REFERENCE MATERIAL

Erosion control mechanisms & flood-resistant construction

CONTENTS

CHAR STABILISATION IN ASSAM – A SIGNIFICANT INTERVENTION FUNDED BY ECHO/DCA

In realization of the urgent need for Char Stabilization in some of the char villages in Assam, CASA, after internal discussions and dialogue with the affected communities, initiated char stabilization work under the **ECHO/DCA** funded flood rehabilitation programme in Barpeta district of Assam. The objective was to protect the habitated chars from erosion with cost effective measures by adopting local knowledge and encouraging people's involvement in the whole process. Government models for erosion control were studied, but the people rejected these models due to their technical sophistication, high cost, very limited scope for community involvement and also limited scope for local level replication.

One of the peculiar features of the Brahmaputra river in Assam are the Chars (riverine silt islands). Chars develop over a period of 10-20 years in the channels of the Brahmaputra River as a natural process. Over a period of time these can eventually become habitable and go under occupation (some chars are upto 40 years old). Once some of the channels get silted the river changes it course and starts eroding old chars thus entailing displacement of the inhabitants and loss of livelihoods.

In consultation with a technical expert, CASA adopted the strategy to develop a people's model of Char Stabilization using a combination of A-Type bamboo spur, bamboo tripod and a sand bag which was further strengthened through plantation of deep rooted local varieties of trees along the banks of the river. This was a technically feasible model developed from a traditional design and could be easily replicated with locally available resources and little involvement of technocrats. These structures help in diverting water current, reducing the speed of undercurrent and also help in inducing sand deposition. These models were implemented on three char islands in Barpeta district and are proving to be successful in controlling erosion. There was a high level of community involvement and ownership in the char stabilization intervention, which was extremely heartening and remarkable.

Fig: Char Stabilization structures in Assam under the DCA-ECHO flood rehabilitation programme

*Michael Gowen - Deputy Head of Unit, Brussels & Yassine Gaba - Technical Assistant, India Office, who were members of the **ECHO mission** to the field areas of CASA's flood rehabilitation programme in Assam said …*

- *The flood rehabilitation intervention was well justified*
- *The quality of the work undertaken was found to be good*
- *Community contingency plans developed as part of the DRR initiates were extremely impressive and felt that the overall model could be replicated.*
- *Community mobilization and participation was extremely good*
- *The lessons learnt workshop organized by DCA & CASA was a good concept and could be tried with other ECHO partners.*

SHELTER PROGRAMME IN ASSAM – A UNIQUE INTERVENTION OF CASA FUNDED BY ECHO/DCA

In the year 2007, 25 out of 27 districts of Assam were affected by the floods. The large scale erosion of land, due to the changes in flow of the river Brahmaputra and its tributaries in various districts such as Guma and Mandia Block in Barpeta, left people with no shelter or livelihood base.

During the post flood situation, the poor and marginalised families were finding it hard to recover from the losses, restore houses and livelihood without external support. There were serious concerns for basic survival among the beneficiaries and the grief over losses of valued and meaningful possessions was tremendous. Apart from this fear and anxiety about personal safety and the physical safety of the family members was significant. Concerns about relocation and the related isolation had created psychological pressure among the beneficiaries and hence increased their vulnerability to diseases and resulted in increased spending on health.

In the absence of concrete Government plans for rehabilitation of the affected people CASA planned a rehabilitation project to link the people to opportunities for restoration which was supported by **ECHO / DCA.**

Conscious effort was taken to ensure that, the people who were most marginalized and excluded from mainstream development programs and post disaster relief interventions and had very limited capacity to claim their rights and entitlements, were given top priority. These beneficiaries were mainly from the Muslim community and many were migrants from within and outside the region who had no recourse but to eke out a living on the flood plains and riverine islands. In most cases they lacked proper identity documents and were exploited on account of their lack of legal status. From within this group preference was given to marginal and landless farmers, women headed households, aged, infirm and people who were recently displaced and people with very minimal access to basic services.

The majority of the existing houses were made of bamboo splits, reinforced mud walls with bamboo pillars and straw roofing on bamboo frames, which did not have enough height and ventilation. These houses were not durable and vulnerable to floods and constant soil erosion. The people living on the banks of the river Brahmaputra and its tributaries such as the Manas, Beki in Barpeta district were under constant threat of erosion. The local situation did not permit shifting to safer places. There was no other option for most of them but to continue living in that area. In view of this peculiar situation, a very innovative housing design was planned and implemented by CASA under **ECHO/DCA funded flood rehabilitation programme**.

Before commencing the project, CASA sponsored a DCA funded study in partnership with Sphere India to explore various shelter designs, appropriate in the multi-hazard prone areas of Assam, and also suitable for the absolute poor. The study was undertaken with active consultation of the communities.

The shelter design of this **ECHO/DCA** project was based on the recommendations of the study. The materials provided were meant for improved traditional houses. These materials consisted of pre-cast concrete pillars, bamboo mats for flooring and bamboo rafters with CGI sheet roofing. There was provision to raise the floor level during flood with bamboo rafters and bamboo mats (Gadhoi) which in normal time served as ceiling. The ceiling had the provision to be lowered to required height as per the flood level to enable shelter for the family.

The houses were constructed in such fashion that in the case of severe flooding or imminent erosion, they could be dismantled easily and temporally shifted for safekeeping and put back when it was feasible on a location that was available without significant involvement of cash or without going to local vendors for loan. This has greatly reduced the recurring financial burden of the beneficiaries who are now diverting the savings to take up secondary livelihood activities.

A total number of 530 families were assisted with house building materials and 20 person-days of Food and Cash for Work for the labour component under this ECHO/DCA project.

REFERENCE MATERIAL 2

STUDY OF CHAR STABILIZATION INITIATIVE IN THE ALLUVIAL FLOOD PLAINS OF BARPETA DISTRICT OF ASSAM

From Technological Approach to Community Based Approach

Church's Auxiliary for Social Action

STUDY OF CHAR STABILIZATION INITIATIVE
IN THE ALLUVIAL FLOOD PLAINS OF BARPETA DISTRICT OF ASSAM
From Technological Approach to Community Based Approach

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EUROPEAN COMMISSION
Humanitarian Aid

DAN CHURCH AID
AYUDA DE DCA
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DENMARK

DanChurchAid (DCA)

PREFACE

The DanChurchAid (DCA) flood rehabilitation project entitled, "Rehabilitation support to most marginalised flood affected families in Assam, India" was financed by DG ECHO under its ad hoc decision in 2007. The project was implemented by DCA in partnership with CASA, targeting the most vulnerable affected communities living in the Char areas of Barpeta district in Assam.

The project has been monitored several times by DG ECHO and its implementation proved to be challenging because of the remoteness of the targeted areas and the level of exposure to river erosion faced by the targeted communities. Given the multiple vulnerability context of India, DG ECHO encourages innovation and mainstreaming of DRR strategies in the relief/rehabilitation projects whenever pertinent and possible. DCA/CASA project promoted an integrated approach consolidating the initial emergency response in mainstreaming disaster preparedness. This project appears thus well calibrated in providing a sustainable solution to the level of exposure into inventive community based initiatives. DCNCASK initiative to stabilise chars appeared particularly innovative in that regards. This approach has not been tested before and its effectiveness has yet to be established, but it provided a community driven simple solution which could be easily reproduced if proved to be efficient. Indeed, in this model no complex technology has been used. Instead local technology and know-how were adopted through a series of community consultation process. The consultative process thus ensured community participation in its execution.

If the impact of this initiative has still to be appreciated, such approach has to be promoted further. The present publication aims at a broader diffusion and it is expected that it will thus participate to a wider dissemination and advocacy on promoting DP/DRR community based initiatives.

Yassine GABA
Directorate General for Humanitarian Aid (ECHO)
European Commission Technical assistant - India Office

FOREWORD

It is well known, that India is a host to different kinds of disasters such as floods, cy-clones, droughts, earthquakes, landslides, tsunami, etc. causing widespread damage to life, property and also hampering the developmental process. Today with the advent of Climate Change phenomenon, the frequency and intensity of disasters are on the in-crease, further exacerbating the already grim status of the vulnerable communities, making them even more susceptible on account of multiple factors.

In the context of recurring disasters and India's vulnerability to various kinds of hazards, CASA has given special emphasis on a more pro-active approach, than being solely re-active to disasters. Over the years, CASA has gained expertise and recognition in its Disaster Risk Reduction efforts mainly in the area of Community Based Disaster Preparedness (CBDP) and developing Disaster Resilient communities.

I am sure, that CASA's initiative of Char Stabilization work in Assam, which is presented in this book will add a new chapter into its ongoing DRR interventions. Assam a tradition-ally flood prone area with its unique characteristics, has been a challenge for various humanitarian agencies to address the issues of flooding and disaster risk reduction. The communities living on Chars have been extremely vulnerable to floods and also under the constant fear of having to relocate due to the recurring phenomenon of chars getting eroded and disappearing into the river.

The char stabilization work initiated by CASA is unique as it is a combination of different traditional methods involving the use of locally available resources and implemented by local people with little involvement of technocrats. I am confident, given the high level of community involvement at various stages of this programme, the ownership of the process by the community and the visible success in controlling the erosion that this model can be used as an effective method in future char stabilization interventions.

It gives me great pleasure to bring out the salient features and findings of this char stabilization initiative of CASA in the form of a book, which will provide a more holistic perspective of the work undertaken, its technical aspects and the process of community involvement in the entire programme.

The uniqueness of the model is its potential to be easily replicated in other similar areas by agencies working on risk reduction aspects. I would like to express my gratitude to DCA/ECHO for extending its support — not only the financial but also its spirit of partner-ship - for the successful implementation of this programme in Assam.

I sincerely hope that this book will serve as a reference point for future DRR interventions in char areas.

Sushant Agrawal
Director, CASA

ACHNOWLEDGMENS

Many individuals and organizations have contributed towards this study and publication.

First and foremost, we would like to thank the communities living on the edge of River Brahmaputra who shared their life experience and traditional knowledge of controlling river bank erosion and stabilizing the Char.

We thank Prof. Zahir Uddin Ahmed, Ex- Principal and Former Head of Civil Engineering Department of Assam Engineering College and Ex- Member of Board of Consultant, Brahmaputra Commission for agreeing to support us in conducting the study as consultant.

Special words of thanks are extended to Mr. Amrit Kumar Goldsmith, Officer on Special Duty, CASA, for facilitating the study and for extending support in bringing out the publication.

We are indebted to Mr. F B Manik Shah Mazumder, Project Coordinator of DanChurchAid (DCA), South Asia Regional office for conducting participatory exercises to document the traditional knowledge and for facilitating parts of the study.

We are grateful to Mr. Sailendra Pandey, Mr. Ratul Pathak and Ms. Anamika Mary Gogoi for contributing photographs for the publication.

We are grateful to Mr. Yassine Gaba of the Directorate General for Humanitarian Aid (ECHO)-European Commission-India Office for the partnership and support extended by him and also for writing the preface, despite a busy schedule.

We thank Mr. Sudhanshu S. Singh, Regional Relief Officer of DanChurchAid (DCA), South Asia Region for conceiving the idea of this study and also for his continuous support.

We also thank Nina Ellinger, Regional Representative of DanChurchAid (DCA), South Asia Region and Directorate General for Humanitarian Aid (ECHO)-European Commission- India Office for accepting the concept of CASA towards stabilization of Char activities and arranging the required resources for the study and for the publication.

Finally we wish to thank Dr. Sushant Agrawal, Director, CASA for his dynamic leadership and support without which this undertaking may not have been possible.

Nirmal J Singh
Head of Emergency, CASA

CONTENT

SECTION ONE: INTRODUCTION

1. Executive Summary

During high floods in August 2006, surveying y boat the flood affected char areas in the lap of river Brahmaputra in Mandia Block of Barpeta district, it became clear that Char Stabilization work is an important part of flood relief, preparedness and mitigation response which should not be ignored.

Mr. Prafulla Sharma of Manav Shakfi Jagaran highlighted this part of flood preparedness programme which is ignored by all while responding to flood response programmes.

The flood ad-hoc decision programme was initiated by ECHO in partnership with DCA through CASA, the char stabilization component of the flood rehabilitation activities become very challenging. The Government of Assam models of Char stabilization are available, but the huge cost involvement is prohibitive and the models do not encourage participation of local flood affected people in the construction and maintenance.

