

An Analysis of the Influencing Factors on Dwelling System of the Fishing Community on the Bank of Karnaphuli, Chittagong, Bangladesh

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ABSTRACT: The settlement pattern and dwelling system reflect the socio-economic condition and cultural behaviour of the community people. The riverine fishing community is one of the ancient and special communities of Bangladesh that has a unique lifestyle and some special features characterize their dwellings. This paper aims at explaining the existing dwelling system of one of the eighth oldest fishing village of Chittagong with relevant problems and identifying the factors that affect the dwelling system of that fishing community. Both qualitative and quantitative analyses are used here and the data were collected from the community people through PRA methods and questionnaire surveys. A number of problems and some special features of the existing dwelling structures in the study area are identified in this research. A relation between the socio-economic condition of the people and their dwellings is also established here by explaining the influence of various factors on their dwelling. Finally, some recommendations are mentioned for improving their dwellings without adversely affecting their livelihood, culture and tradition.

Keywords: Fishing community; dwelling system; socio-economic condition; livelihood; culture.

INTRODUCTION

Bangladesh is called the 'land of rivers'. Rivers are a significant feature of the landscape of this country (Bundell & Maybin, 1996). About one-fifth of the entire fishing area of the country is comprised of riverine fishing areas (Huq et al., 1986) which constitute a vital component of the national agro-ecosystem (Sadeque, 1990). About 12 million people directly or indirectly depend on the fisheries sector for their livelihood (DoF, 2005). Therefore, the fishing community is one of the most important communities in this country. However, unfortunately, the fishing community has become one of the most vulnerable communities in present days from economic, environmental and cultural perspectives. Adverse factors like indiscriminate dumping of domestic and industrial wastes and illegal encroachment of the rivers in the name of development are the causes behind the gradual decline of riverine fishing resources (Ahmed & Reazuddin, 2000). Such a reduction in fishing resources is leading to the livelihood diversification

of the fishing community and thereby changing their whole lifestyle. However, for the development of Bangladesh, it is essential to make the best use of its natural resources. For being an important natural resource, riverine fisheries have to be improved. The promotion of fisheries resources is dependent on the development of fishing communities. Therefore, it is necessary to support the fishing communities to hold on their traditional occupation and culture.

Usually, the dwelling is one of the best indicators of environmental, climatic, social and cultural diversity. Besides, the dwellings of each community reflect their ways of living and lifestyles of the communities (Alam & Kabir, 2016). For this reason, it is essential to know the factors that affect the dwelling characteristics of a community before planning for that community. Riverine fishing communities in Chittagong have also their own form of dwelling structures that is suitable for their occupation and shows the reflection of their social and cultural values. This study was conducted to identify the

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existing dwelling characteristics and related problems of this community and to show the effect of their social, economic and cultural factors on their dwellings.

Statement of the Problem

A settlement pattern is the distribution of human activities across the landscape and the spatial relationship between these activities and the natural elements (Fagan, 1996). The dwelling unit is one of the core elements of a settlement. It is usually characterised by the socio-economic condition and cultural behaviour of the community. Therefore, the preliminary task of settlement planning is the investigation of the factors influencing the dwelling system of the specific community. The fishing community is one of the special communities in Bangladesh whose value, customs, culture and overall lifestyle is different from other communities. However, the social and cultural value of various fishing communities is changing day by day because of unplanned development and resettlement of fishing community. Such activities are also responsible for livelihood diversification of this community that can be a threat to our fishing resources. Therefore, the concern of the community is needed to be taken in any resettlement plan to ensure their better livelihood opportunities and preservation of ethnic and cultural values.

