



## **Lessons Learned & Way Forward for Resilient Shelter Interventions in Rural Myanmar**

Context: Post NARGIS Shelter Intervention

# FOREWORD

The Government of the Union of Myanmar (GoUM), the United Nations (UN), local and international non-government organizations (NGOS) local community-based organizations (CBOs) and the private sector have been heavily involved in Post-NARGIS reconstruction assisting people to rebuild their homes. Several publications have been produced to give statistical and other relevant information to donors for their reference in making funding decisions. It is our hope that this publication will guide decision makers in channeling the right assistance to Shelter recovery in Myanmar.

In spite of our tireless dedication to building back better, shelter is still the least funded of all the sectors. This study is a part of project activities in “Operationalizing DRR in the transition to recovery in Myanmar”. The main objective of this study is to provide the key facts to be considered for future funding and program implementation in order to “fill the gaps” that still remain after Cyclone Nargis, not only in the Delta, but in all areas of the country that are prone to natural disasters.

Experts have used various assessment tools in order to provide this information. This report wishes to provide donors and their respective agencies with the most important and relevant facts in order that they might more effectively focus their funding and shelter recovery programming in the affected areas, while at the same time enabling the sector to better withstand future disasters.

We hope that publications like this one will help the lessons learned from Nargis to spread, not only across the Delta but throughout Myanmar. We know from recently published survey data that Myanmar is now considered among the top ten nations worldwide at greatest risk of natural disasters<sup>1</sup>. Prior to Nargis, Myanmar was not prepared for such events. Many steps have been taken since then but the path towards an acceptable minimum level of preparedness remains long and will require much hard work to come.



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<sup>1</sup> Climate Change Vulnerability Index 2011. Maplecroft. 21/10/2010 <http://www.maplecroft.com/about/news/ccvi.html>.



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Our special thanks also go to Norwegian Ministry of Foreign Affairs for their generous financial support given to UN-Habitat in cost-sharing some resources to publish this document. Without their support, the study would not be come out with the effective result which will be useful for future strategic plan of actions can be achieved for the shelter sector working groups and donors to make the right kind of investments that will benefit for mitigation from disasters in the future.

Last but not least, we would like to express our sincere appreciation to Professor P.K.Das and the members of survey team for their contribution of hard work, commitment and support in analyzing the data and consultation with stakeholders and finalizing the report.

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# LIST OF ACRONYMS AND ABBREVIATIONS

ACTED	Agence d'aide a la cooperation technique et au developpement
AIT	Asian Institute of Technology
ASEAN	Association of Southeast Asian Nations
ASHG	Artisan's Self Help Group
BBB	Build Back Better
BBS	Build Back Safer
BOQ	Bill of Quantities
BPL	Below Poverty Line
BRC	Building Resource Centre
BRM	Building Resource Mapping
CBO	Community Based organization
CC	Climate Change
CGI	Corrugated Galvanized Iron
CIET	Construction Industry Education and Training
CNN	Cable News Network
CSWG	Chair-Shelter Working Group
DFID	Department For International Development
DMC	Disaster Management Centre
DOC	Documents
DRP – CURB	Disaster Response and Preparedness of Coastal and Urban Communities
DRR	Disaster Risk Reduction
EIA	Environmental Impact Assessment
ECCD	Early Child Care Development
EWS	Economically Weaker Sections
GIS	Geographic Information System
GoUM	Government of the Union of Myanmar
HBS	Habitech Building System
HFA	Hyogo Framework of Actions
HH	Household
HUDCO	Housing and Urban Development Corporation
IBB	Interlocking Building Block
IEC	Information, Education, Communication
ICT	Information and Communication Technology
IFRC	International Federation of Red Cross and Red Crescent Societies
INGO	International Non Government Organization
IOM	International Organization for Migration
LIG	Lower Income Group
LNGO	Local Non Government Organization
MAPDRR	Myanmar Action Plan on Disaster Risk Reduction
MES	Myanmar Engineering Society
MESC	Myanmar Emergency Shelter Cluster
MH	Multi Hazard

MOC	Ministry of Construction
MoNATALA	Ministry of Progress of Border Areas and National Races and Development Affairs
MosWRR	Ministry of Social Welfare, Relief and Resettlement
MPH	Miles per Hour
MRCS	Myanmar Red Cross
MS WORD	Microsoft Word
MSP	Multi Skilled People
MSR	Myanmar Survey Research
NGO	Non Government Organization
NRC	Norwegian Refugee Council
NRG	National Resource Group
NVQ	National Vocational Qualification
PDF	Portable Document Format
PIP	Priority Implementation Partnership
PONJA	Post-Nargis Joint Assessment
PONREPP	Post-Nargis Recovery and Preparedness Plan
PPT	PowerPoint
PR	Periodic Review
PRA	Participatory Rural Appraisal
PVA	Participatory Vulnerability Assessment
RCC	Regional Consultative Committee
REAM	Renewable Energy Association Myanmar
RVS	Rapid Visual Screening
SAG	Strategy Advisory Group
SCB	Soil Cement Brick
SEIA	Social and Environmental Impact Assessment
SHG	Self Help Group
SWG	Shelter Working Group
TCG	Tripartite Core Group
TL	Township Level
TOR	Term of Reference
TOT	Training Of Trainers
TWIG	Technical Working Group
UN	United Nations
UN ISDR	United Nations International Strategy for Disaster Reduction
UNDP	United Nations Development Programme
UN-HABITAT	United Nations Human Settlements Programme
UNHCR	United Nations High Commissioner for Refugees
VDC	Village Development Committee
VDMC	Village Disaster Management Committee
VT	Village Tract
VTA	Village Tract Assessment
VTTC	Village Tract Recovery Committee
WASH	Water and Sanitation Hygiene

## EXECUTIVE SUMMARY

The aim of this report<sup>2</sup> was to learn from the post NARGIS shelter recovery interventions, which intended to Build back better and Build back safe through sustainable system of supplying new shelter, repair and retrofitting, capacity building of the carpenters, artisans and integrating DRR in the whole process leading to a disaster resilient living for the people of Myanmar.

The key objectives of the study were to a) study the owner driven, NGO and International agencies' shelter construction, b) identify gaps and opportunities, c) recommend a set of actions including alternative approaches, to enhance effectiveness of Disaster resilient shelter systems in Myanmar. The study was based on, a) desktop research, b) key respondents' interview, c) agencies' interview and d) HH survey. Following is the summary of recommendations.

### PLANNING

Exactness of need assessment depends upon the quality of database. Census is old and hence, a further detailed assessment is needed to refine the data on shelter. Quality of data may be enhanced by carrying out assessment through a participatory process. There is a need for inclusion of government's policy and regulatory aspects in the process of ranking the needs. Use of GIS-based data on population and other infrastructure will enable appropriate shelter and cyclone shelter planning.

Develop multi hazard map and place the existing HHs on it. This will help in assessing vulnerability of the people in different regions of the country enabling planners to enhance their preparedness with fund and capacity building. A major constraint in this regard is access to authentic data. This needs GoUM's involvement in the process. Donors' funding and technical collaboration might be needed.

There is an urgent need for funding on HH in inadequate shelters, plastic or canvas walls and roofs, often overcrowded and little protection from heat and rain- people have very low capability to rebuild. Considering peoples' low level of income, the donors may reconsider their priority on shelters. There is a general need for income generation opportunities enabling people to have some savings for shelter since hundred percent grants is not sustainable in the long run.

While it has been reported that there was convergence, there is a need for documenting such events for future planning. Convergence needs to be reiterated and emphasised in all planning actions.

62% of surveyed HHs live in shelters that are not disaster resilient. However, this figure will be higher than 62% since many shelters will not have all the six safety features. Ensure that new shelter and repaired ones have all six features<sup>3</sup> for cyclone safety. Conduct rapid assessment system for existing shelter condition- there is a need for training in this regard.

The HFA in the context of Myanmar is already prepared and available on the web. Different sources, especially the Agencies' response, indicated that HFA is a weak area- The issue of climate change needs to be emphasised in the context of Myanmar.

<sup>2</sup> UN-ISDR supported this study to assess the shelter recovery in delta and its resilience to future hazards and thus addressing the priority of actions III and IV of the HFA.

<sup>3</sup> 1) anchor, 2) bracing, 3) fixing purlin/ rafter, 4) fix roof cover, 5) roof projection, 6) roof pitch

## DESIGN

The first and foremost requirement of safe design is updating Myanmar's building codes, especially wind and seismic sections. This will enable designers to design shelters and retrofit the existing ones including traditional structures. Self recovery needs examination to ascertain safety. Research on retrofitting needs emphasis. Case-study/example-based handbook on retrofitting may be suggested. This research should examine and understand the traditional shelter technologies. Architectural and engineering institutes need to emphasise traditional technologies and their retrofitting.

Conduct Building Resource Mapping (BRM) exercise in different geo-climatic zones of Myanmar to identify local specific appropriate design, technology and implementation. With reference to the BRM, examine the HHs' dissatisfaction on thermal comfort, adequacy of space, privacy, etc. of new shelters. Most of these could be resolved by reviewing the existing designs. There is a need for developing incremental design option. Design sensitive to Gender and disability is very important.

### IMPLEMENTATION, QUALITY, COST

Owner/community-driven implementation system supported by money and skilled carpenters and artisans is the most suitable method for the affected rural areas. One important issue in this context is quality enhancement. All the documents and survey data indicated that there is a need for quality enhancement of shelter construction.

BRM could be the key to cost savings, enabling selection of appropriate materials, skills, labour intensive systems, efficient management, appropriate design. There should be an all out effort in this regard. Involve engineering colleges, MES, etc. including international collaboration. It is important to understand and document the circumstances under which agencies adopted different standards and costs with respect to TWIGs and whether these variations were adequately explained. This could be a step towards building resource mapping.

### CAPACITY BUILDING

The desired institutional structure towards sustainable capacity building of the architects, engineers, contractors/ builders, carpenters and the artisans on resilient construction and retrofitting is yet to develop. This is to be done at the earliest or else continuous opportunity for capacity building will be lost undermining the achievement and spin off of the present intervention. Capacity for maintenance is crucial. A cadre of multi-skilled people needs to be developed through appropriate training to address maintenance/retrofitting works. This type of service could be rendered through a maintenance booth or an individual.

There is a need for assessing the present and future training demand. Training would require funding, which could partially be through sponsorship by industries. There is a need for costing of training for different categories starting from basic, advanced, etc. A certification system needs to be developed.

### MAINTENANCE

There is a need for creating an enabling environment to encourage people to maintain their buildings on a regular basis, which could be in form of providing subsidised materials for maintenance needs. Inculcate a culture of maintenance by having attitudinal change – viewing maintenance as an opportunity than a liability.

## SERVICES

There should be periodic quality check for Arsenic contamination. Adequate funding and technical assistance will be required on design of toilets. Recycling of the solid waste and management, public awareness on hygiene issues are important- can be through primary education and using media.

## DOCUMENTATION, COMMUNICATION AND INFORMATION

In general, the respondents are unaware of IEC materials. More IEC materials on disaster risk reduction should be produced and with effective strategies reach out to greater number of people. Non-structural mitigation needs to be included in the training manuals.

## IMPACTS AND EFFECTS WITHIN INTERVENTION AREAS

Advocacy is required for all concerned to convey that Shelter supply could be a great opportunity for income generation. The use of local materials and labour intensive shelter construction can lead to substantial income multiplier effect.

Primary schools could be a sustainable way of continuous evaluation of disaster situation through participatory assessment and using teachers as ambassador and children as disseminator. One of the key issues in DRR is development of a Multi-Hazard map which could be used by the engineers and architects while designing a shelter. To mainstream DRR in housing sector, enhanced awareness and strong “political-will” is very important.

## SUSTAINABILITY: ON PROGRAMME EXIT

Make EIA as a mandatory part of development programmes- funding needed for in-country capacity building in this regard. People’s collaborative efforts could be nurtured through BRCs.

## FUNDING

There is a strong need for calculating realistic area specific costs agreeable to government and the donors. Retrofitting is to be based on implementing agencies’ recent experiences. An average amount of money for retrofitting to all will result in a situation where some shelters will remain unsafe due to inadequate money and others will get more than what they require.

The concept of incremental shelter has been proved to be a most sustainable approach. Options such as facilitating small amount of loan many times with short payback period could be explored to enable one to build/expand/transform as and when some money is saved for shelter. However, it is to be noted that Shelter sector remains inadequately funded and there is a need for international humanitarian assistance from everyone.

## ADMINISTRATIVE AND MANAGEMENT (GoUM)

There is an urgent need to publish an updated national building code in the light of recent disasters. Township authorities to be supported by appropriate building bye laws sensitive to disaster safety. This should be included in Architecture and engineering institutes. GoUM could encourage these institutes to emphasise disaster and climate change as “must know” competencies in their syllabi.

Land tenure issues need to be addressed at policy level. Some reports have suggested that land tenure issues to be consulted with local authority and obtain their local approval

There is a need for long term planning for shelters of 50 years life span. Carry out benefit cost analysis whether semi permanent shelters with periodic maintenance is more cost effective than constructing an incremental shelter of more permanent nature.

**The detailed un-prioritised recommendations are in Chapter 8. Their ranking will best be done by GoUM with participation of the Agencies, Donors, INGOs, NGOs, beneficiaries, etc., involved in the post NARGIS interventions. However, this assessment has considered the following as the top most nine points to consider, all having same priority.**

1. More money is needed in shelter
2. There is a need for analytic process of need assessment of the right ratio of retrofitting and new construction, for which accuracy of damage assessment is very crucial. Fund for Retrofitting to be need-based and not average
3. 62% or more of surveyed HHs live in shelters not disaster resilient. They need retrofitting. However, providing money for retrofitting without adequate technical support will not make buildings adequately strong against cyclone and hence, will not add value to the interventions. Architects, engineers, contractors, artisans and carpenters are generally not well trained on retrofitting and hence capacity building is highly recommended
4. Promote Maintenance Booth, Multi-Skilled human resource through Building Resource Centre (BRC)
5. The bare minimum cost of a shelter of 160-200 sft is about US\$650 assuming that the construction uses 10% salvaged materials and beneficiaries offer free labour
6. Structural analysis shows that the above mentioned shelter will not be able to withstand wind exceeding 80 MPH and will be completely destroyed in the event of near NARGIS cyclone. Hence, new designs should have one strong room and provision for upgrading the rest by parts over time to transform a shelter to a permanent one capable of withstanding cyclone such as NARGIS and with a life span of 50 years.
7. Recognise that shelter supply is a great livelihood driver
8. Update building codes, develop appropriate building bye laws



# CHAPTER 1

# **BACKGROUND**

## 1.1 BACKGROUND

Cyclone Nargis struck the coast of Myanmar on 2-3 May 2008 causing massive damage to the lives and livelihoods and properties which made a landfall in the Ayerrawady and Yangon Divisions. Nearly 140,000 people were either killed or remain missing in the affected 37 townships of the country. An estimated 2.4 million people were also severely affected in these townships. Although the devastation caused by Cyclone Nargis has caught all round attention, the region has had a history of severe tropical storms, recurring floods and fires in the dry season. The region is also exposed to low-frequency and high impact events like Tsunami.

Two years have passed since the Cyclone Nargis hit the country and the recovery process is slowly taking place. The most important element during the recovery is to ensure “build back better and safer”, i.e. incorporating DRR in the on-going recovery and reconstruction process across all sectors. Essentially, there is a strong need of integrating disaster risk reduction principles and practices into the Delta shelter sector, which focusses on the cyclone resistant features.

There is also a strong need of community awareness, training of community artisans, carpenters and other construction workers. This will enable them to build back safer and better through appropriate and contextualized shelter construction know-how and knowledge of DRR for overall capacity building of the coastal communities and recovery of the delta in an integrated manner.

## 1.2 RATIONALE

UN-ISDR has supported this study, which will assess the shelter recovery in delta and its resilience to future hazards and thus addressing the priority of actions III and IV of the HFA.

The experience of Cyclone Nargis revealed the need for ensuring disaster risk reduction integrated into the ongoing recovery efforts in the shelter/housing sector. The present study is aimed at analyzing the existing community practices, implementation modalities of various national/international humanitarian agencies in the housing reconstruction in the context of disaster risk reduction. The way forward, based on the analysis/study, will suggest the future plan of action for building the capacities of communities (carpenters and artisans) and the communities. The way forward will also have recommendations for donors and implementing agencies.

The present study aims at assessing the shelter recovery in the Delta and its resilience for future disasters and thus addressing the priority of actions III and IV of the Hyogo Framework of Actions<sup>4</sup> (HFA). Disasters can be entry point to promote sustainable development and in particular accelerate the implementation of the disaster risk reduction practices and strategies. The study aims at providing added value by facilitating a system wide analysis and study of the recovery process with focus on “build back better”. The findings from this systematic analysis will contribute directly to the on going recovery efforts and to be applied through the recovery efforts and be applied through recommendations regarding donors and government policy in recovery for the specific shelter sector in an integrated manner.

<sup>4</sup> 3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels, 4. Reduce the underlying risk factors

## 1.3 AIM AND OBJECTIVES

AIM:

Build back better and Build back safe through sustainable system of supplying new shelter along with repair and retrofitting of the existing ones through capacity building of the carpenters and integrating DRR in the whole process leading to a disaster resilient living of the people of Myanmar. The whole exercise will be based on the experience of post NARGIS interventions in the shelter sector.

OBJECTIVES:

The following are the key objectives of the analysis/study

- ♦ *Study of owner driven, NGO and International agency shelters* being constructed in the post nargis recovery period. This will include study of the best practices, lessons learnt, challenges, impacts of the support and the way forward
- ♦ *Identify gaps and opportunities* in the current practices and procedures of shelter constructions in the Nargis affected areas of the country.
- ♦ *Recommend a set of actions* including alternative approaches, and modes and, corresponding resource requirements that need to be undertaken to enhance effectiveness of Disaster resilient shelter systems in Myanmar.

**Special Note:** Evaluation of the Shelter programme component has been based on the assumption that the entire process of intervention hinges on what eventually happens in the shelters. No matter how efficient delivery system we have, the success of shelters programme will depend upon how the HHs (end-users) find the new abode at personal level- do they feel that it's their home?

## CHAPTER 2

# **METHODOLOGY**

## 2.1 DOMAIN OF EVALUATION

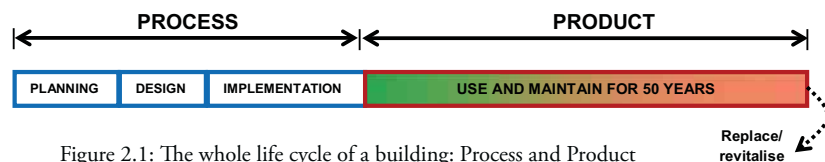


Figure 2.1: The whole life cycle of a building: Process and Product

Figure 2.1 shows the four phases of whole life of a building. The first three form the process which leads to the product, i.e., the building. The fourth stage is using them for whole life before replacing or revitalising it. The present exercise has evaluated both the 'process' and the 'product' of the post NARGIS intervention – “DRR integration in Post-Disaster Recovery Planning and Development in the Shelter/Housing Sector in Myanmar”.

The evaluation of the 'process' has primarily been with respect to the delivery mechanism comprising of a) Planning Process including integration of DRR, b) Implementation Process, c) Design Development, d) Cost Issues e) Capacity and awareness building and all other relevant issues in the present context. The process evaluation has been based on background information provided by the key members of the Shelter Working Group and other key respondents, which formed the desktop research. To cross check/underpin the findings of the desktop research, surveys have been conducted by interacting with the various stakeholders at the National, Township and Village level.

The evaluation of the 'Product', on the other hand, was focused on the a) Quality of construction, b) Shelter and its Facilities and Usage, c) Community Involvement and end-users' feedback, etc. The evaluation of the product was based on site visits and interaction with stakeholders at HH level.

Based on literature survey and the consultant's direct involvement with similar evaluation programmes in social infrastructure programmes in India, Bangladesh, South Africa, Namibia and Iraq, the first draft questionnaires was prepared first. The consultant's previous visit to Myanmar in February- March 2009, especially field visits and community interactions at Labutta and Bogale, has been of great help in the present context.

## 2.2 IDENTIFICATION OF CRITERIA/ISSUES FOR EVALUATION

In any evaluation there will always be a large number of issues involved. However, due to constraint of time and cost one has to identify the most important/key issues in order to focus the evaluation on the things that matter and to ensure that no important aspect is missed out. Identification of the key issues was primarily based on the TOR provided by Chair-Shelter Working Group (CSWG), Myanmar. This was further developed and detailed out after examining evaluation processes adopted in similar post disaster situations elsewhere. Finally this was shared with the CSWG and the survey agency for their review and suggestions which were incorporated in the questionnaires.

The core of the evaluation is how far the basic concept of “Build Back Better and Safer” has been achieved in the post NARGIS intervention towards shelter. The other key area is whether in the process of intervening, DRR has started being integrated and imbibed in the existing institutional

system. The evaluation focuses on capacity building of the construction workers which will enable them to build back safer and better through appropriate and contextualized shelter construction know-how. It has also evaluate whether the end users have developed adequate awareness for a resilient shelter programme- i.e. whether they are informed clients. This will enable the societies to combat future disasters in the Delta area especially cyclone, which is frequent.

The following steps have been planned to carry out the evaluation.

- **DESKTOP RESEARCH (ANNEXURE I AND II) – TOP DOWN**

Desktop research was carried out to get a grasp of the different aspects of the programme. This includes the existing documents regarding the post NARGIS on-going recovery and reconstruction process. Some of the documents such as PONJA, DFID report, DRR of CSGW have been the baseline for evaluation (ANNEXURE I).

There are several sources of voluminous reports and documents, which is usually the case with post disaster situation. However, considering the shortage of time for the evaluation, utmost care should be taken to make sure that the optimum amount of documents from the best sources are sent to the consultant. This is of vital importance since the whole evaluation was, to a great extent, founded on this. Appendix II is an EXCEL file that contains analyzed data along with the criteria for examining the documents under the desktop research.

- **KEY RESPONDENTS' INTERVIEW (ANNEXURE III) – TOP DOWN**

Annexure III began with a few key questions, which had captured the top level management's views on the shelter programme. A limited number of key respondents from the National Level were selected for this type of interview.

The main objective of this questionnaire was to capture the spontaneous reaction of the top level management to understand what their overall views were on the achievements and gaps of post NARGIS shelter intervention. The finding of this was compared with that of desktop, agencies and HH level interviews. This gave an opportunity to examine the similarity and/or differences between the top down and bottom up on same issues.

- **AGENCY- LEVEL- INTERVIEW (ANNEXURE IV) – BOTTOM UP**

The Agency-wise Data format has been designed to gather a complete set of data/information/ evidence based on their actual experience of implementing the projects at site level. It is to be noted that the agencies were working in a highly stressed emergency situation and hence, it is not unusual to put forward some contradictory answers against a series of questions asked on same issues, especially much after the projects were over. Therefore, this part of the evaluation has been a very important component. Care was taken while designing the questionnaire which made it robust enough to eliminate the contradictions while answering the survey team.

- **HH SURVEY (END-USERS' SATISFACTION)(ANNEXURE V,VI)– BOTTOM UP**

While the Appendix I, II and III are top down inputs to the evaluation, the Appendix IV is bottom up. All these are essentially from the supply side of the post NARGIS shelter intervention. No matter how efficient a system may appear to be in the views of the supply side, the acid test of success is what has been the end users' perception on this regard. Annexure IV is a completely bottom up survey. It was designed to capture the end-users' level of satisfaction according to their own perception.

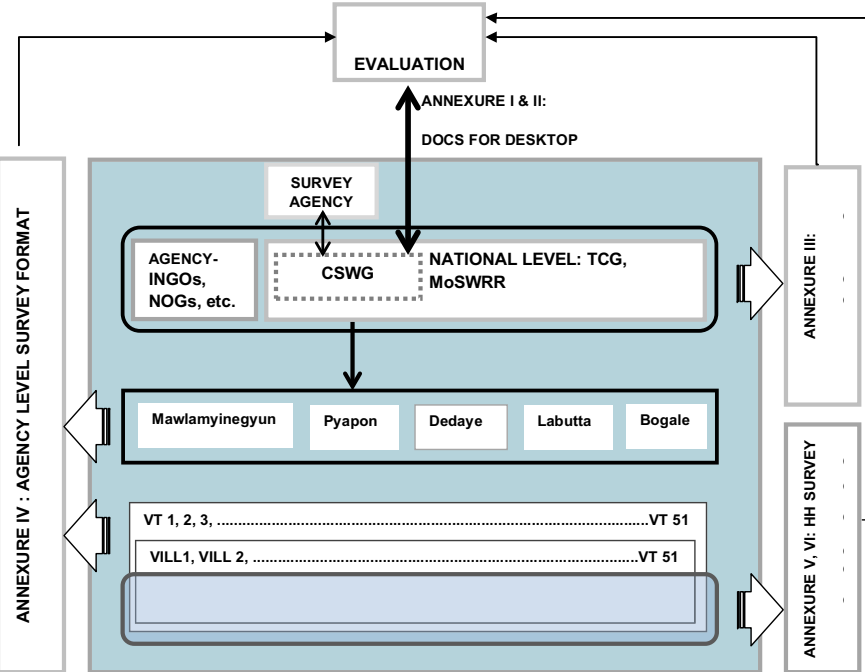
Fairly structured survey questionnaires (Appendix V and VI) were developed which were pre-tested elsewhere. Data of this form has been filled in 918 HHs in Ayeyarwaddy division in



Mawlamyinegyun, Pyapon, Dedaye, Labutta, Bogale Townships. Out of these five Townships, HHs were surveyed in 51 Villages located in 51 VTA. The survey was organised by the CSWG.

### 2.3 ORGANISATIONAL STRUCTURE: WHO DID WHAT

Figure 2.2: Organizational structure of the process of evaluation

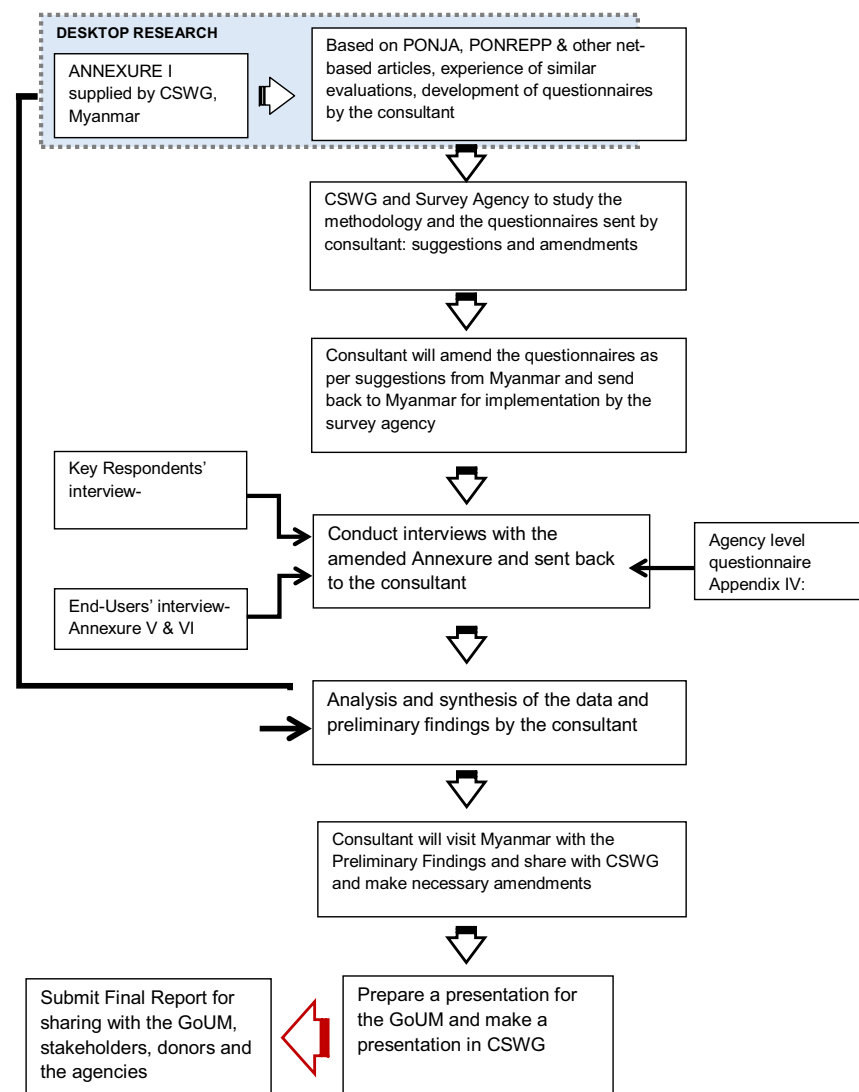


**SPECIAL NOTE:** The CSWG and the survey agency examined and made necessary modifications based on the local specificity of the language, pattern of asking questions, uniqueness of each societies' sense of privacy and ethics, etc. before using the questionnaires.

All the survey forms are in EXCEL worksheets to ease out data analysis process. The survey team made suitable translation in local language of each questionnaire. Utmost care was taken to write the answers in compact and brief sentences without distorting the original meaning of the answers.

### 2.4 THE PROCESS OF EVALUATION

Figure 2.3: Diagram showing the steps of the evaluation



CHAPTER 3  
**BASIS OF DESKTOP  
RESEARCH**

### 3.1 DOCUMENTS FOR DESKTOP RESEARCH

CSWG, Myanmar has been the main source from where all the documents for literature survey were obtained in the context of the present evaluation. The consultant had sent the following list of basic information for the desktop research, which was to be the premise of analysis, synthesis and recommendations. Since there could be several sources regarding the following list, CSWG was requested to mention the source of each set of data. Most of the following were received in some form.