A cost effective people's model of char stabilization design was targeted through PRA process with government involvement. The peoples design on char stabilization is being successfully implemented with the hope that the constructed structures will stabilize the chars and protect the habitat of the vulnerable communities from devastating erosions.

In section TWO of the study deals with EROSION MECHANISM of the Brahmaputra basin as the core issue of approach of Char stabilization initiatives.

In section THREE- EROSION CONTROL INITIATIVES in general was highlighted mainly through Government initiative so far. Point 8 deals with on governmental model through people's participation.

In section FOUR deals with the experience of ECHO/DCA/CASA in implementing the Peoples model of char stabilization work in the blocks of Guma and Mandia of Barpeta district of Assam.

Prof. Z. U. Ahmed is an experienced person in flood management and mitigation was re-quested to do the study and bring out an authentic/authoritative document on the basis of firsthand experience and data of ECHO/DCA/CASA in Barpeta district.

SECTION TWO: EROSION MECHANISM

02. River and river erosions

River is the drainage channel of its catchment discharging overland flow. Along with water, it may dispose a considerable volume of sediment washed down on its way from the watershed and eroded from banks beds. Throughout the ages, the rivers have been serving humanity sustaining its civilizations. But also the destructive rush of river water controls the destiny of people if left unattended. The rivers were causing enormous sorrows by frequent change of their courses by erosion and deposition, by flooding land and habitations causing devastation and damages to lives, properties, lines of communications and structures. To fight against these ravages of rivers, measures are necessary to train the rivers to flow in defined desired channels.

The training of river involves the study of river behavior and its control so as to stabilize its channel course with certain cross section for one or more of the objectives such as:

1. Safe passage of flood water through an economically restricted waterway for bridges and hydraulic structures and prevent their outflanking
2. Protection of river bank and bed against erosion
3. Confine river water against flooding
4. Controlled sediment movement and its deposition.

Studies of the behavior and mechanics of river are essential for the success of river training works under varied conditions. The development of a river course is the works of ages in geological scale, Influence and interdependence of various complex factors involved in river mechanics are inadequately understood. Therefore river trainings are not yet amenable to fully mathematical analysis. However a rational approach can predict the out-come of a river training measure with a fair degree of certainty.

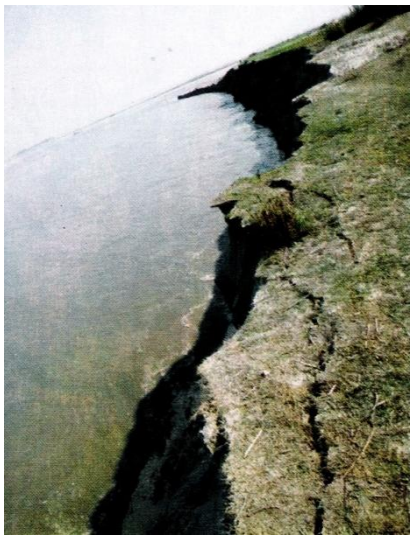
The behavior of river is highly complex because of varying influences created in its catchment climate, soil type, precipitation, topography, vegetal cover and other manmade and natural disturbances. A river in alluvial region is free to lateral movement, transported sediment similar to the bed materials, being formed by the aggrading action of the river itself. It may be marked with the characteristics of meandering adjusting to changed circumstances marking a stable regime. However braided alluvial rivers are marked with un-stable characteristics of formation of multiple flow channels with frequent changes in plan.

The flow of the alluvial river is governed by its discharge, bed slope, sediment charge and its grade, as observed from regime equations for sediment laden channel flow. But these parameters are in the state of constant variation due to various changes in catchment characteristics. Therefore alluvial rivers are active in erosion and deposition. Thus river erosion is mostly a problem of alluvial rivers.

Meandering is the shifting of river flow from one bank to the other in some sort of sinusoidal pattern. It is the action of excess sediment load and bed slope assisted by curvature of flow. If there curvature of flow. If there is a slight irregularity in the river deviating the flow towards some bank, more and more flow will be induced to- wards that bank due to centrifugal effect resulting some sort of helicoidal cross flow which removes the eroded materials from the concave bank and deposits the same on other convex bank and the river flattens its slope by lengthening its course.

When a river with excessive sediment load reaches flood plain, its velocity is reduced thereby reducing sediment car-wing capacity which gets deposited on the river bed itself. Thus river bed level rises and channelization start causing river braiding. A braided river is marked by number of inter connected flow channels with unstable char lands in between. These char lands are made up of highly fertile alluvial deposits suitable for agricultural crop production.

03 Brahmaputra Basin Erosions



Brahmaputra basin is an unstable tectonosedimentary region having frequent occurrences of earthquakes resulting increase in sediment loads in rivers. Loose sedimentary soils on land surfaces and channel banks and beds are also highly amenable to erosion. Overland flow from heavy precipitation causes gulley formation on the land adjacent to outfall and subsurface flow resulting from seeped precipitation water causes bank caving of flow channels. When river is in space, water enters the river banks which subsequently also seeped out during drawdown abating erosion. Thus erosion in alluvial reaches can be grouped as:

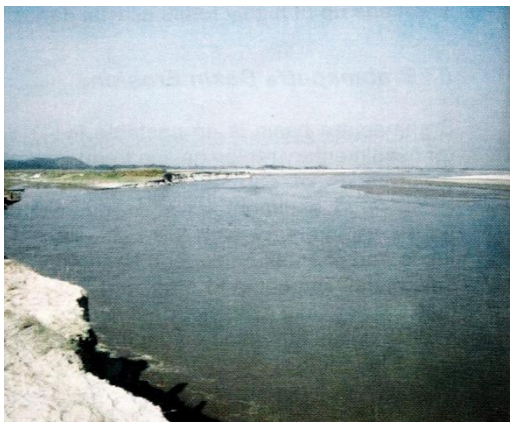
1. Bank erosion in main stream channel
2. Channel bank erosion in braided channels
3. River bed erosion
4. Erosion around obstruction
5. Gulley erosion on chars formed in braided channels
6. Erosion on Iow lying chars during high flood

Accordingly erosion control measures are adopted suiting the particular situation. Mea-suros normally adopted for protection of built up areas on dyer bank such as stone spurs and grayness, bank pitching and revetment, sills and closing dykes etc are very costly which normally cannot be effected without heavy government participation. These costly measures are not suitable for Iow cost budget. They are also not suitable as well as effective in certain cases particularly where sedimentation and channel closure in braided rivers are desired.

Recent introduction in the field of erosion control is the geo-textile technology in which geo-filter tube made of spun-bond polyester fabric sewn together forming a tube which is filled up with sediment resulting a lasting sand filter barrier, that may stabilize the bank. However under the climatic, hydrologic, geomorphologic and fluvial conditions of Brahmaputra basin, the success of the new geo-textile technology is yet to be seen.

The aim of this is to suggest Iow cost suitable measures for erosion control which can be easily constructed using locally available cheap materials and labours without involving much expertise.

04 Erosion Mechanism In Alluvial Plains



Sediments carried by river water are kept in suspension by vertical eddy component of its velocity. When water loses its velocity, its sediment carrying capacity is reduced. In hilly boulder stage of river, there is steep bed slope and water has very high velocity with severe erosive and sediment carrying capacity. Moreover there may be often landslide due to seismicity in the region enhancing the sediment load. When the river descends the floodplain meeting comparatively flatter slope, its velocity and sediment carrying capacity is reduced. River water sheds its excess sediment load on its bed causing irregularities in bed configuration thereby inducing disturbance in flow.

When the sediment load in a river in alluvial plain is in excess of that required for its stability, the river tends to build a steeper slope by depositing some sediment on bed, which in turn tends to increase the width, forcing the channel flow to be diverted towards some bank in a curved trajectory and consequently inducing centrifugal force.

Consequent of this centrifugal force, the traverse slope of the water surface is a factor playing an important role in the mechanism of helicoidal secondary flow. As the centrifugal force is proportional to the radius of curvature, being larger at the outer edge and as the water surface is normal to the resultant of centrifugal force and unit weight of water the transverse water surface is inclined as illustrated in the fig, 1.

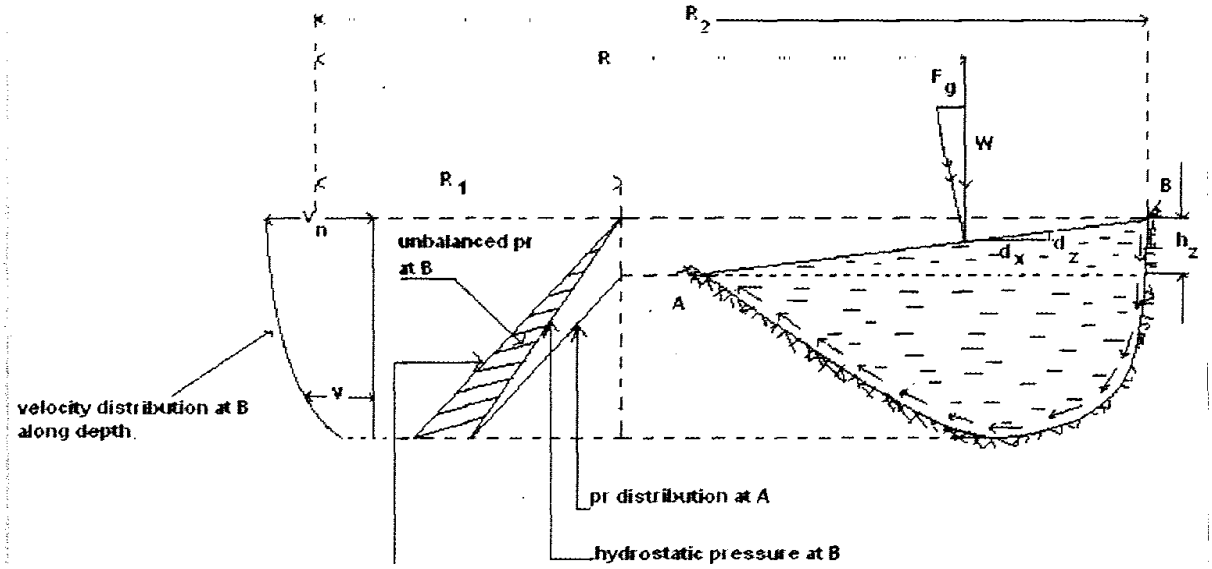


Fig. 1 - Transverse surface slope in a meander and the mechanical model of helicoidally flow,

Therefore there is an excess static head on the concave side of a river bend. Since the velocity drops with depth below the surface, centrifugal effect gradually diminishes from surface to bottom level; the dynamic at concave river bank is not controlled by law of hydrostatics but as illustrated. Therefore the excess hydrostatic pressure produces a cross current from concave to convex side of the river bend. In combination with main stream current, this secondary current produces the helicoidal flow which intensifies erosion deeper and further in to the concave bank forming deep channel and carries over the eroded bed material on to the convex bank causing shoal formation there as illustrated in fig. 2, fig. 3 and fig. 4.

