

A Guide for Ground bed type (*bari-bhiti* style) homestead

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Chapter 1. INTRODUCTION

- Ground bed type (*bari-bhiti* style) homestead is one that is made on a raised earthen mound which is created by piling up the soil that is higher than flood level.
- As this type of homestead remain free from inundation during flooding period, and provides shelter during cyclone, high tide and water logging.
- Different types of trees and vegetables can be planted in this type of homesteads which remain free from saline water. This rich vegetation will protect the houses from strong wind and alleviate current/tide power, gives the people a comfortable shade.
- The nutritional condition of the household members can be improved by consuming various fruits and vegetables by growing them raised earthen mound of ground bed type homestead.
- The huts in the ground bed type homestead are protected from the flood water inundation by double structure. First layer is the raised earthen mound which protect the ordinary flood level. Second layer is the earthen plinth of individual huts that protect from the huge flood level (Fig. 1.1).
- In the stilt type homestead the space can vertically be used only whereas in ground bed type homestead both horizontal use (for huts) and vertical use (for plantation) is possible.

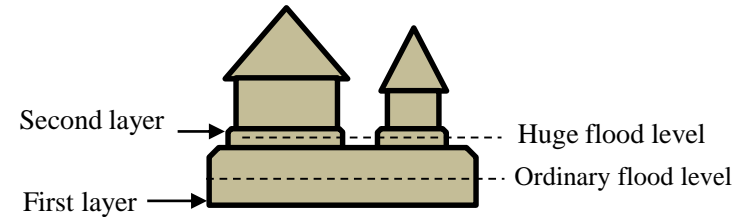


Fig. 1.1 Double layered ground bed type homestead

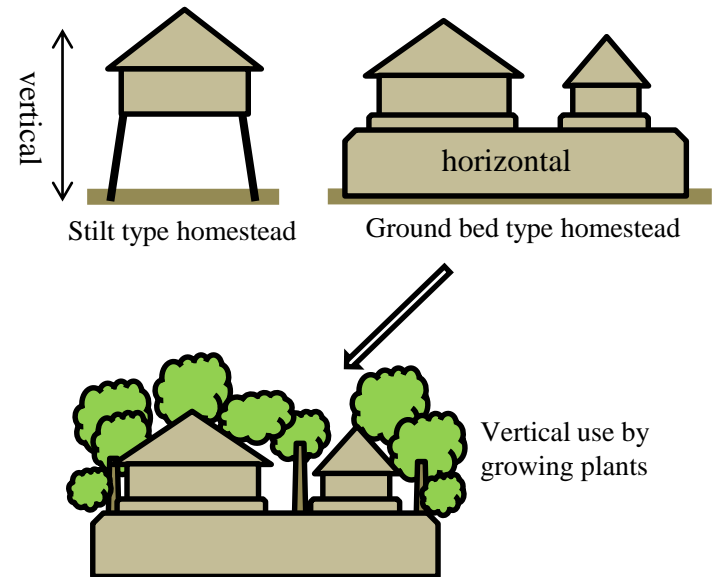


Fig. 1.2 Space design for vertical and horizontal use in homestead

Chapter 2. PLANNING FOR BUILDING NEW HOMESTEAD

2.1 Site selection

Before starting to raise the mound for homestead area planning is necessary to select site for the homestead. Following points may be considered during planning stage of homestead construction-

- The site for the raised mound should be selected in a relatively elevated area which will save necessary amount of soil required to raise the earthen mound.
- It is preferable to be located near a available source of soil. The soil can be collected either from owners own land, or somewhere else (other's land or nearest river bed).

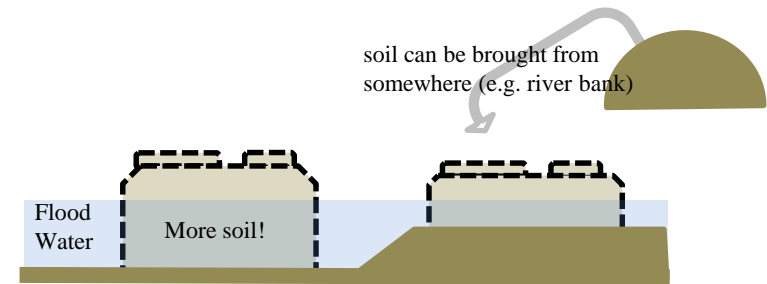


Fig. 2.1 Site selection for raised earthen mound

2.2 Size of raised earthen mound i. e. homestead area

- The size of homestead area usually depends on the necessities of houses. For instance, main house, kitchen, cowshed, tube-well, latrine, size of the court yard etc.
- The size of the homestead depends also on the available additional land for digging soil which eventually turns into a small ditch. In Bangladesh context, usually the size of the land for digging soil is the half (minimum one-third) of the homestead land size. The ditch is useful for fish culture which can supplement protein requirement of the household members.

