop production closely associated with the expansion of irrigation and high yielding crop varieties. There has been a rapid increase in fertilizer use in Bangladesh since the early sixty's. In 1962/63, the total quantity of N, P, K nutrients from urea, ammonium sulphate, TSP and MP was only about 20 thousand metric tons. Since 1980, the use of S and Zn nutrients started, along with N, P, and K. In 1995/96, the total quantity of nutrients used increased to 1.2 million m tons. The fertilizers used were urea, ammonium sulphate, TSP, SSP, MP, gypsum, and zinc-sulphate. At present fertilizer nutrient use per ha cropped area per year is about 100 kg. Besides, some quantity of organic and biofertilisers are also used.

Sometimes pests damage crops to a great extent. To fight pests and to protect crops from harm, pesticides are often used, along with other methods of pest management. On an average, about 3.5 million kg of pesticides are used in Bangladesh annually, including insecticides, fungicides, and herbicides.

Along with modernization of agriculture, different farm implements have come into use for different operations. Both traditional and improved types of farm implements are now being used. The most common farm implements that are presently used for different operations are as follows:

- Farm operations : Farm implements
- Land preparation : Wooden ploughs: iron mould board ploughs; power tillers; tractors
- Seeding : Manual and power seeder
- Weeding : Wetland weedier; dry land weedier; hand hoe
- Irrigation : Done; hand pump; treadle pump and power pump; shallow tubewell and deep tube well
- Spraying : Knapsack sprayer; power sprayer, foot pump sprayer for orchards
- Harvesting : Traditional hand sickle; power drawn reaper
- Threshing and crushing : Pedal thresher for rice and wheat; power thresher for rice and wheat; manual and power maize Sheller; animal and power- drawn sugarcane crusher
- Drying : Solar dryer; batch dryer; large automatic dryer for rice mill
- Milling : Large automatic rice mill; traditional dhekhi

2.26 Agricultural education and research

Education Agricultural education constitutes an important element of the agricultural research and development process. Various institutions have been setup to develop in this field. But these instructions are beyond the reach of many people living in their own homesteads. Thus, training centers can play a huge role in educating these locals.

2.3 Fishing

Bangladesh being a first line littoral state of the Indian Ocean has a very good source of marine resources in the Bay of Bengal. The country has an exclusive economic zone of 41,000 square miles (110,000 km2), which is 73% of the country's land area. On the other hand, Bangladesh is a small and developing country overloaded with almost unbearable pressure of human population. In the past, people of Bangladesh were mostly dependent upon land-based proteins. But, the continuous process of industrialization and urbanization consumes the limited land area. Now there is no other way than to harvest the vast under water protein from the Bay of Bengal, which can meet the country's demand.

More than 80 percent of the animal protein in the Bangladeshi diet comes from fish. Fish accounted for 6 percent of GDP in the fiscal year of 1970, nearly 50 percent more than modern industrial manufacturing at that time. Most commercial fishermen are low-caste Hindus who eke out the barest subsistence working under primitive and dangerous conditions. They bring a high degree of skill and ingenuity to their occupation; a few of the most enterprising ones are aided by domesticated otters, which behave like shepherds, swimming underwater, driving fish

toward the fisherman's net (and being rewarded themselves with a share of the catch). Fish for local consumption are generally of freshwater varieties

2.31 Fishing Crafts

Fishing Craft specialized boat, ship or other vessel used for fishing. In freshwaters, estuaries and offshore areas of the bay of Bengal commonly used crafts are of various types, sizes, and designs.

Dinginauka Small boats with round bottom. The fore and the hind part of the boat are high above the water level. The stem and the bow are long and pointed. In smaller boats there are no deck but the bigger ones usually possess one. The hood is usually lacking, but when present, is located in the posterior part of the boat. The oars are long and paddle-like. The sail is not carried by most dingis but if present it is made of comparatively thin cloth and is supported by bamboo poles attached diagonally. Fishing dingis are also called Jalia dingis. The dingis are named on the basis of the fishing nets operated by them; for instance, Bhesail Dingi, Patam Dingi, Shangla Dingi, and Talal Dingi.

Fig.13 Fishing by country boats

Chandinauka : A traditional fishing boat. The ends are slightly pointed the length varies from 8-12m, beam from 1-3m, and the depth from 75-125 cm. The bottom of the boat is either flat or round. The stem is between 40 and 150 cm. A steering paddle similar to that of an ordinary oar is fixed at the rear of the boat. The hood is situated in the central part of the boat. The sail is often absent but when present is rectangular or square-shaped and placed at the front. The boat is extensively used for Hilsa fishing.

Koshanauka : Anterior and posterior ends are blunt, 7-10 m in length and has a flat bottom. Its oars are made of bamboo poles; the deck is made of whole or split bamboo pieces. A hood is never provided. A triangular sail, when present, is situated in the anterior half of the boat. The boat is used for fishing in shallow waters. Fishing by country boats

Shampan : Seen mainly in Chittagong and other coastal districts of Bangladesh. The posterior part is divided into two pointed parts; the bow is pointed and raised above the water. It is used mainly in ferry-crossing of rivers in coastal regions and sometimes for fishing in the estuaries or in the offshore waters of the Bay of Bengal.

Rafts used in almost all the districts of Bangladesh for fishing in shallow waters, they have various local names viz, Bhela, Bhera, Chali, Bhura, etc. Rafts are prepared mainly by fastening together trunks of banana trees. A raft can be 2-3 m in length and 1-1.5 m in width. Clasp nets (Khepla Jal) and Drag nets (Moya Jal) are operated by rafts.

Fig.14 Fishing trawlers

There are also fishing vessels specifically designed and constructed for fishing in the sea. Until the middle of the 20th century, fishing boats were largely based on local designs. Presently, the construction of fishing boat is an international industry and differences in vessel types have more to do with the fishing methods for which they are employed rather than the port of their origin. In modern fishing boat construction, steel is the most material commonly used, although fiberglass and fibrocement are increasingly being used in making boats too. The principal considerations given to the development of fishing boat construction are higher catching power, smaller crews, and reduced operational costs. The Food and Agriculture Organization has introduced the following classifications of fishing vessels on the basis of the gear used:

- Trawler Vessels with powerful engines and machinery for dragging the trawl nets.

Trawlers can be of different types based on the way in which the nets are dragged.

- Side trawler : Through these trawlers the trawls are launched and pulled at the side of the vessels.

- Stern trawler : Almost all modern trawlers are of stern types where the trawls are launched and recovered over the stern.

- Beam trawler : In this type two beam trawls are towed from boom extending to each side and supported by a central mast.

- Wet-fish trawler is characterized by the way fish are caught and stored in vessels.

- Freezer trawler have freezing facilities; fishes are stored in their freezing chambers when they are at sea for a week or longer.

In Bangladesh sea-going fishing crafts are mainly owned and managed by the Bangladesh Fisheries Development Corporation (BFDC). The corporation has been engaged in fishing in the Bay of Bengal since 1972. It has about 15 medium-sized stern trawlers. The other sea going vessels are boats of different sizes. The majority of the boats are made of wood. The gears used by the fishermen are seine and set bag nets of different sizes.

2.4 Understanding Learning and Research

Learning is a process of acquiring knowledge, skills, values, preference that brings relatively permanent change in action. Learning can refer to reinforcement, modification of prevailing skills, knowledge, values. Formal or practiced way of learning and informal way of learning can be distinguished by how knowledge is acquired and in what conditions. The act of learning associated with experiencing, observing for both formal and informal type of learning. In formal learning one has a limit to learn a dedicated amount of knowledge or skills but informal learning facilitate gaining knowledge to wider extend for the specific purpose. Informal learning relates with field of interest and can offer lifetime urge to know about a sector.

Research is systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions as well to describe, explain, predict and control the observed phenomenon. Research is associated with exploration, fact-finding, analysis and probing. Research about a particular area enriches its appendix and stimulate further arena of research on similar topic.

Learning and research on associated topics of vernacular architecture can build up new possibility to add to this already rich arena. By learning and training the techniques, the local people can achieve both economic and social development.

2.5 Differance between learning centers and school

A community learning center and a school has notable differences in their way to function, formulation, formation, target group, focus, duration, procedure and other aspects. The most distinct aspect of a community learning center to a general school is the informal approach to go close to the general community and develop their lifestyle.

A community learning center grows focusing only to the specific community's needs and evolves according to response. Such a learning center can become a cultural hub, a meeting place, interactive space within the community to serve abreathing space for the community.