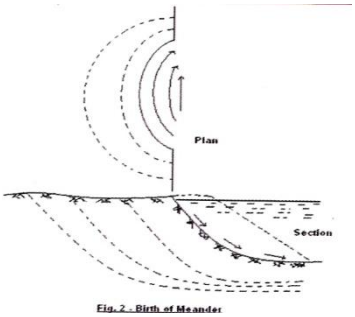


Fig. 2 - Birth of Meander

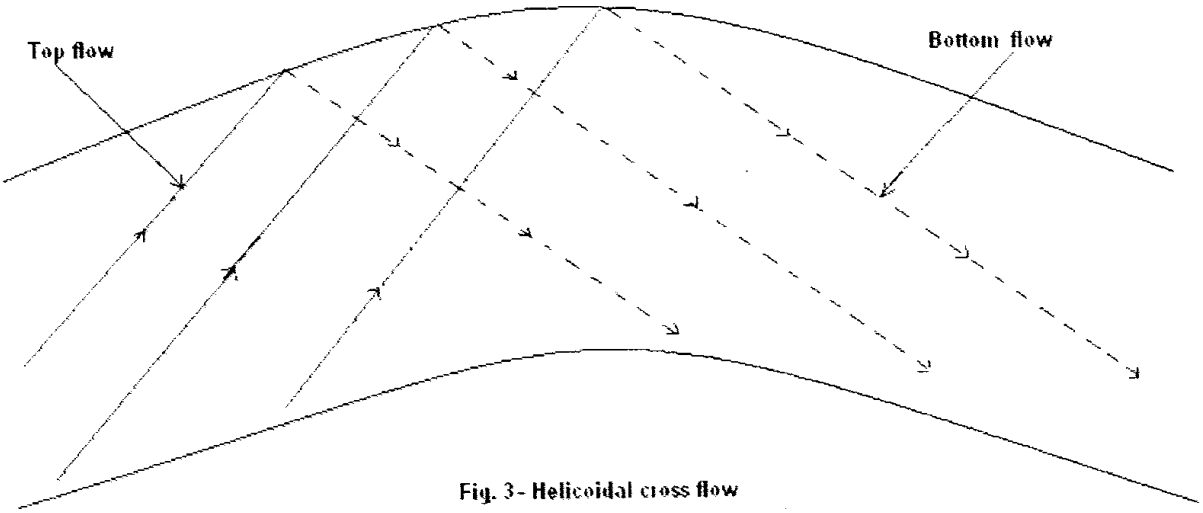


Fig. 3 - Helicoidal cross flow

Braiding of an alluvial river is the excessive variability of its discharge and sediment load. At the falling stage of the river, river loses its sediment carrying capacity, forming islands (chars) by depositing and channels (suti) in between. During very high flood, char lands may rise by silt deposition above the normal flood level resulting very fertile crop land. The suties may share part of the main channel flow during lean season, thereby causing problem for navigation. Char lands are made up of loose soil, surface flow due to rainfall may leads to gulley formation

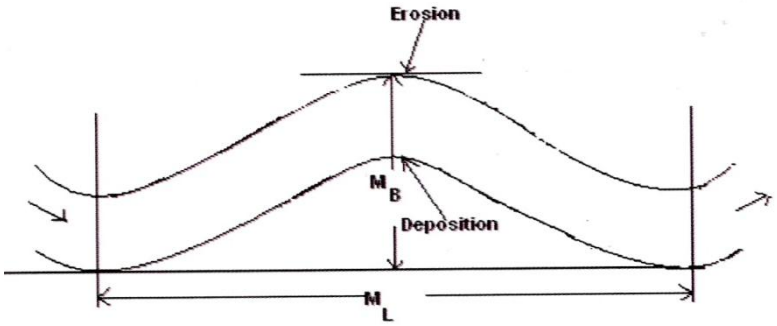


Fig. 4 - Meander belt of a river

SECTION THREE: EROSION CONTROL INITIATIVE IN ASSAM

05 Backgrounds

Erosion control measures are commonly known in our country as river training works. River training works cover all engineering works, structural or nonstructural constructed to control and stabilize a river along a well defined course as well as to regulate its bed configuration. Depending on the problems and objectives, river training woks adopted are;

1. Spurs and groins to divert the flow away from the bank
2. Embankment and levees to confine the flow for flood protection
3. Revetment and riprap to stabilize the bank against erosion
4. Guide bank to lead the flow to a defined channel
5. Sills and closing dykes for Iow water training for navigation
6. Artificial cutoff
7. Stabilization of soil and sediment against erosion.

River training may require one or the combination of the above woks. It is the actual situations and problems in the sites that decide the works to be adopted. As embankment, guide bank, cutoff and sills have no direct protection against erosion; discussions are limited to other erosion control structures. Spurs are the most effective and widely used measures for river erosion control and flow diversion.

Spurs area structures generally constructed transverse to the flow of river extending from bank towards the mainstream flow. A judiciously located spur induces a favorable curvature of flow, diverting it away from the bank to prevent the current striking it, to protect against erosion and caving. Spur can be used in singly or in series or in combination with other protection measures. A single spur located at appropriate point on a river bend can control the entire bend against erosion. Such a spur is an impermeable massive heavy structure made up of stable materials.

Impermeable spurs are made up of resistant material like stone etc. They are generally used for repelling or diverting the flow away from the bank along a desired course. A repelling spur is aligned inclined little upstream where as an attracting spur inclines little downstream for effecting the desired goal. These spurs are very effective for shore line protection but very costly.

Permeable spurs fall in the category of sedimentary groynes which allow the flow of sediment laden water through them. They obstruct slacken the flow to cause the deposition of the sediments carried by the river. Therefore they are best suited for sediment carrying channels. As the sediments accumulate between the groynes, the foreshore becomes more or less permanent.

Therefore permeable spurs require only temporary or semi permanent construction as the lasting effect is produced by the sedimentation trapped by the groynes. Permeable spurs can be made of brushwood, trees, and bamboos, wooden and concrete piles which allow the silt laden water flow through them. Permeable spurs can be made of locally available materials; therefore they have the great advantage of being cheap. Experience has shown that permeable spurs are more effective than solid one in regulating river courses or protecting banks, especially in silt laden rivers.

Flow through the permeable spur does not change abruptly for which silt deposition is evenly and quickly effected. Permeable spurs have been found very successful where the object is:

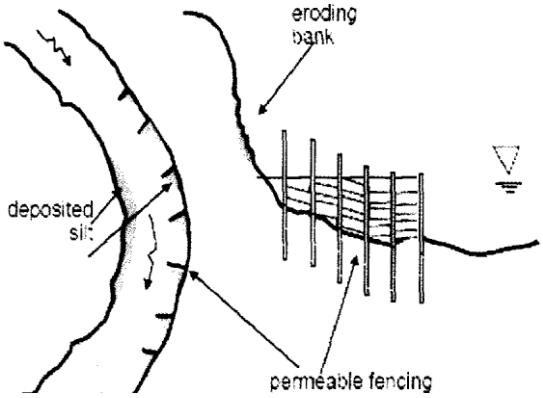
1. To divert or deflect the flow which is threatening a bank or bund,
2. To close a flow channel in a braided river,
3. To affect sediment deposits on low char area.

06 Government Initiatives

The erosion control initiatives in Assam are mainly carried out by Government departments as it involves technocrats and huge finances. Some of the examples of Government initiatives are as follows-

6.1 Permeable Spurs

Late Er. H P Barua, Chief Engineer of Assam PWD utilized on experimental basis in 1935, the use of permeable screens and floating cages, low cost devices made of bamboo for channelization and silting in alluvial rivers of Assam. Bamboo tripods are traditionally used in some areas to close a shallow stream channel in braided rivers. A-Type spurs made up of bamboo are used for bank protection. Series of bamboo porcupines are used for protection of bank and raising bed level by inducing silt deposition. Bamboo and wooden logs along with brush woods are used for gulley head control.



6.2 *A-type Bamboo Spur*

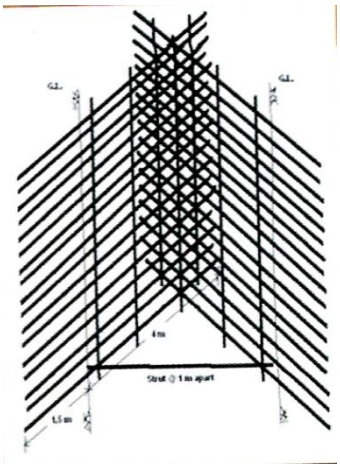


Fig. 5 A-Type spurs

It is a modification of Er Barua's permeable screen. It is made up of series of two bamboo pieces tied together at top by string and other ends struck in ground forming the shape of English capital alphabet A. They are driven closely placed 1.5 m below ground keeping 3m apart and tied together at top. Horizontal bamboos on both faces are tied at lm apart and horizontal struts at lm apart are placed inside. The space inside may be filled with brushwood and toe may be protected by closely placed sand bags.

These spurs are placed at around 2 m intervals extending from bank towards main flow at 7 to 9 degree facing current. A-type spurs are widely used in tributaries of Brahmaputra and Barak basins with good results for bank protection and siltation. They can also be used for closing shallow channels of braided rivers. Fig. 5 illustrates A-Type spurs and their placing for river bank protection.

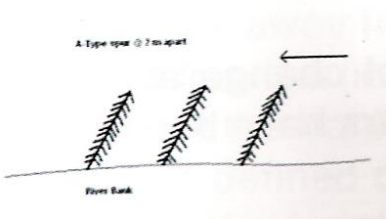


Fig. 5 A-Type spurs

6.3 Bamboo Porcupine

Concrete porcupines are widely used for protection sea shore and built up areas. These are very costly permanent structures. Bamboo porcupines are cheap permeable structures made up of 12 numbers of bamboo pieces 2m long each. They are tied by string to one another forming a cube like open structure fortified by diagonal struts. Each member is projected 0.75m outward leaving middle portion of 0.5m. They are used for both bank protection and bed formation by inducing sediment deposition. Fig. 6 shows

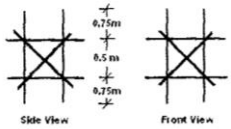


Fig. 6(a) - Bamboo Percupine

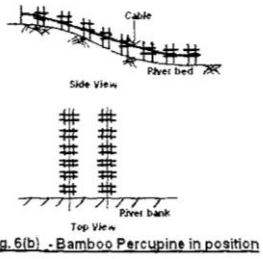


Fig. 6(b) - Bamboo Percupine in position

bamboo porcupines and their placing for river training.

Bamboo porcupines placed in series in a row tied together by a cable. The cable is tied on the bank and anchored to a dead man, which is a heavy weight, either boulders or sand bags encased inside wire mashing. Lines of two rows are placed at 2m intervals and the middle portion of a porcupine is fortified by boulders or sand bags. When bamboo porcupines are used for bed formation, they are placed on the shallow bed with anchorage on both ends and fortified by counter weight of boulder or sand bags in the middle of each porcupine Bamboo porcupines are being used at Bharalumukh in Brahmaputra river at Guwahati resulting silting up of pond just downstream of Bharalu River out fall, which is now a good site recreation activities. They are also constructed across Chintoli and Salmara suti of Brahmaputra.

6.4 Bamboo Tripod

Bamboo tripods are traditionally practiced by Bodo people of Assam for closing a shallow stream channel. Bamboo tripods are placed across the stream to be closed with two legs in line, the third leg acting as support. A bamboo platform is constructed above water level through the three legs and is loaded with stones. The obstruction offered by the legs of tripod causes silting in the bed. Fig. 7 shows a view of the tripod.

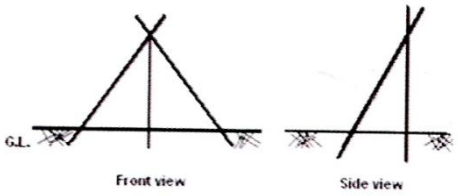


Fig. 7 - Tripod stand

6.5 Gully Erosion Control

The problem of gulley erosion is not attended properly in erosion control measures. Potential causes are runoff from adjacent land, poor drainage, lack of vegetation in appropriate areas and storm water may cause the gulley formation at outfall, which when left unattended, gradually turns agricultural land into rayine. In char areas, soil is very loose and gullies are easily formed by rain water. During high flood, a gulley may lead to the formation of a flow channel leading to a suti. Gulley head may be closed by driving bamboo or wooden logs along with brushwood. Deep rooted vegetation may be planted along the bank line for soil stabilization.

07 Non Government Initiatives

In Morigaon District of Assam, under the initiative of VOICE (Voluntary Initiative for Community Empowerment), a Non Government organization some Char stabilization work was done in the year 2004, 2005 and 2006. The model of the initiative was designed by one of the founder member of VOICE, Mr. Komrul Hussain Choudhury. It was reported that Mr. Komrul Hussain Choudhury got the inspiration from his visit to Vaniakulam Panchayat of Palakad district of Kerala in the year 2001. The Char Stabilisation initiative of VOICE was named *"Raijor Sramdanere Brahmaputra Gorakhonia Protirudh Samity".* Initially in the year 2003 some experiment was done with sand bags, to come up with an appropriate model. In this model plastic granny bags was filled up with river sand and then placed in the selected location. The process involved in this initiative is as follows-

- **Survey and Site identification-** This is one of the important aspect of this model and it requires deep understanding of the river line areas. The water current of the river is studied along with the pattern of erosions. This involved very frequent visit to the river and understand the current from the upstream.
- **Filling and placing of sand bags-** The plastic granny bags are filled till 3/4th part and then tied up with locally available jute rope. The placing is one of the important aspects and is done very carefully in a specialized way in the river bed under the supervision of local experts.