Table 3.1: List of documents asked for from CSWG

Sl no	Documents
<b>A</b>	<p><b>Programme Rationale</b></p> <p>The programme rationale along with maps showing the affected areas and where all the shelter recovery and reconstruction programmes were planned to be implemented. <i>Draw a diagram</i> that explains the roles, responsibilities, etc. of the people/agencies in the present interventions. Provide all relevant reports/documents. <b><u>This data is for the programme as a whole.</u></b></p> <ul style="list-style-type: none"> <li>• A complete list of villages under VT and Townships where interventions took place</li> <li>• The number of NGOs and INGOs and individuals involved in the implementation. How were they selected, what were the TORs? Who appointed them? Who did they report to? What were their internal reporting mechanisms within the agency? What was their interface with the communities?</li> <li>• Interface with the Government and what will be the arrangement of the system developed getting passed on to the government?</li> <li>• People's participation especially about resettlement and transparency of fund flow</li> <li>• Any other relevant data/information</li> </ul>
<b>B</b>	<p><b>Delivery Mechanisms</b></p> <p><b><u>THIS DATA SHOULD BE AGENCY-WISE (OWNER-DRIVEN, NGO, INTERNATIONAL AGENCY AND ANY OTHER)</u></b></p> <ul style="list-style-type: none"> <li>• Planning and Implementation model: The overall management structure, delivery/implementation mechanism and quality control and management of shelters being constructed in the post Nargis recovery period.</li> <li>• Funding - The funding mechanism who gave money and under what conditions, in which instalment the money was given and to whom? How was the settlement of accounts done for each settlement? How transparent was the funding mechanism to the communities.</li> <li>• Any report on the lessons learnt about the delivery mechanisms adopted by each agency- Any good example?</li> </ul>

Sl no	Documents
<b>C</b>	<p><b>Need Assessment and Prioritisation</b></p> <p>Detail process of the need assessment and prioritisation method (draw a flow chart). <b><u>This data should be agency-wise as well as for the entire Delta area</u></b></p> <ul style="list-style-type: none"> <li>• How was it done- the damage assessment data collection process</li> <li>• Who did it</li> <li>• When was it done</li> <li>• The report</li> <li>• Any other relevant data/information in this regard</li> </ul>
<b>D</b>	<p><b>Resource Mapping</b></p> <p>Detail of the resource mapping exercise with an audit of materials, skills, rates and other building construction and maintenance related resources in the affected areas. Preferably this should have maps showing the different resources. <b><u>This data should be agency-wise as well as for the entire Delta area</u></b></p>
<b>E</b>	<p><b>Design</b></p> <p>This should be agency-wise.</p> <ul style="list-style-type: none"> <li>• All designs (shelter+ water+ sanitation+ plot+ settlement layout) implemented at different places by each agency- photos of the shelters</li> <li>• Settlement layouts of the reconstruction of shelters</li> <li>• What is the traditional shelter plan and settlement layout?</li> <li>• Climate data</li> <li>• Functional needs- Standards</li> <li>• Any other relevant information</li> <li>• Structural design calculations and detailing of each design option</li> <li>• Multi hazard map, vulnerability atlas in the codes</li> <li>• Building codes such as RCC, Masonry, Loading, Wind and Earthquake codes, etc.</li> </ul>
<b>F</b>	<p><b>Cost</b></p> <p>Estimated cost with detailed Bill of Quantities for each design option along with brief specifications. Actual cost at each settlement. <b><u>This data should be agency-wise for all sites</u></b></p>

Sl no	Documents
<b>G</b>	<b>Capacity building</b> A complete report of the institutional systems, training package, trainers detail, trainees' detail, management and financial systems, etc. <b><u>This data should be agency-wise as well as for the entire Delta area</u></b> <ul style="list-style-type: none"> <li>Who planned and designed</li> <li>Who were trained and how they were selected- were they non skilled or semi skilled?</li> <li>Who taught and what were their background</li> <li>Any training Manual? Film? Developed or acquired/adapted from other countries</li> <li>Duration of the course and topics covered</li> <li>Evidence that skills have improved? How do we know that the desired qualities of skills have been achieved- any report?</li> </ul>
<b>H</b>	<b>Local Level Building Materials Production Centres</b> Any new building materials production centre established? Detail description along with photos. Describe, what is going to be their fate after the project is over. Has the communities been adequately capacitated to run them independently? Is there a market for the products? <b><u>This data should be agency-wise as well as for the entire Delta area</u></b>
<b>I</b>	<b>Maintenance</b> Detail report Gather information regarding the physical condition of the housing stock. Types of maintenance problems and the range of maintenance costs <ul style="list-style-type: none"> <li>The information will help to analyze current and probable future shelter needs.</li> <li>Any special skill development to take care of maintenance? Multi skilled? Maintenance booth?</li> <li>Retrofitting</li> <li>An audit of the retrofitting requirements of shelters by type of construction (bamboo, timber, brick, concrete houses), estimated cost and plan of action</li> <li>Capacity building on retrofitting</li> </ul>
<b>J</b>	<b>Disaster Risk Reduction (DRR)</b> What is the DRR programme- its target, time scale and achievements expected and plan of action for its functioning beyond the programme. <ul style="list-style-type: none"> <li>Is there a Multi Hazard map showing different types of hazards in different parts of Myanmar?</li> <li>Is there is vulnerability map of Myanmar</li> <li>Report on how HFA is being planned to be implemented in Myanmar?</li> <li>Any evidence of integrating DRR in the housing supply</li> <li>Report on any community-based participatory vulnerability assessment</li> </ul>

Sl no	Documents
<b>K</b>	<b>Sustainability analysis</b> <ul style="list-style-type: none"> <li>Report of any evidence of community contribution - describe- what type? How much monetary value does it have?</li> <li>Environmental impact Assessment report</li> <li>Any study or report which shows that NARGIS been used as an opportunity for sustainable development?</li> </ul>
<b>L</b>	<b>Miscellaneous</b> <ul style="list-style-type: none"> <li>Report of any evaluation by any party on any aspect of the programme</li> <li>Any other relevant report/ documents/ publication</li> </ul>

Table 3.2: Physical construction types and other details (to be filled in by UN-HABITAT)

AGENCY 1: NAME ADDRESS IDENTIFICATION												
	YEAR 1						YEAR 2					
	No of Shelter units		No of Toilets units		No of Drinking water		No of Shelter units		No of Toilets		No of Drinking water	
	Target	Achieved	Target	Achieved	Target	Achieved	Target	Achieved	Target	Achieved	Target	Achieved
<b>TOWNSHIP 1</b>												
Village 1												
Village 2												
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Only a very limited data on the above table could be acquired and hence this could not be included in the desktop analysis. This short coming was tried to be compensated by examining the data acquired through questionnaires for both top down and bottom up.

### 3.2 CATEGORISING THE DOCUMENTS

The documents received from CSWG, Myanmar could be broadly categorised as a) those prepared in the initial days of post NARGIS intervention and immediately after NARGIS. b) the recent documents. Out of these documents, the category “a” provided information primarily on the targets, proposed methods, etc. The category “b” is primarily on the achievements, challenges, gaps. However, it should be noted that both the documents to some extent covered all the issues such as target, method, achievement, gap, challenges etc. The category “a” documents have been termed as “TARGETS” and category “b” as “STATUS”. The following is a list of literature received from UN-HABITAT so far.

#### MAIN DOCUMENTS

##### a) Targets

1. Design parameters for individual shelter Technical working group (TWIG) Shelter cluster – Myanmar NARGIS, 280808
2. Report: Shelter Needs Assessment, Post Cyclone Nargis, prepared by Myanmar Survey Research, for the IOM, funded by DFID, October 2008
3. Post-Nargis Joint Assessment: A report prepared by the Tripartite Core Group comprised of representatives of the GoUM, the ASEAN and the UN with the support of the Humanitarian and Development Community. July 2008- *PDF FILE*
4. Post-Nargis Recovery and preparedness Plan (PONREPP) a report prepared by the Tripartite Core Group comprised of representatives of the GoUM, the ASEAN and the UN with the support of the Humanitarian and Development Community, December 2008. *PDF FILE*
5. Strategic Advisory Group (SAG) – Myanmar 2008, Updated Draft TOR 8 September 2008 *MS WORD FILE*
6. Integration of Disaster Risk Reduction into Housing and Infrastructure Facilities [Ref: MAP-DRR Sub-component 5.5 and 5.7] *MS WORD FILE*
7. Emergency Shelter Cluster, Cyclone NARGIS, May 2008, Myanmar, Strategic Framework *MS WORD FILE*
8. Shelter cluster early recovery strategy - Living document 26-06-2008 *MS WORD FILE*

##### Category “b”, i.e., STATUS

9. Shelter Coordination—Cyclone Nargis, Final Shelter Workshop Notes and Lessons Learnt 26th June, 2009, Prepared By UN-HABITAT- *PDF FILE*

10. REPORT on Outcome and Impact Assessment of Disaster Risk Reduction Programme under the Early Recovery Programme Submitted to UNDP, Myanmar, Myanmar Survey Research, 2010 FEB – MAR. *PDF FILE*

11. Shelter Sector – UN Completion Report *MS WORD FILE*

12. Post-Nargis Periodic Reviews. Reports prepared by the Tripartite Core Group comprised of representatives of the GoUM, the ASEAN and the UN with the support of the Humanitarian and Development Community. *PDF FILE*  
Periodic Review I: Dates  
Periodic Review II: Dates  
Periodic Review III: January 2010  
Periodic Review IV: July 2010

13. Shelter Cluster Urgent Pre-Monsoon Needs, UN-HABITAT, David Evans, Head of Agency (acting), April 2009 *PDF FILE*

14. PPT presentation: Cyclone Shelter Analysis - Current Practices and Way Forward, Analysis and Compilation of Snap Shot Questionnaires, MES and UN-HABITAT

#### Good examples

15. Mainstreaming Disaster Risk Reduction into Housing Sector in Sri Lanka, A Priority Implementation Partnership (PIP) between the Disaster Management Centre (DMC), Ministry of Disaster Management & Human Rights and the Housing planning, construction and approval agencies in Sri Lanka Under the Regional Consultative Committee on Disaster Management (RCC) Program on Mainstreaming Disaster Risk Reduction into Development in Asia. Undated *PDF FILE*

#### IEC

##### Posters

- BBB\_English\_A
- BBB\_English\_B
- DPR - CURB Brochure
- People's Process MYA
- Poster-3\_ We Protect Our Shelter from Rain, Storm & Flood (English)
- ROAP2007- Pages 2-3 english
- ROAP2007-Pages 1-4 English

#### HANDOUT

- Household Guideline (English)-2

#### MANUAL

- Carpenter Guide(English)
- Household Guideline (English)
- Village Shelter Committee Guideline(English)

## DESIGN

IMAGE daydaye0100.pdf- example shelter no-1 section  
IMAGE daydaye0102.pdf- example shelter no 1 – view – net area 15’X16’ = 240 sqft  
IMAGE daydaye0103.pdf- example shelter no 2 – side view  
IMAGE daydaye0105.pdf- example shelter no 2 – Front View  
IMAGE daydaye0106.pdf- example shelter no 3 – side view  
IMAGE daydaye0107.pdf- example shelter no 3 – front view

## BOQ

IMAGE daydaye0101.pdf- example 1 Expenditure schedule  
IMAGE daydaye0104.pdf- example shelter no 2 – Expenditure schedule  
IMAGE daydaye0108.pdf- example shelter no 3 – Expenditure schedule

### 3.3 METHOD OF ANALYSIS

As explained in the Chapter on Methodology, the evaluation has been designed under the 13 heads, viz., 1) planning, 2) design, 3) implementation, 4) quality of construction, 5) cost, 6) capacity building, 7) maintenance, 8) water, sanitation & electricity, 9) communication & information, 10) impacts and effects, 11) sustainability, 12) funding, 13) administrative & management. These 13 points (with sub attributes) form a comprehensive format that will enable one to analyse the situation and recommend, which will be easy to understand and implement by the people who will carry forward the interventions to create disaster safe shelter. Based on international experience elsewhere, this has been modified in the context of Myanmar. Each and every document has been examined to identify the targets, achievements, challenges and gaps of the post NARGIS interventions against the 13 heads.

From the documents 1 to 8, which are reports prepared in the initial days of NARGIS, targets were identified. However, these documents also provided some of the recommendations and status of the interventions. After reading these documents, the targets of the present interventions were identified.

Status of the programme has been identified from the documents 9 to 14 as well as the designs, BOQ and ICT materials supplied by CSWG, Myanmar. The documents 9 to 14 have been the basis of understating the achievements, challenges and gaps against the above mentioned 13 key issues. In order to have a common understanding of what these terms (i.e. achievements, challenges and gaps) mean in the present context, the following diagram has been prepared.

Against each of the 13 key issues (and its sub attributes) of the evaluation, there are targets/objectives, which have been identified from the document study as mentioned above. In theory, the attainments could be zero to hundred percent against each target. In reality, while attainment is unlikely to be zero, achievements beyond eighty to ninety percent are difficult. Therefore, evaluating status of a particular target is difficult to derive mathematically since it is fuzzy. Therefore, it has been assumed that if the attainment of the target/objectives under each of the 13 points is less than about 1/4, it is a gap. It has been assumed that challenge means that the attainment is between approximately 1/4th and 3/4th against the targets. Any attainment beyond 3/4th is an achievement. While enhancing the level for gap could be negative to the spirit of intervention, lowering the level

of achievement will lead to complacency. In this case, the benefit of doubt between ‘gap’ and ‘challenge’ has been given in favour of challenge.

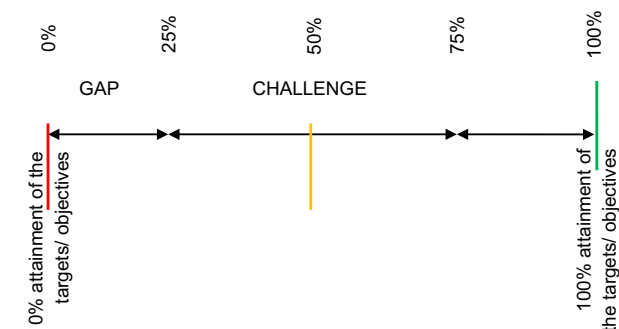


Figure 3.1: Figure shows the process of decision making on “Gap”, “Challenge” and “Achievement”

#### Step 1 of Analysis:

From the above mentioned documents, the Target Matrix shown in Table 3.3 has been developed first by examining each of the 8 documents. Against each of the 13 key issues and their sub attributes, the targets were written first. There were repetitions of the targets since different documents addressed the same issues. After close examination of each box in the matrix, more or less similar types of targets that could be summarised in one or two sentences were marked with same number as shown in the Table 3.3. The boxes not numbered were either statistical data or vital piece of information that indirectly helped in framing the sentences representing targets.

Following the above, the targets defined by different documents belonging to the same number were put together in a box and then converted into one or two sets of final targets by making sure that no important ones are missed out. This is in the WORKSHEET “TARGET REARRANGED” in ANNEXURE II DESKTOP RESEARCH ANALYSIS-TOP DOWN. Table 3.4 shows part of the rearranged matrix.

A small team of architects engaged in DRR safe design (New Delhi) were involved in deciding the targets through several brainstorming sessions by putting up the matrix on a wall in A0 size drawing sheet. This gave an opportunity to each team member to look at the situation as a whole. After one cycle of brainstorming session, the corrected matrix was reprinted on A0 format and the same session was repeated. After successive three sessions, the matrix was finalized.

Table 3.3: Part of the Target Matrix showing how targets were identified


8 MAIN DOCUMENTS 				
A	B	C	D	E
KEY ISSUES	SUB ATTRIBUTES	PONJA	DFD	Strategic Advisory Group (SAG) – Myanmar 2008 Updated Draft TOR 8 September 2008
<b>PLANNING</b>				
1. Was the Planning Process logical and realistic ?	1.1 Need Assessment/ Target setting BACKGROUND/ OBJECTIVES	With the last national census of 1987, it is highly challenging to present an accurate profile of the pre-disaster housing situation of affected area. The assessment team used various data sources to gain an understanding of the situation.	The survey was on 57 villages in severely affected areas of 5 townships. No of village tracts 2 to 32 per township. No of HH per VT 65-5723. Some villages have HH as low as 32. Population per VT 400- 25,000	Objective a) To ensure a seamless transition from coordinating emergency shelter issues to early recovery ones. b) to ensure that implementation programmes are complementary to government interventions
	background continued	Further detailed housing assessment is needed to refine following figures since it is not known, how many of damaged houses belonged to adults who died, where children or other dependents will be housed with other relatives in future. A detailed housing assessment should be conducted at the local level, ideally through a participatory process drawing on the capacities of community-based groups and local NGOs		The Strategy development should where possible complement Government policies, plans, regulations, etc
	Assessed damage-shelter	It is estimated that, out of 800,000 (approx) housing units affected by NARGIS, 450,000 were totally destroyed and 350,000 were lightly damaged. The total damage and losses are estimated at around K 686 billion.	Out of 5 townships 63% of private houses and community buildings were totally destroyed. Repair and rebuilding. 59% (5 townships) of the key respondents said that they will not be able to fully repair or rebuild even after 6 months (from October 2008)	
	Assessed damage contd- shelter		Access infrastructure to the building where communities can take refuge needs urgent repair or improvement	Establish 'Technical Working Groups' (TWGs) as required and ensure such groups are accountable to agreed TORs, ensure timely output, transparent reporting and the closure of such groups on completion of agreed TORs
	cyclone shelter		In five townships 58% of the people reported that monasteries are the safe places to take refuge during cyclone. The school comes next to that. However, these needs examination to address retrofitting	
	1.2 Prioritisation	Due consideration should be given to the poor, and to equity in the provision of assistance.	High priority to be assigned for the Vulnerable HHs which are a) Female headed, b) Disabled income earner, c) Earners away from home, d) Families hosting displaced people, e) Ill income earners, f) Without income earners	
	1.3 Involvement and consultation	The relocating communities (as well as the receiving ones, if applicable) should be consulted throughout the planning and implementation process.		In the Shelter Cluster Meetings a) Government representatives are pro-actively invited on an as-need basis, b) Meetings of Technical Work Groups (TWGs), set up, monitored and closed by the SAG on the recommendation of the Shelter Cluster Meeting.
		It would be beneficial to establish guidance for the type and standard of housing assistance to be provided as part of relief and early recovery operations.		

Table 3.4: Shows part of the rearranged Target matrix


A	B	C
KEY ISSUES	SUB ATTRIBUTES	DESCRIPTION
<b>PLANNING</b>		
1. Was the Planning Process logical and realistic ?	1.1 Need Assessment/ Target setting BACKGROUND/ OBJECTIVES	Objective a) To ensure a seamless transition from coordinating emergency shelter issues to early recovery ones. b) to ensure that implementation programmes are complementary to government interventions policies, plans, regulations, etc c) integrate DRR in recovery d) quantify shelter assistance need, e) community resilience and self-recovery activities f) traditional ways of sheltering with improved safety g) reduce vulnerabilities considering limited resources and limited access to the affected
	background continued	Access infrastructure to the building where communities can take refuge needs urgent repair or improvement
	Assessed damage-shelter	Establish TWGs and ensure agencies comply with the agreed TORs, --> avoid inequity by using transparent criteria and standardized approach focussing on the quality and application of appropriate cyclone-resistant building techniques --> if standards are not met then a full explanation be provided to support the variance --> Shelter assistance should promote equity within or between communities
	Assessed damage contd- shelter	Settlement preparedness plan should try to support the re-construction of community facilities i.e. schools, monasteries and health facilities, as resilient structures so they could be used in the future as disaster relief centres
		The first and foremost one will be to address obstacles that prevent the full utilization of existing assets and capacities. Examples include construction materials, skilled labour, and technical assistance on storm resistant building techniques.
	cyclone shelter	High priority to be assigned for the Vulnerable HHs which are a) Female headed, b) Disabled income earner, c) Earners away from home, d) Families hosting displaced people, e) Ill income earners, f) Without income earners (poor) g) people directly affected by the cyclone h) the landless and those who remain displaced, i) widows, widowers, elderly, children, orphans and families in need of resettlement j) Single-parent

### Step 2 of Analysis:

The Status Matrix shown in Table 3.5 has been developed first by examining each of the 6 documents (Doc 9 to Doc 14), ICT materials, designs and BOQ provided by CSGW, Myanmar. Against each of the 13 points and their sub attributes, the status was categorised as “achievement”, “Challenge” and “Gap” as defined in Figure 3.1. For easy visual reading, the achievements were coloured green, challenges yellow and gaps in red (Table 3.5).

While doing this exercise the same team of architects were involved following the same technique of using A0 print for brainstorming session till the team members were satisfied with the outputs. This is in the WORKSHEET “STATUS” in ANNEXURE II DESKTOP RESEARCH ANALYSIS-TOP DOWN.

Table 3.5: Part of Status Matrix showing how achievements, challenges and gaps were marked

6 MAIN DOCUMENTS 				
A	B	C	D	E
Key Issues	Sub Attributes	EXCRPT 24th July Annex 9 Shelter Cluster consultations/ Shelter Coordination—Cyclone NARGIS, Final Shelter Workshop Notes and Lessons Learnt 26th June, 2009, Prepared By UN HABITAT	Shelter Cluster Urgent Pre-Monsoon Needs (April 2009) UN-HABITAT, David Evans Head of Agency (acting)	Post-Nargis Periodic Review IV July 2010
PLANNING				
1. Was the Planning Process logical and realistic?	1.1 Need Assessment/ Target setting	<p>The shift from Emergency 'Early Recovery' Coordination was probably too early at 3 months – should have been around 5 months.</p> <p>There is no 'one-fit' shelter solution. Cash grants, materials provision, full construction are all valid initiatives</p> <p>UN assessments are useful, but often fail to utilize experience learnt in other areas, repeating same mistakes.</p> <p>Equity is very important to avoid conflict within and between communities. Every effort should be made to ensure packages are equitable and that there is a clear policy on eligibility.</p>	<p>Need assessment: There is a difference between the GoUM's and PONJA's assessment, a) Destroyed 450,000 (PONJA), 375,000 (GoUM), b) Damaged 340,000 (PONJA), 126,000 (GoUM)</p> <p>Response for destroyed houses (including planned programmed until May2009). The International response through semi-permanent or permanent shelter has been (3.8-4.5%), self recovery (46.44%-55.73%) which is often weak and temporary or transitional, balance of vulnerable families with no recovery plan whatsoever (31.3%-37.6%)</p> <p>Response for damaged houses (including planned programmed until May2009). The International response through semi-permanent or permanent shelter has been (15.3%-41.3%), self recovery (20.88%-56.35%) which is often weak and temporary, transitional, balance of vulnerable families with no recovery plan whatsoever (0.88%-2.4%)</p> <p>The gap in supply against destroyed houses is alarmingly high, especially considering the vulnerability of every season's possible high rains, cyclone/high wind. Even the supplied houses are of temporary nature. Therefore, a strategy for permanent houses is an area of concern since people's capability to rebuild their own houses is very low</p>	<p>Repair: Of the HH surveyed in PR IV, 63% (46% PR III) shelters were fully repaired; 13% were almost fully repaired; 21% were partially repaired and 4% were not repaired. Progress was made since PR III.</p> <p>While shelter assistance appears to have been well targeted, 45% of those surveyed received shelter assistance whose dwellings completely destroyed, and 9% reported receiving such shelter assistance whose dwellings were not completely destroyed</p> <p>Despite new construction of dwellings and repair of other shelters, minimum space requirements (SPHERE standard 3.5 sqm/person, i.e., 160 sq ft/HH) were not met in nearly half of PR IV-surveyed HHs in parts of the most-affected areas. New home construction may not take into account the size or nature (extended family of several generations living under one roof) of a particular household. Insufficient shelter size was reported in areas where relatively considerable shelter repair and reconstruction assistance was delivered</p> <p>While the large majority of shelter assistance was well targeted, ill-advised targeting of assistance limits the scope of support available to those who suffered larger losses. Among 426 households that reported their dwelling as being severely damaged or completely destroyed in May 2010 and who reported that their dwelling were fully repaired, 69 per cent had received no shelter assistance</p>

### Step 3 of Analysis:

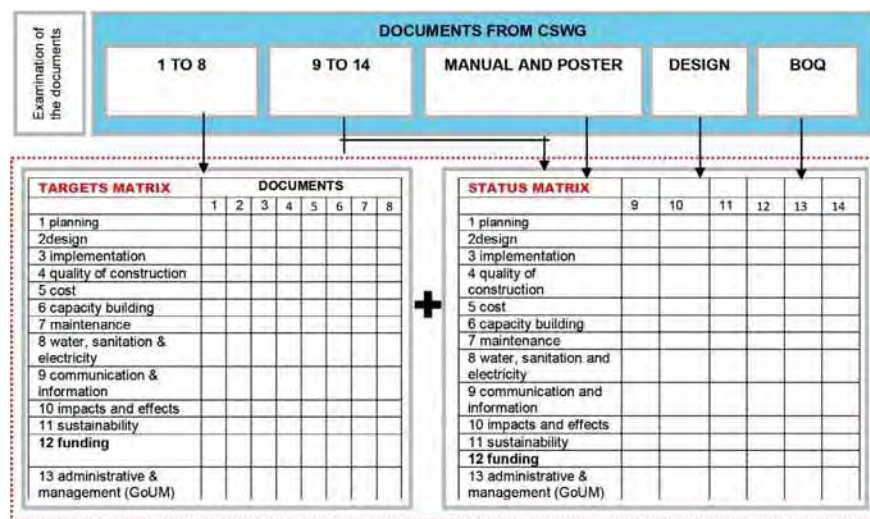
Some of the targets were more suitable as overall objective of a key issue than against a particular sub attribute. From Table 3.4 a few such relevant boxes from the sub-attributes of target were cut and put as the overall objective under each key issue. This increased the ease of placing the status against each of the targets from Table 3.5. The final TARGET-STATUS matrix is in WORK-SHEET "SUPERIMPOSED TARGET STATUS" in ANNEXURE II DESKTOP RESEARCH ANALYSIS-TOP DOWN. Table 3.6 shows part of this final matrix showing the targets/ objectives, status (achievements, challenges, gaps), recommendations and special notes under each of the 13 key issues and its sub attributes. The detailed recommendations under the sub attributes will assist in formulating the targets, indicators and means of verification towards achievement for all future shelter programmes in Myanmar.

Table 3.6: Final Matrix showing the summary of desktop analysis

KEY ISSUES	SUB ATTRIBUTES	TARGETS/ OBJECTIVES	ACHIEVEMENTS	CHALLENGES	GAPS	RECOMMENDATIONS	SPECIAL NOTES
1. Was the Planning Process logical and realistic?	1.1 Need Assessment/ Target setting BACK-GROUND/ OBJECTIVES	Objective a) To ensure a seamless transition from coordinating emergency shelter issues to early recovery ones. b) To ensure that implementation programmes are complementary to government interventions policies, plans, regulations, etc c) Integrate DRR in recovery d) quantify shelter assistance need, community resilience and self-recovery activities f) traditional ways of sheltering with improved safety g) reduce vulnerabilities considering limited resources and limited access to the affected region.	Repair: Of the HH surveyed in PR IV, 63% (46% PR III) shelters were fully repaired; 13% were almost fully repaired; 21% were partially repaired and 4% were not repaired. Progress was made since PR III.	There is no 'one-fit' shelter solution. Cash grants, materials provision, full construction are all valid initiatives	Need assessment: There is a difference between the GoUM's and PONJA's assessment, a) Destroyed 450,000 (PONJA), 375,000 (GoUM), b) Damaged 340,000 (PONJA), 126,000 (GoUM)	The shift from Emergency to Early Recovery Coordination was probably too early at 3 months should have been around 5 months.	With the last national census of 1987, it is highly challenging to present an accurate profile (data) of the pre-disaster housing situation of affected area. The assessment team used various data sources to gain an understanding of the situation.
		Establish TWIGs and ensure agencies comply with the agreed TORs. -> avoid inequity within or between communities by using transparent criteria and standardized approach focusing on the quality and application of appropriate cyclone-resistant building techniques -> if standards are not met then provide a full explanation for the variance. TWIGs will enable accurate need assessment based on minimum standards	The international humanitarian community and the GoUM were able to rebuild more than 63,204 safer and more durable shelters in cyclone-affected 11 townships (cost ranging from US\$ 400 to US\$ 800 by NGOs and US\$ 1,300 to US\$ 1,500 by GoUM)	Response for destroyed houses (including planned programmed until May2009). The International response through semi-permanent or permanent shelter has been (3.8-4.5%), self recovery (46.44%-55.73%) which is often weak and temporary or transitional, balance of vulnerable families with no recovery plan whatsoever (31.3%-37.6%)	Despite new construction of dwellings and repair of other shelters, minimum space requirements (SPHERE standard 3.5 sqm/person, i.e., 160 sq ft/HH) were not met in nearly half of PR IV-surveyed HHs in parts of the most-affected areas. New home construction may not take into account the size or nature (extended family of several generations living under one roof) of a particular household. Insufficient shelter size was reported in areas where relatively considerable shelter repair and reconstruction assistance was delivered	Further detailed assessment is needed to refine the figures since it is not known, how many of damaged houses belonged to adults who died, where children or other dependents will be housed with other relatives in future. Assessment should be conducted at the local level, ideally through a participatory process drawing on the capacities of community-based groups and local NGOs	
		3,549 vulnerable and landless families were provided with right of use and shelter by GoUM and various NGOs	While the large majority of shelter assistance was well targeted, ill-advised targeting of assistance limits the scope of support available to those who suffered larger losses. Among 426 households that reported their dwelling as being severely damaged or completely destroyed in May 2010 and who reported that their dwelling were fully repaired, 69 per cent had received no shelter assistance	UN assessments are useful, but often fail to utilize experience learnt in other areas, repeating same mistakes.	PK's res-A Local Level Building Resource Centre as mentioned above.		



Figure 3.2: The process of desktop research



While identification of the targets is primarily from the docs 1 to 8, the other sources also contributed to an extent



While identification of the status is primarily from the docs 9 to 14, the other sources also contributed to an extent

SUMMARY MATRIX	STATUS					
	Target	achievement	challenge	gap	recommendations	Special notes
1 planning						
2 design						
3 implementation						
4 quality of construction						
5 cost						
6 capacity building						
7 maintenance						
8 water, sanitation and electricity						
9 communication and information						
10 impacts and effects						
11 sustainability						
12 funding						
13 administrative & management (GoUM)						

Based on the Targets identified in the above left matrix and the achievements, challenges and gaps identified in the above matrix on the right, the summary matrix was developed. The final recommendations were put forward after having several brainstorming sessions with the CSGW and professional engineers in Myanmar (December, 2010). The latest documents made available in December, 2010 also helped modifying the recommendations to make them more suitable to the context.

## CHAPTER 4

# DESKTOP ANALYSIS

## 4.1 BACKGROUND (This Chapter is focused on “Process”)

The analysis carried out in this chapter is based on the documents supplied by CSWG, Myanmar. As discussed in the Chapter on Methodology, analysis has been carried out against 13 key issues treated as evaluation criteria. Under each key issue, there are several sub-attributes/criteria. Out of the documents supplied, the initial reports provided information on the “TARGETs” of the post NARGIS shelter intervention. The more recent documents, especially the Periodic Reviews (PR) were examined to get an idea on the present “STATUS” of the interventions against the identified “TARGETs”. Excel worksheet “SUPERIMPOSED TARGET STATUS” in Annexure II shows the achievements, challenges and gaps under each of the 13 key issues as criteria for evaluation after examining the excerpts from various documents supplied. All these have been explained in the Chapter 3: Basis of Desktop Research. This Chapter analyses the achievements, challenges, gaps and attempts to come up with possible recommendations. Appropriateness of a particular excerpt from the documents has been checked at each stage of desktop research and necessary corrections have been done as and when they were identified during the brainstorming session by involving architects working in the field of DRR.

Under each key issue, the objective has been stated first. In order to achieve the objective, the sub criteria have been evaluated. Under each sub-attribute/criterion there are sub-sub criteria. The following is a detailed analysis of the process of post NARGIS interventions on shelter in the context of DRR.

## 4.2 KEY ISSUES

### 1.0 Planning

**Objectives:** The objective of planning was to ensure seamless transition from emergency shelter to reconstruction through transitional shelters with integration of DRR as a cross cutting element. This stage was to make sure that the implementation programmes were complementary to government interventions, policies, plans, regulations, etc. Reasonably accurate need assessment based on current database planning stage will attempt to improve community resilience, traditional ways of sheltering with improved safety and reduce vulnerabilities considering limited resources and limited access to the affected region.

The sub attributes/criteria under planning are as follows

- Data Collection
- Need assessment
- Planning the Target
- Prioritization
- Involvement and consultation
- Realistic planning--> phasing
- Responsiveness of the planning process--> convergence
- Personnel

### 1.1 Data Collection

With the last national census of 1987, it is highly challenging to present an accurate profile (*data*) of the pre-disaster housing situation of affected area. The assessment team used various data sources to have an understanding of the situation.