2.6 Architectural consideration in Designing a Learning Center

A learning center encourages much of interaction between participants, instructors, guests and the community. Thus, compulsorily the center has to accommodate the scopes to hold the interaction and gathering in desirable spaces to both learn, train through various activities and interact . Architecture comes to the assistance in this fact to create the ambience and make a space a dwelling friendly space. Learning through books, articles might not affect everyone effectively. In such cases architectural space might help to create a journey which gives experience and through conditioning one can learn. This learning process is focused mostly the proposed center. More practical training and skills development will play importantrole to the verge of losing its character of being naturally built community. Incorporation of complete open spaces, semi open spaces with the gathering and working court and shaded corridors in between them as thresholds will create delight to experience the journey through the building.

The Building itself is an exhibit of the potential of the indigenous building materials and the innovative, creations, the techniques which will not only play a single role but change its functions on the basis of what is required by the community. It is just not a building but an experience which will be enriched through various designed elements . Architecture plays a vital role here to design the informality and give the feel of vernacular.

CHAPTER 3 : CASE STUDY

3.1 Friendship Centre, Gaibandha, Bangladesh

3.1.1 Introduction

3.1.2 Design Considerations & Approach

3.1.3 Analysis

3.2 COLUMBIA NEIGHBORHOOD CENTER

3.21 CNC COMMUNITY ADVISORY COMMITTEE

3.3 Value Farm / Thomas Chung

3.4 Hunnarshala Office Campus, Bhuj, Kutch, Gujarat, India

3.1 Friendship Centre, Gaibandha, Bangladesh

3.1.1 Introduction:

The Friendship Centre in Gaibadha, Bagladesh is desgined by Dhaka based architect Kashef Mahboob Chowdhury which had been nominated for Aga Khan Award for Architecture, 2016. The Friendship Centre is for an NGO which works with some of the poorest in the country and who live mainly in reverie islands (chars) with very limited access and opportunities. Friendship uses the facility for its own training programs and will also rent out for meetings, training, conferences etc. as income generation.

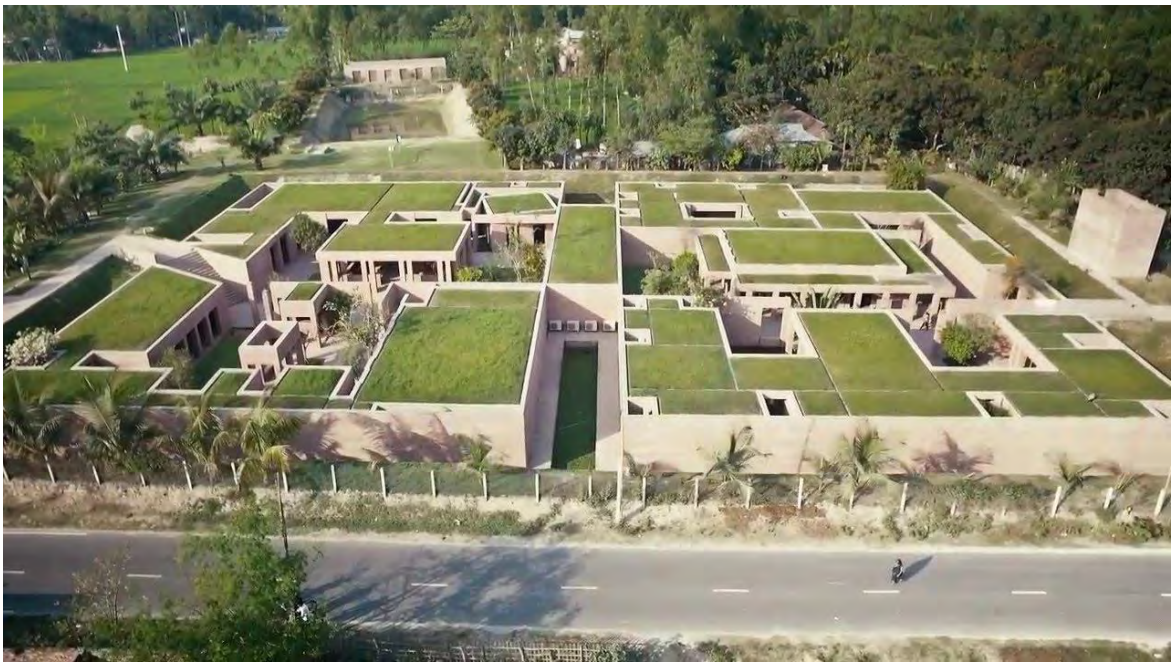

Fig.15 Friendship Centre perspective

Fig.15.1: Friendship Centre, Gaibandha, Bangladesh

3.1.2 Design Considerations & Approach:

The site for the centre is a low-lying area outside Gaibandha, a predominantly agricultural land susceptible to flooding if the embankment for the town is breached. Prohibitive costs for landfill, as well as seismic activity and the low weight bearing capacity of the silty soil, discouraged adopting the usual response of raising the whole site above the high flood level (8 feet); limited funds for the project were directed towards the extensive program of the centre.

With topographical modulation in mind, Kashef Chowdhury decided to create a mini embankment around the site and to construct the buildings inside that enclosure at the existing ground level in load-bearing, exposed brick. Rainwater and surface runoffs are collected in internal pools, and excess water is pumped off to an excavated pond, also used as a fishery.

Fig.15.2: Water body

Fig.15.3: Courtyard

The design inspiration came from the surrounding historical elements. As the architect compares the project to some of the ancient Buddhist monasteries constructed elsewhere in the region. "Simplicity is the intent, monastic is the feel," he added. The use of the local handmade bricks are inspired from the ruins that holds the history of this region.

The building blocks are divided by two types of functions. Firstly the residential part consist of dormitory, staff quarters and dinning. The public block has library, a conference room, a prayer space and a small shop.

One of the design ideas were to have broken forms, pavilions and open spaces to maximize the flow of ventilation and light within the spaces. The green roof works as

thermal protection to the built form which eliminates the need of using air conditions. Large openings in the walls bring natural light and ventilation through the buildings, while a sequence of small courtyards and pools allow cool air to circulate.

3.1.3 Analysis:

Kashef Chowdhury's approach towards the context in this project shows how simplicity can do wonders. The way he considered the contextual elements with the history and archeology, the place became more successful. The sensitivity of the architect towards his decisions regarding the details are sheer genius. The design overall complement the site and do not over power at all.

Fig.15.4: Locals at the centre

This centre is also very successful when it comes to the users. In architect's words,

"It serves and brings together some of the poorest of the poor in the country, yet within the extreme limitation of means, there was a search for the luxury of light and shadows, of the economy and generosity of small spaces, and of the joy of movement and discovery

3.2 COLUMBIA NEIGHBORHOOD CENTER

The Columbia Neighborhood Center supports and empowers youth and families so that the children of the community will develop the life skills necessary to be successful in school and beyond.

The CNC was developed to provide social, recreational and educational services for north Sunnyvale residents. This collaborative project between the City of Sunnyvale, Sunnyvale Elementary School District, Advanced Micro Devices, Sunnyvale residents, and numerous community agencies was formed in the fall of 1994, concurrent with the opening of Columbia Middle School. The CNC, located on a 25-acre site, includes the AMD Sports and Service Center building, Columbia Middle School, and the Sunnyvale Preschool Center. The CNC is open to all community residents and provides a variety of services and activities year round, seven days a week, including evenings.

3.21 CNC COMMUNITY ADVISORY COMMITTEE

The Community Advisory Committee (CAC) is comprised of members of the community who are interested in programs that serve the needs of the CNC service area.

The CAC advises the Columbia Neighborhood Center administration and provides input on the CNC's services by:

- Identifying community needs of the CNC service area,

- Helping to evaluate the effectiveness of CNC services in the community,

- Serving as a resources in effectively operating, planning and advertising CNC services and

- Assisting CNC staff with special projects.

The CAC does not determine policy or direct staff regarding or related to the Columbia Neighborhood Center and its services.

They also provide health facilities like Low-Cost Immunizations for Children may View Community Health Center is providing low-cost immunizations to children who are UNINSURED. This service is intended to assist children with immunizations required for school enrollment and attendance. This service is offered for low-income children who do not have health insurance. No children will be turned away due to lack of funds.

They provide social services too like Support network for battered women

The Support Network has a 24-hour toll-free bilingual (English & Spanish) crisis line available every day of the year. Counselors respond to calls from victims, friends and families, co-workers and neighbors. Callers are encouraged to seek immediate assistance from law enforcement or medical facilities, or to come for counseling. Depending upon the situation, they are given information about the dynamics of domestic violence, safety planning and our range of services.