The fishing community is one of the ethnic communities in Bangladesh. Chittagong is situated along the bank of the Karnaphuli River. The fishing community of Chittagong has developed their settlements for their occupational convenience along the riverbank. The river is the main source of income for the fishing communities of this city. However, in recent years water logging has become a great problem for the inhabitants of the city, especially in the rainy season. The situation is the worst in the residence of fishing communities living near the riverbank. For being riverside inhabitants, they are affected by the cyclone, storm surge and tidal flood at a regular interval. To mitigate the adverse effect of such disasters as well as to preserve the fishing community, both Project Division & Planning Division of Chittagong Development Authority (CDA) proposed a master plan on the “Karnaphuli Riverfront Development” in 2009. Under this project, a 300 feet wide embankment-cum-road will be constructed on the bank of Karnaphuli & adjacent to the fishing village “South Kaibarta Para”. Besides, in Detail Area Plan of CDA proposed to improve the existing low-income settlements of Chittagong city through upgrading in the existing locations or relocation as low-income housing in the suitable locations. For this reason, this oldest fishing community of Chittagong will be resettled under the ‘Resettlement Action Plan’ initiated by JICA and Bangladesh Government. (CDA, 2008). To ensure the successful resettlement of this fishing community, it is necessary to know the existing situation of the settlement and dwelling system of this community. This paper will focus on the present dwelling system with relevant problems facing by the dwellers and factors affecting the dwelling system of the fishing community in “South Kaibarta Para”. This will lead

to some recommendations to improve their dwellings in the last section of the research. These recommendations can be followed during the resettlement phase to avoid the dwelling and accommodation problems of resettled communities.

MATERIALS & METHODS

At the primary stage of this study, a literature review has been accomplished in accordance with the research problem. The village named “South Kaibarta Para” situated along the bank of Karnaphuli river in Chittagong city has been selected as the study area for this research. This area is selected as the study area so that it can play a role as a preliminary study for implementing the resettlement plan successfully. The existing condition, a new trend of changing and the influencing factors upon their traditional dwelling system are the research material to be analysed. Therefore, the objectives of this study are:

- To analyse the existing dwelling system of the community.
- To identify various factors and their influence on the dwelling system in the study area.

Here, the research is based on mainly primary data and consists of mixed qualitative and quantitative analyses. Primary data were collected by both observation and survey methods. Surveys were of different types, such as through personal interviews supplemented by Participatory Research Appraisal (PRA) tools like Focus Group Discussion (FGD) and key informant interviews. The survey was conducted for three months from August to October 2015. Fifty household heads were questioned by using a pre-tested questionnaire covering various aspects of socio-economic characteristics, components and problems housing and dwelling systems. Finally, the collected information accumulated, analysed and presented by textual, tabular and graphical forms to explain the dwelling system of the “South Kaibarta Para” fishing community.

Study Area

The selected site South Kaibarta Para is one of the eighth oldest fishing communities of Chittagong. It is situated in the northeast corner of the Chittagong City Corporation (CCC) at Chandgaon Thana. It is surrounded by ‘Kalurghat West side Ferry Terminal’ in the north, Karnaphuli river both at the south and east and Industrial area at the west. This fishing community is more than 150 years old, which exists with 10.03 acres area with 147 households. The study area map is shown in figure 1. Dwelling system of the fishing village

Built Form

The houses in the South Kaibarta para are in dilapidated condition. Most of the dwelling units of this area are tin-roofed with Bamboo mat walls. The corrugated metal sheets of the tin-roofed houses have mostly been received as relief materials from government and non-government organizations after the devastating cyclone of the 29th April, 1991. Generally, the houses are positioned in the east-west direction according to their religious belief and each house has entrance through the front yard.