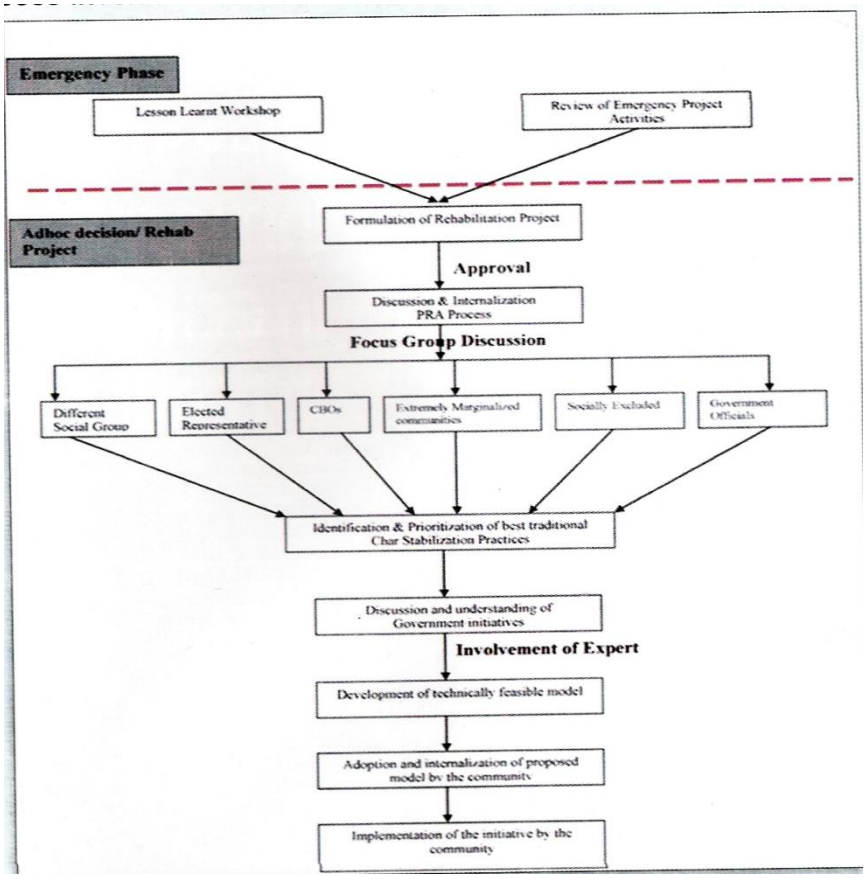
- **Protecting the main bundh (sand bag barrier) with mini bundh-** The main bundh of the initiative is generally 18ft width. The height is generally 8 to12ft, but it actually depends on the location. The main bundh is protected with a mini bundh on both the side, which is generally 12ft width and 2-3ft height. This is done to prevent the bundh from damage that may be caused by strong under current of the river.

- **Carefully guiding the water current to the Bundh-** Brahmaputra being known for strong undercurrent, the current is carefully guided to the burKI through creation of upward slope. This process reduces the speed of the current. Then the water is allowed to fall in the mini bundhand then again sat free, which is generally slow moving water. 0 Placing of sand bag porcupine- Porcupine line structures were created with sand bags and are placed in a scattered way in the river, which further reduces the water cur-rent to induce sand deposition.

VOICE has done river bank stabilization work in the year 2004 in Jotiabori, where 2,75,000 sand bags was used to create a bundh of 700 meter length. The Government Revenue Department of Morigaon district has recorded 8krn length and 3kin width bank stabilization through sand deposition. The similar work was initiated in Chnimari area in the year 2004, in Sitalmari in the year 2005 and in Nathgaon in the year 20.

SECTION FOUR: CHAR STABILIZATION INITIATIVE IN ECHO/DCA/CASA INTERVENTION AREA

In the ECHOIDCNCASA intervention areas mainly in Gumafulbari and Mandia Blocks of Barpeta District, the Char stabilization work is done is Guma, Patharchalie, Barhowra and sildubi village. The process involve in the char stabilization initiative is a follows-



From very inception of Flood Survey the need for Char Stabilization programme was felt. Internal discussions and eventually a decision was arrived that to include Char Stabilization programme as one of the important element of the Flood Rehabilitation Programme in the district of Barpeta.

Chars (silt mass) develop in the bed of Brahmaputra River which eventually becomes habitable. The Char Development process takes 10 to 20 years time. When River Brahmaputra changes its course upstream due to several reasons the developing Chars gets eroded and thus the hope of a habitat is lost. The concern is to protect the habitated chars from erosion with cost effective measures by adopting local knowledge and encourage people's involvement in the whole process.

Strategies were debated on the design and technical feasibility and involvement of the local flood affected community in the programme. The strategy adopted is to develop a people's model of Char Stabilization-Porcupine Structures with local available materials, and plantations of local varieties of trees. These approaches have involved the community and the ownership building process was very visibly prominent.

Thus with the involvement of the affected communities, a Rehabilitation project was formulated for ECHO Adhoc decision. On the approval the ECHO Adhoc decision, the entire project activities were discussed with the community.

It was evolved from those discussions that, for char stabilization model different Focused Group Discussion need to undertaken with different groups. Accordingly numbers of Focal Group Discussion was organized with the following groups-

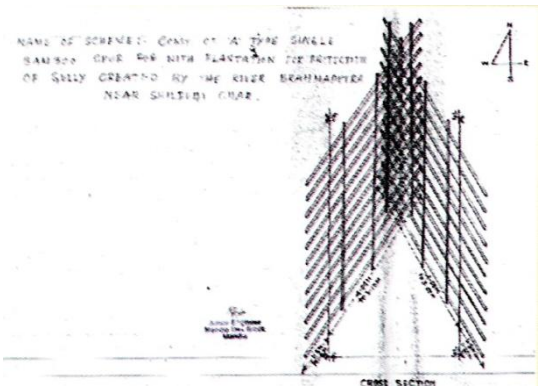
1. Different social groups such as fisher folk, landless agriculture labor, daily wage earner, small and marginalized farmers, schedule caste, etc
2. Elected Representatives such as group member of the panchayats, anchalik Panchayat members, panchayats, zila parishad members etc
3. Community Based Organizations such as youth clubs, Self Help Group, Farm groups etc
4. Extremely marginalized communities
5. Socially excluded communities and
6. Government functionaries mainly in the district and block administration, Water resource Departments, Char Development Departments etc.

With the findings of the FGD, the CASA team sits together with the community to identify and prioritized the best available traditional model for Char Stabilization Practice. After that few discussions were organized with Government functionaries to understand the ongoing Government initiatives for control of erosions. It was observed that the government models are very costly models and has very limited scope for involvement of community. Those models can only be implemented through highly educated technical experts. Thus, the service of a technical expert was hired to develop a technically feasible model out of traditionally available model, so that the model can be replicated easily with locally available resources and with little involvement of technocrats.

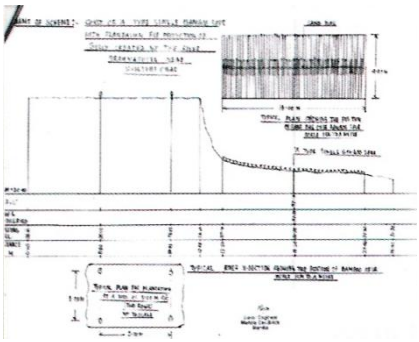
On development of the model, the expert and the CASA/DCA project team discuss the entire model with the affected communities for their adoption and internalization. It was observed that the community found the model very easy and has owned the model as they believe that it had evolved out of their initiatives. The implementation of the char stabilization initiatives was completed with least involvement of technocrats.

Adopted Design in the ECHO/DCA/CASA intervention areas-

The Design adopted in the ECHO/DCA/CASA intervention areas has been evolved from the existing traditional knowledge of the community and is upgraded to technically feasible design which is basically a combination of A-type bamboo spur, bamboo tripod and sand bag initiative. The char stabilization initiative was further strengthen through plantation of deep rooted traditional varieties of trees along the bank of the river.



In this design A-type bamboo spur was installed with 1st class bamboo (Bhaluka/Barua) of 85mm to 100mm diameter and are closely placed 3.00 to 4.00 meter above the ground and 1200mm to 1500mm below the ground. These bamboos are tied together with coir string. After that 2nd class half bamboos (Jati/Batua) are placed horizontally on both faces not more than 1.00 meter apart. Whole Bamboo strut was placed inside the structure, one meter apart. Two numbers of purlin at top and bottom are fitted with vertical struts at 1500mm apart. The plastic granny bags are filled up with river sand and are placed inside the spur. Some bamboo tripod are also installed near the structure.



It is an established fact that riverbank vegetation plays an extremely important role in protecting the "health" of river systems. Riverbank vegetation stabilizes bank sediments to reduce erosion, and provides a buffer between the river and the rest of the catchments to reduce the amount of sediment and nutrients entering the river. Thus in the bank of the river deep rooted avenue trees are planted in a hole of 0.6m diameter and 1.00m deep. The plantation bed is prepared by mixing locally prepared organic manure with the soil. The plantation activity involves planting the saplings, back filling the tranches, watering, fixing the tree guard and maintaining the plant of one year.

The specialty of this design lies with

1. The purpose the design is used such as diverting water current, reducing the speed of undercurrent or inducing sand deposition.
2. The site selection process, such as identifying the specific location where the damage to the spur is limited and result Is enormous.

SECTION FIVE: FINDINGS OF THE STUDY AND CONSLUSION

Many costly measures for erosion control adopted by Government Assam are neither feasible nor possible for public participation for protecting riverine agricultural and homestead land. Public participations need low cost quick yielding measures. Such low cost measures constructed with locally available materials are discussed and recommended for implementation with the participation of beneficiary public. The summarized findings of the Char Stabilization initiatives undertaken by ECHO, DCA and CASA are as follows-

Community involvement in design and implementation

Diverse interests and limited coordination among different Assam State government departments and local stakeholders result in a complicated institutional environment for control of erosions in the state. The local communities were not involved either for developing an appropriate design or for implementation. The executions of the erosion control work are generally undertaken by registered contractors of the department with the support of technocrats. The Char Stabilization initiatives undertaken by ECHO, DCA and CASA duly recognize these facts and tried to involve the local community from planning to implementation to monitoring of the activities. As a result of community involvement, community ownership builds around the dwellers and the man and women participated fully for successful implementation of the project.

Timely response

Delayed in initiation and execution of erosion control work are very common and is due to lack of coordination among the Assam State government departments and local stakeholders. It has been observed that most of the departmental works are initiated during monsoon and the entire dry periods of the year (considered to be most feasible period for execution of erosion protection works) passed in processing files and getting orders. As a consequence of this practice, the actual work failed to be accomplished before monsoon season and the complete benefit of the work never reached. The ECHO/DCA/CASA initiative considered being most timely and appropriate, it is expected that the work will generate significant result for stabilization of chars.

Technical appropriate design with traditional knowledge of river basin

For the technocrats the understanding and knowledge base of the Brahmaputra River is still limited in terms of geomorphology and hydrology. The community living in the river basin since centuries has developed considerable understanding of the river system in their area and its behavior. Thus community knowledge is being used in the design of the project. Apart from this, appropriate selection of site for execution of the work for stabilization of char is also undertaken through community initiative.

Involvement of non technical government administrative functionaries

The erosion control work of Assam Government Departments has no record of involving government administrative functionaries in the design and execution of the work other then involving them in getting necessary administrative approval. In the ECHO, DCA, CASA work of stabilization of Char, it has been noticed that the government administrative functionaries of the panchayat, block and district level are actively involved during planning, designing and execution of the work.

Additional community design upgrade to

There were many community models available for stabilization of chars. These models are traditional, low cost, non technical models and are based on local understanding of river and river basins. These models are designed in such a way that it utilizes locally available materials such as bamboo, sand, etc. The current design adopted in the ECHO, DCA, CASA project is developed from traditional community model and is upgraded to technically feasible model by an expert engineer of river mechanics.