Friends for youth mentoring

Friends for Youth, a non-profit organization, matches trained adult mentors to youth in need of positive adult role models. The commitment for both parties is for one year, spending about 3-4 hours per week in various activities.

Free legal clinic at the CNC

The Columbia Neighborhood Center (CNC) and the South Asian Bar Association of Northern California (SABANC) have partnered to offer free 2-hour legal clinics the first Saturday of each month from 10 a.m. to noon. at 7: 85, Morse Avenue, Sunnyvale. During the legal clinics, volunteer attorneys provide free 20-30 minute legal consultations to answer questions on various legal matters. No appointments are necessary; this is a first-come, first-served program by signing in at the CNC lobby during clinic hours. And also education facilities like Book lending machine.

A lending machine is available in the lobby of the Columbia Neighborhood Center (CNC). The lending machine serves as a mini, free-standing library for residents who find this location more

convenient and accessible than the main Sunnyvale Library. The machine is filled with books for children up to age 5 and school-age students, in English and Spanish. A return bin is also available in the CNC lobby to collect any materials borrowed from the Sunnyvale Library. Machine users can borrow up to five items per visit with a Sunnyvale Public Library card. New library cards are free and can be obtained from CNC staff. The lending machine is available for use any time the CNC lobby is open.

English classes - adult and community education

Free English classes are provided at Columbia Middle School by Sunnyvale Cupertino Adult and Community. Education on Monday and Wednesday evenings starting in September. The classes are from 6-9 p.m. Students must first take an ESL placement test before they can enroll in an ESL class. There is a $40 non-refundable testing and processing fee that covers all four quarters of the school year.

And sometimes one day workshops on

- Free English language development classes
- Free English language class. Participants will practice listening; speaking, reading, and writing in small groups
- with trained volunteers where all levels are welcome.
- They also include recreational facilities such as Year
- round drop-in gym

- Free yoga classes
- Zumba classes
- CNC fitness room

3.3 Value Farm / Thomas Chung

Shenzhen residents were invited to help plant the space, and then come back to harvest and taste the food. “Value Farm creates value by cultivating the land as a collective effort,” Kee says. “We’re exploring the possibilities of urban farming in the city and how that can integrate with community-building.” The exhibition was designed to spark more farming projects. The architects laid out designs explaining, for example, how a market district in Hong Kong could be blanketed in rooftop farms. “This is arguably a viable future for a post-urban Hong Kong, to transform untapped a potential artificial land resource--rooftops--in dense urban areas into productive terrain,” Kee explains.

In Hong Kong, like other cities around the world, there's already a growing interest in rooftop farming.

“Local initiatives stem from residents’ continuing worry about food safety, as well as the obvious attraction of creating a green oasis above the urban chaos,” says Kee. “It’s reconnecting city dwellers with nature, teaching consumers about homegrown food, and offering a more sustainable, accessible food supply.”

Though the Biennale has just closed, and plants have been harvested, the space will likely stay a garden. Kee says the chief curator wants to turn it into a public park.

Architects: Thomas Chung

Location: Shekou, Nanshan, Shenzhen, Guangdong, China

Design Team: Gary Law, Bill So, Sam Wong

Area: 8120.0 sqm

Year: 2013

Photographs: Value Farm

Fig.16 Value Farm photograph

3.4 Hunnarshala Office Campus, Bhuj, Kutch, Gujarat, India

Hunnarshala Foundation is a craftsmen based local research center situated in Bhuj in Kutch district of Gujrat state in western India. Hunnarshala practice was born with the earthquake in Kutch in 2001. Since then the foundation supported the post

disaster rehabilitation efforts all over the world. It also gave the opportunity to discover the rich living building tradition of artisans and their community. It facilitates innovative traditional system to establish social sustainability. The foundation works for improving self- sustaining housing for the poor, favor artisans involvement in mainstreaming buildings and promotes local eco-friendly and cost-effective materials and technologies like earth, bamboo and sewerage recycling. It helps empowerment of the community and train artisan along with establishing policy for government. This is a nugget building in Kutch of knowledge, a skill and sometimes the artisan themselves from all over the world.

The core activities of Hunnarshala foundation:

Community Empowerment

Hunnarshala Foundation has contribution in using green approaches and technologies with the available materials in large scale such as mass housing and city level. They encourage the community to participate in reviving the tradition of building technology and materials. Hunarshala has collaboration with its sister organizations to get inputs particularly on water, renewable energy, bio-diversity, etc.

The foundation makes effort to empower both the rural and urban community.

Rural Community: Rural community empowerment conducted through the projects of Hunnarshala. Shaam-e-Sarahad village resorts, Kachchh earthquake reconstruction, Kosi flood rehabilitation, Indira Awas Yojana are rural development project which has contributed to the innovation in long-lasting and multi-hazard proof affordable technologies.

Urban Community: Urban community development and sewerage recycling are urban development programs of the foundation.

Artisan Empowerment

Artisan Enterprises: For promoting artisanship, Hunnarshala Foundation work with master artisans in developing the green potential of a traditional technology and adapting them into a product for the contemporary market. The artisans are equal partners in this design and research exercise. They demonstrate the proof of concept by using these technologies in the projects we execute and we encourage artisan collectives to take the product to market on their own. Layers, Wood Grains, Mathachhaj, Span, Lustre are companies specialized in the particular fields of

construction. Hunnarshala helps these companies at every stage from providing formal training to providing design support for projects, to financial, accounting and administrative as well as legal support.

Technology Intervention: Hunnarshala works with different stakeholders where the artisans interact with various architects to develop design details and technological interventions. Constant innovation driven by debate is the cornerstone of the working philosophy of Hunnarshala Foundation.

Hunnarshala Foundation Campus: Technological interventions are experimented and made unique for that material in term of technique used.

Khamir craft facility: An important innovation that was done at this campus was that the walls on the 1st floor were made with Wattle & Daub panels. These panels were plastered with lime. On the ground floor all the construction is rammed earth.

Restoring the heritage mud forts of UAE: The project illustrates the value of a master artisan and the role he has to play in the conservation of heritage that made it important for Hunnarshala Foundation. It corroborates the Foundation's core belief that there is immense value in conserving our traditional knowledge.

Karigarshala (Artisan School)

Hunnarshala Foundation's permanent projects are an education initiative as well as an entrepreneurship incubation cell. A Karigarshala or artisan school where dropouts from the formal education system aged between 16 to 18 are trained in carpentry and masonry. At the end of their yearlong training, they are helped them find work as artisans. In the absence of such training, they would be relegated to being unskilled migrant labor. Strengthen the artisan to use the resources and make them work as their culture demands additionally sustainable and time tested approaches with that. This empowerment helps the whole community as what they are doing is not individual achievement but the whole community. Hunnarshala helps the community to get together and educate, promote & motivate the skilled and passionate artisans about the different techniques.

The campus:

The Hunarshala campus building was completely an evolving structure itself. It was designed with a sole reason to demonstrate all the alternative constructional technologies they excel or research in construction practices such as stabilized

rammed earth construction, Space frame systems, Thatch installation, wood roof understructures & CSEB. It was designed to create a platform for the artisans and professionals to support their curiosity to learn and share the knowledge. The whole project was treated like an experiment to adapt the techniques they have researched or excelled and check the performance of the same. The material from the old building was recycled and used in the new building. Hunnarshala‟s office became a symphony of discovery of sustainable building practices taken from various traditions. Also it gives guidance to the principals of new construction. Some of the features that contribute to the design of the Hunnarshala Foundation campus that also contribute to the ecology of the whole campus and also sustainable practice for the society

Weaving reeds around bamboo strip: The women from Mughal community learnt this Indonesian thatch technique to make independent panels that can then be put together on the under structure to create thick, beautiful and long lasting roofs.

Space frame: Wood was traditional roof material to use as structure under the roof sheet. Post the earthquake (2001) space frame was introduced by simply bolting

pipes together to stop wanton cutting of thorn forest. This „Span" now provides

service to iconic buildings with large shelter and post disaster shelters.

Fig.17 Section

The Rammed earth walls: Done by a migrant labor who provides his expertise in

prestigious restoration projects on UNESCO sites in UAE.

Stabilized earth blocks for tsunami reconstruction

The functions are all focused to achieve the reality of the goals.