The main source of data is old and from the documents it appears that the agencies had to depend upon various other sources. As a result, it is not known what had existed before the cyclone in terms of physical infrastructure human and animal population. The processes of data collection of the different sources are not known and hence, their consistency could not be checked. Apart from that, the documents do not explicitly mention about the level of authenticity of the sources- this makes the data collection process weak. Since all the decisions were based on the collected data, this is the right time to make an appropriate action plan to ensure that a system of data collection is in place to combat future disasters efficiently and effectively. Use of GIS will be a very important component of this action.

The Statistical Yearbook, 2008 published in 2009 by GoUM has some data on construction and related issues. For example, the Chart No.6, page 136 shows that in 2007-08, 12,00,000 tons of hardwood was extracted, which is equivalent to 60 million cubic foot of timber. A typical 255 sqft shelter built with bamboo and timber will consume approximately 40 cft of structural timber. Therefore, one can build 1.5 million shelters with the entire extraction of the period 2007-08. This is the national figure and the recent CSWG (December, 2010) concept note on low cost housing technology informs that in the 11 townships alone there is an urgent need of 0.15 million shelters. Hence, there is a huge shortage of structural timber.

**Recommendations:** Further detailed assessment is needed to refine the figures since it is not known, how many of damaged houses belonged to adults who died, where children or other dependents will be housed with other relatives in future. Assessment should be conducted at the local level, ideally through a participatory process drawing on the capacities of community-based groups and local NGOs

There is a need for collecting data on the different types of housing, i.e., RCC, traditional structures, hybrids, bamboo, etc. The national and local terms and categorisation needs to be adopted in this regard.

### 1.2 Need assessment

It was estimated that, out of 800,000 (approx) housing units affected by NARGIS, 450,000 were totally destroyed and 350,000 had light damage. The total damage and losses are estimated at around K 686 billion.

TWIGs was established to ensure that the agencies comply with the agreed TORs. TWIGs was formed to avoid inequity within or between communities by using transparent criteria and standardized approach focussing on the quality and application of appropriate cyclone-resistant building techniques. According to TWIGs, if for some reason, standards could not be met then one has to provide a full explanation for the variance. TWIG was formed to enable need assessment based on minimum standards and it was participatory and well researched.

**Achievements:** a) New Construction: The international humanitarian community and the GoUM were able to rebuild more than 63,204 safer and more durable shelters in cyclone-affected 11 townships (cost ranging from US\$ 400 to US\$ 800 by NGOs and US\$ 1,300 to US\$ 1,500 by GoUM). b) Repair: Of the HH surveyed in PR IV, 63% (46% PR III) shelters were fully repaired; 13% were almost fully repaired; 21% were partially repaired and 4% were not repaired. Progress has been made since PR III.

**Challenges/ gaps:** International response through semi-permanent or permanent shelter has been a) for destroyed houses (3.8-4.5%), self recovery (46.44%-55.73%) which is often weak and temporary or transitional. The balance of vulnerable families has no recovery plan whatsoever. Therefore, the gap in supply against destroyed houses is alarmingly high, especially considering the vulnerability of every season's possible high rains, cyclone/high wind. Majority of the supplied houses are of temporary nature, and hence, a strategy for permanent houses to be set out as a long term plan to address this issue keeping in mind that the people's capability to rebuild their own houses is very low.

As far as the need assessment is concerned, there is a difference between the GoUM's and PONJA's assessment, a) Destroyed 450,000 (PONJA), 375,000 (GoUM), b) Damaged 340,000 (PONJA), 126,000 (GoUM). According to one document, UN assessments are useful, but often fail to utilize experience learnt in other areas, repeating same mistakes.

Despite new dwelling construction and shelters repair, SPHERE standard of minimum 3.5 sq.m./person, i.e., 160 sq ft/HH were not met in nearly half of PR IV-surveyed HHs in parts of the most-affected areas. New home construction may not have taken into account the size or nature (extended family of several generations living under one roof) of a particular HH. Insufficient shelter size was reported in areas where relatively considerable shelter repair and reconstruction assistance was delivered. It should be noted that donor funding had affected the design standard of many shelters in Myanmar. Often due to donors' limited inputs per family it was not possible to meet the TWIG standard.

A very high proportion of HH remain in inadequate shelters – often overcrowded and with little protection from heat and rain. Some 90% of households reported living conditions worse than prevailing pre-cyclone. A very large share of households have only undertaken very temporary repairs – some 30% of households still only have plastic or canvas walls and roofs.

**Cyclone Shelter:** Apart from supplying new cyclone shelters, access infrastructure to the buildings where communities can take refuge needs urgent repair or improvement. Settlement preparedness plan should try to support the re-construction of community facilities i.e. schools, monasteries and health facilities, as resilient structures so that they could be used in future as disaster relief centres. In five township 58% of the people reported that monasteries are the safe places to take refuge during cyclone. The school comes next to that. However, structural safety of these buildings are not known.

**Achievements:** Over 356 community buildings have been built or near completion as multipurpose as well as cyclone shelters by UN/NGOs and Government. 80% of the cyclone shelters are nearby rural communities.

**Challenges:** The respondents rated low with regard to availability of strong cyclone shelter in their villages (most of them under construction). Some newly built schools have cracks on the walls, and they cannot be designated as cyclone shelters. Many buildings currently designated as cyclone shelters are not adequately strong.

While School cum Cyclone Shelters (51%) appear to have been designed, the structural safety of the rest is not certain. Buildings under this category are, Monastery cum Cyclone Shelter 20%, Health center cum Cyclone Shelter 11% , Multipurpose Community Building 7%, Church cum Cyclone shelter 5% Cyclone Shelter - Stand Alone 2% , School cum cyclone shelter & multipurpose community building 2% Other 2%.

#### **Recommendations:**

- Arrange funding for HH in inadequate shelters, plastic or canvas walls and roofs, often overcrowded and little protection from heat and rain.
- Keep in mind that people's capability to rebuild their own houses is very low
- Self recovery needs examination to ascertain safety
- Difference between the GoUM's and PONJA's assessment ,
- SPHERE standard were not met in nearly half of PR IV-surveyed HHs - donor funding per family was inadequate to apply TWIG standard
- There is a need for investigating the existing buildings treated as Cyclone Shelter- Needs further investigation
- Retrofitting need is very important

### **1.3 Planning the Target**

'Programme for Reconstruction of Cyclone Nargis Affected Areas and Implementation Plans for Preparedness and Protection from Future Natural Disaster' in August 2008 and PONREPP have underlying philosophy of 'Build Back Better' which calls for inclusion of DRR elements in recovery including housing.

Regarding the supply of new shelters equity is very important to avoid conflict within and between communities. Every effort should be made to ensure that the packages are equitable and that there is a clear policy on eligibility. The first and foremost one will be to address obstacles that prevent the full utilization of existing assets and capacities. Examples include construction materials, skilled labour, and technical assistance on storm resistant building techniques. The proposed interventions were supposed to be built on the substantial progress that was been made by the families and communities themselves who had rebuilt shelters.

**Challenges and Gaps:** While the large majority of shelter assistance was well targeted, ill-advised targeting of assistance limited the scope of support available to those who suffered larger losses. Many did not receive shelter assistance. According to PONREPP, the number of available artisans with DRR construction training, even with full financing and good organization, would clearly have absorptive capacity problems in the next three years. This will limit the achievable reconstruction targets.

The initial recovery efforts provided support to the value of US\$ 40 – US\$ 80 for "partial repair" in the form of either cash or materials (including tarpaulin) covering a total of 118,879 of these families, which did not meet the minimum humanitarian assistance

**Recommendations:** The shift from Emergency to ‘Early Recovery’ Coordination was probably too early at 3 months – should have been around 5 months. There is a need for planning in a phased manner towards the target considering the absorptive capacity of the artisans. There is a need for ready to use emergency shelters that could be easily transported to the required sites and unfolded to erect in the aftermath of a disaster. Learn from the past experience and set the planning target to address the shelter needs. Make the data on existing strong buildings as cyclone shelter available to reset the target.

**Cyclone Shelter:** From the available documents, it was not clear as to what is the target against the actual need of the cyclone shelters.

#### 1.4 Prioritization

High priority to be assigned for the vulnerable HHs which are a) Female headed, b) Disabled income earner, c) Earners away from home, d) Families hosting displaced people, e) Ill income earners, f) Without income earners (poor), g) people directly affected by the cyclone, h) the landless and those who remain displaced, I) widows, widowers, elderly, children, orphans and families in need of resettlement, J) Single-parent.

While the Government has made shelter replacement a priority, having constructed 4,600 single family houses with a further 3,300 under construction, the response of the international community has been limited to date, having been concentrated on emergency survival supplies. Shelter has not been the top priority to the donors.

**Challenges and Gaps:** From the 752,299 affected houses/families, 182,083 families were provided assistance of some kind (cash, materials, repair or rebuild) and another 420,538 were assumed to be self recovered. This leaves a gap of 149,678 houses/families in 11 townships who required assistance. Out of these, close to 97,000 families are considered as most vulnerable and require urgent assistance in the five prioritized townships. The temporary shelters that was received as emergency assistance in the early phase of the relief effort have gone through two complete monsoons and now facing the 3rd monsoon. These deteriorated materials cannot be considered of much practical value at this time.

Coastal communities being prone to hazards and since maximum deaths resulted due to a lack of safe shelters during Nargis, it is very important to keep in mind the possible consequences should another cyclone strikes this region. Slow shelter rehabilitation and reconstruction has the potential to undermine medium-term recovery efforts, and leaves the population in the Delta largely exposed to hydro-meteorological emergencies. The geo-physical location of the delta, poor communication and evacuation protocols further worsen the risks for the Delta people and shelters without disaster resilient features may further increase these risks.

Some donors felt that it was better to fund livelihoods and then allow the families to re-build shelter themselves using their own incomes. In the opinion of CSGW this is a great mistake as families who earn perhaps US\$1 or US\$2 per day will never have sufficient funds to save hundreds of dollars for a new shelter. In addition, the emergency response was fragile and needed to be quickly backed up with stronger more durable shelters in order to save from a second wave of emergency during the monsoon.

**Recommendation:** Based on the criteria mentioned in the first paragraph of this section, set a method of prioritising to rank the needs. While the most vulnerable groups may require disproportionate humanitarian and technical assistance providing strong support to a few can cause significant damage to the fabric of a community. The temporary shelter materials have deteriorated and cannot be considered of much practical value at this time and hence, this issue is a top priority. Slow shelter rehabilitation and reconstruction may undermine medium-term recovery efforts, especially population in the Delta with poor communication and evacuation protocols. Considering the low income level of the people donors to reconsider its priority on cyclone safe and durable shelters.

#### 1.5 Involvement and consultation

Shelter supply in its implementation will need to establish transparent, accountable systems which facilitate information exchange, and create synergies with other sectors in particular DRR and livelihoods. Donors should explore local capacities and there is a need to increase involvement of local NGOs. INGOs should partner with LNGOs to harness local experience.

Shelter activities could be implemented through a community based approach, where communities participate in making decisions on their priorities, needs, type of assistance, and process of intervention. This will ensure transparency in beneficiary selection to final completion and handover of the houses.

While relocating, communities should be consulted throughout the planning and implementation process. Minimise displacement by encouraging on-site, owner-driven self reconstruction. Relocate individuals and families only if it is appropriate, and that the previously occupied area has been rendered unsafe due to the cyclone. Investments will be needed to make new settlements economically, socially and environmentally sustainable; this requires an in-depth analysis with beneficiary participation.

**Achievements:** In the Shelter Cluster Meetings, the Government representatives were pro-actively invited as and when needed. DRR plans were planned to develop in coordination with other clusters and government ministries. The local Government was kept informed on activities.

**Challenges and Gaps:** Though government participation was initially strong, later on it fell away. So far aid providers have made most of the decisions about who gets what, and have used multiple delivery and targeting mechanisms. Some aid has been inappropriate. Faith-based aid has generally been positive, although it has sometimes given rise to tensions.

#### 1.6 Realistic planning

Within the framework of financial needs, support to owners’ own efforts to rebuild may be provided through a phased approach. This will be with initial support to strengthen disaster resilience provided as part of immediate humanitarian activities and then supplemented over time with greater assistance to improve disaster-resistance.

**Achievements:** Rebuilding cost of 450,000 houses were to be around K285,000 million, of which, the first years’ need was estimated as K47,000 million to provide basic support to owners’ initial efforts to rebuild.



## 1.7 Responsiveness of the planning process--> convergence

Duplication of services was planned to be avoided. This was attempted by limiting the local and international agencies by their geographical focus for providing comprehensive assistance to recipient villages. Shelter Cluster activities were to be closely linked to those of the clusters such as WASH, Education, etc., to ensure coordination and consistency of support.

## 1.8 Personnel

No clear idea from the given documents

Table 3.7: Summary: Planning

Key issues/ Criteria	Sub-attributes/ Criteria	Observations/ Issues	Recommendations
1.0 Planning			
	1.1 Data Collection	last national census in 1987, The assessment team used various data sources to gain an understanding of the situation	<ul style="list-style-type: none"> <li>Further detailed assessment is needed to refine the figures. Assessment through a participatory process drawing on the capacities of community-based groups and local NGOs</li> <li>Use GIS-based data on population and housing types</li> </ul>
	1.2 Need assessment	<p>Due to donor funding often being limited TWIG standard could not be applied. SPHERE standard were not met in nearly half of PR IV-surveyed HHs in parts of the most-affected areas.</p> <p>International response too small and self recovery often weak . Gap in supply against destroyed houses is alarmingly high, people's capability to rebuild their own houses is very low</p> <p>Difference between the GoUM's and PONJA's assessment ,</p> <p>HH often overcrowded and with little protection from heat and rain</p> <p>Access infrastructure to the buildings where communities can take refuge needs urgent repair or improvement.</p> <p>Support the re-construction of community facilities i.e. schools, monasteries and health facilities, as resilient structures so they could be used in the future as disaster relief centres. The respondents rated low with regard to availability of strong cyclone shelter in their villages</p>	<ul style="list-style-type: none"> <li>Arrange funding for HH in inadequate shelters, plastic or canvas walls and roofs, often overcrowded and little protection from heat and rain. Keep in mind that people's capability to rebuild their own houses is very low</li> <li>Self recovery needs examination to ascertain safety</li> <li>A mutually (GoUM and donors) agreed need assessment to be arrived at realistic need assessment to maintain TWIG standards</li> <li>Examine the existing buildings treated as Cyclone Shelter to understand retrofitting requirements</li> <li>Retrofitting needs to be emphasised</li> </ul>

	1.3 Planning the Target	<p>Shelter assistance appear to be well targeted, however, Ill-advised targeting of assistance limits the scope of support available to those who suffered larger losses. 69% of a surveyed HH did not receive shelter assistance.</p> <p>Delta region, have the degraded road infrastructure and river transport capacities,</p> <p>number of available artisans with DRR construction training, even with full financing and good organization will have problem of absorptive capacity</p> <p>recovery efforts provided support (40 – US\$ 80) for “partial repair” in the form of cash/materials covering a total of 118,879 families, which did not meet the minimum humanitarian assistance Cyclone Shelter: no data</p>	<ul style="list-style-type: none"> <li>The shift from Emergency to ‘Early Recovery’ Coordination was probably too early at 3 months – to be around 5 months.</li> <li>Learn from the past experience and set the planning target to address the shelter needs</li> <li>Plan for phased development considering the absorptive capacity of the artisans including their trainings</li> <li>There is a need for emergency shelters that could be easily transported to the required sites and unfolded to erect.</li> <li>Make the data on existing strong buildings as cyclone shelter available to reset the target.</li> </ul>
	1.4 Prioritization	<p>High priority for the vulnerable HHs which are a) Female headed, b) Disabled income earner, c) Earners away from home, d) Families hosting displaced people, e) Ill income earners, f) Without income earners (poor), g) people directly affected by the cyclone, h) the landless and those who remain displaced, I) widows, widowers, elderly, children, orphans and families in need of resettlement, J) Single-parent.</p> <p>Response of the international community towards shelter has been limited – focus is concentrated on emergency survival supplies</p> <p>Temporary shelters received as emergency assistance have deteriorated that cannot be considered of much practical value now</p> <p>Slow shelter rehabilitation and reconstruction has the potential to undermine medium-term recovery efforts, and leaves the population in the Delta highly vulnerable with poor communication and evacuation protocols</p> <p>Some donors felt that it was better to fund livelihoods and then allow the families to re-build shelter themselves- HHs with income of 1-2 US\$/ day can never save sufficient funds for a new shelter.</p>	<ul style="list-style-type: none"> <li>Identify the criteria from the left column and set a method of prioritising to rank the needs.</li> <li>The most vulnerable groups may require disproportionate assistance, though providing strong support to a few can cause significant damage to the fabric of a community</li> <li>The temporary shelters materials have deteriorated- treat this as a top priority.</li> <li>Slow shelter rehabilitation and reconstruction may undermine medium-term recovery efforts, especially population in the Delta with poor communication and evacuation protocols. Considering the low income level of the people donors to reconsider its priority on cyclone safe and durable shelters</li> </ul>

1.5 Involvement and consultation	In Shelter Cluster Meetings Government representatives were pro-actively invited as and when needed. DRR plans were planned to develop in coordination with other clusters and government ministries. The local Government was kept informed on activities.  Government's participation later fell away. Aid providers have made most of the decisions about who gets what, and have used multiple delivery and targeting mechanisms. Some aid has been inappropriate. Faith-based aid sometimes created tensions.	<ul style="list-style-type: none"> <li>• Donors should explore local capacities-INGOs to harness local experience</li> <li>• Need evidence whether people were consulted while relocating communities</li> <li>• An analysis is needed to understand the reasons why the government's involvement got reduced later- this will help further planning-where government's ownership is ensured</li> </ul>
1.6 Realistic planning: Phasing	Based on rebuilding cost of 450,000 houses were to be around K285,000 million, of which, the first years' need was estimated as K47,000 million to provide basic support to owners' initial efforts to rebuild.	<ul style="list-style-type: none"> <li>• Adequate evidence in support of whether realistic phased way of planning took place</li> </ul>
1.7 Responsiveness of the planning process--> convergence	Duplication of services was intended to be avoided by limiting the local and international agencies by their geographical focus for providing comprehensive assistance to recipient villages. Shelter Cluster activities were to be closely linked to those of the clusters such as WASH, Education, etc., to ensure coordination and consistency of support	<ul style="list-style-type: none"> <li>• Evidence in support of this is a gap</li> </ul>
1.8 Personnel	The given documents did not provide any information in this regard	<ul style="list-style-type: none"> <li>• Recommendations could not be put forward</li> </ul>

## 2.0 DESIGN

**Objective:** The objective was to supply disaster-safe shelters and cyclone shelters showing respect to the locations and local culture, which should be cost effective, suitable for future expansion and transformation and participatory

The sub-attributes/criteria under design are as follows

Research and Consultation  
Architectural Design  
To what extent have the shelter designs been improved over earlier designs  
Flexibility- transformation  
Technologies

## 2.1 Research and Consultation

An important component of the post NARGIS intervention has been adequate shelters built with improved features than the traditional houses. It was intended that the agencies will show respect to the indigenous building knowledge and support it instead of posing that the introduced knowledge is superior to the former.

**Achievements:** There are improved features in the new housing supply in the post NARGIS interventions.

**Challenges and Gaps:** From the given documents it was not clear as to what extent the design went through research and consultative process. Retrofitting of the existing buildings is a poor component of the intervention.

**Recommendations:** Research on the retrofitting processes to be emphasised. An example based handbook on retrofitting may be suggested. There are evidences that some of the indigenous houses had lasted through storms for many years. This indicates that a research could be conducted to understand the traditional shelters and device appropriate retrofitting measures for future resilience against cyclone and other disasters

**Cyclone shelter:** Cyclone shelter designs involved consultants and there were design competitions. Cyclone shelter design under UNDP carried out community consultation for design. Under UNDP, participatory cyclone shelter design workshops were conducted at Piye Salu, Magu, etc. in February 2009. Based on the workshops, cyclone shelters were designed and implemented.

## 2.2 Architectural Design

Traditional houses have a multi-purpose room, one small bedroom for adults, an entrance porch or veranda, & an outdoor kitchen. Sometimes open weave bamboos are used to allow light and breeze. HH contents consist of kerosene lamps or candles, sleeping mats, cooking and eating utensils, a small radio/cassette player, wraparound clothing, rain water clay jars and a supply of rice & other basic necessities. These are the basic ingredients of the pattern of events underlying the tradition building forms. Modern designs should be founded on these to create pattern of spaces as a cultural continuity.

Typical plot sizes in urban areas are 40X60 or 80X80 feet. In the affected areas, housing units average around 22X11 feet and are located on plots averaging 30X50 feet. Modern houses are usually about 26X20 feet and comprise of two stories. They are commonly found more in towns than in villages. They have wooden and/or brick walls, with wooden roof support structures, and corrugated/ galvanized iron or zinc sheets. Pillars are either wooden, concrete or in brick. Flooring is mostly stabilized cement.

Based on Sphere Standards, i.e. 3.5 sqm internal area per person as minimum standard, plinth area of (10' x 16') 160 sft expandable to 320 sft was adopted. Based on that, the intervention aimed at providing a 'core' structure of agreed dimensions and no agency were to provide or support more than that. It was also decided that the Housing activities will not exceed the common local standard, e.g. if the majority of houses in a community are of thatch and bamboo construction the additional housing must not exceed that standard.

**Achievements:** By and large the agencies have provided core houses.

**Challenges/gaps:** In some cases, the area standard was not maintained. While there is an improvement in situation (in terms of supply) compared to that of PR III, 70% of surveyed HH (PR IV) heads stated that their residencies are hotter, 45% said wetter and 40% said they were more crowded now compared to pre-Cyclone Nargis. One big difference between PR III and PR IV was the drop in household heads reporting that their residencies are wetter, dropping from 75 to 45 per cent. This may be because the PR III survey was undertaken in the rainy season while data for PR IV were collected in the dry season.

**Recommendations:** Climate considerations should get additional emphasis, especially thermal comfort and rainwater seepage. A field study may be conducted to identify the problems in the existing housing units so that these could be corrected in future. The designs should include site planning at plot level showing a) Tying Boat to tree stump or to bury in mud, b) Fishing nets to put in a bag and tie it to a tree stump c) Power tiller to tie to the house or tree stump or to put in granary, d) Generator to put in granary e) Kitchen utensils to put in a bag and hang in a tree or to put in a box or cupboard f) space for keeping valuables.

### 2.3 To what extent have the shelter designs been improved over earlier designs

#### Flexibility- transformation

Expandability of the houses is an important issue. The objective was that a core house design of 160 sqft will have the flexibility of expanding up to 320 sft.

**Challenges/ Gaps:** Save a few, Architectural drawings received so far do not show adequate details- neither the expandability is clear from the given drawings. The issue of expandability should be supplemented with adequate detail for the community and local carpenters so that they can transform the houses on their own.

**Recommendations:** Use drawings in the manuals to show how the shelters can be expanded in future up to 320 sft. Adequate alternative options should be provided. Dos and don'ts of housing transformation should be included in the manuals.

#### Local specificity

A few documents stated that one-design fitting in all circumstances may not be appropriate. It will be sustainable to provide flexible solutions (materials, size, design, urban, rural) for a variety of circumstances upholding minimum standards. It was also stated that the intervention should provide shelter solutions that are culturally appropriate and respectful of the environment and natural resources. Community-based approaches by involving the affected people in the design and implementation of shelters will ensure local specificity leading to socio-culturally acceptable built environment.

**Recommendations:** Building Resource Mapping exercise is suggested for the geo-climatically different zones of Myanmar. Resource mapping will start at the national level and will go through the township down to village level. From the national level the zone information and multi-hazard maps may be collected. At village level, Local roads, human and material resources, institutes, electricity

situation, anything related to building construction, livelihood, environment, etc. should be recorded. Participatory Vulnerability assessment could be conducted to map area specific vulnerabilities. All these will lead to area specific designs, technologies and implementation.

#### Disability friendliness

According to the documents supplied, adequate evidence was not found regarding disability friendly design.

**Cyclone Shelter:** A competition design for Cyclone resistant house and community cyclone shelters was convened housing, community shelter- 1 for 100, 250 and one for 500 occupants

### 2.4 Technologies

#### Materials

**Local materials:** According to the documents, a) MESC agencies were committed to maximise the use of salvaged and local/indigenous materials from sustainable and legally certified sources, wherever possible b) Debris from the cyclone and waste materials derived from dilapidated emergency material were supposed to be addressed c) It was also agreed to use the locally available roofing material to allow low cost and sustainable maintenance in the future. While doing so it was to be ensured that the provision of materials (wood, bamboo etc.) was procured through certified legal and sustainable forested areas, or from materials no longer productive due to damage from the cyclone. While doing that one should compare them with the availability and prices of materials in the local market.

As most of the Delta houses are on stilts, the provision for durable flooring material is required. However in order to meet limited financial affordability the flooring material should have been locally available such as split bamboo. Affected communities had limited access to raw materials such as bamboo, timber and thatch which was supposed to be addressed through logistics support or the donation of construction materials.

**Achievements:** For a range of reasons it was decided that tarpaulins would not be the best or most acceptable response and therefore a number of agencies pursued other 'emergency/ traditional' roofing material options. This exercise has been quite successful although temporary in most cases.

**Recommendations:** It may be assumed that the actions suggested in the first two paragraphs of this section have been implemented. However, there was no comprehensive document on what had happened in reality. However, one has to check whether it is too late for a field research. It is strongly recommended that there should be a mechanism in place which will document, how much of materials were a) reused, b) procured and transported within Myanmar, c) imported for any future emergency situations.

Issues such as corrosion of steel in the coastal belt is important and the necessary precautions should be taken. Detrimental Chloride and Sulphate actions on steel and cement and most importantly the curing water in the coast will reduce the durability of buildings, if not taken care of.

The Cyclone Shelters were mostly RCC based systems

## Structural

One of the targets of post NARGIS construction was to help the affected communities to re-establish their traditional ways of sheltering with improved safety incorporating DRR construction techniques. This is highly challenging since the professional engineers and the architects are trained predominantly for RCC and steel based structures. Retrofitting of the traditional and modern structures is another area of challenge.

Right after NARGIS, meagre resources caused significant shift to smaller bamboo houses- generally less stable with shorter life. This had posed an additional problem of structural safety of the people. Shelter (in Delta) should withstand at least 80 mph wind and 6.5 Richter Scale or Seismic Factor 0.15. There is a need for indigenous building systems to withstand 80 MPH wind speed and flooding. For flood resistance, the recommended minimum plinth height is 1 meter above the normal high tide level of that particular area. This could be done only if there is a local level flood/ tidal wave map.

47% (PR IV) of surveyed HHs said that safe shelter was available within 0.5 mile from their dwellings (46% PR II, 40% PR III). This included private homes which may be available to some but not all members of a community. Others most frequently mentioned as safe were monasteries, churches, mosques, schools, and other public buildings. The degree to which these structures have incorporated safe shelter features was not assessed. *This tends to suggest that it may be sustainable to retrofit such community identified safe abodes. This could be highly sustainable owing to ownership of the building ensuring periodic maintenance to keep the buildings safe.*

An overall goal of the Shelter Cluster was to advocate for 'Build Back Better' and 'Build Back Safer' including DRR features incorporated in new shelters and to maintain standards such as SPHERE. There was often strong opposition from some donors who felt that the cluster was advocating for standards that were 'too high'. However the cluster stuck to principles and strongly argued that \$800 - \$1,000 for a shelter cannot be 'above standard'. According to the documents, only a small percentage of the intervention took the opportunity to Build Back Better due to lack of adequate money. The sources further explain that (in crude terms) where agencies have spent in excess of about US\$600 and have tried to incorporate DRR features, the shelters are stronger than what existed pre-Nargis.

Many housing units appear to be owner or user-built or built by local craftsmen. In Myanmar, construction of a house is often a collaborative effort within the village and several households work together to build any household's shelter. The most commonly used construction technology is based on traditional knowledge and skills, which is not always disaster safe. In its field visits, one of the assessment teams observed the existence of a fair knowledge of construction with wood, thatch materials, bamboo. However, quite often the appropriate construction techniques for joints of wooden poles and beams were not properly applied for both traditional and modern houses. Steel reinforcing, bolts, grooved joints, etc., were rarely used. In many cases, the components were simply nailed or fastened in a rudimentary manner. Few roofs, whether thatched or covered with corrugated/galvanized iron or zinc sheets, appeared to have had proper cyclone-safety such as nailed-on braces or traction resistant nails.

**Challenges/ gaps:** It must be stressed that dwellings were rebuilt to pre-Cyclone Nargis conditions and not to standards that would protect household members from another cyclone. Only 1% the

surveyed HHs in PR IV lived in a dwelling that had severe winds and storms safety features such as a) built on raised ground, b) at least 2.5 feet deep foundation, c) wind bracing roof trusses d) diagonal wind bracing walls

Fully repaired dwellings were less likely to have wind bracing roof trusses, deep foundations, etc. On a range of other building standards there was no safety difference between dwellings fully repaired and those which were not excepting that 45% (PR IV) of the fully repaired dwellings had wind breaks using trees or other plants.

Myanmar's first building code was published in 1947 by the Rangoon Trust, and revised as a national code in 1991 by Ministry of Border Areas and National Races Development. It is not known how easily accessible this document is or what the monitoring or enforcement mechanisms are at this time. It appears that some basic design standards and building codes are not widely known or available. No structural design calculations examining the structural safety against wind, earthquake, etc. have been received so far. There was no standardisation on the building life of the permanent shelters.

**Recommendations:** Architectural and engineering institutes to include traditional technologies and retrofitting of the traditional and modern structures are the syllabi. There is a need for indigenous building systems to withstand 80 MPH wind speed. Uniformity in building life of the housing units and cyclone shelters is needed. It is important to establish the cost of buildings based on minimum standards and DRR features and accept that as a standard. Make arrangements to ensure that the local craftsmen acquire knowledge on cyclone safe elements such as joints of wooden poles and beams, Steel reinforcing, bolts, grooved joints, etc.,

Ensure that the buildings have a) raised ground, b) at least 2.5 feet deep foundation, c) wind bracing roof trusses d) diagonal wind bracing walls. Update Myanmar's building codes and make sure that the basic design standards and building codes are widely known and available. From the recent reports (CSWG) it is apparent that the code revision process is going to start soon.

Specialist teams need to train a cadre of people for rapid visual screening to identify retrofitting requirements of shelters and the potential cyclone shelters such as schools, monasteries, etc. Teams of specialists should review the safety of the reconstructed buildings, especially where materials and fittings are being reused in the repairs of such structures. Communicate this with the community through posters, handouts, etc.

**Cyclone Shelter:** One of the presentations (MES - UN-HABITAT PPT) informed that the cyclone shelters had the features such as a) Flood safety -58%, b) Wind safety - 5%, c) Flood and wind safety -4%, d) Earthquake, wind and flood safety 33%. It is important to note that structural safety measures should be for all the possible disasters at a location as per the national building code and part achievement in this regard will not help.