Limited involvement of technocrats in implementation

As the model of char stabilization initiative is a community based model upgraded to technically feasible model, so the local communities find it easy to internalize the concept and able to undertake the work with very limited involvement of technocrats.

Utilization of locally available materials

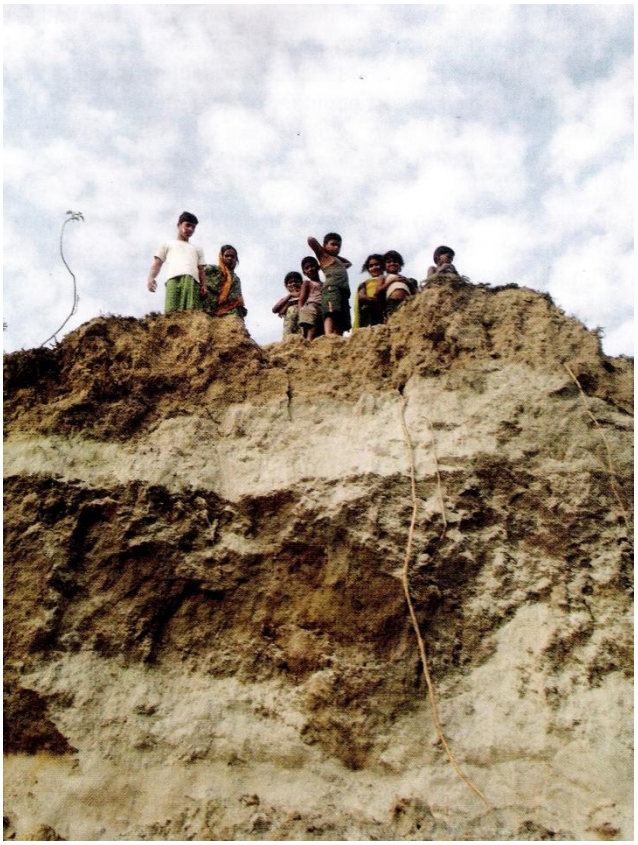
It has been observed that the materials used for char stabilization initiative are locally available. The materials includes bamboo, sand, sand bags, tying materials etc. As bamboo is locally cultivated in the homestead, so it is low cost and easily available in the riverine areas. Sand can also be collected from the river bad. The only cost involvement is in the sand bags and labour. Thus, utilization of locally available materials reduces the cost of the initiative.

Continuous Monitoring & Evaluation by ECHO, DCA & CASA

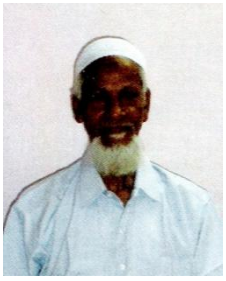
It has been evolved that ECHO, DCA and CASA continuously monitor the initiative and conceptualize the initiative through discussion with the colleagues in partner organizations and also through community discussion. Regular visit to the project villages and interaction with the community and experts make the initiative possible.

Plantation of trees

Riverbank vegetation plays an extremely important role in protecting the "health" of river systems. Riverbank vegetation stabilizes bank sediments to reduce erosion, and provides a buffer between the river and the rest of the catchments to reduce the amount of sediment and nutrients entering the river. Most of the char stabilization initiative under taken in the state does not necessarily include plantation activity as a part of it. The initiative undertaken by ECHO, DCA & CASA has deliberately added plantation activity with native species of plant. This combination has further strengthened the activity to make it a successful initiative.



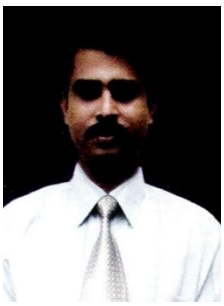
AUTHOR



Prof. Z U Ahmed obtained his B.E. degree in Civil Engineering from Assam Engineering College, Guwahati in 1963 with specialization in Flood Control and M.Eng. degree in Water Science and Engineering from AlT, Bangkok in 1971. Immediately after obtaining his bachelor degree, he joined for teaching in Engineering Faculty and served in various capacities as Lecturer, Assistant Professor, Professor, Head of Civil Engineering Department and Principal in Assam Engineering College. In AlT, he worked as Research Assistant for Hydrographic Survey of Chopaya River Project in Thai land. As a research Scholar in lIT, Delhi, he worked with land surface process of Hydro logic Cycle and developed a model to couple with Atmospheric General Circulation Model. In 1976 he was nominated by Government of Assam as Member of Board of Consultant for Brahmaputra Flood Control Commission. He was the Professor -in-charge of Post graduate courses in Watershed Management and Flood Control in Assam Engineering College and guided number of P G Research Works on Erosion and Conservation of Soil, River Erosion and its Control, Flood studies, Soil Survey and Planning of Watersheds in typical climatic and morphologic North East Region. He has wide experiences for Quality Control in the field of Construction and Management.

FACILITATORS

Mr. Amrit Kumar Goldsmith is a dedicated humanitarian and development activist and has served CASA since 1978 in various responsibilities and currently is the Officer on Special Duty for North East India. He is trained on Disaster Management by CASA and is involved in responding to all the major natural and human made disasters in the country. He was trained in Asian Institute of Technology, Bangkok on Disaster Management and Environmental Study. He helped the World Council of Churches to formulate the Disaster Manual at Zimbabwe, South Africa. He did his exposure study on HIV/AIDS in Malaysia and Thailand. He has conducted survey on Land slide in Nepal. We wrote number of articles in several publications in various development fields. He is also elected convener of North East Social Forum. He is currently helping the Government of Assam in drafting the Water Policy for the state. He is pro active writer on Prophetic Ministry of the Church. He is also the elected president of the Council of Baptist Churches in North East India comprised of 7000 protestant churches. He is the Secretary of Assam Christian Forum.

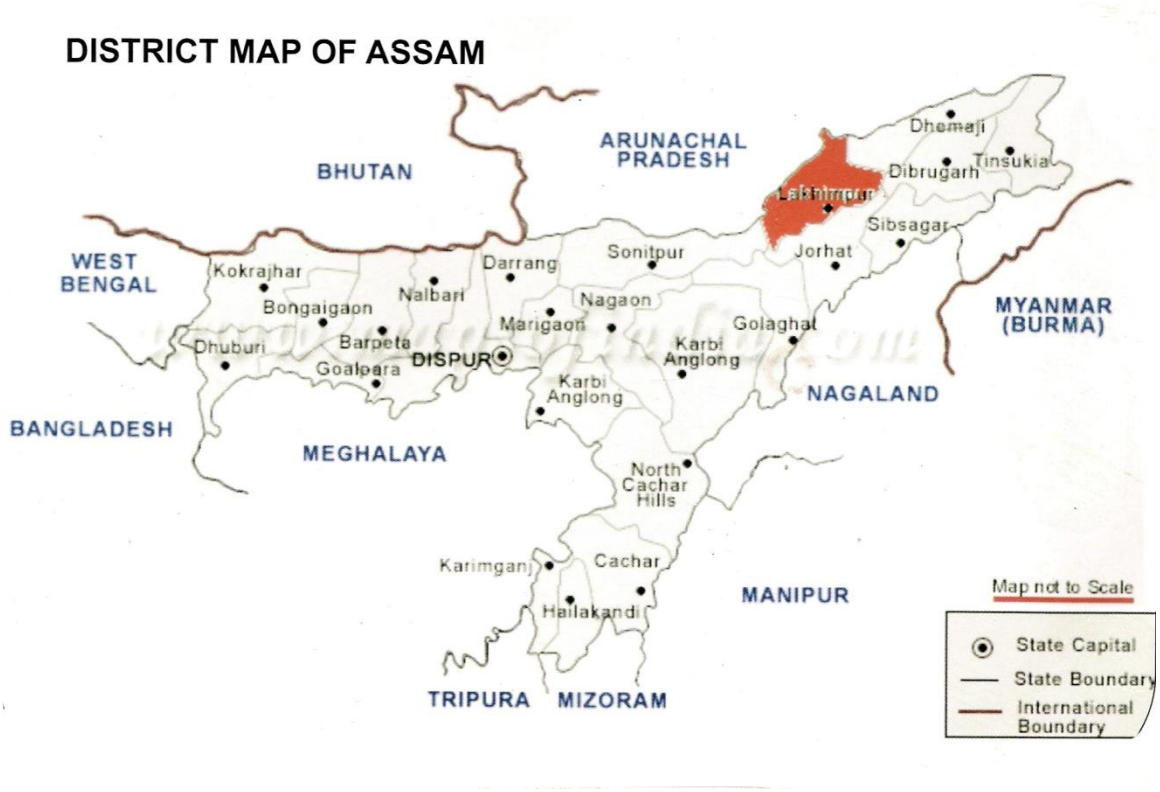


F B Manik Shah Mazumder is a disaster risk reduction and humanitarian response professional with over 9 years of qualitative work & learning experience in community based organization, academia (University),United Nations and International Organizations. He is a Post Graduate in Social Work (MSW) and dual Baccalaureate of Science (B.Sc.) and Social Work (BSW) from Assam University, Silchar. He has considerable experience in interacting with the communities living with disasters in India with a special focus on North East India. He is a tioner and trainer of different participatory tools such as PRA, PLA, Participatory Vulnerability Analysis (PVA), REFLECT (Regenerated Freirean Literacy through Empowering Community Techniques), ELBAG (Economic Literacy and Budget Accountability for (Accountability, Learning &. Planning System), SPHERE Standards etc. In different positions he has served United Nations Development Programme (UNDP), ActionAid India, T M Bhagalpur University, and local organizations. At present he is coordinating the emergency response programme of DanChurchAid (DCA) supported by ECHO.

CHURCH'S AUXILIARY POR SOCIAL ACTION (CASA)

NORTH EAST INDIA.

COMMUNITY BASED DISASTER PREPAREDNESS (CBDP)
IN
BARPETA ASSAM



Supported by
Danchurch Aid (DCA)

Implemented by:
Church's Auxiliary for Social Action (CASA)
KC Das Road, Satribari
Rehabari: 781008
Guwahati, Assam

Church's Auxiliary for Social Action (CASA), an auxiliary of 24 Protestant and Orthodox Churches, is a non-profit and non-governmental, national organization registered under the societies act XXl of 1860. Born out of the concern of the Christian community, to relieve the sufferings of the multitude during the partition of India in 1947, CASA has been serving the interests of the poor and the marginalized, irrespective of caste, creed, religion and political considerations.

Born as a relief organization, CASA stepped into the development programs through its first forward plan in the 1980s. The transformation in focus was manifested through the forward plan of the 1990s and in 2003 which facilitated a shift in the role of CASA from 'doer' to 'facilitator', and from 'need based' to 'issue based', to 'rights based' approach. Today, CASA is one of the foremost relief and development organizations working with a holistic perspective-of social and economic emancipation of the poor and the marginalized. Ensuring an organic link between relief, rehabilitation, and development, CASA integrates development values, principles, and practices in its emergency interventions.

VISION
CASA's vision is inspired by the Christian faith and values. CASA visualizes a society in which peace, justice and equality prevail, and wherein all citizens -irrespective of caste, creed, language, and religion -live in peace and communal harmony. CASA also envisages a society where the poor, women, the marginalized and the underprivileged lead a quality life with dignity and have equal opportunity for their involvement in the development process which is value based and sustainable, and also have an appropriate environment to develop their fullest potential.

MISSION
CASA actively supports and works for a just and sustainable society by creating opportunities for the participation of socially and economically marginalized sections in the development process through networking, alliance building and strengthening of their organizations. CASA also supports local self-governance, peace and reconciliation and sustainable livelihood measures and responds to the environmental issues, natural and manmade disasters and strives to bring the victims to the mainstream while upholding the human dignity. CASA promotes gender mainstreaming at all appropriate levels, mobilizes resources in favor of the poor and optimizes all potentials and capacities existing within the organization and other partners.

COMMUNITY BASED DISASTER PREPAREDNESS/DISASTER RISK REDUCTION.
The relevance of the community-based disaster management approach is increasing in the light of radically changing patterns of disaster occurrence and loss. While occasional large catastrophes associated with earthquakes, volcanic eruptions and cyclones continue to occur, it has been documented that rapid increase in disaster occurrence and loss is due to the exponential increase in the occurrence of small to medium-scale disasters associated with socio-natural hazards such as landslide, flood, drought and fire. In the context of these patterns of disaster occurrence and loss, the CBDM approach offers the viable alternative for managing and reducing risks in developing regions such as Asia.