Karigarshala: it is a training facility center they educate, promote & motivate the skilled and passionate artisans about the different techniques developed by Hunnarshala. It was designed by the foundation and was constructed by the artisans and its students.

The artisan school: the school provides an environment where the students gets an opportunity to interact with visiting students of architecture, engineering, fine arts etc. the team involved in this program ensures that education for these students means providing an overall exposure to become accomplished “Karighars” and future entrepreneurs of the specific trade.

Laboratories: an archive to test adapt, confirm the traditional materials and their technologies. Also soil from every place the India where they have worked are collected, tested, and the information are displayed in the soil-arium in the laboratory.

Project analysis

Inspiration part: The most significant part for choosing this case is the objectives,

goals, work of the Hunnarshala Foundation being similar and inspiring for the project (vernacular learning center) with proper combination of programs and them working effectively. This inspires making a vernacular learning center particularly in Bangladesh where most of the Much of the vernacular built tradition uses earth and bamboo as building materials. Moreover, we see a successful amalgamation of idea and that being made up to work effectively in our neighboring country

Plan

Analysis:

- The plan of Hunnarshala reflects and represents the traditional design

aspects. Features rooted on tradition like, Courtyards, verandahs, and other features that also helps passive solar cooling to respond to climatic needs and adds traditional vocabulary to the design. The materials and technologies are promoted and used by the foundation includes lime, earth, thatch, country tiles along with roof water harvesting, and decentralized waste water recycling.

- Landscape perforates the buildings in a perfect manner to make the campus potent of holding public gathering with full of campus activities.
- Scattered functions surrounding the landscapes a guideline to the journey inside the space of the campus. Also the functions influence outdoor activities Along with indoor which helps in the process of sharing.
- One big open space is left space for the artisan to work,
- The materials and technologies used in the building campus are i.e lime, earth, thatch, country tiles along with roof water harvesting, and decentralized waste water recycling. Hunnarshala Foundation works with stabilized and non-stabilized mud blocks, rammed earth, waffle & daub and adobe.

CHAPTER 4: SITE AND SURROUNDINGS

4.1 Site Analysis

The site is located in Comilla. It is situated along the Dhaka- Chittagong Highway under Goripur Thana and is exactly known as Shingula in Raipur.

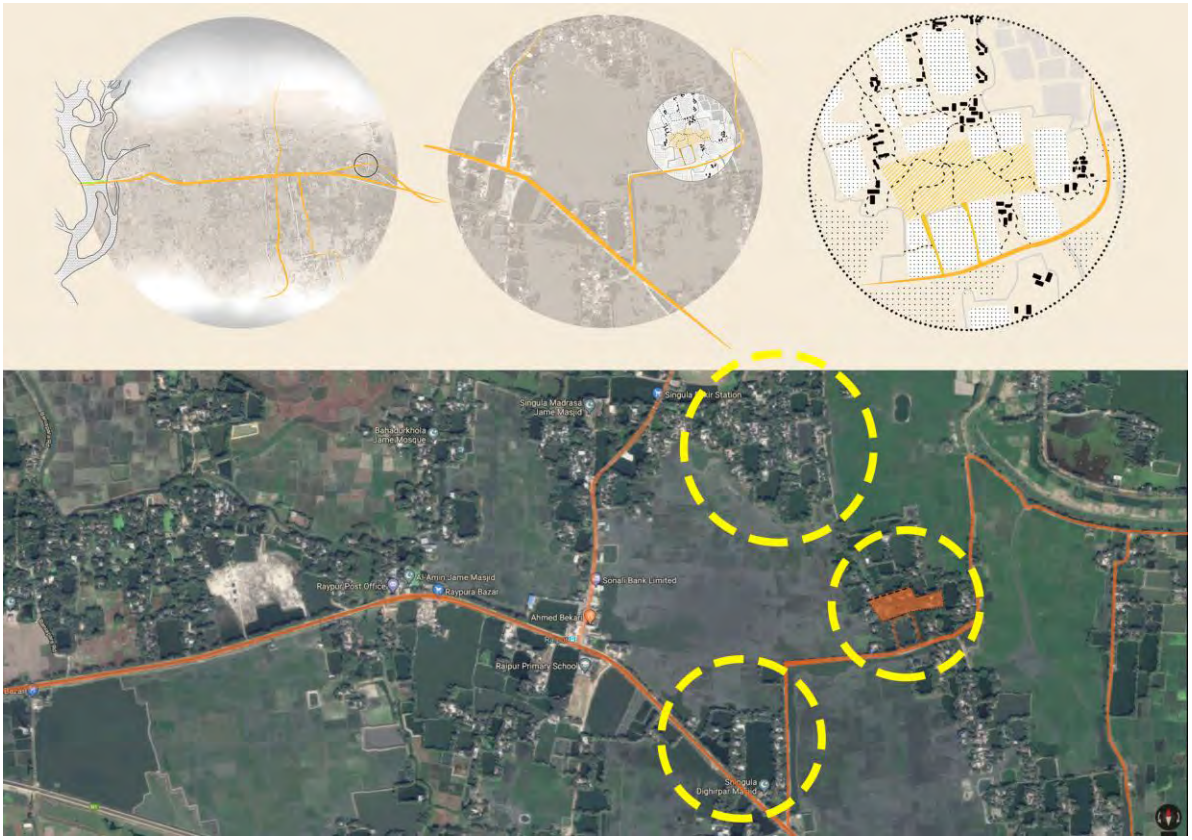

Fig.18 Site location

There are mainly three communities among which the community living in the site is a part of. These communities bond together for various skill based business in order to generate economy.

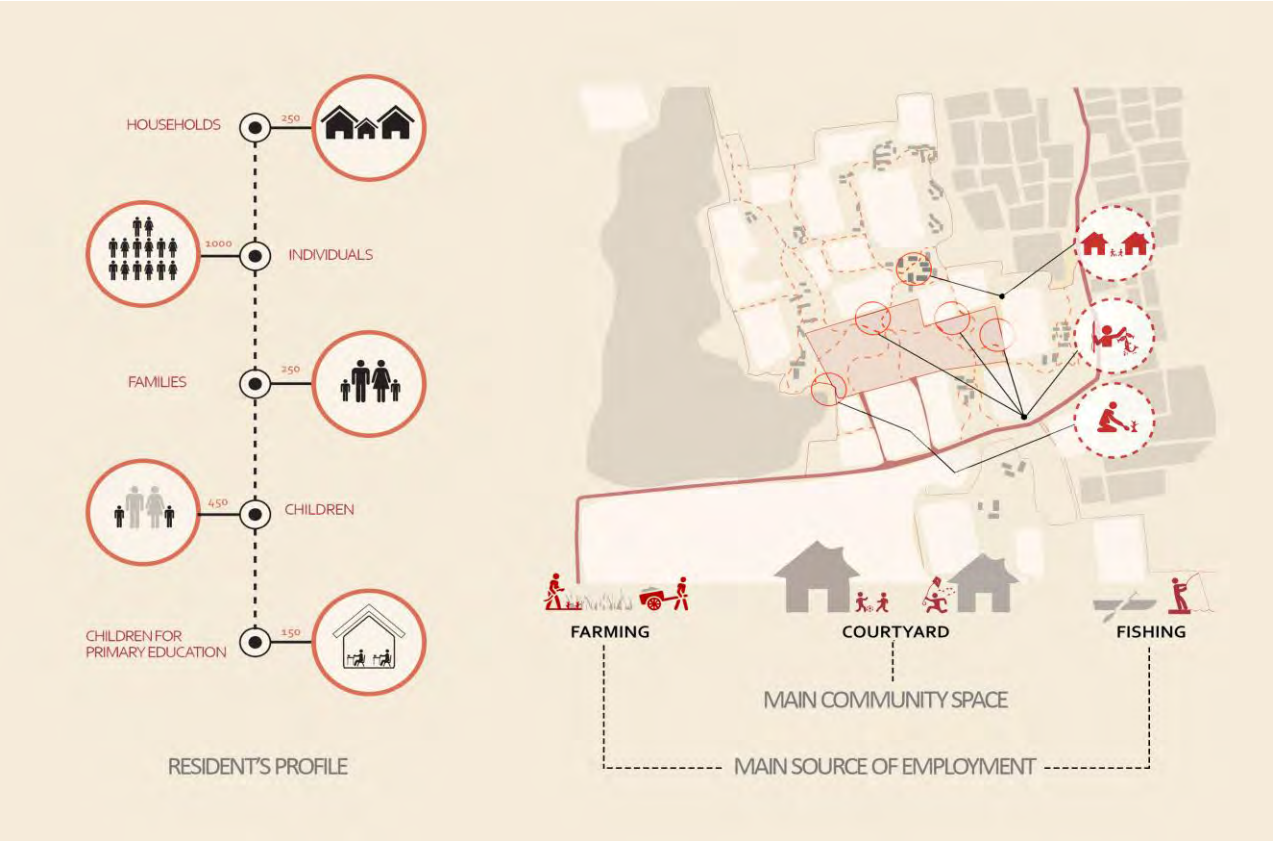

Fig.19 Resident's profile

The site mainly consists of 250 households and an average of 1000 individuals among which the adults mainly generate their income through skills such as fishing and farming. There are around 150 children in the community who can be exposed to primary education.