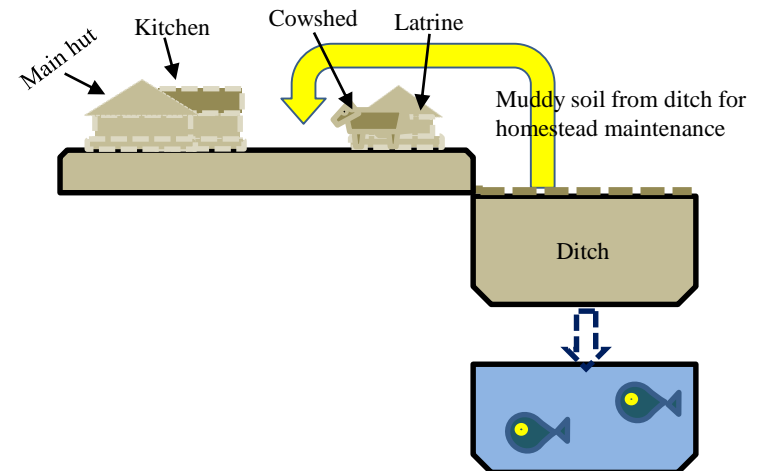


Fig. 2.2 Size of homestead

- Eroded soil from homestead usually deposited into ditch which is useful for the maintenance of homestead.
- If soil is collected from somewhere else such as nearest river bed then there is no need of digging soil from own land.
- If there is available land, it is preferable to keep space for courtyard. In flooding season, there will be water surrounding the homestead and hence the courtyard acts as working space.
- In Bangladesh, the minimum size of the homestead is about 2 decimal (80 m² /870 ft²)

2.3 Space arrangement

- Vegetation in homestead is necessary to protect the huts from strong wind and to protect homestead soil erosion by flood water.
- Space should be selected for tree plantation and need to be designed properly considering wind direction, flood water current direction. Some space should be kept open to keep inside the homestead sunny.
- In Bangladesh, the plantation is usually done on northern side of the homestead to protect the huts from damages caused by nor-wester/cyclone. The south side remains open to get enough sunlight into the courtyard.