People exposed to social and economic vulnerabilities such as dalits, backward caste people, small, marginal farmers, landless labor suffer the brunt of the disaster. Communities are at the frontline of disasters.

Over the last two decades, CASA has experienced that top-down approaches to disaster risk management alone fail to address the specific local needs of vulnerable communities, often ignoring the local capacities and resources. At times this approach further increases the vulnerability of the community. In response to the limitations of this top-down methodology, the community-based disaster management has emerged as an alternative approach. This has resulted in developing mechanisms to mitigate disaster at grassroots through participation of community. CASA has realized that during an emergency, the communities are the first responders and therefore it is essential to prepare community for disaster risk coping and mitigation. In order to get the communities involved in risk management it is critical to convince them of the importance of preparedness, mitigation and prevention.

The bottom-up participatory approach puts people at the center stage in the development process or in the management of disasters. It is premised on three practical considerations:

- Nobody can understand local opportunities and constraints better than the local residents themselves · Nobody is more interested in understanding local affairs than the community whose survival and well being are at stake
- People are the country's most abundant and valuable development resource, which should be harnessed and developed

- CASA believes that the main objective of CBDP is to reduce *vulnerability* of the concerned community and strengthen its existing capacity to cope-up with disasters. CBDP is based on an approach where community participation & ownership in disaster risk reduction are key factors in reducing vulnerabilities of people & minimizing the losses.

EXPERIENCE OF CASA IN THE FIELD OF DRR AND PREPAREDNESS

CASA's response to emergencies and disasters has continued since 1947. CASA has responded to all major disasters in country whether it was an event of earthquake in Uttarkashi, Gujarat and Latur, cyclones in Andhra Pradesh and Orissa, floods in West Bengal or other major emergencies in different parts of country. The numerous emergency interventions have helped CASA in assimilating rich experience & knowledge in the field of disaster mitigation & management. CASA has developed a long-term perspective to disaster response and mitigation by establishing linkages between relief, rehabilitation and development.

Over the years, CASA has realized that an investment for community preparedness in disaster mitigation is an investment towards development. It is an investment towards reduction of vulnerability & poverty, of the disadvantaged communities. In present context, development initiative should be planned in a positive direction where sustainability of environment, respect for traditional knowledge & wisdom is ensured for betterment of entire human race. The State's machinery is very crucial in disaster mitigation but role of community in occurrence of disaster cannot be denied because in case of disaster (when first 72 hours are considered as crucial for saving lives), community is the first responder to the event. The percentage of loss of life could be significantly reduced only if local people are all prepared to take up immediate relief and rescue work by their own. With the changing nature and the increasing intensity of the impacts of disaster, community efforts need to be particularly supported. Therefore, CASA believes that an effective disaster mitigation strategy should aim to facilitate the full potential of community efforts by recognizing their resourcefulness, identifying the gaps in community coping methods, and providing support with the required skills, infrastructure and appropriate financial and human resource in strengthening community organizations and traditional coping mechanism.

Community Based Disaster Preparedness (CBDP) has been integrated with all disaster mitigation programmes of CASA. Focus of CBDP intervention includes enhancement of capacity of local institutions like Gram Panchayats & community based organizations, training of Disaster Mitigation Task Force (DMTF) & local groups, creation of locally mobilized emergency funds, lobbying & advocacy for state disaster policies.

CASA has already integrated the RIGHT BASED PERSPECTIVE by shifting from disaster response to disaster preparedness, which could be much, more effective in disaster prevention, preparedness and management in order to reduce vulnerability. CASA's initiatives of forming Disaster Mitigation Task Force (DMTF) Networks & Forum since 2001 with the help of community has proved that with adequate capacity and preparedness, villagers can face the challenges of disasters effectively. The networks and linkage system with the representatives of PRI and other government departments have been able to build a line of communication and strengthen the relationship between government and community for long-term sustainable disaster preparedness. The legal provisions during disaster and normal period have given importance to educating and making the community aware.

VOLNURABILITY OF THE PROJECT AREA BARPETA DISTRICT ASSAM

Assam remains one of the poorest states in India, with per capita income that is 43% below national average in 2003. Development is constrained by several factors, including poor infrastructure, remoteness. and inability to minimize the impacts of frequent flooding. About 90% of its agriculture land and urban areas are located within the state's flood prone area. Flooding and river erosion are natural disasters having devastating annual impacts, and caused by the runoff of extremely heavy rainfall during the monsoon and high sediment loads from upper watersheds that are geologically unstable but also degraded due to deforestation and shifting cultivation. Their effective management requires a long-term basin wide approach with a sound planning framework integrating short- to longer-term programs including (i) improved catchment management, (ii) multipurpose reservoirs where feasible, and (iii) balanced combination of structural and nonstructural measures to cope with immediate annual risks. Barpeta district is located in the lower part of Assam bordering to Bhutan in the North, Nalbari in the East and Kamrup and Goalpara in the South and Bongaigoan in the West. The mighty Brahmaputra flows from East to West across the southernmost border of the district. Moreover, two other rivers, Manas and Beki flow through the Gumafulbari and Mandia Block to converge in the Brahmaputra. The Mandia is 70 kms from the main town of Barpeta and Gumafulbari is about 20 kms from the district headquarter; they are located in interior locations. The Gumafulbari Block is inhabited by the indigenous (tribal) people such as Bodos, Rabhas, Assamese and the Mandia block is inhabited mostly by the religious

minority population. The Brahmaputra River causes large scale erosion in both Gumafulbari and Mandia Blocks. An embankment measuring 2 km in Gumafulbari was totally washed away by the river during the third wave of floods in the year 2006-2007. As a result, Gumafulbari, a village consisting 1,000 families was eroded. Similarly, in Mandia, land on the banks of the Brahmaputra was washed away and people had no option but to live on the village roads without basic facility of water and sanitation. Families living on Char areas (river islands) are especially vulnerable. In many cases, the Char areas get completely submerged during floods.

CASA with a support from ECHO/DCA responded to the flood situation in Assam in year 2007 addressing rehabilitation needs of the worst affected people in four villages of Mandia Block. DRR and CBDP components were also part of the intervention so as to help the vulnerable communities to face future disasters. Some of the hard and software measures put in place during the programme were High Raised Platforms, Multipurpose Community Disaster Shelters, Char stabilisation, formation of DMTFs, provision of boats for rescue operation during floods, community contingency plan, Emergency Health Kits, etc. These measures were of immense help to the reference communities and have instilled a sense of hope and confidence to mitigate disasters in the future. So to build up on the efforts already made in the area of disaster preparedness, CASA is being implementing CBDP programme in Barpeta district of Assam.

CBDP PROJECT AREAS COVERAGE.

State	: Assam
Dist	: Barpeta
Block	: Gumafulbari and Mandia
Nos. GramPanchayat	: 9
Nos. of Village	: 25
Taskforce	: 25 Village x 8 Members = 200 (Male + Female)

The Gumafulbari and Mandia Blocks are always prone to floods related disaster. The majority of the families residing in these areas belong to religious minority community and cannot leave the place because they do not have any alternative place to go for resettlement due to their very poor economic condition. There, every year when a flood occurs in the district, they are the first community to face the disaster. Earlier the people of these communities were not systematic & strategic in their copping mechanism with disaster like flood. But the previous project has made them to think about the coexistence with flood using their indigenous copping mechanism as well as the systematic copping methods. (Especially the preparedness aspects)

Even though the previous project was first CBDP project undertaken in this part of the district which has created a greater impact on the life of the community. In the process the vulnerable communities were empowered and could improve their living condition to some extent.

During the previous project in this district, series of DMTF trainings and other awareness generation activities were undertaken and the people of these areas are now better prepared to face flood related disaster. This CBDP project will help to sustain and also strengthen the activities carried out in the previous project and also to include new areas of intervention in the district.

The project will help the community to utilize the training skill which the people of the previous project have received and this process will transform the community from disaster life to a prosperous life. During this project period 2010 to 2012, specific objectives and indicators had been projected to implement and empower the community for better preparedness in flood situations.

Overall Objective: Risk reduction of vulnerable communities living in disaster prone areas in Assam through strengthening communities on preparedness and mitigation, influencing on policy advocacy on rights and entitlements and ensure livelihood security

Specific Objective (1):
Disaster mitigation Task forces are formed and equipped with necessary disaster mitigation skills; having contingency plans and ensure livelihood security. Climate Change adaptation techniques and a disaster specific contingency plan for each of the villages are developed.

Verifiable Indicators:
Indicator 1:200 volunteers from 25 project villages have acquired skills and knowledge on various disaster mitigation skills.
Indicator 2: Selected volunteers are organized into 11 DMTG.
Indicator 3: Availability and application of 25 community contingency plans/mitigation plans and map in each villages.
Indicator 4: Increased awareness level of the target community on CCA techniques and usage of adaptation techniques in the target areas

Specific objective (2):
Gender mainstreaming is ensured through enhanced women's participation in the project activities.
Verifiable Indictors:
Indicator 1: Women volunteers are identified for specific training on health, hygiene and encourage involving in decision-making process.
Indicator 2: At least 50% women participations in the programs.
Indicator 3: Women taking responsibility and leading role in the preparedness activities.
Indicator 4: Women Forums are available in the district of Barpeta

Specific objective (3):
DMTF & Forum members have enhanced knowledge base on different rules, regulations, rights and entitlements related to disaster preparedness and response to other social & livelihood security schemes.
Verifiable Indicators:
Indicator 1: Inclusion of disaster preparedness measures in the village planning by the respective DMTF / Forum through incorporating development process.
Indicator 2: Number of meetings and awareness programme conducted for awareness and knowledge development of the people.
Indicators 3: Number of social and livelihood security Programme are integrated (Govt's plan) and included in village disaster preparedness plan.
Indicator 4: Awareness of DMTF on rights and entitlements in disaster preparedness and response.

Specific Objective (4):
Enhancing the capacity of Panchayat representatives about their role and responsibility in a disaster situation starting from relief to developing a contingency plan for disaster preparedness.
Indicator-l: 9 numbers of Panchayat representatives trained on disaster management and policy and their role and responsibility.
Indicator-2:25 numbers of Contingency plans are approved in the Gram Sabha

Specific Objectives (5):
Streamlining policy level advocacy at state level through dialogue with policy makers, media consultation, organizing consultative workshop involving Govt., lAG and key stake holders , and contribute to National advocacy work on DRR and response working closely with Sphere India and other networks.
Indicator-l: 3 Numbers of dialogue with policy makers on revision of Relief Codes, Disaster management Rules organized
Indicator-2:3 number of media consultations organized
Indicator-3: Number of consultative workshops with all stake holders organized.
Indicator -4: Engagement with Sphere India and NDMA for policy advocacy on DRR and response **Indicator-S:**
Inclusion issues during humanitarian assistance are taken up with civil society organizations, lAG and Govt.

Specific Objective 6:
Capacity building and Orientation of CASA team members on DRR and response
Indicator -1: Capacity building and orientation of CASA team members on DRR and Response.
Indicator -2: Experience sharing, learning and blending of best practices taken place between the two zones and documented for future use.
Indicator-3: Sharing and learning with other agencies on CBDP and DRR

ANNUAL ACTIVITIES REPORT FOR THE PERIOD OF JANUARY 2010 TO DECEMBER 2010.
Following are the brief report of the ongoing project of CBDP in Barpeta District of Assam.

Village Meeting
33 number of village meeting were organized with 1,385 participants (1,079 male and 306 female) in both Mandia and Guma Block, Barpeta district. During the meeting aim and objectives of the project was shared with the villagers and encouraged the villagers to take part in the programme. The people of the area appreciate CASA work and come forward to support the programme. Participations of women are progressively increasing in the programme.

- Reviewed the past CASA activities and appraise about the ongoing three years project CBDP and people understood and decided to give fullest cooperation to CASA staff and to take part as people programme.
- Decided to have Village Development Committee in every programme village.
- Women representative members also will be included in the committee.