Many of the community people are engaged in work in Dhaka city. Despite many skills and opportunities through these skills, there are a few boundaries due to which the community is still facing difficulty in development because of which many people opt to go to Dhaka city for other opportunities.

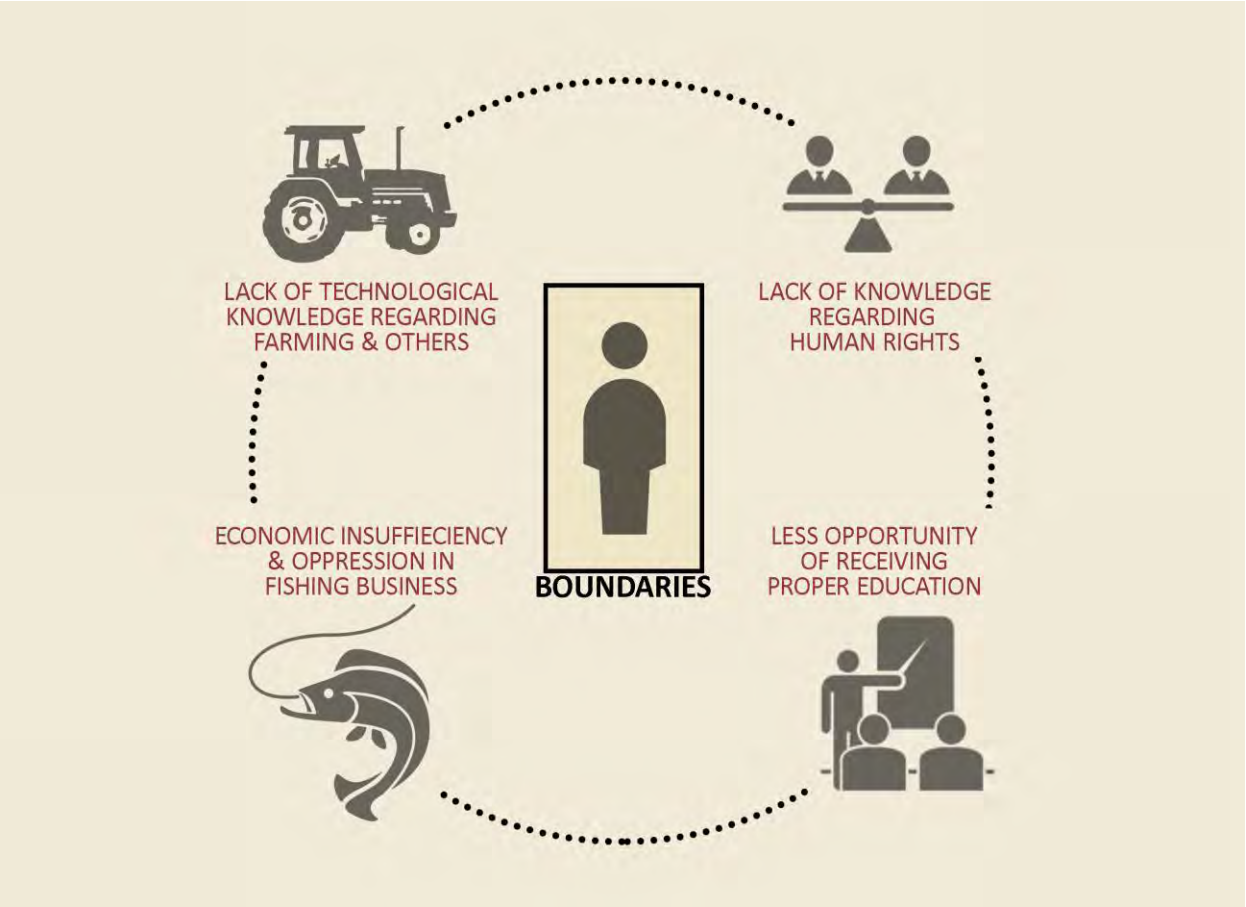

Fig.20 Community boundaries

The boundaries that the community faces are

- Lack of Technological knowledge regarding farming and other skills
- Economic insufficiency and oppression in fishing business.
- Lack of knowledge regarding human rights and various other individual opportunities.
- Less opportunity of receiving proper education.

4.2 Site Review

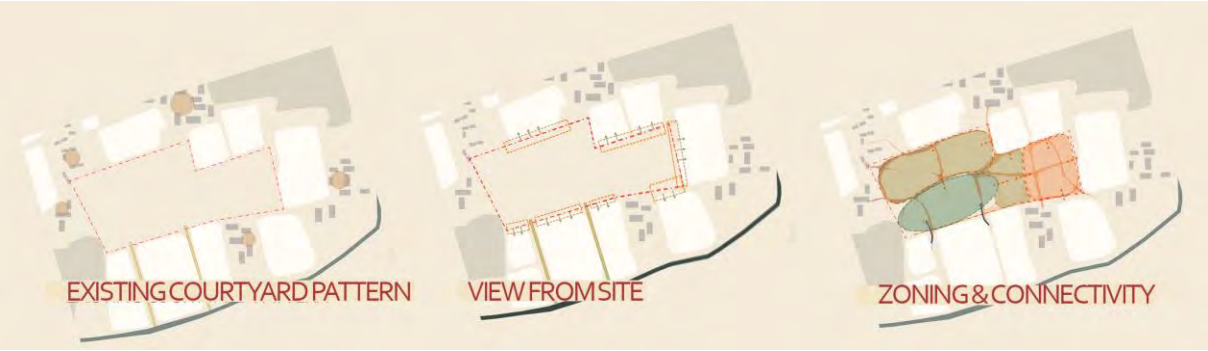

Fig.21 Site review

The site surrounding is very rich with nine water bodies surrounding it and low land which act as farm lands during summer which help in farming and as ponds during rainy season which help in production of fishes.

The communities among the site surrounding use surrounding as walkways and courts. The communities are divided with a court in between.

4.3 Site images

Fig.22 Site images

CHAPTER 05: PROGRAM LIST

5.1 Programs

PROGRAMS	SPACE REQUIRED PER PERSON	SPACE REQUIRED PER UNIT	NUMBER OF USERS	UNIT	AREA (SQUARE FEET)
1. OFFICE					
- LOBBY + RECEPTION		100	2	1	100
- ADMIN OFFICE	100		6	1	600
- ACCOUNTS OFICE	100		4	1	400
- INFORMATION CENTER		350		1	350
- CONFERENCE ROOM	20		15	2	600
- REGISTRAR ROOM		300	1	1	300
- DIRECTOR'S ROOM / SUPERVISOR'S ROOM		300	1	1	300
- PROJECT MANAGER'S ROOM	100		4	1	400
- RESOURCE ROOM	80		2	1	160
- SERVICE					
- TOILET		320		2	640
- KITCHENTTE		400		1	400
- PEON'S ROOM		100		1	100
			TOTAL		4350
			CIRCULATION	30%	1350
					5700
2. EDUCATIONAL ZONE					
- TRAINING CENTER					
- LAB (TREATMENT)	30		30	2	1800
- TRAINER'S COMMON ROOM	20		15	1	300
- TRAINING STUDIO'S (COMMON ROOM)	30		20	1	600
- WORK STUDIOS					
- CRAFTING CLASSES	50		30	1	1500
- MEETING ROOM		500		1	500
- SERVICE		600		1	600
- SCHOOL					
- CLASSROOMS (MULTIFUNCTIONAL)	20		30	4	2400
- TEACHER'S ROOM	30		12	1	360
- MEETING ROOM		500		1	500
- SERVICE		1000		1	1000
			TOTAL		9560
			CIRCULATION	30%	2868
					12428
3. COMMON FUNCTIONS _ PUBLIC ZONE					
- SOUVENIR SHOP (CRAFTS SELL)		1500		1	1500
- MARKET PLACE (PRODUCTS / FISHES / CROPS)		2000		1	2000
- PLAY GROUND					
- EXHIBITION SPACE		1000		1	1000
- PRAYER ROOM		750		1	750
- MEDICAL CENTER		250		1	250
- CAFETERIA / PANTRY		1000		1	1000
- LIBRARY		1000		1	1000
			TOTAL		15000
			CIRCULATION	30%	4500
					19500
4. DORMITORY					
- ROOMS					
- MALE	120		4	4	2400
- FEMALE	120		4	4	2400
- SERVICES		2000		1	2000
- DINING & KITCHENETTE		2000		1	2000
			TOTAL		8800
			CIRCULATION	30%	2640
					11440

CHAPTER 06: DESIGN PHASE

6.1 Concept

The main purpose behind this project is to promote the development of the rural area of Bangladesh. To increase their opportunities, generate economy and distribute knowledge. This project can act like an example and a prototype to guide the rural communities as well. The project is desired from the realization of the need to develop education, opportunities that are available in rural areas. The learning from the past and present, may it be knowledge or resources, can lead to a better future.