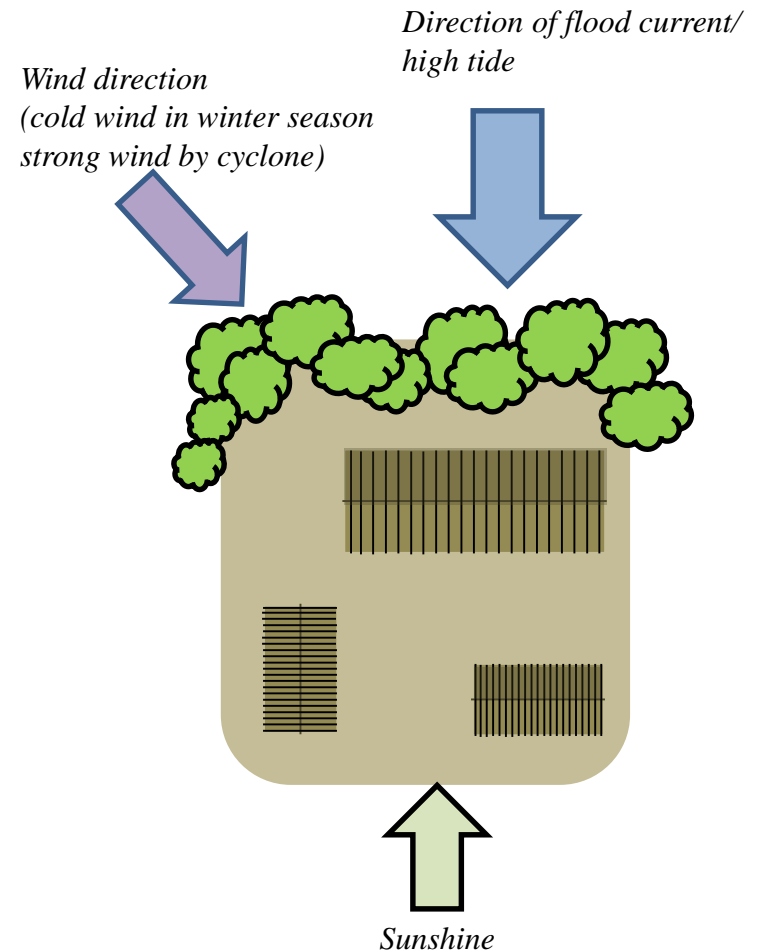


Fig. 2.3 Space arrangement for ground bed type homestead

Chapter 3. CONSTRUCTION OF HOMESTEAD

3.1 Digging/collection of soil

- Raising mound for homestead is usually done in dry season.
- The process starts with collecting soil from another location and is heaped to make a mound of about 4-6 feet height so that the flood water cannot reach to homestead ground level.
- Soil for raising the land is often obtained by excavating a pond on the land, which can later be used for rearing fish and bathing.
- However, if sufficient land is not there, soil has to be brought in from elsewhere. Few basic steps is followed in this case-i) Leveling (achieving appropriate level), ii) Dressing (adding soil to raise level) and iii) Compaction (consolidating loose soil).
- In Bangladesh, the manpower requirements for digging and collecting soil, it usually needs 50 man-days to complete the raised mound for each 40 m² area.
- After making the mound/heap, the soil is being kept fore few months to be settled down and for making it ready to build the huts. Meanwhile this raised earthen mound can be used as vegetable field.



Photo 3.1 Digging of soil for raised mound



Photo 3.2 The raised mound on which huts will be built

3.2 Vegetation on raised mound

- Trees should be planted in such a way that the courtyard get adequate sunlight.
- Native plants of the floodplains should be given priority as they are part of the local ecosystem.
- Trees which provide fruit as well as timber should be given more importance. These also act as financial security.
- Trees with dense root system (coconut, date palm, etc.) should be used on the slope of the homestead mound.
- Trees that can withstand floodwater for a long time should be planted in the lower part of the slope.
- Grasses with affinity for wetness and other ground-cover herbaceous plants (also a source of vegetables) should be planted on the slope as soon as the earthen mound is prepared so that heavy rain can not hit the soil directly.
- Planting catkin grass on the edges of the mound is encouraged because it protects from erosion and is also a source of fuel, fodder and building material.
- Bamboo plantation is highly recommended. It protects the soil from erosion and is an important building material source.
- There should be adequate sunny area for kitchen garden to cultivate seasonal vegetables. This should be on high ground as most traditional vegetables can not survive in floodwater.
- In Bangladesh, local bananas, bamboos, *Lannea coromandelica*, *Saccharum spontaneum*, *Ipomoea fistulosa* etc. are often planted for fastening soil.