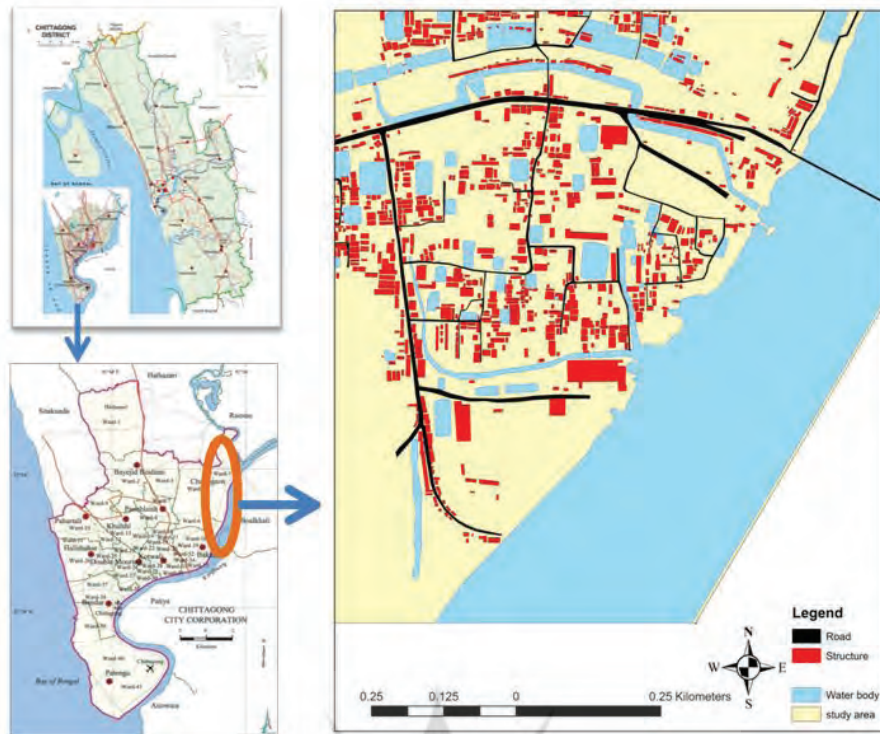


Fig. 1: Study area map (Source: CDA, 2008)

Almost all of the units have small windows or no openings for ventilation except the front door. To maintain privacy, the dwellers use vegetation or CI sheet barrier to isolate their house. Many of the houses are decorated with colourful painting on the wooden plank. Different types of decorative patterns like Om, swastika, foliage, leaves, creepers, crescent, etc. are seen on the exterior walls.

Space Organization of Housing Unit

Generally, the houses are rectangular in plan and have two rooms with a veranda. One room is used for multipurpose use and the other is for a sleeping area. The multipurpose room has worship space sharing with storage. The open spaces around the housing unit hold the kitchen & toilet. Usually, the rooms are partitioned by a bamboo mat wall. A typical housing unit

plan and section are shown in Figure 2.

Sacred Space

Fishermen families having better economic conditions build a small family temple in their front yard. These temples are generally mud-built or have bamboo mat walls with thatch roof or CI sheet roof. Other workers have a particular place for worship purposes in their house located in the north or east corner of the room which has no windows. There are a small 3" to 6" raised earthen surface on which the deity's picture and idols are placed.

Kitchen

In the studied fishing village, all of the households have their own kitchen with a stove. Usually, the kitchen stove is placed

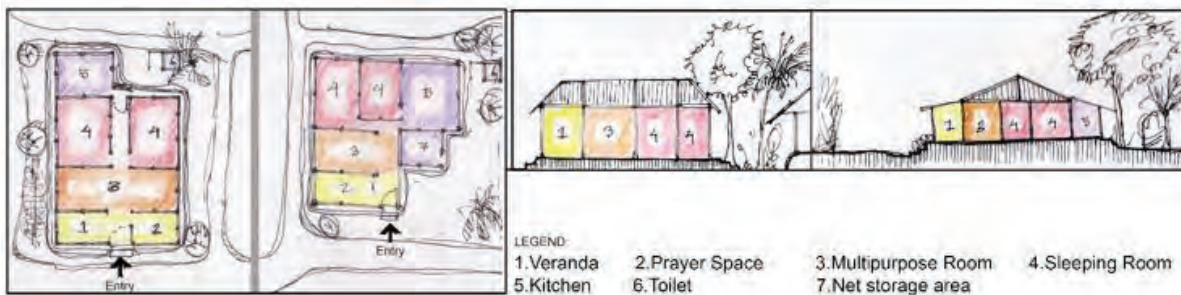


Fig. 2: (Left) Typical unit plan; (Right) Typical section

in a corner of the living spaces. However, due to overcrowding within the house, some families segregate the kitchen from the living space to the back yard. The kitchen is used for cooking, dining and keeping poultry at night. Usually, the kitchen has no windows. The small openings in thatch or bamboo mat walls serve as ventilation. They use earthen stove where firewood is used as fuel. Though the kitchen space is shared by all of the families of the joint family, each one uses their own stove.