**Table 3.8: Summary: Design**

Key issues/ Criteria	Sub-attributes/ Criteria	Observations/ Issues	Recommendations
2.0 Design			
	2.1 Research and Consultation:	<p>From the given documents it was not clear as to what extent the design went through research and consultative process. Retrofitting of the existing buildings is a poor component of the intervention.</p> <p>Cyclone shelter designs involved consultants and there were design competitions. Cyclone shelter design under UNDP carried out community consultation for design.</p>	<ul style="list-style-type: none"> <li>Research on the retrofitting processes to be emphasized. An example based hand-book on retrofitting may be suggested.</li> <li>A research could be conducted to understand the traditional shelters and device appropriate retrofitting measures for future resilience against cyclone and other disasters</li> </ul>
	2.2 Architectural design	<p>In some cases the TWIGs' area standard was not maintained.</p> <p>In PR IV, many of surveyed HH heads stated that their residencies are hotter, wetter and were more crowded now compared to pre-Cyclone Nargis.</p> <p>In some villages the communities are aware how to a) Tie Boat to tree stump or to bury in mud, b) Fishing nets to put in a bag and tie it to a tree stump c) Power tiller to tie to the house or tree stump or to put in granary, d) Generator to put in granary e) Kitchen utensils to put in a bag and hang in a tree or to put in a box or cupboard f) space for keeping valuables.</p>	<ul style="list-style-type: none"> <li>A snapshot survey to know why the area standard was not complied with</li> <li>New designs to consider pattern of spaces of traditional shelters</li> <li>Climate considerations should get additional emphasis, especially the rainwater seepage and thermal comfort.</li> <li>The designs should provide space requirements and show the safe locations for the items "a" to "e" in the column on left</li> </ul>
	2.3. To what extent have the shelter designs been improved over earlier designs	<p>There was no information on how the new designs are superior to the traditional designs</p> <p>Save a few, Architectural drawings received so far do not show adequate details- neither the expandability is clear from the given drawings.</p> <p>Needs flexible solutions for a variety of circumstances that are culturally appropriate and respectful of the environment</p> <p>According to the documents supplied, adequate evidence was not found regarding disability friendly design.</p>	<ul style="list-style-type: none"> <li>Use drawings in the manuals to show how the shelters can be expanded in future up to 320 sft. Adequate alternative options should be provided.</li> <li>Dos and don'ts of housing transformation should be included in the manuals.</li> <li>Building Resource Mapping exercise is suggested for the geo-climatically different zones of Myanmar</li> </ul>

		<p>Cyclone Shelter: A competition design for Cyclone resistant house and community cyclone shelters was convened housing, community shelter- 1 for 100, 250 and one for 500 occupants.</p> <p>Virtually no further information was available in this regard</p>	
	2.4 Technologies	<p><b>MATERIALS</b></p> <p>There was a plan to maximise the use of salvaged and local/indigenous materials, debris from the cyclone and waste materials- there was no documentation on this.</p> <p>The Cyclone Shelters were mostly RCC based systems</p>	<ul style="list-style-type: none"> <li>A mechanism to be in place to document any future emergencies which will include, how much of materials were a) reused, b) procured and transported within Myanmar, c) imported.</li> <li>Feasible solutions to Chloride, Sulphate action and saline water should be ensured</li> </ul>
		<p><b>STRUCTURAL</b></p> <p>Often strong opposition from some donors who felt the cluster was advocating for standards that were 'too high'. Cluster strongly opposed that. Agencies spent in excess of about US\$600 and have DRR features</p> <p>Small percentage of the intervention could take the opportunity to Build Back Better due to fund constraint</p> <p>field assessment teams observed inappropriate construction techniques for joints of wooden poles and beams in traditional and modern houses.</p> <p>1% of the surveyed HHs in PR IV lived in a dwelling that had severe winds and storms safety features. Fully repaired dwellings were less likely to have wind bracing roof trusses, deep foundations, etc.</p> <p>Myanmar's first building code published in 1947 and revised as a national code in 1991. Appears that it is not widely known or available.</p> <p>No structural design calculations received so far.</p> <p>There was no standardisation on the building life of the permanent shelters.</p> <p>Cyclone Shelter had the features such as a) Flood safety -58%, b) Wind safety - 5% Flood and wind safety -4%, d) Earthquake, wind and flood safety 33%.</p>	<ul style="list-style-type: none"> <li>Indigenous building systems to withstand 80 MPH wind speed and flooding</li> <li>Retrofitting of the traditional and modern structures is another area of challenge. Retrofitting need assessment of Monastery, etc. through RVS</li> <li>Architectural and engineering institutes to include traditional technologies and retrofitting of the traditional and modern structures are the syllabi.</li> <li>Make arrangements to ensure that the local craftsmen acquire knowledge on cyclone safe elements such as joints of wooden poles and beams, Steel reinforcing, bolts, grooved joints, etc.,</li> <li>Update Myanmar's building codes and ensure they are widely known and available.</li> <li>Communicate importance of retrofitting through posters, handouts, etc</li> <li>Ensure that the area specific structural safety requirements are achieved according to the codes.</li> </ul>

### 3.0 IMPLEMENTATION

**Objective:** The programme to demonstrate a delivery mechanism with an effective construction, supervision and feedback system for its construction

The sub criteria under implementation are as follows:

- Effectiveness of the system including its flexibility
- Feedback monitoring and review mechanisms
- Transparency
- Technical Support/ In-House Engineering Cell/ Supervision
- Planning, scheduling
- Fund flow

#### 3.1 Effectiveness of the system including its flexibility

From the documents it appears that many housing units were rebuilt by the communities. While some agencies built the houses for the community, the others were owner built. However, the documents did not provide a clear picture on the different delivery mechanisms adopted in the post NARGIS reconstruction.

**Recommendations:** Efficiencies of the different mechanisms adopted for delivery of the housing units to be examined to understand their suitability. This will not only be useful for emergency, the delivery of housing in the normal situation could greatly benefit from the study.

#### Community Participation

The documents suggested that community based implementation could be the most effective construction procurement model to achieve appropriate quality of shelter. A well designed community mobilization and home owner driven-approach results in more women engaging and taking leadership roles. In addition to this, there is a wide range of other benefits of this over contractor driven shelter provision. Some agencies used a self-help option with technical support brought in from outside of family.

**Challenges/ gaps:** The issue is how much the communities, the local NGOs, carpenters and masons have learnt from this to create future resilient shelters. A field study in this regard will be important to employ similar approaches in future.

**Cyclone Shelter:** The cyclone shelters were contractor based. There was no information in the documents on whether there was consultation with the affected families prior to construction. At least in one case there was a detailed community participation in design and location of the cyclone shelters in Pyin Salu, Magu 1, Pyin Bo Gui.

### 3.2 Feedback monitoring and review mechanisms

By August 2008 there were around 40 agencies engaged in shelter provision and less than 10 of them had significant experience or capacity to scale-up. This is a very important issue since one of the major outputs of the interventions was to develop capacity within the country so that there is greater preparedness to combat the future disasters. There is a need for investigating as to why this did not happen with the 30 agencies. The investigation should try to acquire from the experience of the successful agencies. Based on the study, a future line of action can be drawn to enhance the overall capacity of the agencies.

#### 3.3 Transparency

The documents did not provide clear information in this regard.

#### 3.4 Technical Support/ In-House Engineering Cell/ Supervision

The documents did not provide clear information in this regard.

#### 3.5 Planning, scheduling

The documents did not provide adequate information in this regard. Some of the documents informed that sequencing and prioritization of shelter assistance must account for seasonality. Reconstruction was slowed during the monsoon from May through October- this has direct and indirect effect on cost.

#### 3.6 Fund flow

The documents did not provide any information in this regard.

Table 3.9: Summary: Implementation

Key issues/ Criteria	Sub-attributes/ Criteria	Observations/ Issues	Recommendations
3.0 Implementation			
	3.1 Effectiveness of the system including its flexibility	Documents did not provide a clear picture on the efficiencies of different delivery mechanisms adopted in the post NARGIS reconstruction. It was suggested that community based implementation is effective construction procurement model to achieve appropriate quality of shelter. Some agencies used a self-help option with technical support brought in from outside of family. Not clear how much the communities, the local NGOs, carpenters and masons have learnt from this.	<ul style="list-style-type: none"> <li>• Efficiencies of the different mechanisms adopted for delivery of the housing units should be examined to understand their suitability.</li> <li>• A field study on community based system to be carried out</li> </ul>



		The cyclone shelters were contractor based. There was no information in the documents on whether there was consultation with the affected families prior to construction.	
	3.2 Feedback monitoring and review mechanisms	Of 40 agencies engaged in shelter provision less than 10 of these had significant experience or capacity to scale-up.	• There is a need for investigating as to why did this happen. The investigation should try to acquire from the experience of the successful agencies
	3.3 Transparency	The documents did not provide any clear information in this regard.	• Recommendations could not be put forward
	3.4 Technical Support/ In-House Engineering Cell/ Supervision	The documents did not provide any clear information in this regard.	• Recommendations could not be put forward
	3.5 Planning, scheduling	The documents did not provide adequate information in this regard. Some of the documents informed that sequencing and prioritization of shelter assistance must account for seasonality.	• Recommendations could not be put forward
	3.6 Fund flow	The documents did not provide any information in this regard	• Recommendations could not be put forward

#### 4.0 QUALITY OF CONSTRUCTION

**Objective:** The programme to demonstrate high quality shelters through appropriate quality management

##### 4.1 What has been the overall quality of construction under the present intervention?

This component of the intervention appears to be inadequate. The documents are silent about the mechanism of quality control. It has been reported that out of the 750,000 affected families, almost 60% or 444,000 have rebuilt shelter without formal support from the state or other agencies. The most important issue is that the quality of that rebuilding is unclear and there is a strong fear that a considerable number of these shelters are significantly weaker than the shelter lived in prior to Nargis.

**Recommendations:** In all future interventions quality control mechanism must be in place. Quality control starts right from the design stage down to building completion and maintenance. Unless quality is ensured, the spatial quality will be low, frequency and cost of maintenance will be high and most importantly building life will reduce making the interventions un-sustainable.

**Cyclone Shelter:** The documents did not provide any information in this regard.

Table 3.10: Summary: Quality Of Construction

Key issues/ Criteria	Sub-attributes/ Criteria	Observations/ Issues	Recommendations
4.0 Quality of Construction			
	4.1 What has been the overall quality of construction under the present intervention?	<p>This is a weak component (as per documents)</p> <p>Quality of the rebuilding is unclear and there is a strong fear that a considerable number of these shelters are significantly weaker than the shelter lived in prior to Nargis.</p> <p>Cyclone Shelter: The documents did not provide any information in this regard.</p>	<ul style="list-style-type: none"> <li>• In all future interventions quality control mechanism must be in place</li> <li>• Emphasis is needed on this to enhance the life cycle cost and reduce maintenance cost</li> </ul>

#### 5.0 COST

**Objective:** Is to achieve cost effective shelter and cyclone shelters with minimum life cycle costs

##### 5.1 Any conscious attempt to reduce the costs? Was it successful?

According to the documents, salvaged materials were planned to be used in reconstruction and the emphasis would be on local materials and technologies. However, how was it done and where was it done are not clear from the documents.

**Recommendation:** Cost and durability are interdependent. It is important to recognise that the cost of a unit be based on TWIGs standards. The reference will be the cost of conventional construction. Based on that, the different options could be explored based on building resource mapping exercise to identify the technologies which are cost effective, labour intensive and least damaging to the environment. An in-depth research in this regard is highly recommended.

##### 5.2 What has been the cost?

Proposed financial assistance was supposed to cover building cost of the core unit. Using local prices, cost of disaster-resistant core unit (26 sqm) was around K 600,000, assuming 10% of salvageable material from the debris. This was triangulated against local prices in affected areas during field visits, and benchmarks for material and construction costs in neighbouring countries.

It was decided that the material purchase decisions in support of housing will be carefully made to avoid inflating or depressing local markets. However, it was unanimously agreed in TWIG that the cost of construction should not be lower than US\$2 per sqft. The technical Working Groups established clear standards for a shelter of approximate 160sq ft to 200sq ft which should have costed around US\$700. The mean repair cost was decided to be US\$168 with a minimum of US\$16. However, different agencies incurred different costs during implementation which is as follows.

- ◆ UN-HABITAT trained carpenters (on DRR) and village committee members built demonstration shelters (US\$900)
- ◆ UN-HABITAT Shelter option 1 (240 sqft) 350,000 kyat, option 2 (255 sqft) 347,500 kyat, option 3 (255 sqft) 420,500 kyat
- ◆ Solidarities shelters to last 1-2 years (US\$350)
- ◆ ACTED and NRC (cost US\$900 – \$1200)
- ◆ IFRC allocates up to 350,000 Kyat (US\$350) for house repairs/reconstruction
- ◆ Myanmar Business Coalition constructed high quality houses (US\$2500)
- ◆ Meta Development Foundation high quality houses (US\$500-\$2,400)
- ◆ REAM-Design: Life span: 2 years, Plinth area: 156 sqft, Cost: USD 2 / sqft

**Challenges/ gaps:** It is evident from the above discussion that there has been a wide variation in cost of new construction due to different agencies adopting different standards.

**Recommendations:** It is important to understand under what circumstances, agencies adopted different standards and costs with respect to TWIGs and whether these variations were adequately explained.

Based on International experience, a minimum of 10 years life span may be suggested for the transition shelters, which will provide adequate time for the people to upgrade/acquire permanent structure (50 years life). The cost of a building based on the safety features is to be determined. Based on durability and structural safety options for a) foundation, b) walling, c) roofing d) finishes could be determined. After conducting a building resource mapping, a list of feasible technologies which are cost effective, labour intensive and environment friendly could be prepared. All the technologies listed should be examined against the minimum durability and safety criteria to create a bank of feasible technologies in a particular zone of Myanmar. Availability of the required materials and skills for cyclone safety features such as appropriate anchorage, bracing, connections, etc. should be ensured at local level. Clearly this will require a huge funding which can be achieved in a phased manner prioritizing the most deserving ones.

**Cyclone Shelter:** The documents did not clearly provide information on this.

### 5.3 Use of Disaster-Safe Cost Effective Construction Technologies

The documents did not clearly provide information on this.

Table 3.11: Summary: Cost

Key issues/ Criteria	Sub-attributes/ Criteria	Observations/ Issues	Recommendations
5.0 Cost			
	5.1 Any conscious attempt to reduce the costs? Was it successful?	Planned to use salvaged and local materials in reconstruction. Not clear how this was done  Cost of a unit to be based on TWIGs standards. The reference should be the cost of conventional construction.	• Different options to be explored based on building resource mapping to identify technologies which are cost effective, labour intensive and least damaging to the environment. An in-depth research is highly recommended
	5.2 What has been the cost?	It was unanimously agreed in TWIG that the cost of construction should not be lower than USD 2 per sqft.  As per TWIGs shelter of approximate 160sq ft to 200sq ft should cost around US\$700, mean repair cost 16 to 168 USD Different agencies incurred widely different costs of new construction due to different standards and ground conditions not reflected in the documents.  Cyclone Shelter: The documents did not clearly provide information on this.	• It is important to understand under what circumstances, agencies adopted different standards and costs with respect to TWIGs and whether these variations were adequately explained  • 350 USD 2,500 USD was the range of cost- calculate what is the most reasonable one
	5.3 Use of Disaster-Safe Cost Effective Construction Technologies:	The documents did not clearly provide information on this.	• Recommendations could not be put forward

### 6.0 CAPACITY BUILDING

**Objective:** a) well designed capacity/awareness building programme (DRR) for construction workers, communities and administrative staff b) Creating a cadre of master trainers c) certification mechanism, d) sustainable institutional system for continuous support to capacity building

#### 6.1 Is the capacity building programme satisfactory?

Technical assistance and training is vital. Post-disaster reconstruction focused on BBB (Build Back Better) and BBS (Build Back Safer) with DRR features. The documents stated that there is need for training of local artisans (carpenters, masons, etc.) and local builders in DRR construction, damage assessment and safe house location. Hands-on training to construction workers on simple

application for safer housing and infrastructure were urgently needed. A separate detailed guidance note was to be prepared to incorporate structure joints details, bracings and other cyclone/high speed wind resistant measures; construction materials, hazard resistant design and construction techniques for different communities.

Capacity building of local communities is vital for successful implementation. This capacity building can be in all forms: logistics, project management, working together to moderate material prices. It will enable households to re-establish adequate shelters and include the improvement or strengthening of indigenous construction methods. For self-repaired or built shelters, support was to be provided to retrofit or build new shelters. Early recovery interventions were to include skill development programmes to ensure improved construction and maintenance. The focus was on increasing the capacity of HHs and local tradesmen to build and maintain safer and improved houses. One document mentioned that these activities may be anchored on local facilities and networks (resource centres) to ensure that safe building practices are integrated to the long term knowledge base of the area. It is very important to enhance awareness and capacity of the Authorities on need, importance and application of mainstreaming DRR.

**Achievements:** Over 1,000 skill carpenters were trained for ToT and more than 5,100 carpenters were trained to construct household shelters incorporating disaster risks reduction measures. Disaster preparedness training was imparted to over 500 village shelter committees. Manuals have been developed for the community, carpenter, etc. UN-HABITAT has developed DRR training programmes for carpenters and village committee members.

**Challenges/gaps:** According to one of the documents, capacity and knowledge of DRR safe practises and local materials are lacking at field level. As mentioned before, one assessment team reported that appropriate construction techniques for joints of wooden poles and beams are often not properly applied for both traditional and modern houses. The most important issue is how to make sure that they are safe against a wind of 80 MPH. There should be an emphasis on retrofitting.

**Recommendations:** While there is achievement in capacity building, its sustainability is a challenge. Training, awareness and capacity building may be facilitated by local level Building Resource Centres (BRC) in a sustainable manner. A network of BRCs will ensure safe building practices at local levels. BRCs will cater to a) production and storage of cost effective materials and technologies, b) construction skill development training (with certification), c) multi skilled people for maintenance and retrofitting d) consultancy and support for new construction, d) maintenance booth to support local maintenance needs.

To facilitate BRCs there is a need for institutional system headed by the concerned Ministry and by networking with Universities and international institutes. This will also include competency examinations and certifications. In many developed and developing countries this model has worked well, e.g. National Vocational Qualification in UK, Training institutes in South Africa, etc.

While many TOTs have been conducted and many people have been trained, there is a need for assessing the training demand to cater to the local needs. A computerised tracking system should be in place to find out the trained resources when needed.

There should be an emphasis on retrofitting. An example based illustrated book on retrofitting by showing a collection of implemented good examples is required.

Table 3.12: Summary: Capacity Building

Key issues/ Criteria	Sub-attributes/ Criteria	Observations/ Issues	Recommendations
6.0 CAPACITY BUILDING			
	6.1 Is the capacity building programme satisfactory?	Capacity building of local communities is vital for successful implementation. This capacity building can be in all forms: logistics, project management, working together to moderate material prices. These activities may be anchored on local facilities and networks (resource centres) to ensure that safe building practices are integrated to the long term knowledge base of the area.  Need for enhancing awareness and capacity of the Authorities on need, importance and application of mainstreaming DRR.  As per document, capacity and knowledge of DRR safe practises and local materials are lacking at field level  There should be an emphasis on retrofitting.	• Different options to be explored based on building resource mapping to identify technologies which are cost effective, labour intensive and least damaging to the environment. An in-depth research is highly recommended

## 7.0 MAINTENANCE

**Objective:** Sustainable maintenance mechanism to make sure that the buildings provide high quality space during its whole life that is affordable

### 7.1 To what extent has maintenance of building been considered during the planning, design and implementation process?

For any developing country, maintenance has been a major issue. From the given documents, maintenance preparedness for shelters in terms of capacity, funding and awareness was not clear.

**Recommendations:** It should be noted that quality of construction will largely determine the maintenance requirements of a shelter and hence, this issue needs special attention. It will be sustainable for the government to create an enabling environment so that people are encouraged to maintain their buildings on a regular basis. As mentioned in the previous section, a maintenance booth and BRC will be a sustainable way of addressing this issue. Adequate and affordable training on multi-skill for maintenance (minor masonry + electrician's + plumber's skills) will be a key to the success.

**Cyclone shelter:** According to a document there is a plan for regular maintenance work of the cyclone shelters. However, there was no detail in this regard.

**Recommendations:** Ownership, regular use of the spaces and periodic inspection and routine maintenance system must be ensured. Funding is crucial in this respect. The BRC- based system suggested above is applicable for the cyclone shelters as well.

Table 3.13: Summary: Maintenance

Key issues/ Criteria	Sub-attributes/ Criteria	Observations/ Issues	Recommendations
7.0 Maintenance			
	7.1 To what extent has maintenance of building been considered during the planning, design and implementation process?	<p>As with developing countries, maintenance appears to a major issue in Myanmar as well. From the given documents, maintenance preparedness for shelters in terms of capacity, funding and awareness was not clear.</p> <p>Cyclone shelter: According to a document there is a plan for regular maintenance work of the cyclone shelters. However, there was no detail in this regard.</p>	<ul style="list-style-type: none"> <li>• Government to create an enabling environment so that people are encouraged to maintain their buildings on a regular basis.</li> <li>• Use media</li> <li>• Incentives for maintenance</li> <li>• Maintenance booth in BRC</li> <li>• Adequate and affordable training on multi-skill for maintenance (minor masonry + electrician's + plumber's skills) will be a key to the success</li> <li>• Attitudinal change – viewing maintenance as an opportunity than a liability</li> <li>• Cyclone shelter- ownership, regular use of the spaces and periodic inspection and routine maintenance system must be ensured. Funding is crucial in this respect.</li> </ul>

## 8.0 WATER, SANITATION AND ELECTRICITY

**Objective:** Shelter needs basic services and energy. Out of these, drinking water of acceptable quality and adequate quantity and safe sanitation system are the most crucial ones and fundamental human rights.

### 8.1 Are the shelters provided with basic facilities and amenities?

**Drinking water facility:** Nargis had damaged many HH rainwater harvesting systems. Storm surge and flooding following cyclone caused salination of many community ponds. This has led to drastic shift in primary sources of water from ponds to rain water tanks. The immediate humanitarian needs are rehabilitation of communal rain-water ponds, rehabilitation and restoration of HH rain-water harvesting systems, rehabilitation of tube wells/hand-pumps.

**Water and Sanitation:** It was agreed to provide household rainwater harvesting system and latrine within 5 meters radius from the core house. To strengthen rainwater harvesting from the roof it was suggested to use water tight and durable material. About 1.8 million severely affected people are in need of improved water supply. Initial recovery activities were to enable families to reacquire earthen pots to harvest rainwater, the dominant source of clean drinking water.

**Achievements:** PR IV findings indicated that the HHs using improved drinking water sources in rainy season have increased to 72% from around 66% in PR II and PR III. Agrarian society dependent on rainy season must have an ability to store water. The average water storage capacity has increased from 94 gallons (PRII) to 111 Gallons in PR IV. The PR IV survey showed that 98% of the 893 households owning animals had enough drinking water for their animals. This is a sign that households did not have a problem storing water.

**Challenges/ Gaps:** Over 40% of surveyed HHs had a protected water source within their compound, while 56% accessed a nearby unprotected well, a public tap, a tube well, spring, pond, dug well or a standpipe. Adequately treated water has increased over the years having the highest of 76% HHs in PR IV. However, this was low among HH headed by disabled person, and HHs that did not own land.

In rainy season 35% of HH surveyed (PRIII) had 3 or more litres drinking water per member per day which is adequate as per SPHERE standard (2.5–3 litres per day per person). In dry seasons, adequacy of drinking water fell to 15% (PR III). Use of improved drinking water sources in dry season has increased to 20% (PRIV) from around 15% in both PR II and III. In the dry season, many households switch to unimproved water sources, particularly surface water with the risk of contamination or increased salination resulting from the Cyclone Nargis deluge of seawater and the more recent storm surges caused by typhoons. In PR IV, the average travel time to fetch water and return home during the dry season is 27 minutes, which is 6 minutes in rainy season. This has a bearing on family members, particularly females who traditionally are responsible for this task

A majority of households have access to either safe water sources or are effectively treating water before use except in an area south of Yangon. The dry season results in less reliance on rainwater and an increased exposure to less safe water from ponds and surface water, much of which remains salinated. Some villages (surveyed) still do not have enough drinking water and they fetch it from nearby villages. Pan Phu village (Community discussion group) mentions “To build a tank for drinking water” as a key priority

**Recommendations:** The first and foremost action is to set the required standard (quality) of drinking water. Following that and the SPHERE standard, there is a need for nation-wide comprehensive plan to supply similar standard of water to every HHs. This should be on a phased manner. While revitalising the traditional system of water collection and storage is important, they must meet the international standards on quality. The concept of community tank for rainwater storage may be encouraged.

According to CNN.com (accessed 19th Nov 2010) a new study revealed that Myanmar's cyclone-devastated Irrawaddy delta face high risks of arsenic contamination in groundwater that could cause cancer and other diseases. An in-depth study in this respect is of top most importance. There should be periodic quality check for Arsenic contamination.

## Toilet facility

Toilets (latrines) in rural areas are normally separate outdoor shacks, and washing facilities are generally planks or stairs leading to the river. In urban areas, households use septic tanks with two chamber soak pits. Most latrines that existed prior to the cyclone have collapsed or are now unsafe for use due to flooding. Open defecation has increased, and unsafe excreta disposal with direct drop latrines, without pits, is common. The proportion of households practicing unsanitary defecation – open defecation, floating latrines or trenches – almost doubled to 40%.

**Achievement:** 19% of surveyed HHs reported having received latrine construction materials, similar to that reported in PR III

**Challenges:** The low use of improved sanitation in some areas possibly reflects the constrained access, which the aid agencies experienced in supplying the materials needed to improve sanitation facilities due to transportation challenges and clearance procedures. Of the surveyed HHs in PR IV, 44% reported using improved sanitation facilities (43% in PR II and III). Although 26% of the surveyed HHs used a pit latrine, they are shared facilities with other HH and hence, be classified as unimproved. Progress has been made in improving sanitation facilities since the PONJA report was issued, however, much remains to be done to address sanitation and toilet facility.

45% of the surveyed HHs in PR IV reported that they properly dispose of solid waste (27% in PR III, 16% in PR II). The most common method practised in PR IV was burning of waste. The next most common method practised in PR IV was throwing solid waste into a river at the risk of polluting local water supplies as well as affecting communities downstream.

**Recommendations:** Affordable toilet of adequate standard is a great challenge in most of the developing country and Myanmar suffers from similar problem. As defined in the PR, improved facilities are the pour-flush toilets or latrines that are connected to a sewer, a septic tank or a pit; ventilated improved pit latrines; pit latrines with a slab or platform cover; and composting toilets or latrines. Adequate funding and technical assistance will be required in this respect. A non-networked system should be developed to cater to the needs of villages which are isolated. Recycling of the solid waste and its management is of paramount importance. There is an immediate need for funding a research in this respect.

**Electricity:** Documents did not report anything in this regard

Table 3.14: Summary: Water, Sanitation And Electricity

Key issues/ Criteria	Sub-attributes/ Criteria	Observations/ Issues	Recommendations
8.0 Water, Sanitation And Electricity			
	8.1 Are the shelters provided with basic facilities and amenities?	<p><b>Drinking water facility</b></p> <p>Over 40% of surveyed HHs had a protected water source within their compound, while 56% accessed a nearby unprotected well, a public tap, a tube well, spring, pond, dug well or a standpipe.</p> <p>Adequately treated water has increased over the years. However, this was low among HH headed by disabled person, and HHs that did not own land.</p> <p>SPHERE standard for drinking water is achieved however, quality issues need attention.</p> <p>dry season results in less reliance on rain-water and an increased exposure to less safe water from ponds and surface water.</p> <p>Myanmar's cyclone-devastated Irrawaddy delta face high risks of arsenic contamination in groundwater.</p>	<ul style="list-style-type: none"> <li>• Need for national-wise comprehensive plan to supply similar standard of water to every HHs in a phased manner.</li> <li>• Revitalising the traditional system of water collection and storage is important, keeping international standard on quality.</li> <li>• The cost of community tank for rain-water storage may be worked out to arrange fund for that</li> <li>• There should be periodic quality check for Arsenic contamination</li> </ul>
		<p>Toilet facility</p> <p>Most latrines existed before NARGIS have collapsed or are now unsafe for use. Open defecation has increased, and unsafe excreta disposal with direct drop latrines, without pits, is common.</p> <p>Low use of improved sanitation in some areas possibly reflects the constrained access aid agencies experience in supplying the materials needed to improve sanitation facilities due to transportation challenges and clearance procedures.</p> <p>While progress has been made in improving sanitation facilities since the PONJA report was issued, much remains to be done to address sanitary toilet facility needs</p> <p>One of the common methods was throwing solid waste into a river at the risk of polluting local water supplies as well as affecting communities downstream.</p>	<ul style="list-style-type: none"> <li>• Adequate funding and technical assistance will be required on design and implementation of toilets</li> <li>• A non-networked system should be developed to cater to the needs of villages which are isolated.</li> <li>• Recycling of the solid waste and its management is of paramount importance.</li> <li>• There is an immediate need for funding a research in this respect to identify good examples</li> <li>• Public awareness on hygiene issues is important- can be through primary education- use media</li> <li>• Government's enabling environment is important</li> </ul>



		<b>Electricity</b> Documents report anything in this regard	• Recommendations could not be put forward
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## 9.0 DOCUMENTATION, COMMUNICATION AND INFORMATION

**Objective:** Communication with the stakeholders and dissemination of good practices is absolutely necessary- this could be through drawings, manuals, workshops etc

### 9.1 What did the Agencies do for communication of ideas to the stakeholders?

#### General

According to the Shelter Working Group, fully destroyed dwellings were eligible for a full shelter (including materials, labour and transport costs amounting to US\$600). Severely destroyed dwellings are eligible for materials and transport costs, estimated at US\$200, and partially destroyed dwellings, US\$85. There was a clear need for Public Information campaigns to explain eligibility. This was essential to avoid frustration and jealousy and spreading of negative rumours.

**Challenges/ Gaps:** In general villagers have not been informed about eligibility criteria, they lack information about aid flows which could lead to feeling of inequity, and there are no complaint mechanisms in place (although there are some local checks and balances).

**Recommendations:** There is a need for systemic improvement on communication in this regard. According to the documents there is a need for greater clarity on resettlement policy, which would help those affected identify their options. Based on the statements of some of the documents it may be said that there is a need for clarity on the difference between emergency standards and ER Shelter standards among the people involved in the intervention process.

#### Drawings

Based on the drawings supplied by CSWG, Myanmar, it may be said that, save a few, they were inadequate. The emphasis should be on how to expand the shelters, joint details, bracing system and anchorage detail. Retrofitting aspects have not been covered by the drawings examined so far.

#### Manuals guidelines

It was planned that the Guidelines and capacity building programs will be implemented before Nargis recovery programs finishes. However, range of structures varied from region to region and hence, the development of precise guideline was challenging. The purpose of the manuals was to enhance awareness on basic safe construction and risk reduction techniques by disseminating through simple educational material and skill development on improved construction and maintenance.