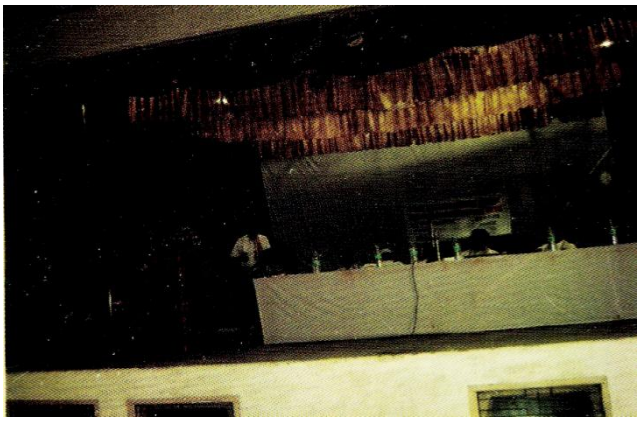
Mass awareness programme
To aware large number of community on issue 6 nos. of Mass awareness programme was organized with 842 participants (230 male and 612 female). During the programme, importance of disaster preparedness and the role of DMTF were discussed. Apart from meeting with community mass rally were also carried out to educate more people. Mass rally programme was address by the CBDP project staff including Mr. Pradip Surin, Field Officer; Mr Lesehu Meru, Sr. Coordinator NEI and area key leaders.

Baseline Survey
During the reporting period Baseline survey in 23 villages were carried out with an objective to collect the first hand data of the project area for smooth functioning of the programme. Initially village meeting were carried with DMTF and villagers and then 3 member of DMTF in each village were selected by the villagers to complete the baseline survey. After the survey was done, the villager approved the data collected by the 3 members of DMTF.

Hazard, Risk, Resource and Opportunity Mapping
During the period 15 villages have prepared Hazard, Risk, Resource and Opportunity mapping to analyze the situation in the time of disaster preparedness intervention. It is important to study the situation of the location and population to formulate the appropriate strategy for preparedness measures. PRA tools were used to study the situation. Villagers gather in the open space and draw the map in the ground floor, while doing so it give the villagers better picture of their villages and the same will be documented in paper for future references. It was to be noted that women participation in the process is more. The maps clearly indicate the following realities of the villages:-

- Identification of the vulnerable area (Hazard and risk area) of the villages.
- Identification and list preparation of vulnerable groups (women, children, old age and physically challenged group) of the community.
- List preparation of opportunity available in the area i.e. infrastructure, means of communication. · Identification of strength and weakness (visible and non-visible) within community and individual.

WORKSHOP ON CLIMATE CHANGE/Global Warming District Level



One day district level workshop on Global Warming and Climate Change was organized at District Library-Barpeta on 20th November 2010. The programme is embedding on the issue on Disaster Risk Reduction particularly for Disaster prone village communities. The prime objective of the workshop is to create Mass Awareness Education among the local communities residing under the district and the affect of Climate Change that are causing great threat in disaster prone area. Mr. P. C. Deka, ADC (Relief) of Barpeta, Government of Assam was the Chief Guest of the Programme. in his Speech he extended his gratitude and thankfulness to CASA for taking up DRR project in the area and assures CASA to assist whenever necessary. He also requested CASA to include the school students in such kind of environment related programme so that the young generation can take active part in protecting the environment as well as planet earth. Mr Lesehu Meru, Sr. Coordinator-NEI and Mr. Pradip Surin, Field Officer also facilitated the programme. The programme was attended by Panchayat member of the Mandia and Gumafulbari block, SHGs member, VDCs member and staffs of DRR altogether 60 participants attend the programme.

State Level consultation on climate change/global warming in regards to Disaster Risk Reduction.

One day State Level consultation climate change/Global warming complex CTC on 18/12/10 with the ob state level awareness about climate change and global warming and to create state wide support from the various parts of the state.

There were altogether 35 participants from the project area key leaders; project Implementing Organizations from Assam had attended the day long programme.

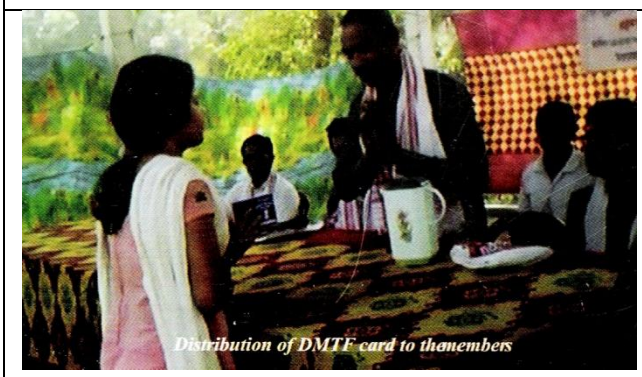
Resource person had deliberated on the subject Climate Change & Global Warming in regards to Disaster Risk Reduction: Global/National/NEI Region & particularly Assam State perspective. Thereafter, the participants had interaction and discussion with the panelist, enriched good learning and experiences. **PROGRESS OR ACHIEVEMENTS**

During the project implementation period of Jan'2010 to Dec'2010, the following progress has made and achieved.

(1) Interview was conducted and appointed project key staff.
(2) Project staffs were oriented on CBDP-Barpeta project and conceptually clear to carry forward.
(3) Rapport building and re-strengthen the relationship of DCA/CASA and village community/ Goan Panchayat.
(4) Village community understood the importance of DCA/CASA presence and decided to give active cooperation and participation.
(5) 192 volunteers were identified and acquired their knowledge and skills on disaster mitigation.
(6) Constituted 24 Village Development Committee's out of 25 programme village.
(7) In 23 village, baseline survey and SWOT analyses was done.
(8) 1S village Hazard, Risk Resource and opportunity mapping was done and identified different group women, children, old age and physical challenge of the community.
(9) Identified volunteers for DMTF in 24 village and also formed 5(five) DMTG.
(10) During district level workshop on global warming and climate change, 60 {sixty) participants understood the magnitude of the thread, has decided the following to implement in their village.
    - Use clean boil water and discourage water bottle from market
    - Compact fluorescent light bulb to be use in the house.
    - Safe tree and more plantations.
    - Indigenous method of domestic garbage management and re-cycling.
    - Proper use of electricity and swift off when is not use.
    - Proper use of mobile.
(11) SHG's were formed among the most vulnerable women group by undertaking income generating activities through Bank loan.
(12) Deputy Commissioner was appraised about the CBDP project of DCA/CASA and his subordinate officer Additional Deputy Commissioner appreciated the DCA/CASA project and actively participated in programme.

Progress of the project related to its immediate/specific objectives

Objective 1: Disaster mitigation Task forces are formed and equipped with necessary disaster mitigation skills; having contingency plans and ensure livelihood security. Climate Change adaptation techniques and a disaster specific contingency plan for each of the villages are developed.

Insert Project outcome indicators	**Status / key achievements / impact**
	Assam
200 volunteers from 25 project villages have acquired skills and knowledge on various disaster mitigation skills.	192 volunteers from 24 project villages have acquired skills and knowledge on various disaster mitigation skills. Volunteers are now imparting training to the village youths on disaster mitigations skills.
 *Distribution of DMTF card to thamembers*	A General Village meeting was conducted in every village and aware about the CBDP programme of DCA/CASA. Village communities have been selected the DMTF. Conditions set up the Village Development Committee that, the member should; WORK voluntarily with any remuneration / person must be mentally and physically sound & strong/ sincere & honest/Ready to work on 24 X 7 modes. Positive response from community towards the support of project 1 district level workshop on climate change and global warming was conducted in Barpeta district with 60 participants comprises of VDCs, SHGs member and Panchayat member of both the blocks (Gumafulbari and Mandia). ADC (Relief) of Barpeta, Government of Assam extended his gratitude and thankfulness to CASA for taking up DRR project in the area and assures CASA to assist whenever necessary. He also requested CASA to include the school students in such kind of environment related programme so that the young generation can take active part in protecting the environment as well as planet earth. Programme for school student to be conducted and it is in process 1 state level workshop on Climate change was organized at CASA, Guwahati office with 35 participants. More state level programme on Global warming/Climate change Participants were enlightened and project staff shall incorporate global warming/climate change impact in their ongoing programme.
Selected volunteers are organized into 11 DMTG. 	Selected volunteers are organized into 2 DMTG (how many DMTGs organised?)
	Meanwhile, 2 DMTG have been formed in Gumafulbari and Mandia Block in consultation with villagers & VDCDs. Participation of young women in DMTF & DMTG is gradually increasing.
	Baseline survey was done in 23 villages and first hand data information of the villages was collected. Hazard, Risk, Resource and Opportunity mapping was done in 15 villages and accordingly Community Contingency Plan under preparation

Strategies used to achieve/progress on objective 1

- Conducted general village meeting in each-of the programme village with the
- Objective to empower the community.
- Conducted joint meeting with Village Development Committee members and DMTF.
- Resolved to collect Rs.8/-i.e. Rs.2/- per week, per household per month, to Open joint Bank Account in the name of Disaster Relief Fund.
- Joint Bank Account will be operated by Chairperson VDC, one member from DMTF and one member from SGH
- FOLLOW-UP collection of Rs.2/per household per week is under process
- Oumora village has collected Rs.1400/- for Disaster Relief Fund and Bank opening is under process.

Objective 2: Gender mainstreaming is ensured through enhanced women's participation in the project activities

Insert Project outcome indicators	**Status/key achievements/impact** **ASSAM**
Women volunteers are identified for specific training on health, hygiene and encourage involving in decision-making process.	Women's were involved in awareness and health related activities and in decision making process.
	Women's of the selected villages are now pro-active to participate in any programs conducted CASA/DCA. Conducted Meeting with SHGs to create awareness on disaster mitigation and also to facilitate opportunity for sustainable livelihood activities.
At least 50% women participations in the programs.	Received 99% women participation in every program.
Women taking responsibility and leading role in the preparedness activities.	Women are taking part in preparedness activities.
	Due to strong motivation and awareness by our DRR staffs in Barpeta, women are taking part in the preparedness activities. Women participants are gradually increasing in meeting.
Two Women Forums are available in two districts.	Under process.

Strategies used to achieve/progress on objective 2

· In the first place, only few women were taking part in the activity, hence DRR staff visited the Block Extension Officer and collected the list of SHGs in the two blocks. They had separate SHGs meeting and requested the group member to take part in the programme. As a result more and more women are taking part in the programme

Objective 3: DMTF & Forum members have enhanced knowledge base on different rules regulations, rights and entitlements related to disaster preparedness and response to other social & livelihood security schemes.

Insert Project outcome indicators	**Status / key achievement /impact**
	Assam
Inclusion of disaster preparedness measures in the village planning by the respective DMTF / Forum through incorporating development process.	The process is on in the village. Meanwhile, 2 DMTG are formed in 2 Blocks.
	Done through conducting village meetings/ interaction with village communities.
Number of meetings and awareness programme conducted for awareness and knowledge development of the people	34 Meeting were conducted with the total participants of male 1079 and 306 female. 3 awareness programmes are conducted for awareness and knowledge development of the people, participated by male 230 and female 612.
	NSSS schemes were discussed, other schemes of Govt. of Assam and Central was informed to the village

	communities. The issues of Global warming/Climate change was also discussed during Village meeting and most of people vow against deforestation.

Strategies used to achieve/progress on Objective 3

- Objectives of the DRR program were announced to the village mass.
- Villagers accepted the objectives of CASA, DRR program.
- Awareness programs were conducted as mentioned on the above statistic.
- Educational programs were organized and conducted to create awareness among the village mass.
- DRR ground staffs were intensely involved in the entire process.
- Initiated and identify volunteers through Village Development Committee members.

During the first meeting villagers were appraise about the DRR project and had discussion how to implement the project. Also with the objective of having DMTF, its criteria were share and finally decided that village community will select volunteers among the village youth and the same to be finalized in next meeting. Accordingly, on the second meeting Village Development Committee member selected the youth and groups were divided and their role was share with them.

Objective 4: Enhancing the capacity of Panchayat representatives about their role and responsibility in a disaster situation starting from relief to developing a contingency plan for disaster preparedness.

Insert Project outcome indicators	**Status / key achievements / impact**
	BARPETA, ASSAM
120 numbers of Panchayat representatives trained on disaster management and policy and their role and responsibility.	Meeting with Panchayat representatives on disaster management and their role was held in 24 villages. Training on disaster management and policy and their role and responsibilities need to be conducted to strengthen the representatives.