Photo 3.3 Planting vegetation on the periphery of raised mound

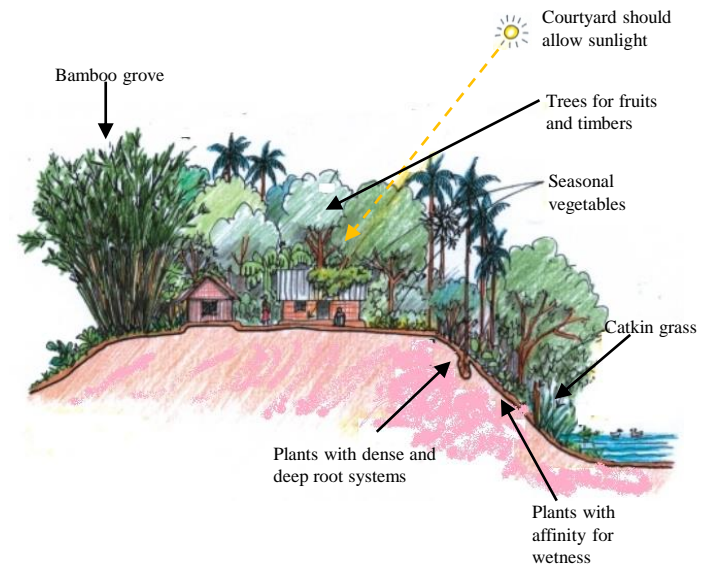


Fig. 3.1 Vegetation on raised mound for homestead in flood prone area

3.3 Making earthen plinth for individual huts

- After the land preparation is done and the earthen mound being settled down, the plinth for individual house is made.
- The earthen plinth is usually built at around 5 feet away from the edge of the earthen mound of the entire homestead area.
- The area of the plinth depends on the size of the house that depends on the number of household members.
- The height of the plinth is varied usually from 1.5 to 2.5 feet.
- Two types of plinth are found- one is the whole plinth consisted of sandy clay soil which is then covered with clayey mud. Another one is consisted of a brick perimeter wall around the typical earthen plinth that resists erosion from the sides.
- After filling the plinth, the soil is rammed with hammer to be compacted.

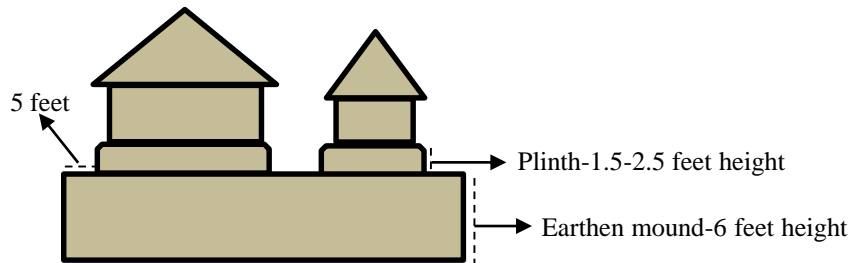


Fig. 3.4 Height of earthen mound and plinth and distance between edge of mound and house plinth



Photo 3.4 Earthen plinth consisted of clay soil



Photo 3.5 Brick perimeter wall plinth filled with soil

3.4 Construction of houses

- The nature and style of the houses varied according to the culture, environment, availability of the raw materials in the locality, ability of people etc.
- In Bangladesh, three types of houses are found viz. Kutcha house, Semi-Pucca house and Pucca house.
- In Kutcha house, the foundation is made with earthen plinth with bamboo (sometimes timber) posts; the walls consisted of organic materials like jute stick, catkin grass, straw, bamboo mats etc. and the roof is made with thatch (rice or wheat or maize straw) or sometimes reed stalk framing.
- In Semi-pucca house, the foundation is made with earthen plinth; brick perimeter wall with earth infill; brick and concrete. The wall are made with bamboo mats; CI sheet; timber (sometimes split bamboo) Sometimes part or full brick. Roof is consisted of CI sheet with timber framing (sometimes split bamboo).
- In Pucca house, the foundation is made with brick and concrete; walls consist of brick and the roof is made with reinforced concrete (RC).



Photo 3.6 Kutcha house



Photo 3.7 Semi-pucca house



Photo 3.8 Pucca house

3.5 Construction of other basic infrastructures

- Other than the main house there should have built other basic infrastructure especially tubewell for water supply, latrine for sanitation, and kitchen for cooking.
- The tubewell should be located on raised ground, or itself should be raised by extending the riser column, to avoid contamination by floodwater and also to continue serving during flood.
- The most basic and important aspect towards ensuring hygienic sanitation is to discourage and prevent open defecation and use of hanging latrines. These practices contaminate water sources and is a major cause of spreading diseases during flood.
- Simple pit latrine is the most cost-effective and somewhat hygienic sanitation option. An improved version with a concreted squatting slab is recommended if available in the locality.
- The location of the latrine would be near the tubewell for immediate cleaning of the hands.
- Another essential infrastructure is the cooking shed which process the food materials to feed the household members. It is usually located at the side of the main house in the homestead.

Chapter 4. MAINTENANCE OF HOMESTEAD

Homestead is gradually damaged by rain shower and flood current. If the damages continue and proper maintenance is not done the homestead will be broken. Therefore, continuous observation and maintenance is necessary. Homestead can be maintained by two ways. One is regular maintenance and another one is periodic maintenance.