Courtyard

The courtyard is a semi-private space shared by the household members and may be taken as a space of residential activity. Mainly, they use this space for net mending. It takes at least three men to mend a net in a week. The front yard is also used as a relaxing space and play area for the children. These open spaces also become active during the time of festivals and celebrations of birth and marriage ceremonies. From the survey, 25 courtyards of various sizes ranging from 250 sqft to 1250 sqft have been seen. The typical plan and picture of a courtyard are shown in figure 4.

House Construction Technique

Inhabitants of the village usually use local material for the construction of the house. The available materials are commonly used for construction including:
Bamboo, one of the commonly used materials for housing construction, is available in and around Chittagong district.

The people also have a process of seasoning these bamboos as they use them for fishing and then they use this seasoned bamboo for house construction. This process of seasoning helps the bamboo to last for at least two years.

Black clay, commonly known as 'Kalo-Mati' is used for Plinth and it is collected from the river.

C.I. sheets, another commonly used material for construction, is available due to the constant supply of reliefs after any cyclones in this area and thus people use it as mainly as the roof as well as the wall in some cases.

Wood is a traditional material but, nowadays, due to the high price of it, very few people use this material. Rather because of longevity issues and low maintenance cost, at present noticeable changes are observed in the use of building materials which cause the demolition of their original culture and architecture. For example, Brick wall & Concrete post are being used as a building element.

House Extension

When the household size increases, they need to extend the house. Generally, the extension is done on the backside of the house where the kitchen is built. By shifting the kitchen, another sleeping area is added if possible. The bamboo mat wall is used for room extension and partition wall. The roofing materials are kept similar to the original house. At present due to the insufficiency of spaces in the village, inhabitants have to construct a new room next to an existing housing unit sharing a



Fig. 3: Religious space of the house



Fig. 4: (Left) Typical courtyard plan; (Right) Photograph of a typical courtyard

common roof and wall to accommodate a new family.

It is little or no space for further expansion of housing units as the social and natural boundaries of the village do not permit this expansion. Due to these problems, the density within the village is getting higher and creating a slum condition as a result.

Water Supply & Sanitation

River is the main source of water in the study area from the ancient period. But due to the increase of pollution and lack of adequate safe water, use of river water decreased in the dwellings of 'South Kaibarta para' Community tube wells are commonly used as the source of drinking water in the study area. Ponds are primarily used for bathing or washing items. Nevertheless, the number of ponds is decreasing day by day for the allocation of more houses. As a result, tube wells are being used for multiple purposes. The sanitation condition of the villagers is very poor. The majority of the families use open space as a toilet. Some of the fisherman families have pit latrine at the back yard but in damaged situation due to improper construction and ill management.

RESULT & DISCUSSIONS

Changes in Settlement Pattern

The settlement pattern of the study area reveals that the dwellings are compactly built, but due to the unplanned growth. Higher population growth rate is responsible for such unplanned settlement pattern. From the FGD and key informants' interviews, it was found that population density in this area has risen significantly in the last 10 years. With no provision for expanding the land area of the village, it has become congested. There is a lack of open space. Moreover, there is no playground for the children to play and even the size of courtyards of clustered houses is squeezing. Land crisis has also increased conflict among families of the fisherman and creating social distance.