Strategies used to achieve/progress on objective 4

- 3 GP level meetings were conducted with the participants of 65 male and 11 female and their roles in the project were discussed.
- Generated awareness among the PRA members on the ongoing programme.

Objective 5: Streamlining policy level advocacy at state level (Orissa and Assam) through dialogue with policy makers, media consultation, organizing consultative workshop involving Govt., lAG and key stake holders, and contribute to National advocacy work on DRR and response working closely with Sphere India and other networks.

Insert Project outcome indicators	**Status / key achievements / impact**
	BARPETA, ASSAM
6 number of media consultations organized.	Media from Local news paper were involved in the programme. Programs were highlighted in the local T.V and News paper.

Strategies used to achieve/progress on objective 5

Media was personally contacted and informed about the implementation of CBDP project in Barpeta district and they have given due important to the programs. In all the mass awareness programme they take part actively and published several articles in the local news paper Barpeta as well as in the local TV. channel.

Objective 6: Capacity building and Orientation of CASA team members on DRR and response

Insert Project outcome indicators	Status / key achievements / impact
	BARPETA, ASSAM
Capacity building and orientation of CASA team members on DRR.	Series of the orientation programs were held and project Staff are enabling to implement the project with clear understanding. Project Staff were trained on various subjects such as disaster mitigation skill, global warming/climate change, advocacy & Networking.

As expected one of the positive outcomes of the DRR Programme is people's enhanced knowledge and understanding towards disaster risk reduction. These are helping people to understand their vulnerability and importance of organized response to the local disaster. For instance: The Community Development Committees or village development communities are monitoring the progress. The involvement of community based groups was followed to ensure longer term sustainability of the efforts being done under the project. Women section of the communities had taken interest and their involvement is also a good example and thus ensuring sustainability in the process.

SCOPE IN DEVELOPMENT THROUGH WOMEN EMPOWERMENT

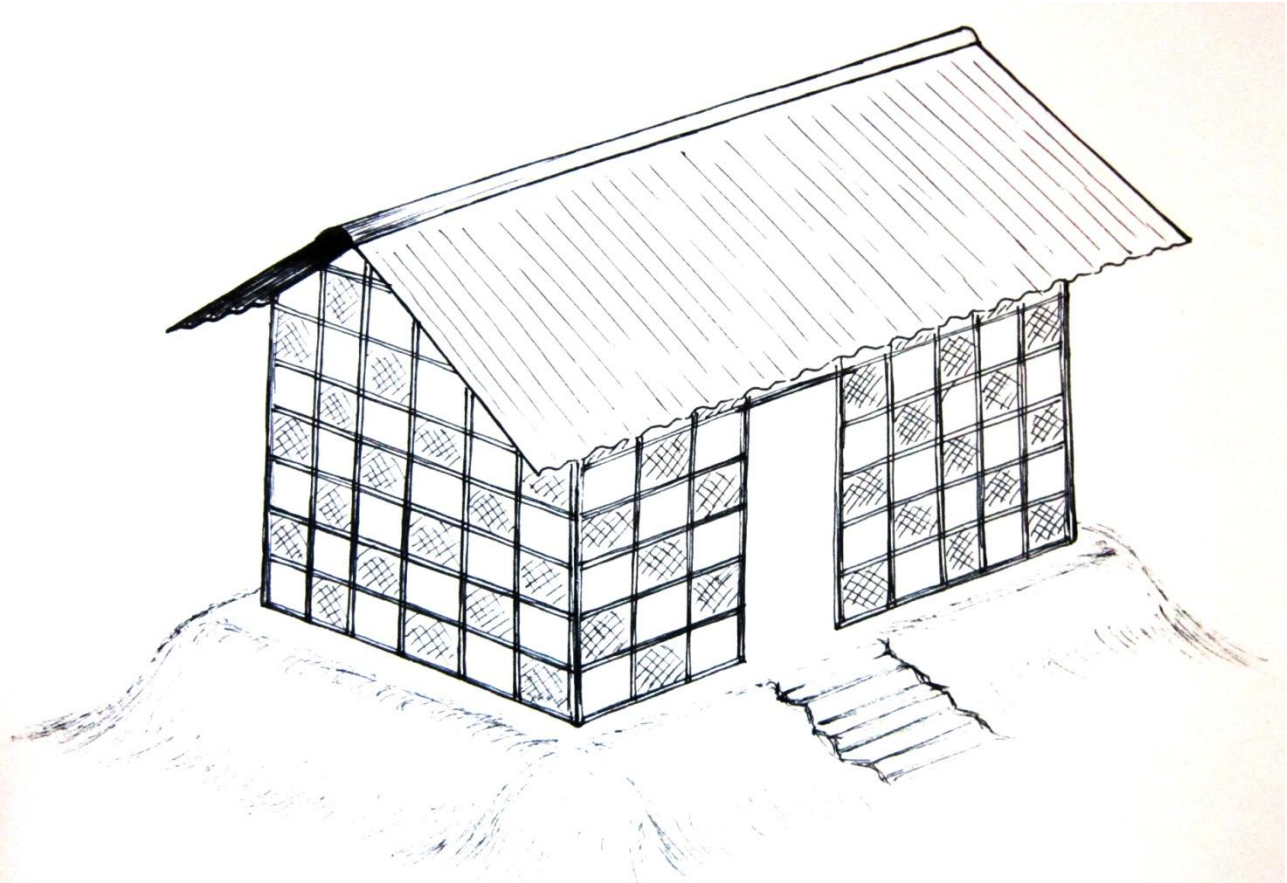
Ms. Damayanti Deka an unemployed girl hail from Bhogerpar village under Gumafulbari block-Barpeta. She lost her father at her early age who was the only bread earner of their family. He left behind his wife and four children. His wife has to manage four children with great difficulties and struggled for survival.

Ms. Damayanti the eldest daughter in the family, approach the DRR staff during youth meeting for help where she was advice to formed SHGs in her area. She had initiated and formed SHG with 11 (eleven) local women in her village Bhogerpar in 2010. They have opened a bank account in the name of their group and started function effectively. There is monthly tariff and collected amount were being deposited to Bank regularly on monthly basis. With their own collected amount they had started training centre in cutting and embroidery in the village. Unemployed girl and women were being trained in their center and later they have made daily used women cloth by all the member. They also approached nearest market shop and sale their products. Ms. Damayanti not only teaches women how to cut and design cloths but she also aware the women on disaster preparedness, health and hygiene in their training center. She has shown other women to undertake income generating activities for self sustenance and livelihood.

Now Bank has understood their ability and creditability, given loan out of which they are earning and supporting family.

She thanked DRR staff for showing her way to help her family and also to make herself independent.

NOTES FROM THE FIELD



Name of Char Island – **Bangi-Khwa**
2 villages on same Char Island -

i. Bangi-Khwa (129 families) – came 7 years ago on char from mainland village Bangi-Khwa, which got eroded in floods. They have given the same name to Char Island.
ii. Mou-Khwa (170 families) – came 4 years ago to Bangi-Khwa Char Island from another Char, which is now under water as per them. They plan to move out of Bangi-Khwa once their original Char (or a new Char) emerges out. Bangi-Khwa Panchayat (Village Head) allowed / gave land to Mou-Khwa people to live until they find/get land of their own.

'*Khwa*' means *Khana.*
All Muslims – Bangladeshi Refugee
Bangi-Khwa Char is getting eroded @ ½ km per year.
Original size of Char (7 years ago) – 7km (N-S) x 6 km (E-W)
Present size (2012) – 3 km (N-S) x 6km (E-W)

Livelihood
Most of the people do labour work apart from farming.
Farming – Rice (*Aahu-Dhaan*), Ground Nut, Moong Dal (*Maati-Kalai*), Onion, Jute
Livestock – Buffaloes & Goats – Just before floods they usually sell or eat them.

There is one govt. primary school . . .
but teachers from mainland don't come regularly as they have to cross the river every time.
Health problems they face during flood season – Fever & Diarrhoea.
No health centre facility at Char Island.

Lohit Pathak, 45 – can't speak (physically challenged)

Village: **Barusha**, District: **Barpeta**

Hindu, unmarried, living in a new house (shelter) given by CASA.

With a combination of RCC and Bamboo posts, the shelter (10' x 14') has removable wall panels (split bamboo - woven mats). If required, these wall panels & posts can be dismantled before / during flood season for house shifting.

Another interesting feature of the shelter is false ceiling panel (split bamboo – woven mat), which can be brought down to create a high raised floor (supported by additional bamboo) in case of flood.

High plinth / platform & movable house are old techniques commonly seen in Assam. During the flood season many of them are prepared with boats and most of them can swim.

Removable bamboo mat – '*bahar-ber*' in Assamese

Biraza Pathak, 73 year old mother still prefers to live in the old house (next door), since it was built by her husband.

Both of them were involved in site selection / orientation of new house . . . Lohit also participated in construction process helping the hired labour.

CASA provided Rs. 800, 80 kg rice, all the construction material and technical support. All the house owners were supposed to involve in the construction process. Shelter design is such that the highly skilled labour isn't required.

Bizara lives with 2 of her 6 sons. They used to do farming but now they have given their land (10 beega) on rent. In return they get 400 kg rice per annum.

Akshaya Pathak, 30 – Daughter-in-law [MG_4927 – weaving gamosha for her husband for the '*beehu*' eve (Assamese New Year)]

Husband (42) does rice cultivation (3 beega land) and labour work on daily wage. He is also into teaching (private tuitions).

Livelihood - She does weaving (cotton) – learnt from her mother.

She likes the RCC posts as they are 10 times more durable (50 years) than bamboo (5 years). She also likes the 2-way CGI sheet roofing with bamboo mat false ceiling. The house is thermally comfortable according to her. Their old house was made of bamboo and thatch, which got damaged in 2007 floods.

Vocabulary

Tat-sal - Process of weaving / weaving machine.

Gamosha – Men's scarf – Gamchha in Bihar

Saadar – Upper part of women's outfit – Indian Saari in 2 parts

Mekhela - Lower part of women's outfit

Tarla Bayan, 40

Village: Bhagipar

Family: Husband, 2 sons (1 unmarried), 2 daughters

Livelihood - Does weaving herself.

Husband does farming on somebody else's land as labourer.

Personal farm land (1½ beega) has gone in erosion (2007 flood)

Old house got damaged in 2007 flood

In 2010 (localised) floods when the water level reached up to 3 ft., they used false ceiling as raised floor @ 5-6 feet. Husband and son did the job of building the raised floor.

She and her daughter spent the entire flood season on that raised floor, while husband and son stayed near embankment to save the livestock.

They avoid (mud) plastering on walls (split bamboo panels) as the plaster makes the wall heavy and non-portable, though they feel that mud plaster will keep the house warm during winters.

Himani Thakuriya, 40

Village: Bhagipar

Livelihood – She does weaving and husband is a mason.

In their, village girls generally get into weaving and boys into farming.

They did all the labour work themselves during the construction of new house.

She feels concrete posts are permanent – bamboo posts aren't.

If she has money she will build her house with RCC post – at present they have used bamboo posts for the expansion of house.

Jamal-ud-din

Village: Mou khwa

Family: Wife, 5 boys (2 separate) and 4 girls

Livelihood: Does not have his own cultivation land . . . works as labourer on somebody else's paddy field. Also does fishing.

Recently (in 2012), he shifted towards the centre of the char (island). One edge of the char is getting eroded (@ ½ km per year) where he had built earlier. (Shifted without concrete posts as they were heavy)

He says – *'there is no guarantee of speed of water . . . kabhi idhar, kabhi udhar rah sakte hain . . . ab to aadat ban gayi hai.'*

'I want to live and cultivate on my land . . . but that's under water now. I believe that one day my land will come back.'

'We never had a good/pukka house . . . but now really happy with CASA's support. I really like the raised plinth and dual-purpose false-ceiling of my house . . . high raised platform, that CASA provided, was also required in our village.'

Lal Bhanu, widow

Family: 1 son and his 2 wives

Livelihood – Son is a labourer

They also plan to sell the offspring of the 2 goats given by CASA.

They are happy with the CASA shelter as the CGI sheet roof covering protects them from rain.

Also the false ceiling which acts as storage space and insulation in summer, and can be used as raised floor in case of floods.

She plans to go to High Raised Platform in the flood season and will take the CGI sheets & roof members/structure along.