**Achievements:** There have been manuals for the communities, carpenters, etc as well as other ITC materials.

Table 3.15: Summary: Documentation, communication and Information

Key issues/ Criteria	Sub-attributes/ Criteria	Observations/ Issues	Recommendations
9.0 Documentation, Communication And Information			
	9.1 What did the Agencies do for communication of ideas to the stakeholders?	<b>General</b> In general villagers have not been informed about eligibility criteria, they lack information about aid flows which can raise perceptions of inequity, and there are no complaint mechanisms in place (although there are some local checks and balances)	<ul style="list-style-type: none"> <li>• greater clarity on resettlement policy</li> <li>• investigation why people were not informed about eligibility how could this be eliminated for the future disasters- needs a clear strategy and mechanism with checks</li> </ul>
		<b>Drawings</b> Save a few, the drawings appear inadequate.	<ul style="list-style-type: none"> <li>• The emphasis should be on how to expand the shelters, joints details, bracing system and anchorage detail.</li> <li>• Retrofitting aspects have not been covered by the drawings examined so far</li> </ul>
		Manuals guidelines Manuals exist	<ul style="list-style-type: none"> <li>• The above recommendations are applicable here as well</li> </ul>

## 10.0 IMPACTS AND EFFECTS WITHIN INTERVENTION AREAS

**Objective:** Examining if there are positive or negative impacts of the project within the intervention areas

### 10.1 What were the effects of the program on the end-users?

#### Impact of supply

Housing programmes generate livelihood opportunities for women and direct and indirect job creation and hence, shelter provision should feature in donor livelihoods strategies. Any labour-intensive/based technologies will enhance livelihood of local people- using local building materials, skills of communities in 'building back better'. This will maximize income multiplier effect on local and regional economy.

**Recommendation:** There is a need for change in the international community's perception of shelter/housing as infrastructure supply only. Its livelihood potential should be encouraged by the donors by using local materials and skills based on improved local vernacular.

#### What are the evidences that DRR has been integrated with the programme

The longer-term housing recovery strategy is to help owners to strengthen their existing efforts to rebuild on their own land, making the traditional rural house more disaster-resistant. Another important component is to ensure that DRR and mitigation measures are integrated into emergency response plans from the beginning.



**Achievements:** According to some documents, integration of DRR into shelter sector has been one of the major achievements from the early recovery phase. The surveyed HHs were asked whether they had implemented any disaster preparedness actions towards making their house strong enough to withstand strong winds. They answered that they had arranged a) to tie up the house with guy ropes, b) to fix the roof with wooden bars, c) to strengthen the posts with wooden bars. Implementation is most satisfactory in growing trees, reinforcement of houses and storage of important things and assets. Formation of the main VDMC and task forces has been completed and compilation of village data and making mappings—social, resource and vulnerable—are judged by the villagers as useful. In overall assessment, DRR programme is effective and successful to a certain extent and villagers see it positive and participated actively in the program. Every DRR village has formulated Community-Based Disaster Preparedness Plan. Most households have plans to carry out the measures from life-saving to storage of food, water and family assets

**Challenges/ Gaps:** PR III used a score card to determine whether disaster-preparedness measures were considered during the construction of the house, which include a) building house on raised ground, b) having trees or other plants close to house to serve as a wind break, c) having shorter side of the house face direction of wind, d) using a pitched roof and ensuring that roof is water tight. Based on these, each surveyed HH was assigned a score between zero (not prepared) and 5 (good preparation). The PR IV responses indicate a preparedness score of 2.56 (PRIII-2.46, PRII-2.1). Scores remain low in some areas of the coast hit hardest by the Cyclone where many of these households have rebuilt without assistance.

Save a few, most of the DRR villages have difficulty in building life-saving mounds owing to lack of space and/or funds. Villagers see the improvement of streets in their villages as a key priority for smooth evacuation during a disaster. Currently, streets are not good during monsoon.

Since Cyclone Nargis, the GoUM and international and local organisations undertook interventions to improve disaster preparedness. Despite this, nearly three quarters (n=1,400) of HH heads reported they were not prepared for another disaster, while only 1% of them felt completely prepared. 6% stated that there was a village emergency protocol; and 3% of HHs heads reported community drills had occurred to prepare for a future emergency. The quality of these plans, protocols and drills were not assessed. Disaster risk reduction poses continuing challenges in an area subject annually to frequent storms

**Recommendations:** There are conflicting reports with regard to DRR preparedness, which could be owing to survey carried out by different agencies in different areas. However, this variation of observation needs further investigation. This is perhaps the most important challenge which needs continuous funding through a sustainable institutional system. The BRC could be a hub of such activity with a networking with apex institute at National level.

Certain solutions of preparedness should be reviewed, e.g., building mounds for safety. In Bangladesh, mounds worked well in flood due to rainfall and failed in tidal wave. During a field visit to MAGU, Myanmar the villagers reported that during NARGIS standing in the open area was impossible since raindrops felt like bullet shots on skin. Since moulds would cost a lot of money, these is a need for exploring alternatives to this in the tidal wave prone areas.

More trees should be planted to increase safety during cyclone as evident from the villagers reporting that, trees saved their lives. Survey shows that most villages have grown trees for windshield.

The evacuation drill on moving the villagers to the cyclone shelter or strong shelters is an achievement. This should be done on a regular basis. There is a need for continuous funding and institutional system (BRC) to make it sustainable.

Table 3.16: Summary: Impacts And Effects Within Intervention Areas

Key issues/ Criteria	Sub-attributes/ Criteria	Observations/ Issues	Recommendations
10.0 Impacts And Effects Within Intervention Areas			
	10.1 What were the effects of the program on the end-users?	<p><b>Impact of supply</b> Housing programmes generate livelihood opportunities for women and direct and indirect job creation.</p> <p>Labour-intensive/based technologies enhance livelihood of local people- using local building materials, skills of communities in BBB. This will enhance income multiplier effect on local and regional economy.</p>	<ul style="list-style-type: none"> <li>• Advocacy needed for the international community's to convey that shelter/housing could be an opportunity for livelihood generation</li> </ul>
		<p><b>Evidence on DRR integration with programme</b> Satisfactory in growing trees, reinforcement of houses and storage of important things and assets. As per one survey, villagers see DRR as positive and participated actively in the program.</p> <p>On an evaluation scale of 5 PR IV responses indicate a preparedness score of 2.56. Scores remain low in some areas of the coast hit hardest by the Cyclone where many of these households have rebuilt without assistance.</p> <p>Villagers see the improvement of streets in their villages as a key priority for smooth evacuation during a disaster. Currently, streets are not good during monsoon.</p> <p>Nearly three quarters (n=1,400) of HH heads reported they were not prepared for another disaster, while only 1% of them felt completely prepared.</p> <p>There are conflicting reports with regard to DRR preparedness, which could be owing to survey carried out by different sources in different areas.</p>	<ul style="list-style-type: none"> <li>• This is perhaps the most important challenge which needs continuous funding through a sustainable institutional system.</li> <li>• Evaluate the poor buildings with RVS</li> <li>• The BRC could be a hub of such activity with a networking with apex institute at National level</li> <li>• More trees should be planted to increase safety during cyclone as evident from the villagers reporting that, trees saved their lives.</li> <li>• Primary schools could be a sustainable way of continuous evaluation of the disaster situation through PVA and using teachers as ambassador and children as disseminator</li> <li>• Climate change issues to be included</li> </ul>

## 11.0 SUSTAINABILITY: ON PROGRAMME EXIT

**Objective:** To examine whether there is adequate indication that the established shelter system will continue on exit of the present programme

### 11.1 What are the spin offs of the present interventions

Dissemination of any of the programme components in the non intervention areas is viewed as an indication of sustainability. In this context it will be worth investigating if the DRR programme has directly or indirectly influenced at any level from the national to the village- from the planners down to the villagers. From the given documents this issue could be assessed.

### 11.2 Environment

#### Impact of construction

Even though a large share of the damaged and destroyed houses was to be recycled in the reconstruction effort, there would still be greater demand on natural construction materials. Consequently, the sustainable harvesting of bamboo, palm fronds and related materials, as well as the implications of using young leaves and fallen betel nut trees in the reconstruction process, should be analyzed. The agencies were supposed to be mindful of environmental impact of all activities and were to attempt to strengthen not diminish the environment. In areas with depletion of indigenous construction materials, early recovery interventions had planned to promote the planting of appropriate species and encourage sustainable harvesting techniques.

**RECOMMENDATIONS:** There is an immediate need for EIA (not received so far). The impact of RCC, brick, steel based constructions in terms of depletion of non renewable and renewable energy and emission of CO2 needs to be audited. While Myanmar is not known to be a high emitter of CO2, it will be one of the worst affected due to climate change. The energy audit will help Myanmar to do Carbon trading with the emitters. PVA may be adopted for at primary school level for developing a lifestyle change towards climate change. While the emission and embodied energy of the imported construction materials will be high, the issue of inland river transportation of construction materials also needed review to understand the present status.

### 11.3 Sustainability on programme exit

The important issue under this head is whether there are indications that on exit of this intervention, Myanmar will have a disaster resilient society without or at least with least external support from the international community.

#### Indication of ability to spend on shelter

An estimated 420,538 families built back their homes through “Self-Recovery” (especially in Yangon Division except for Kungyangon township). According to DFID study, 30% of the HHs in 5 townships had the capacity to take loan to improve house. Out of the 30%, If they took loan they would repay by a) Selling crops/fish/through wages 27.7%, b) Selling current capital assets/valuables 0.3% , c) By getting the money from a relative/ friend/ relief organisation 0.2% d) By other means 0.5%. While some of the survey reports indicate that people have some capacity to invest

on their shelter, many do not have that. Monthly family income of the surveyed HH ranges between 2.8 to US\$200 with a mean of US\$32. Spending the most of the income in 5 township (Food -89%, health-4.6%, education-4.5%, shelter- 2.3%, others and alcohol-0.1%). This indicates very limited capability of the people to spend on shelter.

#### Indication of any shelter related capacity building

PONJA reported that people have made a tremendous collaborative effort and partially rebuilt an estimated 80% of houses already. Self recovery of 20.88 to 56.35% shelters indicates that people have a tremendous capacity within themselves. DFID (2008:39) noted that people, excepting financial capability, has capacity to rebuild/repair their own houses without waiting for technical help.

While household poverty, limited external funding, and weak organizational capacities are constraining factors, other factors represent opportunities. These include the spirit of mutual support that exists within communities, existing skills, renewable local resources, and the desire of people to help each other.

**RECOMMENDATIONS:** Need for social housing for a section of the people. Care to be taken to form the basis for selecting this group otherwise it may spoil habit & create social tension.

Peoples’ technical capacity should be examined to ascertain whether they are in conformity with the structural safety and DRR requirements. This needs investigation of the self built and repaired buildings. The existing manuals and ICT materials may be reviewed to explore how the identified mistakes could be eliminated.

Peoples’ collaborative efforts could be nurtured by establishing local level BRCs and keeping room for participation of the local people. The BRCs will give opportunities to the local youths to get trained as construction supervision and construction workers and get a certificate on completion. This will not only generate domestic level employment the trained people could work in the foreign countries to bring revenue to Myanmar. There is a need for sponsorship for the training. The industries should come forward in this regard apart from assistance through the government. However, the training should not be total grant, some amount of self contribution will make the system sustainable. The BRC can be a source of employment if it could act as a production cum store of construction materials adopting innovative techniques.

Table 3.17: Summary: Sustainability

Key issues/ Criteria	Sub-attributes/ Criteria	Observations/ Issues	Recommendations
11.0 Sustainability: On Programme Exit			
	11.1 What are the spin offs of the present interventions	Documents did not show any significant spin off of the DRR programmes in non intervention areas	<ul style="list-style-type: none"> <li>• A study on this aspect will reveal the facts on success and gaps which will help in planning for the future disasters</li> </ul>
	11.2 Environment	<p>Impact of construction agencies were to be mindful of environmental impact of all activities and attempt to strengthen not diminish the environment.</p> <p>In areas with depletion of indigenous construction materials, early recovery interventions had plan to promote the planting of appropriate species and encourage sustainable harvesting techniques.</p>	<ul style="list-style-type: none"> <li>• Need for EIA. Assess impact of RCC, brick, steel based constructions in terms of depletion of non renewable and renewable energy and emission of CO2</li> <li>• Look for carbon credit</li> <li>• Adopt PVA type tools at primary school level to inculcate lifestyle change towards climate change</li> <li>• Environmental impact of inland river transportation of construction materials needs review</li> </ul>
	11.3 Sustainability on programme exit	<p>While some people have some capacity to invest on shelter, many don't</p> <p>spirit of mutual support exists within communities along with, existing skills, renewable local resources, and the desire of people to help themselves</p> <p>People have made a tremendous collaborative effort and partially rebuilt an estimated 80% of houses. People, excepting financial capability, have capacity to rebuild/ repair their own houses without waiting for technical help.</p> <p>limited external funding, and weak organizational capacities are constraining factors</p>	<ul style="list-style-type: none"> <li>• Handle grant based housing carefully to avoid spoiling habit &amp; social tension</li> <li>• Check if peoples' technical capacity is in conformity with the DRR requirements- accordingly, amending the existing manuals and ICT materials.</li> <li>• Peoples' collaborative efforts could be nurtured through BRCs by keeping room for participation of local people.</li> <li>• BRCs trained people will generate domestic level employment as well as help in earning foreign currency</li> <li>• Need for sponsorship for the training</li> <li>• BRC can be a source of employment if it could act as a production cum store of construction materials adopting innovative techniques</li> </ul>

## 12.0 FUNDING

**Objective:** To examine whether there is adequate provision for funding considering a combination of peoples' own effort, GoUM's efforts and international level loans and donations

### 12.1 New Construction

Not taking account of absorptive capacity and constraints, the assistance needed is of a total of US\$142.25 million. Shelter packages to vulnerable households @ 600 US\$/HH needs US\$30 million for 50,000 new or fully rebuilt durable shelter. 130,000 families or half a million people are under tarpaulin and they need replacement. These are families with marginal livelihoods and many are sick and old or weak. Their shelters will not protect them from monsoon. There is an immediate need of US\$10.2 million to replace temporary roofing materials before storms. There is an urgent need for the donors to commit to sustainable shelters US\$500 –US\$700 each.

In the post SIDR situation in Bangladesh, 160 sqft of area of a shelter would have had a cost of about UD\$3,200 (contractor supplied) at 2008 rate. This is with an estimated life of 50 years (termed as permanent) with RCC slab, engineering brick wall, isolated column footing, MS doors, windows, etc. Most of the shelter/housing options in Myanmar are relatively low cost compared to other countries, where the structures are usually of more permanent materials and hence, cost much more. Therefore, the shelter cost in Myanmar cannot be termed high and should be accepted as at least UD\$650 for new shelter.

**Achievements:** By June 2009 UN-HABITAT and Shelter Cluster Partners had raised more than US\$21million for durable shelters. From international funds more than 69,000 families were assisted with repairs to shelter and over 30,000 families received new shelters. According to SAG Terms of Reference, World Concern provided 10,000 households to other members of the Cluster and IOM had US\$800,000 available for specific projects to be proposed by other members of Cluster.

**Challenges/ gaps:** While the achievement shows some progress in funding, it is far from the target. This gets further problematic since some donors were reluctant to fund for shelter because of issues regarding land ownership. In PR IV, 94% (n=557) of households reported that the main obstacle to undertaking repairs was a lack of cash (same as PR III, PR II). The second most common problem was a lack of materials, which has declined from 50% and 55% in PR II and PR III respectively to 36% in PR IV. The government's supply of shelter, though continuous, will inevitably be a slow process addressing only a small percentage of the overall need.

The documents reported that shelter was the Least Funded Post-Nargis sector with no clear resources neither any mechanism to address the issue of re-housing vulnerable families which may reverse the gains made by other sectoral interventions. Many individuals went for substandard repair and rebuilding. 80 percent of those surveyed indicated that the greatest obstacle to rebuilding is a lack of money. It is apparent from the above discussion that a huge financial gap exists in the shelter sector.

**Recommendations:** To encourage the donors, the Cluster needs to advocate on land ownership issues. Apart from that, there is an urgent need for a transparent process of cost estimation for new shelter, retrofitting and repair. It appears that each source has adopted different basis for cost esti-

mation and hence, the wide variation. NARGIS data on cost from the agencies could be harnessed and analysed how much it costs to build/repair shelters in different circumstances. This will enable one to predict area specific estimations in Myanmar. The experience of the implementing agencies is invaluable.

A realistic fund planning based on acceptable standard of housing both in terms of spatial and material specifications is required. This will help in achieving the target of housing for the affected people in a phased manner through a clearly understood long term plan. Shelter sector remains inadequately funded and there is a need international humanitarian assistance from everyone.

**Cyclone shelter:** The recovery of shelter and settlements means that households have better access to more cyclone shelters. The need assessment of the cyclone shelters was not visible in the documents supplied by CSWG. A GIS-based need assessment of the cyclone shelters considering catchments population should be carried out if not done already. The funding for this has to be planned accordingly. One of the crucial issues is that the maintenance of the cyclone shelters could be as important as the supply of new ones. Using them as schools, community centres, etc, will develop ownership and thus chance of better maintenance in future.

## 12.2 Repair, strengthening and upgrading

Different sources provided different cost figures of repair, strengthening, etc. According to one source, strengthening with DRR provisions in 350,000 damaged shelters at the rate of US\$50 per HH, needed 17.5 million USD. Another source reported that upgrading to minimum standard of temporary/partially repaired shelters UD\$250/HH needed UD\$92.5 million for 370,000 temp/partially repaired shelter upgraded. In reality repair costs are case specific and are dependent on the technical specifications for safety. Therefore, the basis of costing for repair and strengthening is difficult to arrive at unless a well planned methodology is adopted. While technical specifications for safety are very important, they should be practical enough to consider the fund constraints.

**Challenges:** The estimated cost of repair and upgrading mentioned in the documents appear to be 'ball-park figure'. Emphasis on repair, strengthening and upgrading housing units is sustainable.

**Recommendations:** Needs a well researched basis for costing to calculate the funding required. There is a need for creating a database on how much would it cost if a) all ABC are needed in a shelter, b) only A, B or C or any combinations. An average figure of money given to all the affected people would mean that some will get more than required and others less resulting in unsafe shelter. In this process the system of fund allocation could be strictly made needs based increasing value for money and a more resilient built environment. However, this need training capacity building and institutional mechanism to carryout rapid assessment of the existing shelters. It will be cost effective to create a cadre of multi skilled people at local level. BRC could be a feasible hub for this.

## 12.3 Water supply

As with the repair cost of the shelters fund requirements for water supply has different figures. For example, while one source reported that Nargis-damage and losses in water sector were estimated to be K 8.5 billion, the other one mentioned it as 21,946 million Kyat (13,428+8519). While there could be valid reasons for such variation, the documents did not reveal anything in this regard.

Recommendations: A thorough research is need in this regard. Explore the success stories in the developing countries and adapt to the Myanmar conditions. The issue of Arsenic contamination should be emphasised and there is a need for periodic quality checking.

## 12.4 Sanitation

Sanitation needs (8090+1478=9568 million kyat)

**Recommendations:** Same as above

Table 3.18: Summary Funding

Key issues/ Criteria	Sub-attributes/ Criteria	Observations/ Issues	Recommendations
12.0 Funding			
	12.1 New Construction	<p>The government's supply of shelter is inevitably slow and addressing only a small percentage of the overall need.</p> <p>shelter/housing options in Myanmar are relatively low cost compared to other countries, where the structures are more permanent and hence, cost much more.</p> <p>There is no single figure on funding requirements for the post NARGIS shelter construction. One suggestion is that donors to commit to sustainable shelters US\$500 –US\$700 each.</p> <p>Some Donors were reluctant to fund housing because of land ownership issues</p> <p>shelter was the Least Funded Post-Nargis sector- a huge financial gap exists in the shelter sector</p>	<ul style="list-style-type: none"> <li>To encourage the donors, the Cluster needs to advocate on land ownership issues</li> <li>urgent need for a transparent process of cost estimation for new shelter, retrofitting and repair. NARGIS data on cost from the agencies could be harnessed and analysed how much it costs to build/repair shelters in different circumstances. This will enable one to predict area specific estimations in Myanmar</li> <li>At least UD\$600/HH may be accepted to ensure DRR features in new shelters</li> </ul>
	12.1 Repair, strengthening and upgrading	<p>Different sources provided different cost figures of repair, strengthening, etc. Therefore, the basis of costing for repair and strengthening is difficult to arrive at unless a well planned methodology is adopted. While technical specifications for safety are very important, they should be practical enough to consider the fund constraints.</p>	<ul style="list-style-type: none"> <li>There is a need for creating a database on how much would it cost if a) all ABC are needed in a shelter, b) only A, B or C or any combinations. An average figure of money given to all the affected people would mean that some will get more than required and others less resulting in unsafe shelter. Fund allocation to be needs based</li> <li>This need training capacity building and institutional mechanism to carryout rapid assessment of the existing shelters. It will be cost effective to create a cadre of multi skilled people at local level. BRC could be a feasible hub for this.</li> </ul>

12.3 Water supply	As with the repair cost of the shelters fund requirements for water supply has different figures.	<ul style="list-style-type: none"> <li>Thorough research is need in this regard. Explore the success stories in the developing countries and adapt to the Myanmar conditions. The issue of Arsenic contamination should be emphasised and there is a need for periodic quality checking.</li> </ul>
12.4 Sanitation	Sanitation same as above.	<ul style="list-style-type: none"> <li>Same as above</li> </ul>

### 13.0 ADMINISTRATIVE AND MANAGEMENT (GoUM)

**Objective:** Identification of issues which the GoUM can resolve in collaboration with the International Agencies

#### 13.1 Standards

TWIG established clear standards for a shelter of approximate 160 to 200sq ft costing around US\$700. However, the government later adopted a standard of 320sq ft with expected cost of US\$2,500. The government maintains this standard for its own relatively small programme. It is desirable that an agreement is reached between the Government and donors to avoid different standards or strategies in the domain of post NARGIS housing. It is preferable that a written acceptance of agreed standards be obtained from government authorities. The Shelter Cluster is advisory and cannot be regulatory. While the government and donors can ensure compliance with standards, eventually it is GoUM who will take the proactive role as a regulator. TWIGs assumed a radical shift from emergency shelter to permanent shelter and this has still not been fully realized. The MESC had aimed to provide its members with a clear distinction between emergency shelter, transitional shelters, and reconstruction through the provision of example designs, costs, standards and references. A lack of clarity has been observed in the existing document. There is a need for constant reminder through ICT materials.

#### 13.2 Policy decision

It has been emphasised that the current rate of storm resistant construction is too low. One of the documents suggested that rate of construction could be increased substantially if certain donor restrictions on assistance for construction could be waived or lifted.

There is a strong need for computerised database on housing, which will generate a single source of data acceptable to all. International experience shows that such database could be robust through a consultative process and also by considering NGO and other sources of information. This data needs to be GIS-based and the appropriate Ministry should be its custodian. The database will also keep a record of every disaster related interventions to make sure that mistakes are not repeated. Any future planning will be in accordance with the database.

Revision of the building codes is extremely important especially after NARGIS. It will set the minimum standards of every aspect of housing planning, design and implementation. The code should contain a multihazard map to enable the architects and engineers to make zone specific designs. The basic wind speed and other design related matters could change in the light of NARGIS.

The UNDP report (September, 2010) provides hazard maps for flood, storm surge, cyclonic wind, earthquake, tsunami and fire. However, the report admits that authenticity and access to data on hazard was the biggest hurdle in their assignment. This issue cannot be resolved without the direct participation of the GoUM. There is an urgent need to collaborate with the Meteorology department to gather information on what kind of data is available that could be analysed and included in the building codes. While developing the national building code the first two items to be taken on a priority basis are Earthquake and wind codes.

Architecture and engineering course curricula should emphasise disaster and climate change as “must know” competencies. Nation-wide seminar and discussions will be needed to arrive at a consensus on how this topic should be internalised without overburdening the existing teaching-learning process. This will ensure that the students graduating from the institutes will have competency to create disaster and climate-safe built environment in Myanmar. Capacity building of the professional architects, engineers, construction supervisors, contractors and construction workers in disaster-safe construction could also be promoted with adequate funding and through suitable Policy/strategy. Experience of similar exercises from the neighbouring countries could be helpful.

While the Gender and disability issues have been mentioned in the documents, there is a need for further reinforcing them.

#### Local level institutional support

According to one document, assistance program for community-based reconstruction and retrofitting should focus on a) design of cyclone-resistant standard housing units; b) provision of a roving retro-fitting service which can provide advice to individual home builders and home owners, and supervise the compliance with cyclone-resistant building standards; c) training and capacity building of local labour, contractors and community members; and construction of accessible safe cyclone shelters in all villages. As mentioned in several sections above, BRC could play a key role to all these requirements and help in building disaster resilient housing in Myanmar. It will play an important role to bring the “Lab level” knowledge to the “grass root level”. BRC could have a roving unit to reach the places where access is difficult for an individual to receive a particular service of new construction or retrofitting or major maintenance. RBC will act as a cost effective consultant/information centre to the local people where technical support for new shelter and repair/retrofitting and information on financial aspects will be available. BRCs will advice people on where and how one can access loan, grant etc. The other roles of the BRCs have been discussed in the relevant sections above. BRCs could be encouraged by the GoUM if considered to be suitable.

#### Coordination of the shelter supply

SWG has no further funding so cannot formally function as ‘lead’, beyond 30th June 2009, but will assist other key agencies to continue to meet and to try to resolve emerging issues. In addition to UNHABITAT, agencies such as UNHCR, CARE, IOM, NRC, ACTED, SOLIDARITES have all expressed interest in keeping an informal mechanism alive. It appears very important to have a “lead” for some more time. This is very important considering the fact that only a limited number of agencies exist with full capacity and expertise. A longer existence of the ‘lead’ may enhance capacity and expertise of the local level agencies.



## Recommendations

### Standards

The Shelter Cluster is advisory and cannot be regulatory. While the government and donors can ensure compliance with standards, eventually it is GoUM who will take the proactive as a regulator

Need for constant reminder through ICT materials on clear distinction between emergency shelter, transitional shelters, and reconstruction

### Policy decision

Land tenure issues need to be addressed at policy level and at local level to ensure security and to meet donor requirements.

Rate of storm resistant construction could be increased substantially if certain donor restrictions on assistance for construction could be waived or lifted

Strong need for computerised database on housing, with appropriate Ministry as a custodian

Revision of the building codes that includes multi hazard maps

Architecture and engineering course curricula should emphasise disaster and climate change as “must know” competencies.

While the Gender and disability issues have been mentioned in the documents, there is a need for further reinforcing them.

Enabling policy/strategy to create RBC at local level

Additional funding to SWG function for some more time

Table 3.19: Summary Administration and Management

Key issues/ Criteria	Sub-attributes/ Criteria	Observations/ Issues	Recommendations
13.0 Administrative And Management (GoUM)			
	13.1 Standards	<p>While TWIG established clear standards for a shelter the government maintains its own standards. Shelter Cluster is advisory and cannot be regulatory. While the government and donors can ensure compliance with standards eventually it is GoUM who will take the role</p> <p>Radical shift from emergency shelter to permanent shelter has still not been fully realized. Lack of clarity has been observed on a clear distinction between emergency shelters, transitional shelters.</p>	<ul style="list-style-type: none"> <li>GoUM who will take the proactive as a regulator</li> <li>ICT materials to emphasise on clear distinction between emergency shelter, transitional shelters, and reconstruction</li> </ul>
	13.2 Policy decision	<p>Current rate of storm resistant construction is too low.</p> <p>Database is a weak components in the post NARGIS interventions</p> <p>Codes are old</p> <p>While the Gender and disability issues have been mentioned in the documents, there is a need for further reinforcing them.</p> <p><u>Local level institutional support</u> assistance program for community-based reconstruction and retrofitting should focus on a) cyclone-resistant housing design b) roving retro-fitting service; c) training and capacity building of local labour, contractors and community members. BRC could play a key role to all these requirements</p> <p><u>Coordination of the shelter supply</u> UN-HABITAT has no further funding so cannot formally function as 'lead', beyond 30th June 2009. It appears very important to have a "lead" for some more time. This is very important considering the fact that only a limited number of agencies exist with full capacity and expertise.</p>	<ul style="list-style-type: none"> <li>Land tenure issues need to be addressed at policy level and at local level to ensure security and to meet donor requirements</li> <li>rate of storm resistant construction could be increased if certain donor restrictions on assistance for construction could be waived or lifted</li> <li>strong need for computerised database on housing, with appropriate Ministry as a custodian</li> <li>Revision of the building codes</li> <li>GoUM to encourage Architecture and engineering institutes to emphasise disaster and climate change as “must know” competencies.</li> <li>While the Gender and disability issues have been mentioned in the documents, there is a need for further reinforcing them.</li> <li>Enabling policy/strategy to create RBC at local level</li> <li>Additional funding to SWG for some more time</li> </ul>



This Chapter has provided a detailed analysis based on the documents, reports, manuals, posters, and other engineering data from different agencies, individuals and donors. Experience from elsewhere has also been roped in this chapter to increase the robustness of the analysis. The recommendation of the 13 Tables in this Chapter has been a major contributor in the last Chapter on way forward. However, this being is desktop needed cross checking with the findings of the key respondents (top down), agency level survey (bottom up) and most importantly HH survey. The HH survey data analysis has been designed to gauge the end users' satisfaction level on the shelter as a product. No matter how efficiently and cost effective shelter a system can provide within a time frame, peoples' satisfaction is the acid test since they are going to live there with families in safe and acceptable living condition. The following three Chapters focus on the survey data analysis.

## CHAPTER 5

# **KEY RESPONDENTS' INTERVIEW ANALYSIS**

## 5.1 NOTES ON THE SURVEY (This Chapter is primarily “process” centred)

The Key Respondents are those, who were at top level management at Yangon and were involved in the post NARGIS shelter programme. Some of them had a direct or indirect role in conceptualising the appropriate interventions required to cope up with the emergency situation of shelter. Apart from that, the Key Respondents are those who were/are also involved at top level of management in the latter part as well.

The main objective of interviewing the Key Respondents was to get a bird’s eye view of the project as a whole. The evaluation team interviewed six personnel from different organisations. The interviews were conducted in-person and through an informal discussion. The interviewer first asked a question and initiated a discussion from where the response was summarised and tabulated. After conducting the interview the interviewer reviewed the answers and tabulated them in the Excel worksheet.

Deliberately, the interview questions were kept semi structured and not as rigorous as the desktop analysis considering the fact that the purpose was to get a bird’s eye perspective. It was also due to the fact that people at that will be too busy to be caught in a long hauled interaction session. However, the 13 Key Issues were in tacit form in the semi structured questionnaire for the key respondents so that the responses could be compared with the other surveys and the desktop research.

In the Annexure III, the answers of the respondents R1, R2, R3, etc. (Table 5.1) have been tabulated. The data analysis has been carried out in Annexure III by comparing row-wise response of the interviewees against a particular question. In the last column of each question, the overall pattern has been recorded. The findings of the analysis have been presented in the Table 5.2.