Physical Factors

Physical factors include drainage, drinking water source, sanitation, etc. These factors influence the placement and spacing of dwellings. Sometimes the existence of utilities like shops & groceries also influences the location of the households. The availability of water in the Karnaphuli river is the main reason behind the growth of this 'South Kaibarta Para' settlement. This means that in the early years, the fishing community was completely dependent on the river for their earning (i.e. fishing) and the supply of water for various purposes (like drinking, cooking, washing, etc.). Day by day, dependence on river water was started to decline due to various reasons (like water pollution in the river, lack of fishing opportunities, etc.). During the survey, many ponds were found which are primarily used for bathing or washing purposes. As per our rural dwelling system, most of the houses in the selected fishing community were built in connection with ponds and riverside. However, the rapid growth of population and lack of adequate space for the allocation of more houses

have severely squeezed the number of ponds in recent years. This is because community tube wells are being used for many other purposes along with supplying drinking water. This trend has also reduced the trend of building houses near the riverside. Besides, changes in the supply of river water and fishing resources are responsible for changing the occupation of the dwellers in the selected fishing community.

Demographic Factors

1. Family type & size

In this fishing village, families can be classified into two types: 1) Nuclear family- married couples with children and 2) A joint family- group of people related by blood and/or by law. A nuclear family consists of the members of two generations (parents and children) and a joint family with members of three or more generations. In the study of a fishing village, it was found that 14% of fishermen lived in joint families and 86% lived with a nuclear family. Over the last two decades, the nuclear family is very popular through the area because of getting greater freedom of movement and economic opportunities, better dress, better education and woman authority.

On the basis of family size, the fishermen are classified into four categories: Small family (2-4), Medium family (5-7), large family (8-10) and very large family (above 10). The highest percentage was obtained in the 5-7 members' family (60%). The lowest percentage was obtained in the above 10 members' families (6%). 14% of people lived in 2-4 members family, 20% of people lived in 8-10 members' family. The average family size 6.4 per family is larger than the national average of 5.6 people per house (BBS, 2011) in case of a single-family. Household size has a great influence on the size and spacing of the dwellings in the study area. The size of the dwelling unit is being reshaped as per the household number and size. Most importantly, the expansion criteria of the house in order to fit the new generation is changing.

2. Distribution of plots & size

Besides household size, plot size is also an important factor that determines the quality and character of a dwelling unit. The 'South Kaibarta Para's fishing community is a densely built low-income settlement. Unlike other low-income communities, the rapid growth of population is responsible for the increase of dividing families as well as frequent distribution of plots. As much as the distribution is frequent, the sizes of plots become smaller. For instance, a plot size of 550 sqft dedicated to a single family of 4 persons gradually serves for a family of 10 persons. The ancestral law of inheritance in this fishing village allows all the male children (only) to have their share equally in the dwelling unit of the family. Once, a fisherman inherited then he distributes the fragmented plots again to the number of inheritances. Therefore, the plot turns to smaller in size in an unending process for the next generation. As a result, the dwelling units are squeezed as per plot size which affects the standard living condition inside the houses.

Table 1: Size of the dwelling unit according to the household size

Category	Household Size	Maximum Housing Unit (Sq. ft)	Minimum Housing Unit (Sq. ft)
1	2-4	210, 70	150, 50
2	5-7	300, 50	220, 36
3	8-10	410, 45.5	360, 40
4	Above 10	420, 42	350, 35

Economic Factors

Economic factors have a direct influence on the dwelling system of a community. With higher economic growth and rising income level, people will be able to spend more on houses. From the interviews, it was found that the highest income per day of the fisherman from selling fish was BDT 350 and the lowest was BDT 300. Moreover, every year many people are getting involved in fishing as a seasonal or part-time occupation. As a result, fishing pressure is continuously increasing.

From the table 2, It is observed that fishermen with higher income comparative to others in the village are more willing to change their household structure into a permanent one/ Pucca structure using brick wall (with/without concrete post) and RCC slab as roof for further expansion and low maintenance cost.

In addition, we see that about 53% of the fishermen earn their livelihood only by fishing. Over the past few years, about 40% of the families have adopted some extra income sources besides fishing. In the survey, we have also found that during the off-season fishermen are depending upon other occupations unrelated to fishing. Pulling rickshaw or working as labours found to be the most common alternative option among them. However, a few numbers of respondents (especially women of the fishing village) are seen to make some extra income through vegetation, poultry and cattle rearing, hand craft etc. using the small leftover space they have now. Such alternative income sources help them to manage their livelihood at the time of off-seasons. This signifies the need for more open space surrounding the dwelling units.