It aims to create awareness among the community about how the resources available in a rural community can be the source of development in architecture, living, economy and social unity.

The concept derives from the basic skill the community members possess and make them their strength.

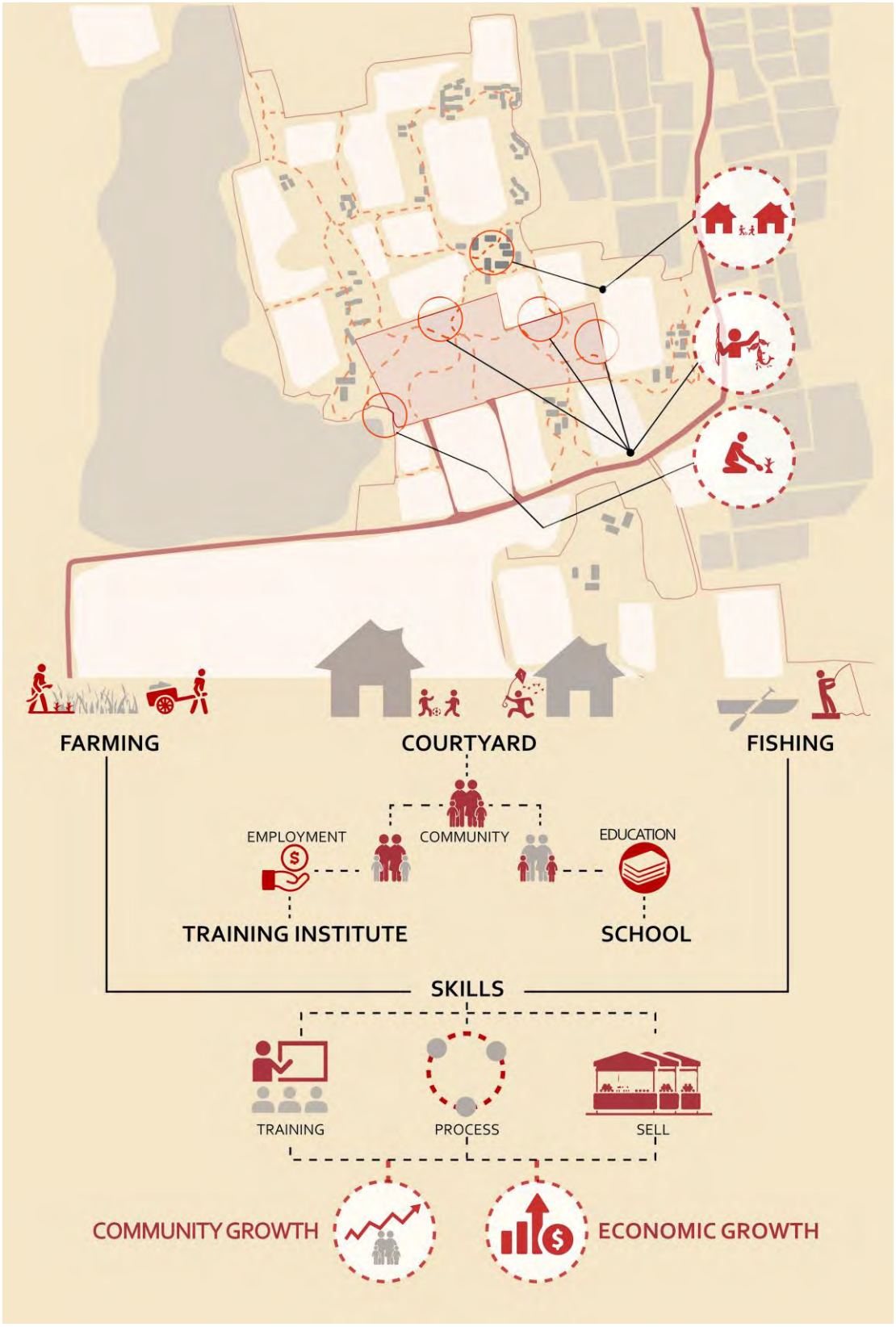
FARMING
COURTYARD
FISHING
EMPLOYMENT
COMMUNITY
EDUCATION
TRAINING INSTITUTE
SCHOOL
SKILLS
TRAINING
PROCESS
SELL
COMMUNITY GROWTH
ECONOMIC GROWTH

Fig.23 Concept

The adult in the community could engage themselves in their basis daily skilled work such as farming and fishing which could be polished through training. Whereas, the children would be provided basic primary education. All of these could be done in a Center which would help to make each community member self reliant.

Fig.24 Self Reliance Diagram

Center of self reliance will mainly consist of a school and Training institute which will help to develop an individual by providing basic education, knowledge about various rights and opportunities and polish and train the skills of the individuals to help them be self reliant through which they can be exposed to more opportunities and generate more economy within their homesteads and develop their homesteads.

6.2 Purpose of the project

Fig.25 Project purpose diagram

The center holds the purpose to provide various training and learning opportunities such as

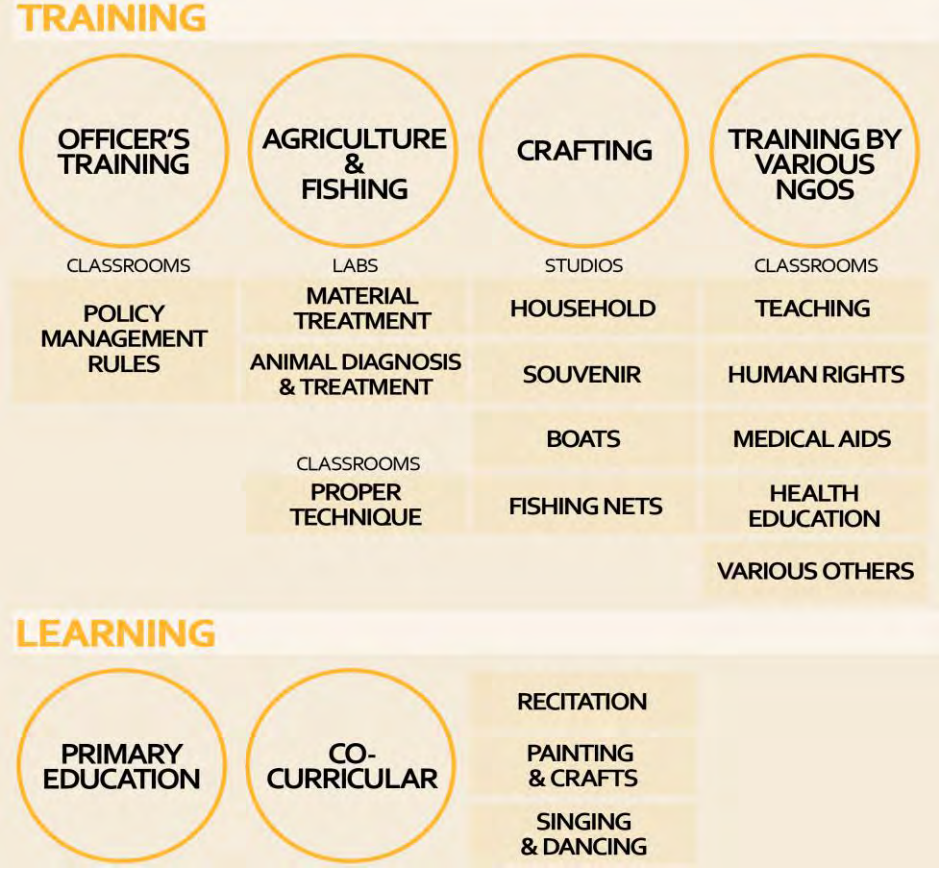

Fig.26 Training and Learning flow diagram

6.3 Design Development

The site surroundings and opportunities were analyzed thoroughly. The existing walkabilty, ponds and community relations acts as forces of site.