Table 5.1: Format of the questions for the key respondents

Q	Key Questions	Respondents				Pattern
		R1	R2	R3	R..	
01	In your opinion, what were/are the main goals of the Post Disaster Recovery Planning and Development in the Shelter/Housing Sector in Myanmar?					
02	What is the most important difference that the program did in the communities - name one or two most important ones?					
03						
04						
05						
06						
07						
08						
09						
10						
11						
12						
13						

Table: 5.2: Pattern of response of the key respondents

QUESTIONS/ ISSUES	PATTERN OF RESPONSE
Q1: In your opinion, what were/are the main goals of the Post Disaster Recovery Planning and Development in the Shelter/Housing Sector in Myanmar?	The main goals of the post disaster recovery should be based on the philosophy of “While responding to the past, prepare for the future”; key issues - quick supply of disaster safe shelters which are durable, cost effective, of low maintenance, community based and innovative.
Q2: What is the most important difference that the program did in the communities - name one or two most important ones?	The programme has made the community more cohesive than before. People feel safer and they are well informed about the safety issues of shelter. Community has the right to choose, community participation has been a major achievement of the programme.
Q3: Do you think that the programme has given adequate emphasis on the most deserving people such as Old, Single Women, Persons with disabilities, people BPL, etc.	Respondents thought that they had adequately emphasized on the most deserving people.
Q4: In terms of delivery mechanisms which are the agencies you would cite as the good examples. Why do you think that they are good?	All the agencies termed themselves as good examples. One agency has given a detailed justification as to why their delivery mechanism was good.
Q5: What alternatives could be considered for responding to the housing needs of low income people who cannot afford a shelter?	Help them in increasing livelihood to enable them to have adequate saving to own shelters. One suggestion was to give them shelter kits and grant.
Q6: What are the strengths of the Post Nargis Shelter Programme?	Better prepared and experienced to identify and support the most vulnerable people by providing shelter. Beneficiaries are more confident about safety, especially about their children. Disaster safe housing, community based construction, improved social relation and increased social solidarity are the strengths of the intervention
Q7: What are the weaknesses or problems with the post Nargis Shelter Programme?	Shortage of fund, existing low level of skill of carpenters, land issues, aid etc are the weaknesses.
Q8: Have you observed any negative impacts on the HH/communities from the shelter Program? If so, what have you observed?	Due to fund shortage, all the affected people could not be addressed which led to jealousy and misunderstanding between community and agencies. Some people prefer to live in their traditional scattered houses which they were used to before Nargis.
Q9: Based on your experience, what would you recommend for changing or improving the administration of the program?	Enhance Quality control, supervision and material delivery process. The village leaders to be involved in beneficiary selection.
Q10: What do you think of the quantum of funding to serve all the affected HH? 1-> too low, 2->low, 3->OK	Quantum of funding was low.
Q11: In your opinion, has the desired community awareness been developed towards resilient shelter in future- i.e., are they now informed clients?	The communities are more informed clients than before NARGIS in terms of resilient shelters. However, there is a need for disseminating this on a wider scale

QUESTIONS/ ISSUES	PATTERN OF RESPONSE
Q12: Do you think that the desired institutional structure is in the process of development towards sustainable capacity building of carpenters and masons on resilient shelter - comments?	The desired institutional structure towards sustainable capacity building of the carpenters and the masons on resilient construction is yet to develop. <i>This should be done at the earliest or else continuous opportunity for capacity building will be lost undermining the achievement of the present intervention.</i>
Q13: Are you aware of any good example by any agency who has integrated DRR with shelter planning and implementation?	Agencies reported that UNDP, DRC, NRC have integrated DRR in shelter planning and implementation in places.
Q14: Are you aware of any evidence of HFA being integrated with development plan - either by any Agency or the government?	This issue is important. The response of the interviewees made it apparent that there is a lack of clarity in this regard. There is a need for strengthening HFA as a cross cutting issue to all concerned in shelter programme.
Q15: Do you think that the present intervention is approaching the goal in right direction and satisfactory speed?	Agencies reported that the present approach towards shelter is approaching the goals in the right direction and speed, which could be appropriate in their intervention areas. <i>However, there is still a need for commonly accepted and understood goal of shelter programme for all the stakeholders to enable a concerted effort.</i>
Q16: Is there still a need for the program? If yes then for how long?	By and large the agencies suggested one to one and half years of further support through the programme
Q17: Do you have any other comments, suggestions, or questions regarding the evaluation table above?	None

As mentioned before, the purpose of the key respondents' interview was to capture their opinion through an informal way. However, the final objective was to arrange the pattern of their answers against the 13 key issues adopted in the desktop research so that the pattern could be compared with that of the other three sources. The above Table 5.2 has been rearranged in Table 5.3 against each of the 13 Key issues/criteria.

Table 5.3: Pattern of key respondents' response against the 13 key issues

KEY ISSUES/ CRITERIA	PATTERN OF KEY RESPONDENTS' ANSWERS
1. Planning	The main goals of the post disaster recovery should be based on the philosophy of "While responding to the past, prepare for the future"; key issues - quick supply of disaster safe shelters which are durable, cost effective, of low maintenance, community based and innovative.  Help them in increasing livelihood to enable them to have adequate saving to own shelters. One suggestion was to give them shelter kits and grant.  The village leaders to be involved in beneficiary selection.
2. Design	
3. Implementation	The agencies termed themselves as good examples. MRCS and IFRC have given a detailed justification as to why their delivery mechanism was good.  Enhance Quality control, supervision and material delivery process.
4. Quality of construction	
5. Cost	
6. Capacity Building	Existing low level of skill of carpenters is the weakness of the intervention  The desired institutional structure towards sustainable capacity building of the carpenters and the masons on resilient construction is yet to develop. This should be done at the earliest or else continuous opportunity for capacity building will be lost undermining the achievement of the present intervention
7. Maintenance	
8. Water and Sanitation	
9. Communication & information	
10. Impacts and effects	The programme has made the community more cohesive than before. People feel safer and they are well informed about the safety issues of shelter. Community has the right to choose, community participation has been a major achievement of the programme.  Due to fund shortage, all the affected people could not be addressed which led to jealousy and misunderstanding between community and agencies. Some people prefer to live in their traditional scattered houses which they used to before Nargis  Agencies reported that the present approach towards shelter is approaching the goals in the right direction and speed, which could be appropriate in their intervention areas. However, there is still a need for commonly accepted and understood goal of shelter programme for all the stakeholders to enable a concerted effort.  The communities are more informed clients than before NARGIS in terms of resilient shelters. However, there is a need for disseminating this on a wider scale  Communities are better prepared and experienced to identify and support the most vulnerable people by providing shelter. Beneficiaries are more confident about safety, specially about the children. Disaster safe housing, community based construction, improved social relation and increased social solidarity are the strengths of the intervention

11. Sustainability	UNDP, DRC, NRC have integrated DRR in shelter planning and implementation in places.  This issue is important. The response of the interviewees made it apparent that there is a lack of clarity in this regard. There is a need for strengthening HFA as a cross cutting issue to all concerned in shelter programme.
12. Funding	In several sections the issue of low level of funding for shelter have been reiterated.
13. Administrative & management	land issue is a weakness .  By and large the agencies suggested one to one and half years of further support through the programme.

After filling in the main questionnaire, the interviewees were asked make overall comments on the shelter programme. The following Table 5.4 shows the data collection format in this regard, where R1, R2,... etc are the respondents.

Table 5.4: Key question: In your opinion, what are the three most important issues or questions that should be raised to evaluate the present programme?

National Level		Suggested Issue 1	Suggested Issue 2	Suggested Issue 3
	R1			
	R2			
	R3			
	.....			

After comparing the responses of the interviewees, the following summary has been prepared.

#### Issue 1:

The respondents considered the acute shortage of building materials as a very important issue. This has been echoed by different documents prepared in the initial days after NAGIS as well as the recent survey reports as well. The issue is very important and should be planned well in advance to ensure preparedness to combat all future disasters. One crucial point is that there are hardly any trees which could be sources of construction materials in the affected areas.

In view of this situation there is a need for exploring alternative building construction materials and technologies to compensate for the shortage of timber. Large scale plantation programme for construction timber would be an important intervention.

#### Issue 2:

The respondents opined that the new houses are not affordable for the community. This is not a surprise considering the fact that the average income of the HHs in the Delta area is too low. The issue of affordability is closely interlinked with the above mentioned problem of shortage of construction materials. There is a need for viewing the construction as an opportunity for income generation. This calls for a reappraisal of the existing design, technology, materials and skills.

#### Issue 3:

The agencies emphasised on the issue of calculating the actual need to achieve the target. They have highlighted the need for reinforcing the criteria for need assessment. In fact there is adequate experience in this regard which can emerge as a premise for selecting the criteria and prioritising them.

#### Issue 4

This is a very important area where the Government's role and political will is extremely important.

All these have been used as cross reference in the way forward

CHAPTER 6  
**AGENCY LEVEL  
INTERVIEW ANALYSIS**



## 6.1 METHOD OF ANALYSIS (This Chapter is process and product oriented)

The main objective of interviewing the Agencies was to capture detailed information/ data evidences, etc. in the context of post NRGIS shelter programme. Since the selected agencies had the actual experience of implementing the projects at site level, this part of the evaluation has been considered to be a very important basis for comparing its findings with that of the others.

While interviewing all the agencies would have been the best, many were not available since the projects were over sometimes back. Nevertheless seven agencies who were actively involved with the implementation of the different components of the shelter programme have provided information in great detail.

Though the agency level interviews covered both the process and product aspects of the evaluation, the questionnaire for them had an emphasis on the process part. The issue of shelter as a product was in-built in some of the questions under sub-attributes/criteria to have some idea on what the agencies thought of the shelters as products. This was done since the agencies main focus was to help the beneficiaries to get the products in time and with acceptable quality and within budget. Therefore, their strength was more on the process.

Annexure IV shows the filled in forms and the patterns. The same method of analysis was adopted as with the Key respondents' interview and the desktop research. Against each sub-attribute/ criteria, the answers given by all the seven agencies were compared and then the final pattern was tabulated in the last column.

The following Table 6.1 to 6.11 show the pattern or observations and the key recommendations that could be put forward based on the agencies' response to their interviews. The key recommendations have been compared with that of the other three sources (desktop, Key respondents, HH) and the relevant portions have been included the way forward.

## 1.0 PLANNING

Was the Planning Process logical and realistic?

Table 6.1: Summary of observations/ recommendations and the key recommendations on Planning

Questions( Key Issues/Criteria)	Summary Of Observations/ Recommendations	Key Recommendations
1.1 Need Assessment/ Target setting		1.1 Need Assessment/ Target setting
1.1.1 What process did the Agency adopt for need assessment? Was it based on damage assessment survey? Who did the survey?	the agencies had carried out need assessment directly by interacting with the affected people at their project sites based on their own methods	need assessment directly by interacting with the affected people (site specific)- access , remoteness, dispersed villages were constraint in need assessment- lack of clarity between retrofitting and repair- HFA is a weak area- needs clarity on this
1.1.2 Does the Agency think that there was any gap in the above process? If yes, suggest what should have been done then & what can be done at this stage to mend the gap.	access to the villages was a constraint in need assessment- villages remote and dispersed	
1.1.3 Has the Agency carried out need assessment of retrofitting for cyclone-safety of existing shelters? If not, are they aware of any such exercises done by others?	lack of clarity between retrofitting and repair- weak area	
1.1.4 Is HFA integrated in the development process of the Agency's area of work?	HFA is a weak area- needs clarity on this	
1.1.5 Ask the Township/ Village Tract level personnel if they know what HFA means in development planning?	same as above	
1.2 Prioritisation		1.2 Prioritisation
1.2.1 Was there a method of prioritisation adopted by the Agency? If yes, what was it? What were the criteria for allocating shelter- poverty/ women/ old/ disabled?	more or less same criteria for need assessment were adopted- one agency adopted PRA method of ranking, which may be developed as a common strategy for future disasters and general planning	more or less same criteria for need assessment were adopted- PRA type method of ranking be developed as a common strategy for future use- Phasing of shelter needs emphasis- Build on the actual experience of changing priorities over time and create a databank for future reference
1.2.2 Rationale behind phasing of shelter supply over the years	Rationale behind phasing of shelter supply over the years-not clear from the agencies' responses	
1.2.3 Was there a change in priorities over time	Some agencies mentioned about it-needs a clearer information in this regard-Build on the actual experience of changing priorities over time and create a databank for future reference	
1.2.4 Was there re-appropriation of targets?	no	
1.3 Involvement and consultation		1.3 Involvement and consultation
1.3.1 Composition of the planning team. Was any architect/engineer involved ? Who provided the technical inputs?	most of the agencies used architects and engineers in the planning team	Architects and engineers were in the planning team- involvement of township people community in planning

Questions( Key Issues/Criteria)	Summary Of Observations/ Recommendations	Key Recommendations
1.3.2 What was the role of the Township planning teams in shelter planning?	agencies mentioned about the involvement of the township people in planning. However, agencies' response in this regard was non uniform	This needs to be mainstreamed in non disaster situation as well- this was a strong component- convergence to be kept in all planning.
1.3.3 Discussions held with the end users, if any. How have such discussions influenced the planning decisions	by and large community involvement took place in planning, which is an achievement. This needs to be mainstreamed in non disaster situation as well	
1.3.4 Links/ convergence with other programme components, i.e., health, livelihood, water sanitation, etc.	The responses of the agencies indicate that this was a strong component- shelter was linked with water sanitation, health, livelihood, environmental awareness	
1.3.5 Any other type of consultation that helped in planning	beneficiary participation in construction process, township authority, land and forest department , choice given to the beneficiaries on household materials for their shelter, environment and infrastructure issues	
1.4 Realistic planning		1.4 Realistic planning
1.4.1 Was the construction implementation at Village level carried out centrally by the Agency itself or there was a bidding process to appoint national/ TL contractor or it was by appointing a local NGO or a contractor or any other form? Describe briefly\$	various methods of construction implementation were adopted such as a) beneficiaries with the help of trained carpenters, b) by agency itself, c) grants to households, d) implemented by community under the supervision of an engineer- it is strongly recommended to evaluate the efficiencies of each system adopted for implementation	Strongly recommended that the various aspects of realistic planning be evaluated - they may be suitable in different contexts. The range of problems faced could be used as a checklist for future actions- climatic and seasonal conditions based planning and scheduling will help in realistic time frame
1.4.2 Did the agency encounter any problems with the above process of implementation?	problems were a) confusion on job description of carpenter, b) delivering housing materials, c) weather caused delay- it is an array of problems faced which could be used as a checklist for future actions	
1.4.3 What was the time frame planned? Has there been any deviation? If so, what are the reasons for such deviations?	Working within timeframe in some areas was problem due to rain, accessibility problem due to high tide, transportation difficulties	
1.5 Responsiveness of the planning process		1.5 Responsiveness of the planning process
1.5.1 People's participation especially about resettlement and transparency of fund flow	1.5 Responsiveness of the planning process	This is a strong point and this must be maintained

## 2.0 DESIGN

Have the designs evolved through a well researched and consultative process to deliver an effective product

Table 6.2: Summary of observations/ recommendations and the key recommendations on Design

Questions( Key Issues/Criteria)	Summary Of Observations/ Recommendations	Key Recommendations
2.1 Design Development		2.1 Design Development
2.1.1 Shortcomings of shelter designs prior to NARGIS and how were they rectified in the new designs	New designs had houses with concrete footing, latrine, CGI sheet roofing, diagonal wall bracing and cross bracing, raised flooring to keep out from water level, Diagonal wall bracing and cross bracing.	Use the experience of community consulted design as an accepted method and prepare designs in advance - arrange additional funding for this action. This exercise will also help in developing area specific transition shelter for future disaster preparedness-building codes (yet to be updated) must be understood and followed
2.1.2 Who prepared the designs?	Mostly architects/engineers designed in consultation with the communities -agency response indicate that the "consultation" was of varying degrees	
2.1.3 Any plan for transition shelters to handle future disasters	No plan so far for transition shelter for future disaster preparedness	
2.1.4 Is there a building code in Myanmar? Is it easily accessible? Which code do the engineers and architects use for disaster safe designs?	Responses indicate that it's a very weak area. This is a very fundamental need for a common basis for zone specific disaster safe construction	
2.2 Consultation/ Involvement		2.2 Consultation/ Involvement
2.2.1 Was there a Design Brief on the basis of which designs were developed? Who developed this Brief?	While there was design brief for cyclone shelter, this was not the case with the shelters (not expressed clearly in the response of the agencies)	Design brief for the shelters will be zone specific and be developed based on recommendation 2.1. For the safety and suitability of the designs, appropriate authorities (may be township or below) to approve the designs
2.2.2 Who chose and approved the final designs to be implemented?	There was no uniformity of the process of design approval	
2.3 Building Resource Mapping		2.3 Building Resource Mapping
2.3.1 Was a building resource mapping exercise conducted to identify locally available construction materials?	Except for one agency it is a weak area. BRM in the context of shelter design and construction should be clear to all involved. While the agencies must have done some form of BRM, there is a need for a well organised BRM exercise to obtain locality specific designs and technologies and construction management	A well organized BRM exercise in the context of design, technology and implementation to be implemented - zone wise- the data to be computerized for use at any level-funding, capacity building and institutional development is needed

Questions( Key Issues/Criteria)	Summary Of Observations/ Recommendations	Key Recommendations
2.4 Communication of Design		2.4 Communication of Design
2.4.1 In cases where the construction was done through the community/ owner builder, was any additional effort made to communicate the design properly to the villagers?		
2.5 Flexibility		2.5 Flexibility
2.5.1 Do the design options have provision for future expansion and transformation?	Agencies informed that the designs are expandable	3D drawings demonstrating how to expand with a list of dons and don't to be added to the manuals
2.5.2 How many HHs have undergone such expansion/ transformation in the survey areas?	10 to 50% houses have extended their shelters	
2.6 Local specificity		2.6 Local specificity
2.6.1 Is the same design being used all over the affected areas or there are Village specific designs?	Except one agency (who designed as per budget available) slight or no change in design	BRM based and community consulted designs will automatically ensure local specificity. designs must comply with the multi hazards prescribed by the codes (yet to be updated)
2.6.2 What are the basic materials used for construction? Name them and also mention which are local, which are transported from other parts of Myanmar and which are imported materials?	Basic materials: mostly local materials - timber, bamboo, transported materials were steel, cement, etc	
2.6.3 Whether the shelters have been designed for area specificities like cyclone, seismic zones, flood prone areas, expansive soils etc.?	Area specificity of design: Most of the agencies made cyclone and flood specific designs. only one agency mentioned that shelters were designed for 60miles/hour-TWIGs standard is 80 miles/ hour-needs greater emphasis	
2.7 Disability friendliness		2.7 Disability friendliness
2.7.1 Any innovative features incorporated in the design to make it disabled friendly? What are they?	Disability: only one agency mentioned that ramps were provided in ECCD cum shelter	Attempt for barrier free design-providing ramp is not adequate

### 3.0 IMPLEMENTATION

Has this programme been able to demonstrate an effective construction, supervision and feedback system for its constructions?

Table 6.3: Summary of observations/ recommendations and the key recommendations on Implementation

Questions( Key Issues/Criteria)	Summary Of Observations/ Recommendations	Key Recommendations
3.1 Effectiveness of the system including its flexibility		3.1 Effectiveness of the system including its flexibility
3.1.1 With regard to effectiveness of the Agency's construction implementation method a) state two points as strengths and b) two points as weaknesses	strength a) capacity building of carpenter, b) close co-ordination with VTRC, township, c) beneficiary participation, d) community training - weakness a) engineers could not go to site, b) some HHs tried to take advantage of construction c) some HHs sold out kits did not use them d) funding e) targeting f) lack of involvement of community in cyclone shelter construction, g) communication gap, beneficiary selection due to remote areas	The community based method is a strong point. As far as the weaknesses are concerned, documenting and using them as checklist will increase preparedness of the planners to cope with such problems in future
3.1.2 Ask the same question (as above) to TL/VT officials related to shelter construction and write down the pattern of their answers	this question was not answered adequately	
3.1.3 In case of owner builder, what kind of flexibility is given to them in implementation, fund flow and accounting procedures?	not clear from the response	
3.2 Feedback and review mechanisms		3.2 Feedback and review mechanisms
3.2.1 How was the Agency's performance reviewed? Who did the reviews? And in what frequency?	All agencies did their performance review by themselves excepting one who got reviewed by the donor	Independent review of the agencies to be planned for the future works. It will be good for the agencies as well. Care to be taken to ensure that the reviewers do not act as examiners- they should act as supports to the agencies
3.2.2 State a few goods points mentioned by the last review. Also state a few areas of concern	All the respondents reported that the reviews revealed that their performance was good since community showed satisfaction about the new shelters.	
3.2.3 Have there been any instances of the fund flow system being reviewed to avoid delay in construction?	Only one mentioned that there was fund delay	

Questions( Key Issues/Criteria)	Summary Of Observations/ Recommendations	Key Recommendations
3.3 Transparency		3.3 Transparency
3.3.1 In case certain works were constructed through contractors, what kind of bidding process was adopted?	Transparency: agencies did not involve contractors- community based or owner built systems were adopted - it is an achievement	sharing of information was there, however, a common mechanism of financial transparency to be developed
3.3.2 How was information regarding construction shared with the community? Was there a system of social auditing in the implementation	Agencies who implemented construction themselves reported that they shared information with communities though explicit social auditing was not carried out. The community based construction had everything in-built	
3.3.3 What has been the perception of the community about transparency during construction?	some agencies did not respond, others reported that there was transparency. An independent study on community's perception on transparency to be carried out	
3.4 Technical support at site level		3.4 Technical support at site level
3.4.1 System of onsite supervision - number of times the supervisor/ engineer visited the site.	Mostly on a daily basis for almost all, which is good	BRC based technical support appears to be sustainable- BRCs to employ the local level resources. In future agencies can hire people from the BRCs. This will create local employment and capacity as well
3.4.2 How many project sites were handled by one supervisor? What were their qualifications? Were they trained?	Some agencies used trained carpenters and some engineers. 2-3 sites per supervisor up to a maximum of five sites- It is sustainable to have trained carpenters as supervisors, though a diploma engineer or a BRC trained supervisor could be planned for. Number of sites will depend on the accessibility to the sites	
3.4.3 In case of owner-driven shelter supply, have additional technical support in terms of manuals, trainings, demonstrations etc. been provided?	the agencies reported that manuals were provided to the communities. It may be important to note that transmission loss may be a crucial issue and should be examined from time to time	
3.5 Fund flow		3.5 Fund flow
3.5.1 Any problem encountered regarding fund flow that has delayed the implementation? Describe	one agency mentioned that getting government approval for procurement of materials was a problem	no recommendations put forward

#### 4.0 QUALITY OF CONSTRUCTION

What has been the overall quality of construction under the present intervention?

Table 6.4: Summary of observations/ recommendations and the key recommendations on Quality of construction

Questions( Key Issues/Criteria)	Summary Of Observations/ Recommendations	Key Recommendations
4.1 Quality of Construction of building components		4.1 Quality of Construction of building components
4.1.1 How will the agency rate the overall quality of construction? Very good, good, OK, not so good	While most of the agencies reported that the quality was good, some informed that the life span of the shelters was 2 years and quality could have been improved had more money been spent on shelter	An independent quality check mechanism to be in place. In any project proposal this will be a very important component

#### 5.0 COST

Has there been a conscious attempt to reduce the cost of construction even while maintaining reasonable quality? Have the attempts been successful?

Table 6.5: Summary of observations/ recommendations and the key recommendations on Cost

Questions( Key Issues/Criteria)	Summary Of Observations/ Recommendations	Key Recommendations
5.1 Cost control		5.1 Cost control
5.1.1 What are the unit costs of the shelters under the Agency and what was the prevailing conventional unit cost for similar construction?	Conventional cost is \$1200-\$1500 per shelter. The agency costs varied- \$410, \$650, \$1200. One agency's cost of construction was \$200 and they explained that due to bulk procurement of materials the cost came down to \$200 per shelter. Labour was 12%- one agency- not labour intensive. Technologies were material and perhaps transportation intensive	BRM will be the key to cost savings, which could be due to appropriate materials, skills, labour intensive systems, efficient management, appropriate architectural design- There should be an all out effort in this regard- use of local materials will reduce transportation cost and energy, involve engineering colleges, MES, international collaboration regarding innovation in local materials and alternative transportation systems
5.1.2 What was the basis of fixing unit costs for various constructions?	Basis of unit cost: not very clear reporting on this issue	
5.1.3 If unit cost has increased, what are the reasons? Was it due to changed specifications, enhanced quality, use of imported materials, post cyclone disrupted market, opportunist building material suppliers/ contractors, or any other reason	50% of the agencies reported cost increase- two reported that the cause of cost increase was due to transportation problem	
5.1.4 If there is a reduction in unit cost, specify the reasons - design rationalisation, reducing wastage, training of construction workers, good management, use of local materials and cost effective technologies etc.	only one agency out of six reported that there was reduction in cost of construction which was due to efficient management. There was no instance of cost saving due to technology or architectural design	

Questions( Key Issues/Criteria)	Summary Of Observations/ Recommendations	Key Recommendations
5.1.5 How far has local materials been used as a strategy to increase local employment.	from the reporting it was not clear how the agencies increased local employment- some mentioned that they had used local materials. The issue of labour intensive systems was not discussed	
5.2 Use of Disaster-Safe Cost Effective Construction Technologies		5.2 Use of Disaster-Safe Cost Effective Construction Technologies
5.2.1 What is the disaster-safe cost effective technologies being used (foundation, wall, roof, etc)? How many buildings have been constructed with such technologies?	except one agency there was concrete evidence on the use of disaster safe foundation, wall and roofing systems	Disaster safety is a strong component - cost effective needs further review

## 6.0 CAPACITY BUILDING

Is the capacity building programme satisfactory

Table 6.6: Summary of observations/ recommendations and the key recommendations on Capacity building

Questions( Key Issues/Criteria)	Summary Of Observations/ Recommendations	Key Recommendations
6. Is the capacity building programme satisfactory		
6.1 Planning		6.1 Planning
6.1.1 Who designed the capacity building programme? Is there an institutional arrangement for the continuance of the trainings on exit of the present interventions? If yes, describe.	The interventions did not appear to have influenced the development of government institutional system. The government to act as a facilitator and the private/societies to own the small decentralised resource units such as BRC. There is adequate capacity/ facilities which have been developed in this intervention which could be harnessed to make an institutional system	There is a need for an institutional development of construction capacity building facilitated by the GoUM through policies/strategies. An in depth study be conducted to arrive feasible training packages based on the experience of post NARGIS- NVQ of UK or CIET of South Africa model may be explored. A certification system to be developed - BRC could be a hub of this activity
6.1.2 What are the contents of the training packages? And what were the durations	Carpentry and DRR techniques were the emphasis. While 3 month's training is going to be costly and availability of the people will be a problem, 2-3 days training is too low. An in depth study to be conducted to arrive a feasible training package based on the experience of post NARGIS	
6.1.3 Who trained them? What educational qualifications did they have? Attach literature on the training of trainers.	As far as trainers are concerned a high standard must be maintained. Though expensive, it is going to be sustainable to train people with the help of well trained engineers with the help of master carpenters.	

6.1.4 What were the criteria for selection of the trainees	It is suggested that the NVQ of UK or CIET of South Africa model of selecting trainees at different levels may be adopted where the mentors (trained teachers) conduct a basic test on the interested candidates (who could be illiterate) and decide which module of training one should take. In summary there is a need for institutional system to make this sustainable and useful for the society	
6.1.5 Were certificates distributed? Who issued the certificates? And what are the future institutional arrangements for this?	A certification system to be developed ( BRC could be a model)	
6.1.6 Any training for maintenance? Any multi skilled human resource for maintenance?	The need for multi-skilled training is important. One needs to design training modules based on a survey on common problems of maintenance in different areas. Each multi-skilled person must have a basic tool-box	
6.1.7 Any training on retrofitting?	This component needs special attention since repairing or retrofitting a damaged/weak building without knowing what retrofitting means will not add value for money and the buildings will not be disaster safe in spite in investing money. Peoples life will be at stake	
6.2 Implementation		6.2 Implementation
6.2.1 Who were trained - skilled? Unskilled? Semi skilled?	A list of people mentioned in this row will be a good start to assess their training needs based on their abilities, age and basic qualification	Training cost for different categories to be determined
6.2.2 Any Manual for new construction that was used for training?	Most of the agencies used manuals	
6.2.3 Training cost per candidate	Need for costing of training for different categories starting from basic, advanced, etc. depending upon the competencies desired	
6.3 Post Implementation		6.3 Post Implementation
6.3.1 What is the evidence that skill has improved	A study by and independent agency not involved with the implementation to be conducted to obtain evidence on skill development. Transmission loss will be a crucial issue. One time training is good but not enough. There should be scope for refresher courses of small duration	An independent organization to investigate the extent of capacity built. Document the process and product and carryout analysis and create a computerised database

Questions( Key Issues/Criteria)	Summary Of Observations/ Recommendations	Key Recommendations
6.3.2 How many were trained	Good number of people. It needs to be up scaled. It is important to set up an institutional system for up scaling training. Ensure sustained employment for the trained people	
6.3.3 What is the mechanism to know where they are- any database?	Collate the existing data from the agencies on the trained people and their whereabouts. Set up a computerised system for that.	
6.3.4 Did any evaluation of the implementation of capacity building take place?	Two agencies did the evaluation which must be shared to know the findings. An independent evaluation is needed	

## 7.0 MAINTENANCE

To what extent has maintenance of building been considered during the planning, design and implementation process?

Table 6.7: Summary of observations/ recommendations and the key recommendations on Maintenance

Questions( Key Issues/Criteria)	Summary Of Observations/ Recommendations	Key Recommendations
7.1 Planning for Maintenance		7.1 Planning for Maintenance
7.1.1 What has been the usual practice of maintaining shelters of different Townships?	Maintenance: Poor component	Training package for maintenance, funding mechanism for maintenance, incentives for maintenance, attitudinal change among the engineers- maintenance is an opportunity not a liability
7.1.2 Who provides the funds?	No information	
7.1.3 Does the Agency see this issue as a concern?	The agencies considered this to be a very important issue as this is inter connected with safety of the people and durability- funding is a major problem	
7.1.4 Are any manuals/guidelines developed on maintenance for the end users?	Only two agencies have maintenance manual. This needs very special attention	
7.1.5 Plan for any maintenance booth to cater to the future maintenance requirements of the people at local level?	The concept of maintenance booth is worth considering. This centre could be at local level. Already trained people by the agencies and the master trainers could be organised to make a Artisan's Self Help Group which will run a maintenance booth. Alternatively a BRC can house a maintenance booth	

Questions( Key Issues/Criteria)	Summary Of Observations/ Recommendations	Key Recommendations
7.1.6 Is there adequate awareness among the carpenters and masons on the impact of quality of construction on future maintenance problems?	The response was 50% yes and 50% no	
7.2 Post construction		7.2 Post construction
7.2.1 System of regular and corrective maintenance	no system in place	no recommendations

## 8.0 FACILITIES AND AMENITIES

Are the shelters provided with basic facilities and amenities?