Built form Factors

The availability and cost of materials have a significant influence on the dwelling units. During the establishment of this settlement, almost all of the people were poor and their dwelling was made with locally available materials like wood,

leaves, straw, etc. Therefore, almost all of the dwelling units were Kutcha in structure. From the data of the respondents, 86.27% of houses were Kutcha, 9.80% of houses were semi-pucca and no Pucca building was there in 20 years ago. However, at present the existence of semi-pucca House is 26 %, pucca house is 4% and kutcha house is 60%. Day by day availability of various materials and purchasing capability of the community people is increasing. As a result, the house forms, building styles and materials used in construction had significant variations in present days of the locality.

Table 3 indicates that, the number of houses using brick and concrete post are increasing. Low maintenance cost and sustainability issue play a vital role behind this changing trend. Besides local handmade bricks are easier to collect, install and even repairing.

Maintenance Cost

The maintenance cost of a dwelling unit includes the repairing cost, Electricity bill etc. The maintenance cost is very low in this area. As they are the owner, they do not need to pay their rents. They have to spend the repairing cost for building material and mostly because of the aftermath of any natural disaster, the maintenance cost rises. It has been found that the Kutcha houses need to repair all of its building materials (such as straw/CI sheet, bamboo, wooden plank etc.) at a regular interval of 2-3 years. Whereas semi-Pucca houses may need to change its CI sheet in about 5-7 years and Pucca houses may have no other expenses except painting. People spend at least 10% of their income for the maintenance annually on an average.

Climatic Factors

1. Disaster vulnerability

Due to the location of the village near the riverbank, the inhabitants have to face major threats of a disaster at a regular interval. Natural hazards like the cyclone, storm surge, tidal

Table 2: Dwelling type in different types of occupation and income level

Group	Occupation	Percentage	Household Income	Dwelling type
Group-A	Fisherman	(53%)	4000-7000	Kutcha
Group-B	Fisherman + Alternative Income	(40%)	7000-10000	Semi-Pucca
Group-C	Fishing business	(2%)	Above 15000	Pucca
Group-D	Others	(5%)	10000-15000	Semi-Pucca

Table 3: Percentage & Building Materials of different dwelling type

Dwelling type	Roof Materials	Wall Materials	Floor Materials	Percentage of dwellings
Kutchha	Thatched with straw	Bamboo Mat	Soil/Mud	8%
	Tin/ CI Sheet	Bamboo Mat	Soil/Mud	52%
Semi-Pucca	Tin/ CI Sheet	Brick and concrete	brick	36%
Pucca	RCC slab	Brick and concrete	brick	4%

flow, riverbank erosion and earthquake were witnessed by the inhabitants of the village over the past years. For example, the village has already lost its about 10% land by riverbank erosion. Every year the remaining land is overflowed by the tidal water even for several months. The vulnerability context of the village can be better understood by the living condition of these people. The impact of such hazards also causes a long-term effect on their socio-economic condition as well as the dwelling system.

from the survey, we have found that the plinth of the houses goes under water in the rainy season. Frequent repairing cost is also needed after the loss by heavy wind during cyclone. But the dwelling units having an extremely bad condition have been damaged severely. The dwelling units for this reason now focus on durability, sustainability and resistant to natural hazards.

2. Orientation of the house

In Bangladesh, traditionally the rural houses are mostly east west elongated and north-south facing. In the surveyed fishing

village 85% houses are east-west elongated and 25% houses are north-south elongated. The difference in orientation of these houses is because of the wind direction from the Karnaphuli river. By setting the smaller face of the houses to the high wind pressure gives the dwelling units better protection during the cyclone time.

Ethnic & Socio-Cultural Factors

In Bangladesh, traditionally the rural houses have combined courtyard. Generally the houses are elongated to east-west and entrance will be from the front yard. According to their religious belief every house has a religious space located at the north or east corner of the house. The courtyard is shared by the household members and may be taken as a space of residential activity.