4.1 Regular maintenance

- Small cracks and crevices are formed during dry season on the plinth of house and on court yard.
- This cracks weaken the basement/plinth of the houses and need to be repaired. These cracks and crevices should be repaired regularly (once in a month except the rainy days) by plastering with a mixture of water, clayey soil/muddy soil (collected from the adjacent ditches) and raw cowdung. If raw cowdung is not available then rice bran can be used instead.
- The mixture consisted of 70% water, 15% clay soil and 15% cowdung.
- It should be remembered that too much clay in the mixture will result cracking and too little clay will result a powdery weak plaster.



Photo 4.1: digging of clay/muddy soil to the homestead



Photo 4.2: Plastering of plinth with muddy soil mixture

4.2 Periodic maintenance

- Every year in rainy season, the homestead surface is washed away.
- After few years when the surface become too sandy (colors turn into whitish), it should be refreshed by layering with clay soil from the base of the adjacent ditch.
- This also help supplying nutrients to the homestead soil for growing of plants, both trees and vegetables.
- The layering should be done in every three to four years depending on the intensity of soil erosion.

4.3 Maintenance of vegetation

- It is advisable to keep seasonal vegetables through out the year as these provide nutrition to the family members and act as a source of financial security.
- Besides, the root system of the vegetable plants bind the soil of homestead that reduce the soil erosion.
- New tree seedlings should be planted after cutting the old one.



Photo 4.4 Layering of homestead surface with new soil



Photo 4.5 Seasonal vegetables on the homestead

Chapter 5. CONSTRUCTION OF HOMESTEAD IN BANGLADESH

5.1 A Case study from Tangail district of Bangladesh

The Dakshin chamuria village in Tangail district of Bangladesh, is a flood prone area. This case study is about a local villager named Md. Zoyed Ali of 59 years of age. Mr. Ali built his homestead in a raised mound about 2 (two) years ago. First he raised the earthen mound (locally called viti) with an area of 3500 ft². The length of the viti was 70 ft and the width was 50 ft. and the height was 6 ft. After the mound has been completed Mr. Ali and his sons planted banana plant before moving to this new homestead. During the process of building individual houses, they also planted Mango, jackfruit, Mahogany and Eucalyptus tree.