Table 6.8: Summary of observations/ recommendations and the key recommendations on Facilities and amenities

Questions( Key Issues/Criteria)	Summary Of Observations/ Recommendations	Key Recommendations
8.1 Drinking water facility		8.1 Drinking water facility
8.1.1 Provision type- one per HH? Or shared?	only two respondents reported that some form of DW facility exists. Its quality and adequacy during dry seasons are the issues	A comprehensive long term planning is needed for ascertaining adequate quality of water and adequacy during dry seasons. Rainwater harvesting is a strong component, though it needs cost effective storage- a community storage may be explored
8.1.2 Adequacy and Quality of water	needs enhancement	
8.1.3 Is there provision for rain water harvesting?	this is a strong component	
8.2 Toilet facility		8.2 Toilet facility
8.2.1 Is there a toilet for every HH?	All except one reported that every HH has a toilet- the quality of the toilet is important which should be examined	A study to be conducted based on international experience of affordable and maintainable toilets to evolve a suitable solution for Myanmar- this is an extremely important issue
8.2.2 Is the location secured and has adequate privacy	Only one agency reported that there was security problem- others reported that this is not an issue	
8.2.3 Cleanliness and ease of maintenance	needs further investigation	
8.2.4 disposal system of the solid waste and waste water system	This is a serious problem	
8.3 Other amenities		8.3 Other amenities
8.3.1 Is there provision of electricity	no electricity from grid. There are some non conventional facilities available such as solar, generator, batteries, etc	No recommendations
8.3.2 Is there a Play field nearby	mostly it exists	
8.3.3 Proximity of school and hospital - nearby or far away	no clear pattern	



## 9.0 DOCUMENTATION, COMMUNICATION AND INFORMATION

What did the Agencies do for communication of ideas to the stakeholders?

Table 6.9: Summary of observations/ recommendations and the key recommendations on Documentation, communication and information

Questions( Key Issues/Criteria)	Summary Of Observations/ Recommendations	Key Recommendations
9.1.1 Agency level documentation with regard to shelter supply	Manuals and posters were used by most of the agencies. This is the time to identify good examples from the existing ones for dissemination	Examine the existing ones, and extract the good examples
9.1.2 Documents developed for supporting shelter work activities at field like guidelines, manuals, films etc.		
9.1.3 Any poster or booklet, street drama, on the concept of DRR especially designed for the community?		

## 10.0 IMPACTS AND EFFECTS WITHIN INTERVENTION AREAS

What were the effects of the program on the end-users?

Table 6.10: Summary of observations/ recommendations and the key recommendations on Impacts

Questions( Key Issues/Criteria)	Summary Of Observations/ Recommendations	Key Recommendations
10.1 Impact of supply		10.1 Impact of supply
10.1.1 Under the agency, how many HHs have been provided with shelters and how many are yet to get them? By when it will be done?	The supply is too small compared to the need.	Need for additional funding to reach the affected people. Explore how the livelihood of the existing Nippa leave workers could be absorbed by other income generation systems
10.1.2 How many people are still displaced in the area under the agency's jurisdictions?	no pattern	
10.1.3 Are there still some people living with extended family, friends and neighbours, as well as in relief camps	only one agency reported that some people are still living with relatives	
10.1.4 Has the present shelter Program produced any unintended negative effects?	One agency has reported that Nippa leave workers are suffering after materials such as CGI, etc. are preferred being used in shelter	

Questions( Key Issues/Criteria)	Summary Of Observations/ Recommendations	Key Recommendations
10.2 What are the evidences that DRR has been integrated with the programme		10.2 What are the evidences that DRR has been integrated with the programme
10.2.1 Are the Township people aware of DRR? What is it in their perception?	Township people are aware of DRR	While there are evidence at some of the surveyed villages that DRR is in the process of being integrated with village level preparedness- the need for Multi-Hazard map is urgently required- community-based disaster maps could be digitised and integrated as a second layer of data for MH map
10.2.2 Is there any effort such as Participatory Vulnerability Assessment by involving the community to map the vulnerabilities at local level?	PVA is used by some agencies	
10.2.3 Are there any example of DRR (focusing on cyclone resistant features) being integrated with the planning process?	not answered clearly	While there are evidence at some of the surveyed villages that DRR is in the process of being integrated with village level preparedness- the need for Multi-Hazard map is urgently required- community-based disaster maps could be digitised and integrated as a second layer of data for MH map
10.2.4 Are there multi hazard map in place? Or at least it is in the process of making? Any Vulnerability atlas?	PVA type of method will be another way of acquiring map on vulnerability at local level- this should be digitised and integrated with the national level macro MH map	

## 11.0 SUSTAINABILITY: ON PROGRAMME EXIT

What are the spin offs of the present interventions

Table 6.11: Summary of observations/ recommendations and the key recommendations on Sustainability

Questions( Key Issues/Criteria)	Summary Of Observations/ Recommendations	Key Recommendations
11.1 Direct and indirect influences towards resilient shelter in the Delta area		
11.1.1 Any evidence of cyclone safe features imbibed from the present designs in the non-intervention shelters	Mostly there is no evident of dissemination of DRR in the non intervention areas	Trained carpenters available at village level- increased awareness on disaster safety, disaster safe shelters in existence in the project areas
11.1.2 Are there (or if there is any plan for) local level resource centres for building materials production along with technical support on disaster safe construction technologies, and skills for the local needs of new construction and maintenance?	It appears that the capacity, desire and need are there, one has to set up an institutional system and nurture this for a while- policy, planning and funding to be in place	
What are the indicators that on exit of this intervention, Myanmar will have a disaster resilient society without or with least external support from the international community?		
11.2 Indication of ability to spend on shelter		11.2.1 Indication of ability to spend on shelter
11.2.1 Any evidence of community contribution? Describe- what type? How much monetary value did it have	Strong evidence of community contribution especially non-monetized	Very poor capacity to spend money on shelter construction
11.2.2 How many people have rebuilt their houses investing their labour in the area under the Agency?	Some evidences that community contributed free labour	

# CHAPTER 7

## HH SURVEY DATA

## ANALYSIS

### END USERS' SATISFACTION SURVEY

## 7.1 NOTES ON HH SURVEY (This Chapter is “Product” centred)

This Chapter is based on the data collection on HHs’ perception on the shelters and CSGW’s most recent report in this regard (November, 2010). Of the 918 households who responded to the survey, 396 (43%) received new houses. The rest of 522 had their houses repaired by themselves with or without any support. CSGW reports that with two years passed, the support they had received might not have impact anymore.

The observations from the data analysis have been put under the 13 heads, though not all heads have been covered by the HH survey. This data has been used to cross check the pattern observed on a) desktop research b) key respondents’ survey and c) Agencies’ response. In the chapter on recommendations, the HH survey data has been included in the relevant sections as one of the most important pillars of this evaluation. The following is a detailed discussion on the HH survey data. The analysis of the data is in Annexure V and VI.

### 1.0 PLANNING

**Priority:** While 51% of the surveyed HHs assigned top priority to livelihood support, the remaining wanted shelter and had specifically discussed it. The HHs are poor and per capita monthly income is 14,400 kyat (482 kyat/day). The majority of the HHs surveyed is agriculture labourers and is in very poor economic conditions.

The CSGW survey report (2010) recommended that apart from providing livelihood support to the most vulnerable segment of the population such as casual labourers, support should be extended also to the non-vulnerable groups such as farmers and mid-level fishing households who could be the source of employment and food at local level.

**Setting target:** From the HH data, it appears that many wanted new shelter while they perhaps needed repair only, which could be because the grant money for the former is more than the latter. Such conclusion may be true since in an earlier survey in the same area, half the HHs mentioned that they had the capacity to upgrade their shelters before the rainy season. People could have thought the present survey could be an opportunity to get some grant.

This is not uncommon in a post disaster situation. Similar situations have been observed in India (Orissa super cyclone) and Bangladesh (SIDR). In Bangladesh, the need assessment team took photographs of the existing damaged buildings which largely eliminated such problems.

The following Figure tends to suggest that affordability has been the main cause of the HHs to move to the present shelter.

Figure: 5.1 Reasons for shifting to the present shelters

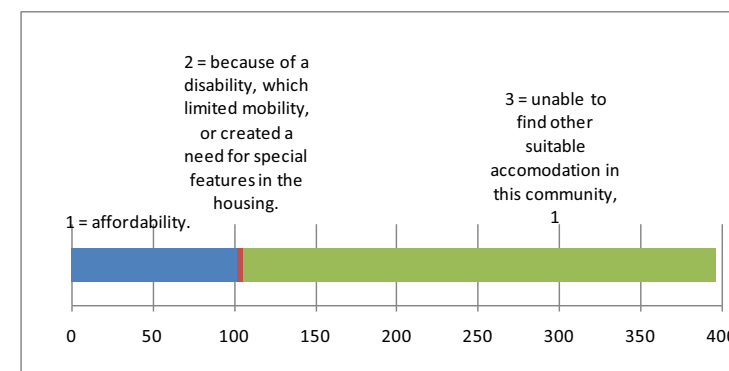
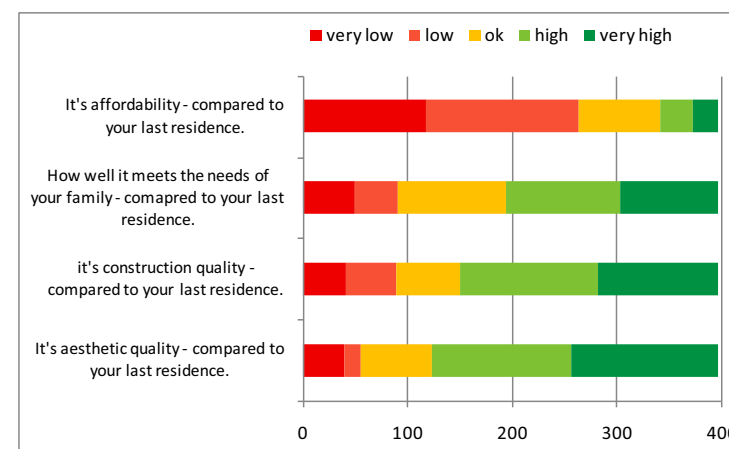


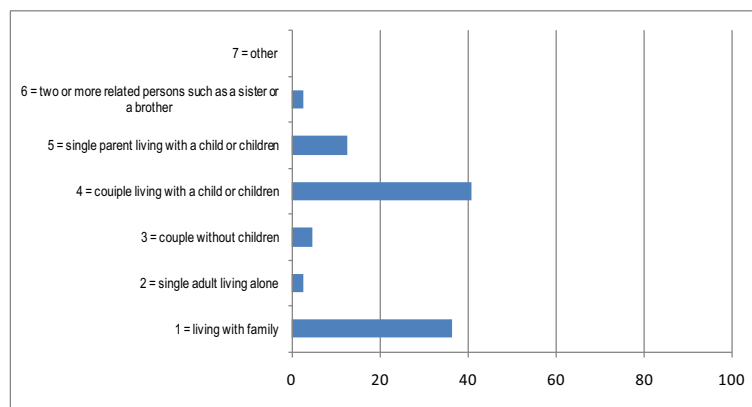
Figure: 5.2: pattern of response of the HHs against a) affordability b) meeting the needs c) quality d) aesthetics of the supplied shelters



From the above Figure it is apparent that affordability is the most crucial issue in shelter supply. Aesthetic quality has the highest level of satisfaction which is due to the fact that the shelters are new. Peoples’ increased confidence on safety of these shelters could be a hidden reason for such satisfaction.

According to CSGW report (November, 2010) the HHs are not happy with distances of their houses from their work place. Respondents’ dissatisfaction with their shelters’ distances from their work may originate from the fact that their dwellings are neither close to the water front for their fishing business nor near the paddy fields where majority of the respondents go to work.

Figure 5.3: Different sizes of HH population in the surveyed HHs



The above Figure indicates that couple living with children and people living with family have the highest occurrences. However, the other requirements, though small in scale, should not be ignored since they are also part of the social need. In new supply, appropriate design options should be prepared for all the varieties. It will be ideal to have an upgradable or transformable design to take care of the varying needs of the HHs.

### Cyclone Shelters

Overall eighty one percent of the respondents reported that they have a building in their respective communities where one can take refuge in times of heavy rains, strong winds or surge. The distances to the nearest cyclone-resilient structures from their houses range from 5 yards to 2,400 yards and the estimated time it could take the respondents to reach the strong structures from their houses range from one minute to 80 minutes. The mean distance to the building is 303 yards and the estimated average time is 17 minutes.

Figure 5.4: Available strong buildings for cyclone shelter according to the communities' perception

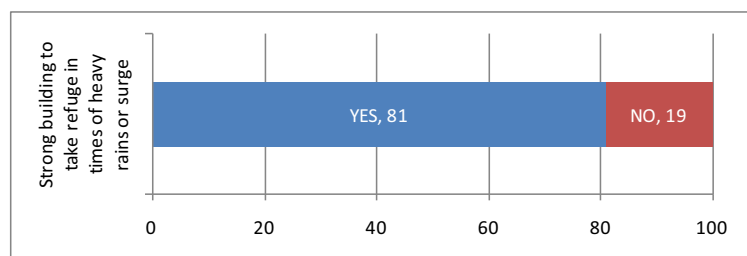
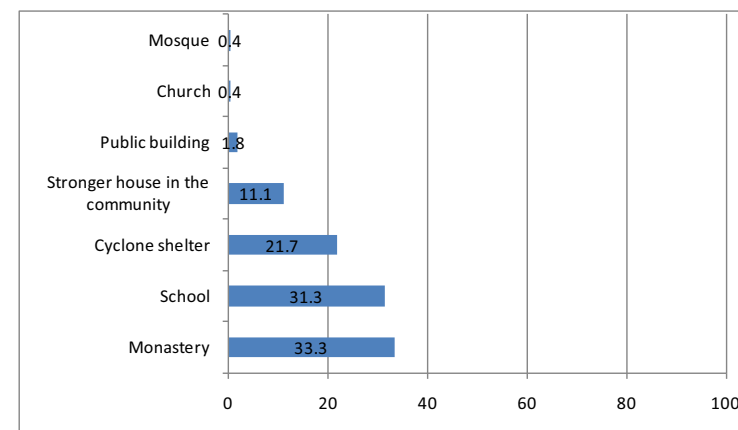


Figure 5.5: Percentage of different types of strong buildings and cyclone shelters available as refuge for the communities



As regards disaster risk reduction, the most common strong structures are monasteries, schools, cyclone shelter and stronger houses in the communities which account for 97.4 percent in total.

This is a vital piece of information regarding sustainability of cyclone shelter. Before, planning to supply additional cyclone shelters it is very important to know where these buildings are situated. A GIS based system will be the best tool for planning in this regard (refer to NRC's works). In terms of maintenance and housekeeping of the strong structures, the religious buildings will obviously be superior to the buildings supplied as cyclone shelters after NARGIS because of funding and ownership. However, there are a few issues regarding this facility as cyclone shelter. It is not known the extent to which these buildings are actually cyclone safe. Therefore, it will be cost effective to inspect these buildings and take retrofitting/repair measures to bring them up to the code requirements on safety.

While calculating the required cyclone shelters one of the conditions will be that they are within the communities and have good access roads.

## 2.0 DESIGN

### Minimum Space Standards

Almost 65% of the respondents assigned top most priority on the total area of their house. Per capita space is still short of the SPHERE Standards of 3.5 metres square. The need for minimum space is evident from the following Figures.

Figure 5.6: The survey revealed that children over 5 years old share bedroom with their parents?

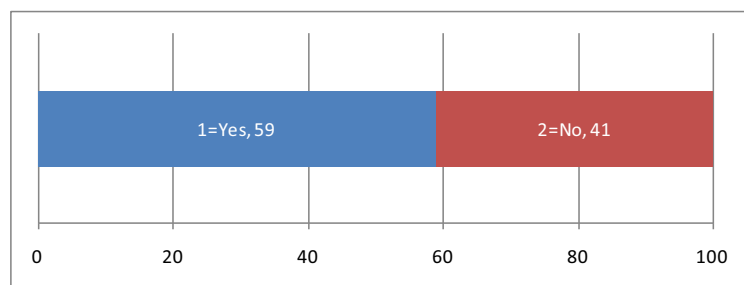
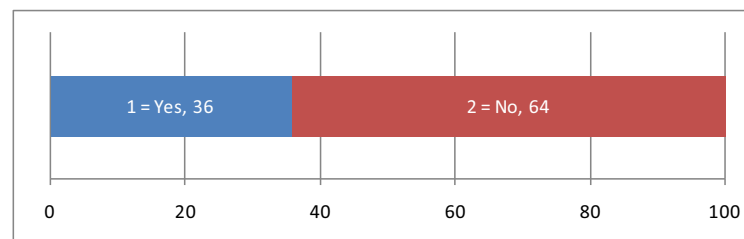


Figure 5.7: In 36% of the HHs the old people share room in the night



The following Figure shows that the surveyed HHs assigned the highest priority to dwelling size followed by comfort in summer, need for cooking space and number of bed rooms and security issues

Figure 5.8 shows that people consider the size of their dwelling to be the top most priority. Figure 5.9 shows that the HHs reported their major dissatisfaction on this issue. The Figure also shows that the satisfaction level regarding cooking space is the least among the respondents. This criterion happens to be a “very high priority”. The level of satisfaction for bed room is also as low as for the cooking space. This is because the new houses built in the Nargis-affected areas rarely have a separate cooking space.



## Comfort Of The New Shelters

Figure 5.8: Priorities of importance assigned by the respondents against 12 criteria

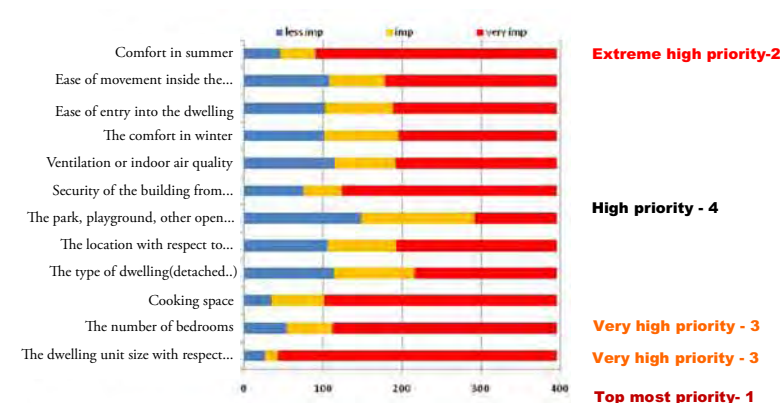
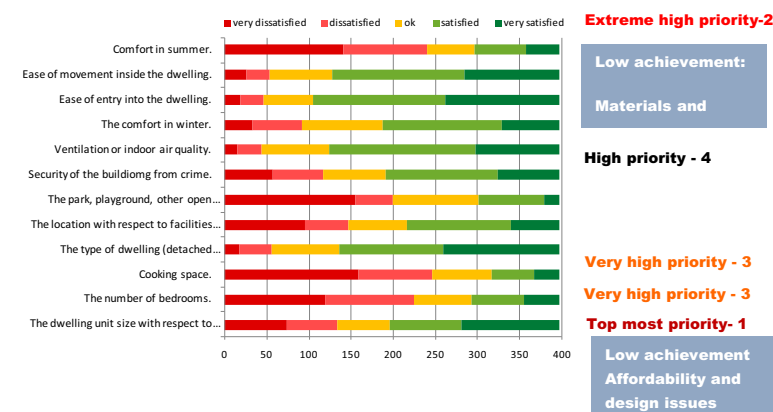


Figure 5.9: satisfaction level of the respondents against 12 criteria



**Summer comfort:** According to the recent CSWG survey (November 2010) the respondents expressed, in general, their dissatisfaction over their present houses compared to the ones they had prior to Nargis. Almost half of the respondents said that they live in less quality houses from protection from the sun, per capita of space, adequacy of space between boys and girls, wind or harsh weather conditions. 42% HHs expressed satisfaction on rain protection of their present shelters, which is probably due the use of corrugated iron sheet roofing. However, the same roof caused discomfort in summer for the residents since corrugated iron roofing quickly transmits direct heat from the sun to the interior. Lack of ceilings in most cases is another cause of summer discomfort.

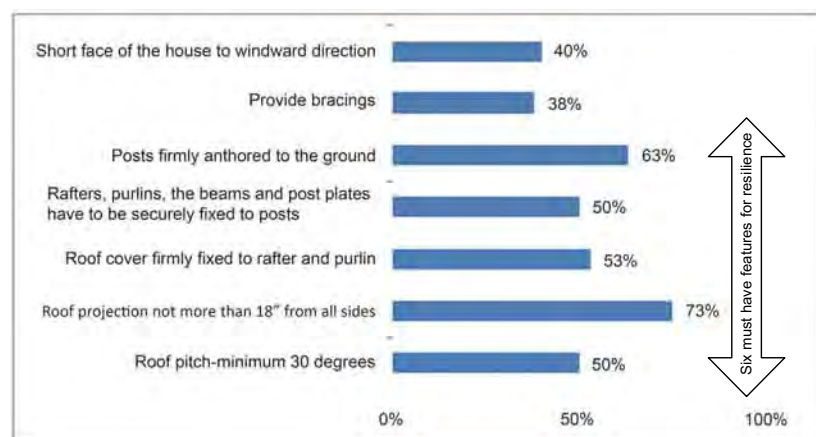
**Expandability:** CSWG survey revealed that the HHs are happy with the provision for future expansion and transformation. Nearly two-thirds or 63 percent of the households gave positive comments on that aspect. However, it is extremely important to know whether structural safety had been retained while expanding or modifying the given shelters. There is a strong need for clear guidelines in the manuals on the issue of expandability and transformation without jeopardising the originally designed structurally safe shelter.

**Disable friendly:** Altogether 28 households of the survey area mentioned that they have members who have limited mobility. Of them only six said that their houses are designed for the convenience of their disabled household members. This is a very important component of shelter programme. The objective in this regard is to create barrier free built environment with an emphasis on the toilets and bathing facilities.

### Technology

Construction technology plays an important role in disaster safety of shelters. There are several prerequisites for such structural safety and in Myanmar the following seven have been adopted for this purpose.

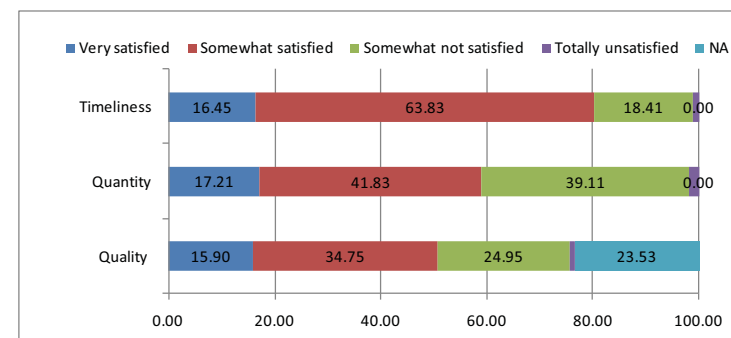
Figure 5.10: The pattern of disaster-safety features of the HHs



The HHs surveyed had the above pattern of disaster safety features in their shelters. The greatest achievement has been in restricting the roof projection within 450mm. Provision of bracing is the least. However, it must be noted that until and unless a shelter has all the above features, it won't be disaster safe. By providing the features partially will not be able to protect the building for future cyclones. It is, therefore, strongly recommended that there is a need for advocating through all the ICT materials on the need for all the features for disaster safety. A true indicator of disaster resilience would be to capture data on how many shelters have all the six<sup>5</sup> features. It will give a better picture on disaster resilient shelter. This will also give an idea on retrofitting requirements.

### 3.0 IMPLEMENTATION

Figure 5.11: Three important indicators of users' satisfaction



<sup>5</sup> 1) anchor, 2) bracing, 3) fixing purlin/ rafter, 4) fix roof cover, 5) roof projection, 6) roof pitch



The agencies reported that the speed and direction of approach towards the goal of shelter supply was satisfactory, which may be true in their project sites. However, a different pattern has been observed in the HHs' response in this regard. The above Figure shows that as far as timeliness is concerned the level of satisfaction is on the lower side. In terms of quantity of shelter supply, the level of satisfaction was also on the lower side. This calls for greater attention on the issues of faster delivery and larger quantities of shelters.

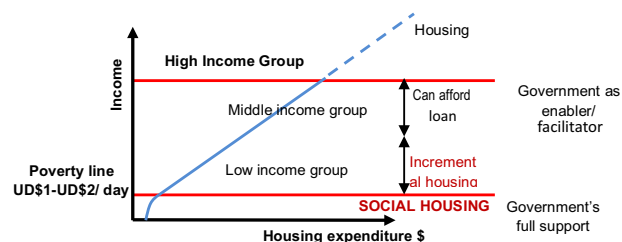
#### 4.0 QUALITY OF CONSTRUCTION

From Figure 5.2 it appears that the HHs are satisfied with the quality of the present shelter when compared with the previous one. However, Figure 5.11 shows that the end users' satisfaction on quality of construction was on the lower side. This could be due to that fact that the previous shelters were of much lower quality when compared to the present one. In this context, the key respondents have emphasised on the need for emphasising quality control and supervision. The Agencies (bottom up) have reported that access difficulty, remoteness etc. were hindrances towards adequate supervision of the construction sites. From these it may be reasonable to assume that there is a need for quality enhancement.

#### 5.0 COST

Figure 5.2 shows that the new shelters are hardly affordable. It is to be noted that grant based system may be a humanitarian need, however, in normal situation, affordability of the shelters has to be generated through enhanced livelihood opportunities of the economically disadvantaged people. The following Figure could be a useful tool to get an overall idea on the affordability situation at local, township and national level, which will help in policy change to create enabling environment for affordable housing.

Figure 5.12: Influencing the Housing Market: Housing Policy



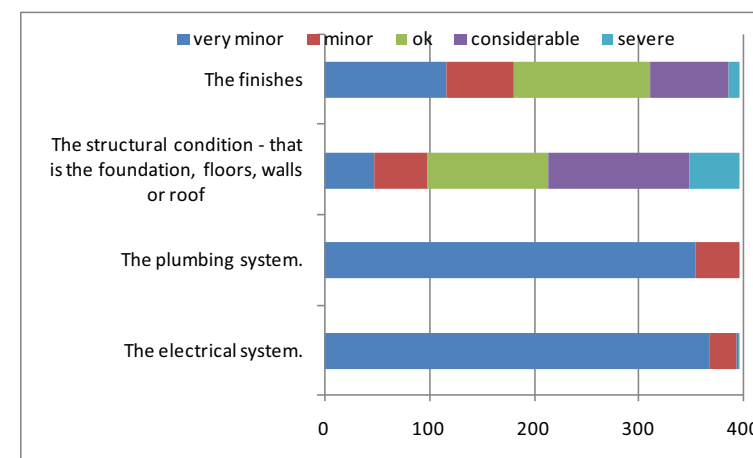
Source: Based on Babar Mumtaz' Presentation (UN-HABITAT, AMMAN, March 2010)

#### 6.0 CAPACITY BUILDING

Figure 5.10 shows that a lot more needs to be done to ensure disaster safety of shelter. One of the keys to this will be to build upon what has already been done. As mentioned earlier that disaster safety of a shelter could be achieved only if all the seven elements are provided in a shelter. This must be reflected in the capacity building programme. The master trainer while teaching should emphasise that these seven are the "must know" components of disaster safety. Any transmission loss will be counterproductive. It will be useful to conduct a field research on the trained carpenters to understand the level and types of transmission loss, if any.

#### 7.0 MAINTENANCE

Figure 5.13: pattern of maintenance requirements



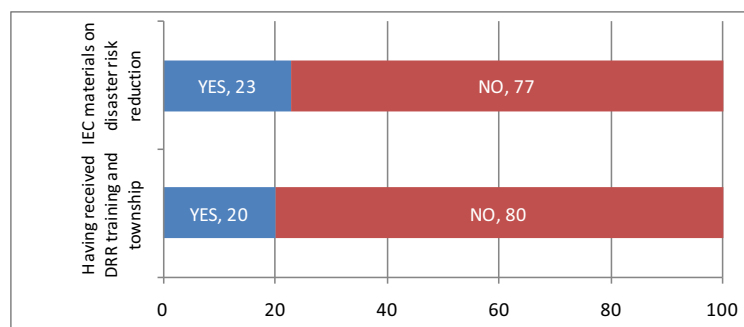
It is too early to examine the maintenance issue. However, the HH survey revealed some pattern of maintenance requirements of the newly supplied shelters. The finishes and structural maintenance requirements appear to be significant. However, such pattern should be verified at site. If the pattern of survey response comes out to be true then it will be a matter of serious concern and appropriate measures should be taken. These could either be due to in appropriate design/ technology or quality control or could be all in one.

#### 8.0 WATER SANITATION AND ELECTRICITY

CSWG (November, 2010) reports that having an electrical system and a plumbing system were not given priority in building new houses for shelter support recipients in post-Nargis interventions. There were given either grade one or two but for most recipients, the systems do not exist.

## 9.0 DOCUMENTATION, COMMUNICATION AND INFORMATION

Figure 5.14: Access to IEC materials for DRR features in shelter



The agencies have developed manuals and posters aiming at awareness and capacity building on how to build a disaster-resilient shelter. CSWG report informs that, in general, the respondents are unaware of such documents. Only about at most one-fifth of the respondents have seen those documents. The situation is worse in Labutta where only nine respondents or 5% of the total households in the township mentioned having or have seen such documents.

When asked about training on disaster risk reduction, 20% of the total households mentioned that they had attended one kind or another of such training. Having attended some kind of training is more common than having participated in emergency drills.

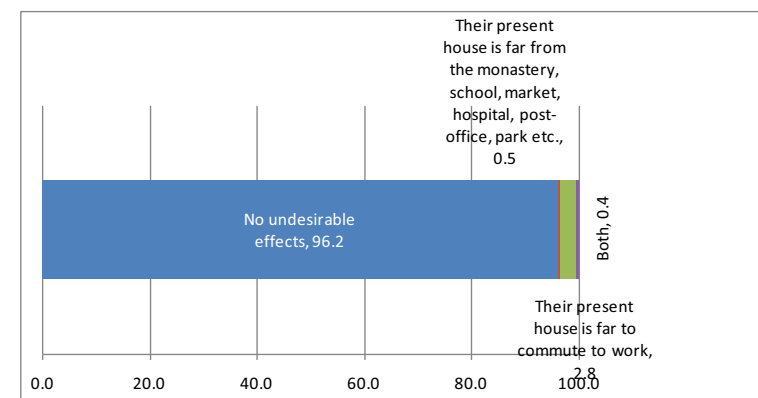
Authorities from 36 communities said that they had IEC materials related to disaster risk reduction. Based on such survey, CSWG report stated that they are not widely spread or distributed in the communities concerned but are given only to certain locals. The findings indicate that distribution of IEC materials have not been effective given the fact that limited number of respondents have access to such materials. CSWG report recommends that more IEC materials on disaster risk reduction should be produced and effective strategies be worked out to reach out to greater number of people.

### Posters & Manuals



## 10.0 IMPACTS AND EFFECTS WITHIN INTERVENTION AREAS

Figure 5.15: Undesirable effects of the shelter programme has been minimum



The HHs were asked whether they think that the present Housing Program (post NARGIS) had any undesirable effects on them. 96% informed that they did not find any such effect. Mostly the locations appear to be satisfactory. Only a small percentage of the shelters had problems of being far away from monastery, school, markets, etc. A very small percentage of people reported that their work place was far away from their shelters. Therefore, it appears that the shelter locations were satisfactory.