In this fishing village fishermen use the courtyard for:

- The net mending and repairing
- Making nets which is done by specific craftsman
- Refining the minnows

This space is constantly being used by the fishermen as a space

Table 4: Annual cost according to different dwelling type

Annual Maintenance Cost (in BDT)	Percentage of Dwellings		
	Kutchha	Semi- Pucca	Pucca
Less than 1000	0	0	2
500-1000	10	14	2
1000-2000	42	12	0
More than 2000	8	0	0

Table 5: Types of damage of dwellings by disaster (Source: Field survey 2015)

Category	Type of Damage	Percentage (%)
1	Full house damaged	5
2	Loss of CI sheet	35
3	Over flooded plinth	45
4	Attacked by external factors (tree, heavy objects)	15

Table 6: Size of Courtyard according to dwelling numbers in a cluster

Category	No. of houses	Max size of Courtyard (sqft)	Min size of Courtyard
1	3	900	250
2	4	730	345
3	5	1250	700

of circulation and interaction, however, it is seen that when the fishermen go for fishing and the village is partly empty, the women and the children, share this space for gossiping and playing. Therefore, the provision of courtyard in a fishing community is an inevitable design part of their dwelling system.

Recommendation

From the findings of the survey the following recommendations can be considered to overcome the existing problems of the dwelling system of the study area. These will also be useful to be executed for the fishermen families when the resettlement process is started -

- i. Every dwelling unit of the fishing community should be provided with adequate living space, a sacred space for religious purpose, a cooking space with proper ventilation and at least a small courtyard for handcrafting, vegetation etc.
- ii. Provision of adequate sanitation facilities (like communal sanitary facilities) and their regular maintenance should be ensured in the fishing village.
- iii. Proper ventilation and extension opportunities should be ensured in all of the dwelling units to avoid congestion and conflicts. If horizontal expansion is not possible, then vertical expansion opportunities can be considered. Dwelling units should be built in a planned form through maintaining proper Floor Area Ratio (FAR)
- iv. Pucca building unit is recommended for the fisherman families both for lessening the maintenance cost and disaster resilience. Especially for coping with the disaster vulnerability from cyclone and earthquake, relatively low-rise building with long-lasting building materials should be selected.
- v. Affordability issue must be a primary concern at the time of planning. Government subsidy and phase wise construction policy can be solution to their problem.
- vi. Each housing unit for a family must ensure the standard living condition with required space and basic service facilities. Each unit should be environmentally sound. As a whole, the entire village should have all the necessary urban community facilities.
- vii. The provision of open spaces connected to the dwelling unit should be ensured so that the traditional lifestyle of the fishing village will be preserved. This will also help to enhance the social cohesion among the families.
- viii. Fishermen's livelihood can be improved through providing extra income options in their individual household premise and collectively also. This is the matter of hope that now particular incentives for the banned seasons are provided as they can't go for fishing during the seasons
- ix. Last but not the least; ensure the availability of water and fisheries resources to make their livelihood sustainable.

CONCLUSION

Existing dwelling system of the village "South Kaibarta Para" is characterized by higher population density, compact settlement pattern, poor infrastructure, lack of proper utilities (like gas, sanitation etc.), disaster vulnerability, higher maintenance

cost and inadequate future expansion opportunities. Structures and quality of the houses in this area is the reflection of their socio-economic condition. Improvement of their dwellings with adequate facilities is a precondition to improve the living standard of the dwellers of this village. Though the dwellings of the selected fishing village are in dilapidated form, they have some special features that cannot be removed. Such as the orientation of the dwellings are based on their religious belief and courtyard and sacred space reflects their culture and tradition. Besides, the existence of the courtyard is related to their occupation as it is used as worship space. For this reason, these parts can never be excluded from their dwelling structures rather should be provided in an improved form. The key factors that influence the dwelling structures in the selected fishing village are household size, income, availability of building material, maintenance cost, religious belief, culture and tradition. Another important aspect of this settlement is the adequacy of river water and fisheries resources that will ensure their sustainable livelihood. These factors must be taken into consideration before conducting any kind of development activities regarding the settlement and dwellings of this community.

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