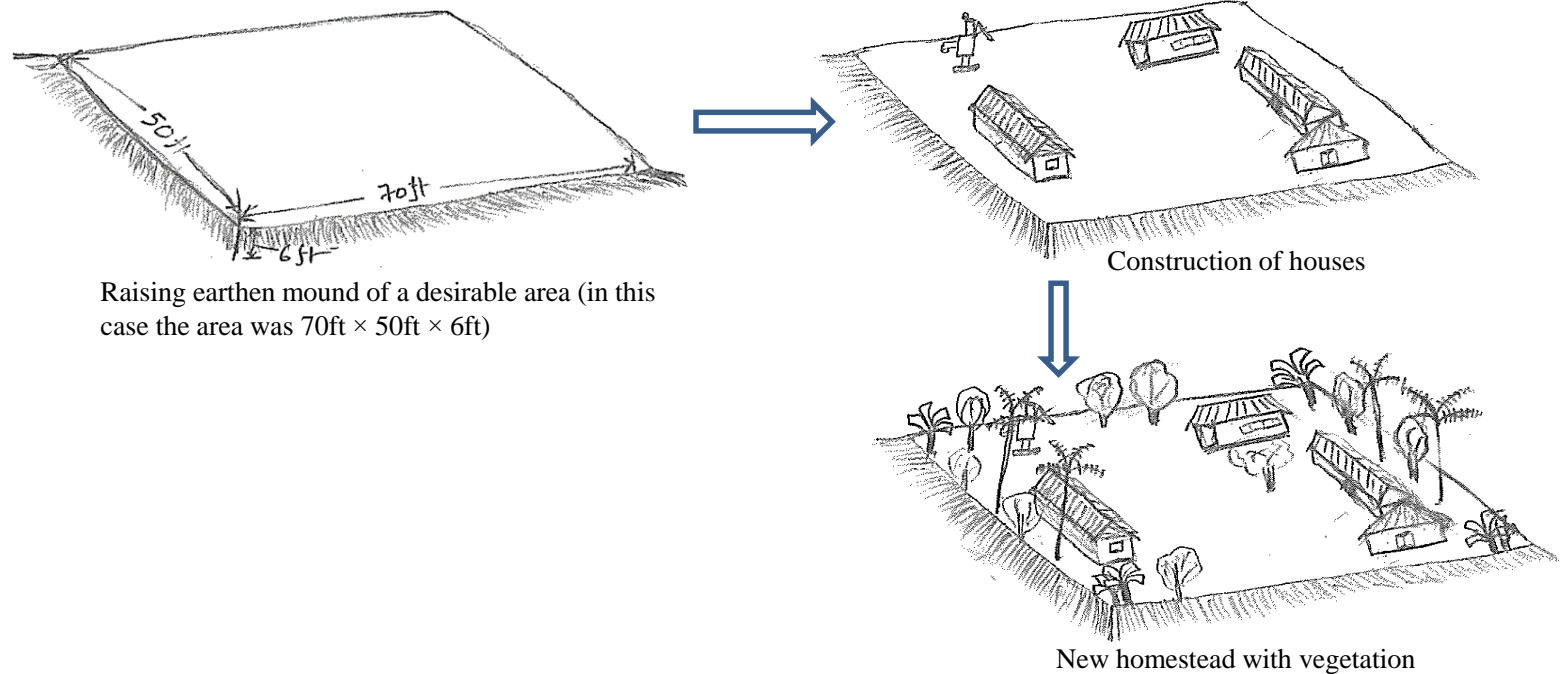


Fig. 5.1 Steps of building homestead in Bangladesh (a case study)

5.2 Photographic view of Homestead construction in Bangladesh (Tangail district)

Beginning



Construction of raised mound by digging soil



Mounds is settling down meanwhile vegetation is planted



Completion



After 10 months, bananas have grown.
Vegetables growing also started.



One month later, along with banana some other plants were planted to fasten soil



Huts are under construction



Chapter 6. BREAKDOWN OF COSTS FOR HOMESTEAD CONSTRUCTION

Note:

- The size of the raised earthen mound is 2 decimal (870 ft² with 6 ft height). It is the minimum size of constructing homestead.
- The size of the house is 200 ft² (20 ft × 10 ft). The foundation is an earthen plinth. The structure consisted of RC (Reinforced Concrete) posts, CI (Corrugated Iron) sheet walls; the roof is made with timber framed CI sheet. Door and windows are framed with timber.
- Exchange rate at time of homestead construction, approx. 1 USD= 78 BDT

Items	Quantity	Rate	Total cost (tk)
1. Raised earthen mound			
- When soil is brought from another location-including labor cost	5250 ft ³	1500 tk/200 ft ³	39,000
- When soil is collected from own land-labor costs need to be paid	100 man days	300 tk/man days	30,000
2. Foundation-earthen plinth (20 ft × 10 ft)			
- Labor cost for carrying mud soil	10 man days	300 tk/ man days	3,000
- Labor cost for compacting plinth	5 man days	300 tk/ man days	1,500
3. Construction of hut (20 ft × 10 ft)			
- Concrete pillars/posts	20 pcs	300 tk/pillar	6,000
- Timbers	40 ft ³	500 tk/ft ³	20,000
- CI (Corrugated Iron) sheet	9 band (1band=72 feet)	5000 tk/band	45,000
- Accessories (Nails, screw, GI wire etc.)	-	-	2,000
- Windows (timber framed)	3 windows	1500 tk/window	4,500
- Door (timber framed)	1 door	4000 tka/door	4,000
- Ceiling (bamboo made)	-	-	5,000
- Masson cost for hut construction	-	-	5,000
Total		:When soil is bought from another location	135,000
		:When soil is collected from own land	126,000

Chapter 7. CONCLUSION

- Homestead construction on raised mound (*bari-bhiti* style in Bangladesh) plays an important role of providing flood free space for livelihood of people living in flood affected area.
- This style of homestead construction also creates a working opportunity for the household members, especially for the women by homestead gardening all the year round. Even during the flooding period it is possible to cultivate summer vegetables on open ground of the raised mound of homestead.
- Through homestead gardening on the raised mound, there is a possibility to improve food security and increase nutritional status of the poor and extreme poor in the flood affected area.
- Therefore, ground bed type homestead (*bari-bhiti* style) could be an alternative method of homestead construction to stilt type homestead that is usually practiced in the flood prone area of Myanmar.