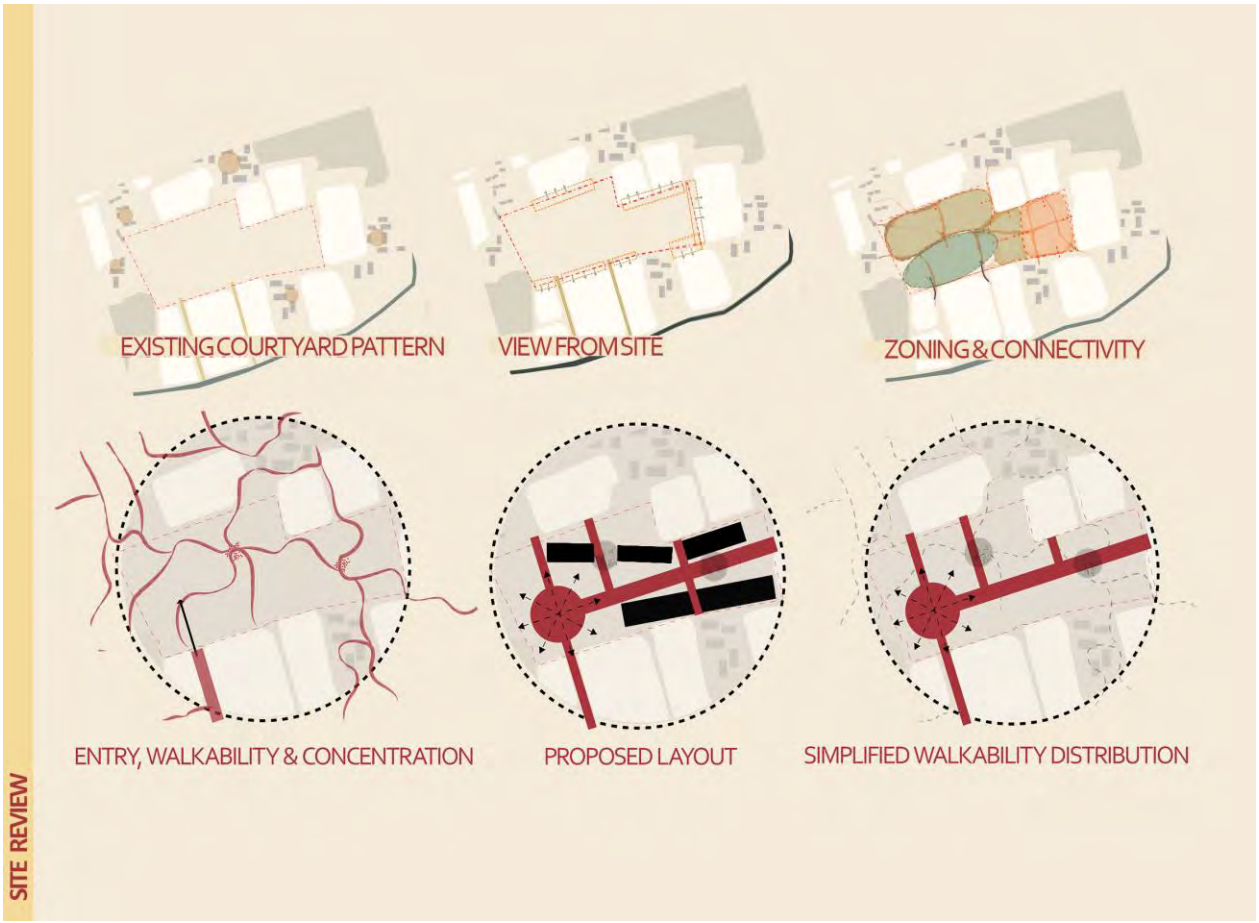

Fig.27 Design Development diagram

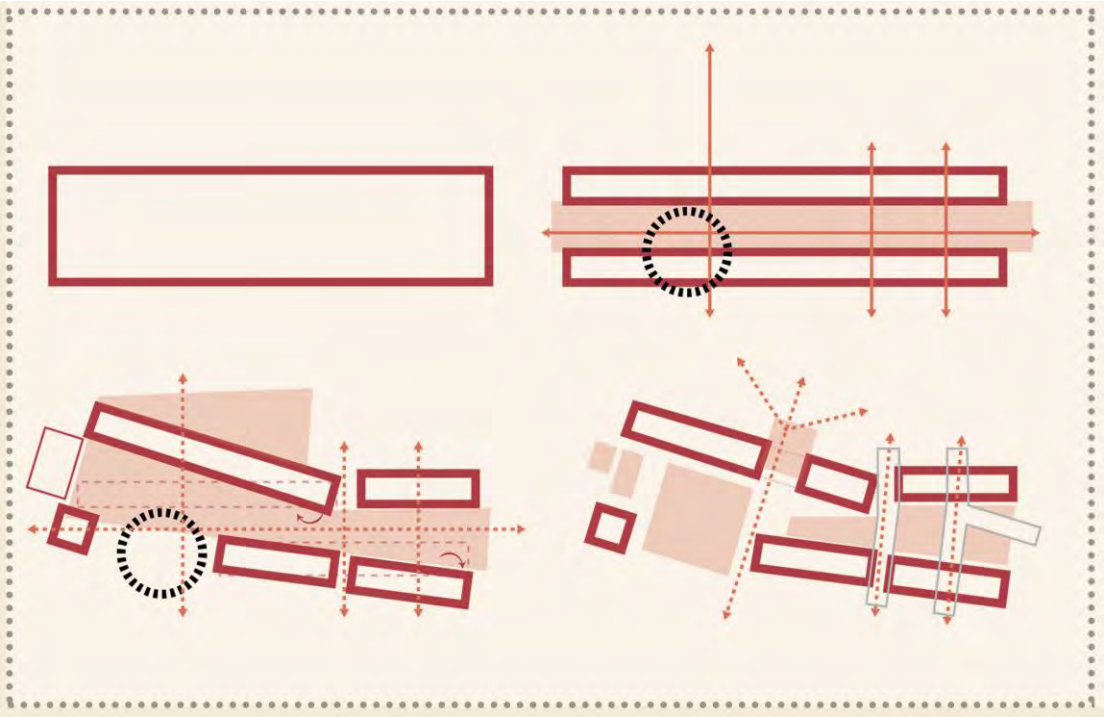

Fig.28 Form division diagram

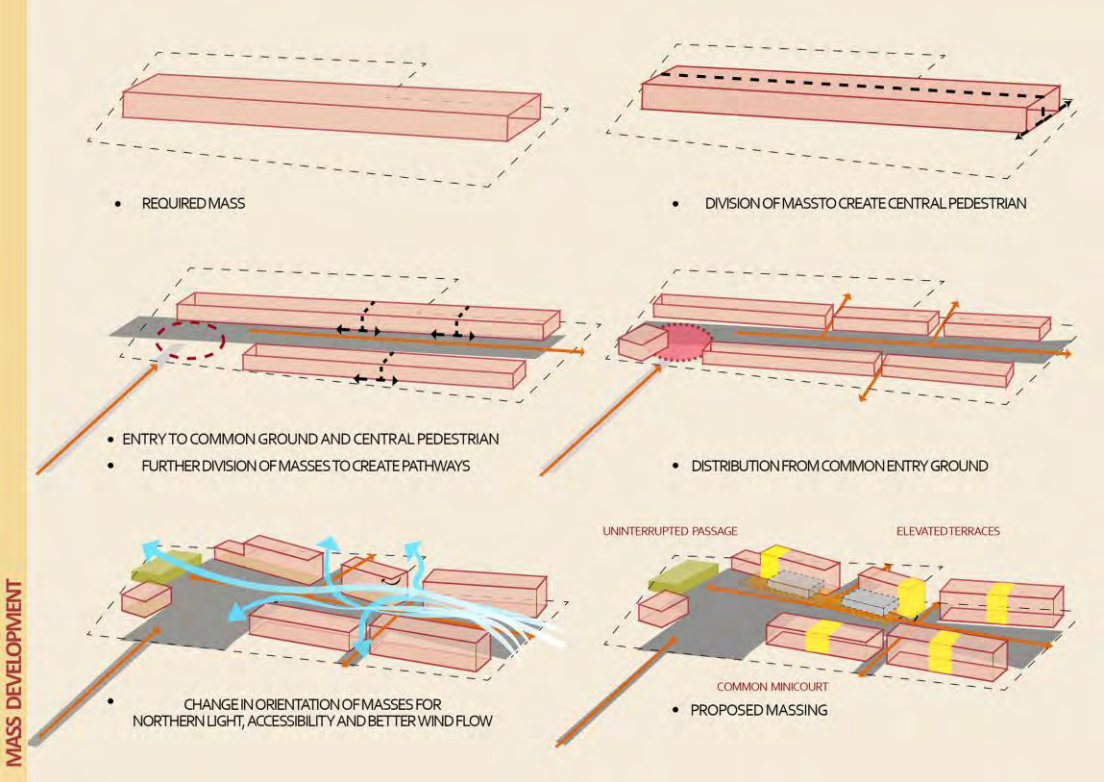

Fig.29 Mass Development diagram

The mass is developed by focusing on the main connection between the ponds and keeping the existing walk ability and simplifying it. The zoning is done keeping the public square in mind consisting of a mosque, bazaar and playground which has strong relationship among themselves as public hubs and keeping their heritage intact.

6.4 Plans, Elevations and Sections

Fig.30 Master plan

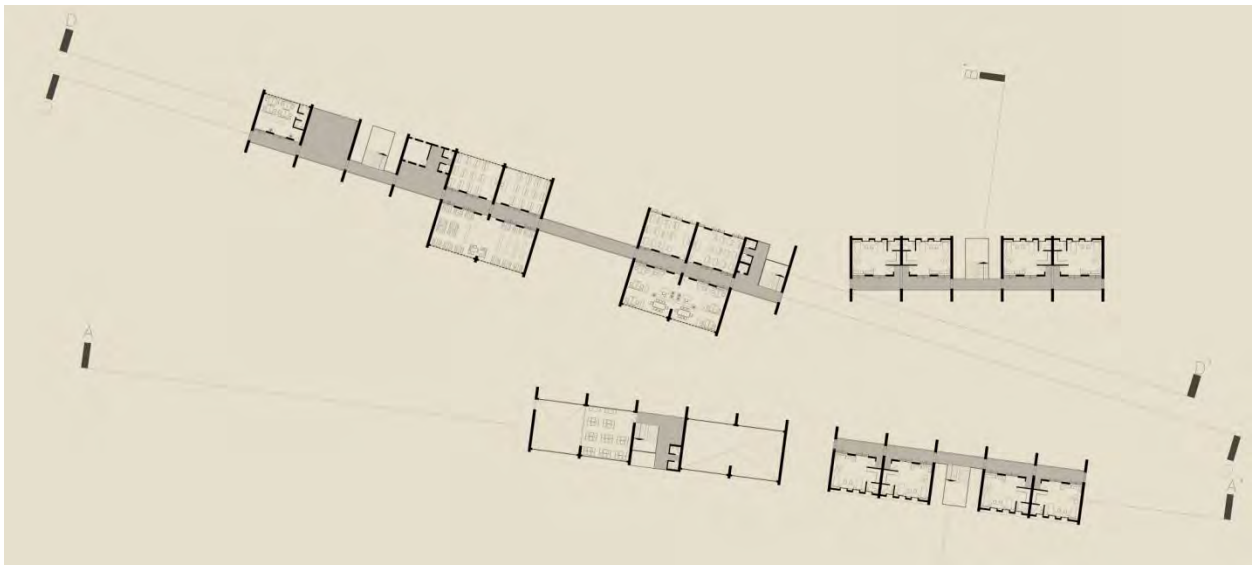

Fig.21.1 First floor plan

Fig.31.2 Second floor plan

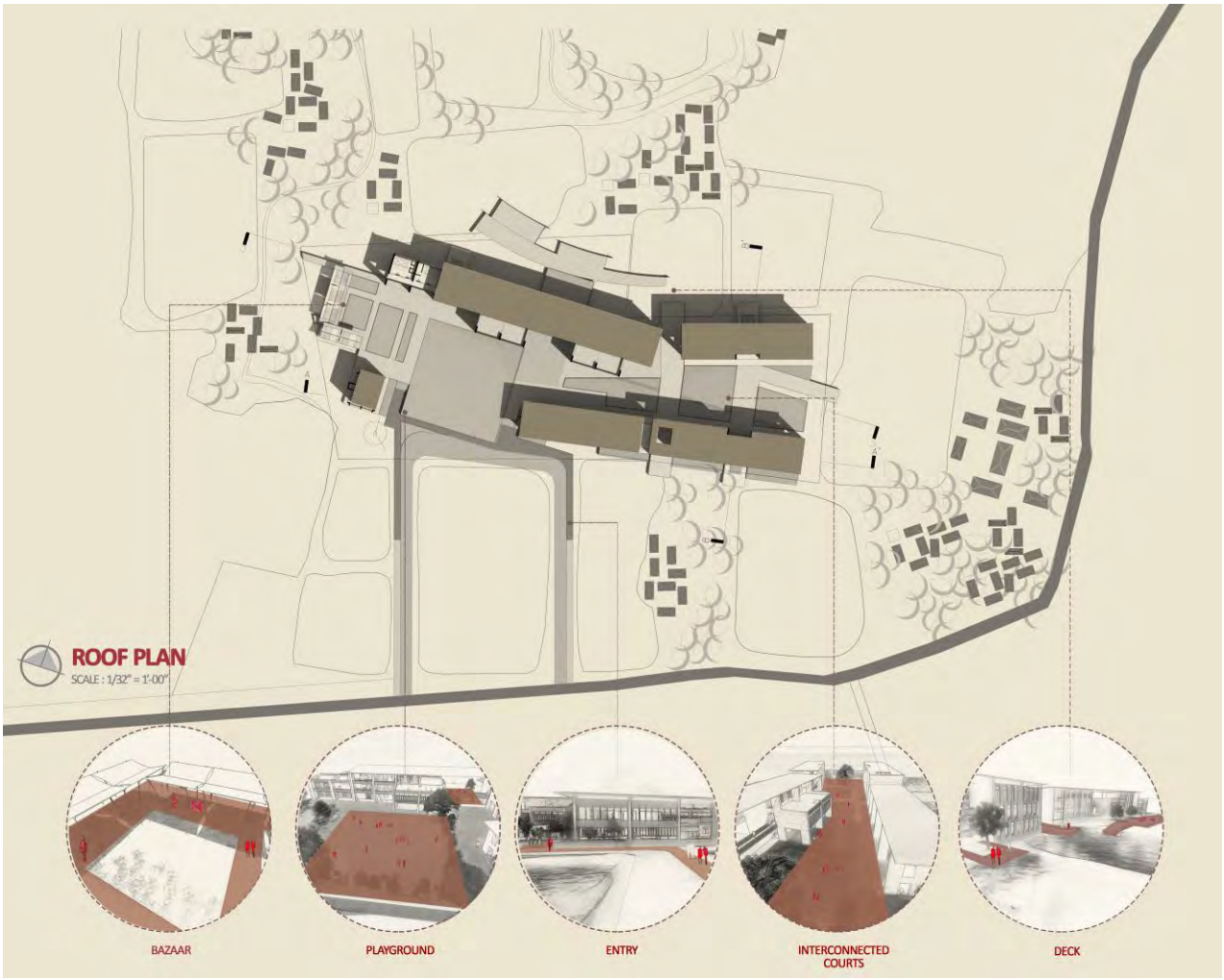

Fig.32 Roof Plan

Fig.33.1 Sections and elevations

Fig.33.2 Sections and elevations

Fig. 34.1 Sectional Diagram

Fig.34.2 Sectional Diagram

Fig.35 Perspective detail diagram

Fig.36.1 Render image

Fig.36.2 Render image

6.5 Model photographs

CHAPTER 07: CONCLUSION

7.1 Conclusion

7.1 Conclusion

The main purpose behind this project is to promote the development of the rural area of Bangladesh. To increase their opportunities, generate economy and distribute knowledge. This project can act like an example and a prototype to guide the rural communities as well. The project is desired from the realization of the need to develop education, opportunities that are available in rural areas. The learning from the past and present, may it be knowledge or resources, can lead to a better future.

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