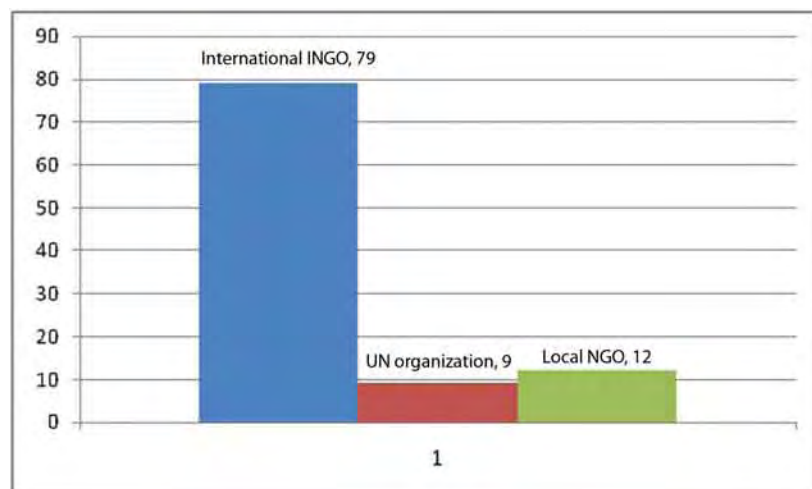
## 11.0 SUSTAINABILITY: ON PROGRAMME EXIT

According to village authorities, communities have conducted some kind of mapping in preparation of disasters. The most common form of mapping is "resource mapping" in which both material and human resources have been mapped in the communities. The least form of mapping done is "vulnerable mapping" in which vulnerable persons and households have been mapped to render them support in time of a disaster.

In future all such efforts should be in a format that could be digitised. Ideally, an Aerial photo or a GIS map may be used in BRM so that the vulnerability could be digitised and kept as second layer information on the MH map of Myanmar.

## 12.0 FUNDING

Figure 5.16: Funding pattern



Main donors for the shelter support are international INGOs. About 80% of the households covered by the survey received shelter support from international NGOs. In this context, local NGOs included locally established non-government organizations and the local agencies or firms which received funding from the government.

The figures are taken from household questionnaire responses. Because many respondents received new houses, their support centered around 300,000 kyat or about 333 US dollars in absolute terms. Compared to other four townships, Dedaye households received shelter support slightly less value than their counterparts. The mean value of the support they were given is about over 232,000 kyat while that of given to their counterparts in the other four townships is over 300,000 kyat. The maximum value received is in Labutta with 1.6 million kyat or around 1,770 dollars.

Non uniformity of funding needs special attention. The exact rationale for these variations should be understood before strategising this issue. If the variation is due to the local circumstances such as transportation cost, weather, available local sources, etc. then it must be communicated with the beneficiaries otherwise this may lead to misunderstanding among the communities.

## 13.0 ADMINISTRATIVE AND MANAGEMENT (GoUM)

No observation

The following Table 7.1 is the summary of HH survey analysis arranged against the 13 Key Issues/ criteria for the convenience of comparing them with the findings of the other three sources, viz., 1) desktop analysis, 2) key respondents' survey, 3) agency level data. The HH survey data analysis carried out in this Chapter has been used in the way forward.

Table 7.1: Summary of HH survey data analysis

CRITERIA	PATTERN OF KEY RESPONDENTS' ANSWERS
1. Planning	<p><b>Priority:</b> The survey report recommended that apart from providing livelihood support to the most vulnerable segment of the population such as casual labourers, support should be extended also to the non-vulnerable groups such as farmers and mid-level fishing households who could be the source of employment and food at local level.</p> <p><b>Setting target:</b> HH survey revealed that some people wanted to get access to money for rebuilding whereas their shelter needed repair and they had the capacity to do so. Photographic evidence of the existing damaged buildings may eliminate such problems since it had worked in the neighbouring country.</p> <p><b>Cyclone Shelters:</b> 80% respondents reported to have a building where one can take refuge in cyclone. It is <u>very important to know where these buildings are situated. A GIS based system will be the best tool for planning in this regard.</u> Therefore, it will be cost effective to <u>inspect these buildings and take retrofitting/repair measures to bring them up to the code requirements on safety.</u></p>
2. Design	<p>There are six types of living pattern identified by the survey team out of which a) Couple living with a child/children, b) living with family and c) single parent with children are the top three. The other requirements, though small in scale, should not be ignored since they are also part of the social need. In new supply, appropriate design options should be prepared for all the varieties. It will be ideal to have an upgradable or transformable design to take care of the varying needs of the HHs.</p> <p>Future survey should capture how many shelters have all the seven features which will be a better indicator for disaster resilient shelter.</p> <p>Minimum Space Standards: 65% respondents assigned top most priority on the total area their house. Area of shelters is still short of the SPHERE Standards. HHs reported their major dissatisfaction on cooking space and bed room.</p> <p><b>Comfort Of The New Shelters:</b> Almost half of the respondents said that they live in less quality houses from protection from the sun, per capita of space, adequacy of space between boys and girls, wind or harsh weather conditions. Lack of ceilings in most cases is another cause of summer discomfort.</p> <p><b>Expandability:</b> MSR survey revealed that the HHs are happy with the provision for future expansion and transformation. There is a strong need for clear guidelines in the manuals on the issue of expandability and transformation without jeopardising the originally designed structurally safe shelter.</p> <p><b>Disable friendly:</b> This is a very important component of shelter programme. The objective in this regard is to create barrier free built environment with an emphasis on the toilets and bathing facilities.</p>
3. Implementation	<p>HHs reported low level of satisfaction on timeliness, quantity of shelter supply, the level of satisfaction was also on the lower side. This calls for greater attention on the issues of faster delivery and larger quantities of shelters. In case of owner-driven approach, fund flow and availability of carpenters are crucial</p>

4. Quality of construction	The end users reported low level of satisfaction on quality of construction. The key respondents have emphasised on the issue of quality control and supervision. The Agencies have reported that access difficulty, remoteness etc. were hindrances towards supervising the construction sites.
5. Cost	Affordability is the most important issue. The new shelters are hardly affordable.
6. Capacity Building	Disaster safety of a shelter could be achieved only if all the seven elements are provided in a shelter. The master trainer while teaching should emphasise that these seven are the “must have” components of disaster safety. Any transmission loss will be counterproductive. It will be useful to conduct a field research on the trained carpenters on how much and types of transmission loss.
7. Maintenance	Field investigation to be conducted on the reported problems regarding finishes and structure. Identify whether these are due to inappropriate design/ technology or quality control
8. Water and Sanitation	MSR (November, 2010) reports that having an electrical system and a plumbing system were not given priority in building new houses for shelter support recipients in post-Nargis interventions. There were given either grade one or two but for most recipients, the systems do not exist.
9. Communication & information	MSR report informs that, in general, the respondents are unaware of IEC materials. More IEC materials on disaster risk reduction should be produced and effective strategies be worked out to reach out to greater number of people.
10. Impacts and effects	
11. Sustainability	In future “resource mapping”, “vulnerable mapping”, etc. should be in a format that could be digitised. Ideally, an Aerial photo or a GIS map may be used in BRM so that the vulnerability could be digitised and kept as a second layer information on the MH map of Myanmar.
12. Funding	For some grant based system will work, though it is sustainable to enhanced livelihood opportunities to increase their shelter affordability. Policy to create enabling environment for affordable housing. Non uniformity of funding needs special attention. The exact rationale for these variations must be communicated with the beneficiaries otherwise this may lead to misunderstanding among the communities
13. Administrative & management	

## CHAPTER 8

# WAY FORWARD

## 8.1 SPECIAL NOTE ON WAY FORWARD

The desktop research has been carried out in Chapter 4. The Chapter 5, 6 and 7 are the survey data analysis of the key respondents, agency level, and HH. Out of these four sets of analysis, the first two are primarily top down and the rest are bottom up. This evaluation is based on these four pillars. The desktop recommendations have been the most rigorous because of many sources of inputs over a long period of time. This made it possible to come up with specific recommendations under the sub attributes/criteria which are in detail. The survey data analysis at top and grass root level brought forward facts from different people of different agencies and individual HHs. The HH survey covered 918 families in 51 Villages, located in 51 VTA spread over Mawlamyinegyun, Pyapon, Dedaye, Labutta, and Bogale Townships.

The four pillars have made the evaluation process robust. As mentioned in the Chapter on Methodology, ***this evaluation has been based on both the process and product*** of the shelter programme undertaken after the NARGIS. While *the first two (Chapter 4, 5) are process centred, Chapter 6 is on both process and product though heavy on the former. Chapter 7 is completely product centred.* This gave a very balanced ground for evaluating the post NARGIS shelter programme in terms of its achievements of DRR, capacity building and the other components discussed in detail in the first few Chapters.

In this Chapter, the findings of the four sources have been compared against each sub attributes/criterion and then the final recommendation has been put forward. Source of a recommendation has been mentioned if the issue has been raised by only one. Desktop research does not come under this since it is not based on firsthand experience.

The following is the detailed recommendations against all 13 key issues/ criteria and the sub attributes. This Chapter has been named as way forward since it goes beyond the recommendations by providing a few details on how to go about the future sustainable shelter in Myanmar. Instead of using the term, cyclone safe shelter, only shelter has been used since it is implied that a home should be robust enough to absorb the natural forces.

## 8.2 RECOMMENDATIONS

### 1.0 PLANNING

#### 1.1 Data Collection

The Census data is old. Because of this there is no way one can assess what existed before NARGIS. Considering this, a further detailed assessment is needed to refine the data on shelter. Quality of data may be enhanced by carrying out assessment through a participatory process drawing on the capacities of community-based groups and local NGOs. The Agencies' response indicated that data collection on the damage assessment was done directly by interacting with the affected people (site specific). However, while doing that the constraint were a) access, b) remoteness, c) dispersed villages. Keeping that in mind, updating data on shelter condition would be the first and foremost action towards disaster preparedness.

The acquired database to be computerised. Use of GIS-based data on catchments population and other infrastructure will enable appropriate shelter and cyclone shelter planning. This is a long term activity.

## 1.2 Need assessment

The core of the need is to supply and upgrade all shelters having all six features<sup>6</sup> for cyclone safety in the hazard prone areas. Future survey to record how many existing shelters have them since that is a better indicator for disaster resilience. The TWIGs/ SPHERE standards have defined "what is meant by disaster safe shelter" in Myanmar (minimum standard). Based on that one has to calculate the basic cost of a shelter and upgrading with minimum spatial standard and the seven points (refer to Figure 5.10) after verifying structural safety for 80 miles/hour wind speed. This will provide the quantity and quality needs of sustainable shelters in the delta area.

A rapid assessment system for existing shelter condition to be developed. It will enable one to calculate the need-based financial requirement of retrofitting. Providing an average amount of money for retrofitting to all will result in a situation where some shelters will remain unsafe due to inadequate money and some HHs will get more than what they require. There is a need for training in this regard. A long term fund planning should be based on this calculation and it should be explored how much can be delivered in a phased manner keeping fund shortage as a major constraint.

Disaster preparedness could be enhanced by locating the repair/retrofitting requirements on a multi-hazard map showing the vulnerability situation of different zones of Myanmar. This will enable the planners to get prepared should there be a disaster in future. Apart from that it has serious implication on the basis of loads to be considered for structural safety. One structural design for the whole of delta will not be appropriate since both the tidal surge and wind speed will reduce as one goes toward inland. Recently, reports have been prepared by UNDP on multi-hazard map, however, authenticity of the maps and difficulty in accessing basic data in this regard have been the constraints. There is a need for the direct involvement of the GoUM in this regard, especially its meteorology department. Donors funding and technical collaboration might be needed for this. However, the value added in the domain of DRR will be many times more than the financial inputs.

The need assessment for cyclone shelter was not visible in any of the documents. HH survey revealed that (81% respondents reported) communities have buildings that can be used as cyclone shelter. It is very important to know where these buildings are situated. A GIS based system will be the best tool for need assessment of cyclone shelter considering these building rather than duplicating the facilities. It will be cost effective to inspect these buildings and take retrofitting/repair measures to bring them up to the code requirements on safety. The NRC's work in GIS mapping may be explored to know how much one can learn from there.

The size and location of a cyclone shelter is crucial, however, it is also important to make sure that the road to it should be accessible round the year.

There is an urgent need for funding on HH in inadequate shelters, plastic or canvas walls and roofs, often overcrowded and little protection from heat and rain. Keep in mind that people's capability to rebuild their own houses is very low.

Different methods and basis adopted for need assessment have led to different estimates of shelter requirements. There is a need for a mutually (GoUM and donors) agreed need assessment.

<sup>6</sup> 1) anchor, 2) bracing, 3) fixing purlin/ rafter, 4) fix roof cover, 5) roof projection, 6) roof pitch

### **1.3 Planning the Target**

The shift from Emergency to 'Early Recovery' Coordination was probably too early at 3 months. The supplied documents suggested that it should have been around 5 months.

Learn from the past experiences and set the planning target to address the shelter needs. Even when one provides all the money required for shelter, the target cannot be achieved since there is clearly an absorptive capacity of the artisans including their trainings. This calls for planning in a phased manner.

From the documents it may be said that there is a need for clarity among the stakeholders on the differences between emergency, transition and permanent shelter. This will lead to a realistic estimation of shelter demand.

The HFA in the context of Myanmar is already prepared and available in the web. Different sources, especially the Agencies' response, indicated that HFA is a weak area- needs clarity on this. The issue of climate change needs to be emphasised in the context of Myanmar, its neighbouring countries and the developed countries. Mutual co-operation in this respect is very important. Myanmar being a low emitter can look for carbon trading. An audit of GHG level from the housing sector could be important since it is much lower than other countries.

HH survey revealed that some people wanted to get access to money for rebuilding whereas their shelter needed repair and they had the capacity to do so. Photographic evidence of the existing damaged buildings may eliminate such problems since it had worked in the neighbouring country.

### **1.4 Prioritization**

Agencies' response clearly indicated that more or less same criteria for need assessment were adopted. Based on the Agency's experiences, PRA or similar method of ranking needs to be examined, which could be developed as a common strategy for future use. It should be remembered that the government's policy and regulatory components are non-negotiable and to be excluded from the prioritisation system while interacting with the communities in this regard. However, the communities to be informed about the non-negotiable parameters.

Based on the HH survey, it is recommended that apart from providing livelihood support to the most vulnerable segment of the population such as casual labourers, support to be extended also to the non-vulnerable groups such as farmers and mid-level fishing households who could be the source of employment and food at local level.

Considering peoples' low level of income, the donors may reconsider their priority on shelters which are cyclone-safe and durable. Care to be taken while ranking the most vulnerable groups. While they may require disproportionate assistance, providing strong support to a few can cause significant damage to the fabric of a community.

Slow shelter rehabilitation and reconstruction may undermine medium-term recovery efforts, especially for the population in the Delta with poor communication and evacuation protocols. Needs to speed up the process.

Key respondents' interview suggested helping the extreme poor people in increasing livelihood to enable them to have adequate saving to own shelters. One suggestion was to give them shelter kits and grant.

### **1.5 Involvement and consultation**

It may be important to know why the government's involvement got reduced in the later part of the shelter programme. This will help further planning to ensure government's ownership.

Donors to explore local capacities -. INGOs to harness local experience

Need evidence whether people were consulted while relocating communities.

Architects and engineers were in the planning team and there were involvement of township people and the community in planning. However, this model needs to be mainstreamed in non disaster situation as well- this was a strong component of the programme.

Key respondents' interview suggested that the village leaders to be involved in beneficiary selection.

### **1.6 Realistic planning: Phasing**

Based on the Agencies' response, it is recommended that the range of problems faced in the post NARGIS interventions could be used as a checklist for future actions- climatic and seasonal conditions based planning and scheduling will help in realistic time frame planning. The instances of changing priorities due to several reasons will also be a premise of learning.

### **1.7 Responsiveness of the planning process--> convergence**

Agencies' response indicated that there was convergence; which is a strong point. However, there is a need for documenting the instances of convergence on record. Convergence to be reiterated and emphasised in all planning actions.

### **1.8 Personnel**

Recommendations could not be put forward

## **2.0 DESIGN**

### **2.1 Research and Consultation**

Use the experience of community consulted design as an accepted method and prepare design options in advance - arrange additional funding for this action. This exercise will also help in developing area specific transition shelter f or future disaster preparedness-building codes (yet to be updated) must be understood and followed

Township authorities to be supported with appropriate building bye laws sensitive to disaster safety

Research on the retrofitting needs emphasis. Case-study/example-based handbook on retrofitting may be suggested. This research should examine and understand the traditional shelter technologies and device appropriate retrofitting measures for future resilience against cyclone and other disaster.



It is a high priority to update Myanmar's building codes, especially its wind and seismic sections. Instead of starting from basic, the code development to be based on what already exists and where are the gaps. The gaps could be temporarily compensated by acquiring relevant portions of the codes from the neighbouring countries. Suitable maps and design basis needs to be emphasised so that the architects/ engineers find it easy to adopt while designing buildings. It should be ensured that the codes are widely known and available through proper distribution system and capacity building programmes on how to interpret the codes. The code on structural safety should consider the timber construction and other innovative technologies.

## **2.2 Architectural design**

Compliance with the accepted standards is a must. A snapshot survey to be conducted to know why the area standards (TWIGs/SPHERE) were not maintained in the post NARGIS shelter intervention in spite of this being agreed by all as a basis.

New designs to consider pattern of spaces of traditional shelters. It is important to design based on the brief (Second bullet 2.1). Climate-comfort should get additional emphasis, especially the rainwater seepage and thermal comfort.

HH survey showed that there are six types of living patterns identified by the survey team out of which a) Couple living with a child/children, b) living with family and c) single parent with children are the top three. The other requirements, though small in scale, should not be ignored since they are also part of the social need. In new supply, appropriate design options to be prepared for all the varieties. It will be ideal to have an upgradable or transformable design to take care of the varying needs of the HHs.

Climate Change considerations to be considered by conducting community participated vulnerability assessment and incorporated in the designs

Building Resource Mapping (BRM) exercise is suggested for the geo-climatically different zones of Myanmar. A well organized BRM exercise in the context of design, technology and implementation to be implemented in different zones. The data to be computerized for use at any level- funding, capacity building and institutional development is needed

Design sensitive to Gender and disability is a very important component of shelter programme. The objective in this regard is to create barrier free built environment with an emphasis on the toilets and bathing facilities. There is a need for emphasising this issue.

Minimum Space Standards: 65% respondents assigned top most priority on the total area their house. Area of shelters is still short of the SPHERE Standards. HHs reported their major dissatisfaction on cooking space and bed room. Cost saving by adopting appropriate technologies may accommodate a cooking space within budget.

Comfort of the new shelters: Almost half of the respondents said that they live in less quality houses from protection from the sun, per capita of space, adequacy of space between boys and girls, wind or harsh weather conditions. Lack of ceilings in most cases is another cause of summer discomfort. Most of these may be resolved by reviewing the existing designs and analysing where and how these could be improved.

## **2.3 To what extent have the shelter designs been improved over earlier designs**

The CSWG (November, 2010) informed that the surveyed HHs showed their satisfaction on shelter extension issues. However, this needs to be guided through a list of Dos and don'ts (pictorial) of housing transformation in the manuals to ensure that the safety issues are not violated while doing extensions. Use drawings in the manuals to show how the shelters can be expanded in future up to 320 sq ft. Adequate alternative options should be provided.

## **2.4 Technologies**

A mechanism to be in place to document any future emergencies which will include, how much of materials were a) reused, b) procured and transported within Myanmar, c) imported.

Feasible solutions to Chloride, Sulphate action and saline water should be ensured. Otherwise the steel elements will corrode and the cement concrete portion will deteriorate rapidly reducing the safety and durability of the shelter.

Indigenous building systems to withstand 80 MPH wind speed and flooding

Retrofitting of the traditional and modern structures is another area of challenge. Retrofitting need assessment of Monastery, etc. This issue has already been dealt before.

Architectural and engineering institutes to emphasise traditional technologies and retrofitting of the traditional and modern structures are the syllabi.

Make arrangements to ensure that the local craftsmen acquire knowledge on cyclone safe elements such as joints of wooden poles and beams, Steel reinforcing, bolts, grooved joints, etc.,

Communicate importance of retrofitting through posters, handouts, etc. Media could be used in this regard

Self recovery needs examination to ascertain

**Special note:** Designs to be approved by an appropriate authority to ensure TWIGs standard. The objective is to supply a disaster safe shelter what is comfortable according to the minimum standards. For example, the use of false ceiling can significantly improve the thermal comfort. The cost of a shelter should be determined following all these. Based on the post NARGIS interventions, Zone-specific comfortable designs should be prepared so that there will be no waste of time for design development in future.

## **3.0 IMPLEMENTATION**

### **3.1 Effectiveness of the system including its flexibility**

HH survey reported low level of satisfaction on timeliness and quantity of shelter supply. This calls for greater attention on the issues of faster delivery and larger quantities of shelters. In case of owner-driven approach, fund flow and availability of carpenters are crucial.

From the above report, examination of the documents and interaction with top level management at Myanmar level it appears that owner/community driven implementation system supported by money and skilled carpenters and artisans is the most suitable method for the affected rural areas. Different implementation systems may be adopted for the peri urban and urban areas, which can be built upon by documenting and analysing the different mechanisms adopted for delivery of the housing units.

In order to make the owner/ community driven system robust there is a need for documenting the field experiences on community based implementation. To make the community-driven sustainable, the carpenters' skills and training will be crucial. The possibility of forming Artisans' Self Help Group (ASHG) and establishing a small Building Resource centre at local level may be explored. These two could make the owner/community driven system work. Linkage with national body for technical assistance is needed to maintain quality of training. A detail in this regard has been put forward in Section 8.3.

Out of the 40 agencies, only 10 had adequate capacity. There is a need for investigating as to why this did not happen with the remaining 30 agencies. The investigation should try to acquire from the experience of the successful agencies.

### **3.2 Feedback monitoring and review mechanisms**

PR was an external mechanism of feedback, monitoring and review. However, the agencies did not share any documents on how the monitoring and feedback were internally recorded. This could be a great source of knowledge to make future programmes seamless.

### **3.3 Transparency**

According to the agencies' response, there was sharing of information in their projects sites. However, there was no detail on how this was done, which could have enabled one to develop a common mechanism of financial transparency. Future development programme to develop a system of transparency well in advance based on the agencies experience of what had worked in this regard and what didn't.

### **3.4 Technical Support/ In-House Engineering Cell/ Supervision**

Recommendations could not be put forward

### **3.5 Planning, scheduling**

Recommendations could not be put forward

### **3.6 Fund flow**

Recommendations could not be put forward

## **4.0 QUALITY OF CONSTRUCTION**

### **4.1 What has been the overall quality of construction under the present intervention?**

The HH survey has reported a low level of satisfaction on quality of construction. It is important to note that the key respondents also have emphasised on the issue of quality control and supervision. The third source, i.e., the Agency-response (bottom up) has reported that access difficulty, remoteness etc. were hindrances towards supervising the construction sites. It may be noted that the three different sources (key respondents, agencies & HH) have independently come to the same conclusion on the need for quality enhancement of shelter construction.

In all future interventions, quality control mechanism must be in place. There is a need for quality audit as an integral part of future shelter projects. Capacity of the site supervisors and the carpenters' will determine the quality of construction. The HHs' enhanced awareness would reinforce this issue since they can insist on the desired quality of construction. The indicators of quality control could be a) strength, b) dimension c) line d) level and e) plumb. The other advantage would be minimising the wastage at site. All these would lead to a cost effective building with low life cycle cost

## **5.0 COST**

### **5.1 Any conscious attempt to reduce the costs? Was it successful?**

HH survey clearly reported that affordability is the most important issue in the shelter programme. According to them the new shelters are hardly affordable. Some of the measures taken were partial use of salvaged materials and local materials. However, the structural materials had to be transported and bad weather caused difficulty while transporting them.

BRM could be the key to cost savings, which could be due to appropriate materials, skills, labour intensive systems, efficient management, appropriate architectural design. There should be an all out effort in this regard. Involve engineering colleges, MES, etc. including international collaboration.

### **5.2 What has been the cost?**

350 USD 2,500 USD was the range of cost

A variety of unit costs have been reported in the documents without explaining the background reasons for this. Therefore, it is important to understand and document under what circumstances, agencies adopted different standards and costs with respect to TWIGs and whether these variations were adequately explained. This could be a step towards building resource mapping.

The bare minimum cost of a shelter of 160-200 sft is about US\$650 assuming that the construction uses 10% salvaged materials and beneficiaries offer free labour.

### **5.3 Use of Disaster-Safe Cost Effective Construction Technologies:**

Disaster safety is a strong component of the post NARGIS shelter programme, however, there is no direct evidence of the use of cost effective construction technologies

## **6.0 CAPACITY BUILDING**

In the cyclone affected areas 200 to 500+ carpenters have been trained by the agencies. As far as the intervention villages are concerned, capacity building has been reported to be satisfactory by the agencies (bottom up) though the key respondents' (top down) report have informed that the existing low level of skill of carpenters is a weakness of the intervention

The desired institutional structure towards sustainable capacity building of the carpenters and the artisans on resilient construction is yet to develop. This should be done at the earliest or else continuous opportunity for capacity building will be lost undermining the achievement and spin off of the present intervention. An in depth study be conducted to arrive feasible training packages based on the experience of post NARGIS. BRC could be a hub for this. National Vocational Qualification (NVQ) of UK or Construction Industry Education and Training (CIET) of South Africa model may be explored. A certification system to be developed - BRC could be a hub of this activity. This issue has been covered in Section 8.3.

Disaster safety of a shelter could be achieved only if all the seven elements (Figure 5.10) are provided in a shelter. The master trainer while teaching should emphasise that these seven are the "must know" competencies in disaster safety. Any transmission loss will be counterproductive. It will be useful to conduct a field research on the trained carpenters on how much and types of transmission loss has taken place, if any.

After examining the four pillars (desktop, key respondents, agency level and HH survey) it appears that the capacity for maintenance, especially preventive and corrective actions is to be developed. A separate cadre of multi-skilled people could be developed through appropriate training to address minor and major maintenance/retrofitting works. Multi skill will include basic knowledge on carpentry, masonry, electrical and plumbing so that one such with a helper can mend the defects. This type of service could be rendered through a maintenance booth or an individual which could either be an ASHG or a BRC. There is a need for networking with the national level resource institutions and the concerned Ministry being the facilitator. While this should be market driven, there will be a need for kick start support with money and on other issues.

Many carpenters have been trained under the DRR programme. However, there is a need for assessing the present and future training demand. The demand could be enhanced by advocating through various means including appropriate radio programmes. This could be a great livelihood opportunity for the local people. A computerised tracking system of the trained people to be in place

Having emphasised on the issue of training for both carpentry and multi skill, it must also be emphasised that training would require funding, which could partially be through sponsorship by the industries. From the agencies it appears that \$50 to \$100 was the training cost per candidate. There is a need for costing of training for different categories starting from basic, advanced, etc. depending upon the competencies desired.

The Agencies' response indicated that there is a lack of clarity between retrofitting and repair. This must be clarified through appropriate measures such as posters. There is a need for developing and illustrated book on retrofitting.

## **7.0 MAINTENANCE**

### **7.1. To what extent has maintenance of building been considered during the planning, design and implementation process?**

Most of the maintenance related issues have been covered under Capacity Building, e.g., maintenance booth, multi skilled people, using the media for awareness building, etc.

There is a need for creating an enabling environment to encourage people to maintain their buildings on a regular basis, which could be in form of providing subsidised materials for maintenance needs. However, the most important action will be to inculcate a culture of maintenance by having attitudinal change – viewing maintenance as an opportunity than a liability

Cyclone shelter- ownership, regular use of the spaces and periodic inspection and routine maintenance system must be ensured. Funding is crucial in this respect.

HH survey reported that there are maintenance problems in their shelters. Field investigation to be conducted on the reported problems regarding finishes and structure. Identify whether these are due to in appropriate design/ technology or quality control.

## **8.0 WATER, SANITATION AND ELECTRICITY**

### **8.1 Are the shelters provided with basic facilities and amenities?**

A comprehensive long term planning is needed for ascertaining adequate quality of water and adequacy during dry seasons. Rainwater harvesting is a strong component, though it needs cost effective storage- possibility of community storage may be explored. Revitalising the traditional system of water collection and storage is important, keeping international standard on quality.

Since there are instances of Arsenic contamination in the neighbouring countries, there is a need for testing quality of water in the Myanmar's cyclone-devastated Irrawaddy delta. It is safer to introduce a system of periodic quality check for Arsenic contamination

Adequate funding and technical assistance will be required on design of toilets. A study to be conducted based on international experience of affordable and maintainable toilets to evolve a suitable solution for Myanmar- this is an extremely important issue

A non-networked sanitation system to be developed to cater to the needs of villages which are isolated.

Recycling of the solid waste and its management, public awareness on hygiene issues are important can be through primary education- use media

Government's enabling environment is important

CSWG report (November, 2010) informs that having an electrical system and a plumbing system were not given priority in building new houses for shelter support recipients in post-Nargis interventions. There were given either grade one or two but for most recipients, the systems do not exist. While the present situation demands basic structural safety from disasters, these issues to be discussed and a suitable long term plan be in place.

## **9.0 DOCUMENTATION, COMMUNICATION AND INFORMATION**

### **9.1 What did the Agencies do for communication of ideas to the stakeholders?**

Greater clarity on resettlement policy is required. It may be important to know why some people could not be informed about eligibility. The findings will help in eliminating such problems in future interventions.

The emphasis to be on how to expand the shelters, joints details, bracing system and anchorage detail. Retrofitting aspects have not been covered by the drawings examined so far.

CSGW report informs that, in general, the respondents are unaware of IEC materials. The report strongly recommended that more IEC materials on disaster risk reduction should be produced and effective strategies be worked out to reach out to greater number of people.

Non-structural mitigation needs to be included in the training manuals

Manuals and posters to emphasise on clear distinction between emergency shelter, transitional shelters, and reconstruction.

## **10.0 IMPACTS AND EFFECTS WITHIN INTERVENTION AREAS**

According to the key respondents' survey report, the programme has made the community more cohesive than before. People feel safer and they are well informed about the safety issues of shelter. Community has the right to choose, community participation has been a major achievement of the programme. The communities are more informed clients than before NARGIS in terms of resilient shelters. However, there is a need for disseminating this on a wider scale.

Due to fund shortage, shelter needs of all the affected people could not be addressed which led to jealousy and misunderstanding between community and agencies. Some people prefer to live in their traditional scattered houses which they used to before Nargis. It is important to know how the agencies dealt with such situations, which could be used in future.

Advocacy is required for all concerned to convey that Shelter supply could be a great opportunity for income generation. The use of local materials and labour intensive shelter construction can lead to substantial income multiplier effect which has a direct bearing on people's affordability and enhance standard of living conditions.

While there are evidences at some of the surveyed villages that DRR is in the process of being integrated with village level preparedness- this is perhaps the most challenging component which needs continuous funding through a sustainable institutional system. One of the key issues in DRR is development of a Multi-Hazard map which could be used by the engineers and architects while designing a shelter. The community-based disaster maps could be digitised and integrated as a second layer of data for MH map.

To mainstream DRR in housing sector enhanced awareness and strong political will support will be very important.

More trees should be planted to increase safety during cyclone as evident from the villagers reporting that, trees saved their lives.

Primary schools could be a sustainable way of continuous evaluation of the disaster situation through participatory vulnerability assessment and using teachers as ambassador and children as disseminator. Climate change issues to be strengthened in DRR and local wisdom in this regard may be vital.

As a result of the use of CGI sheets as roof the livelihood of the existing Nippa leave workers have been adversely affected. They could be absorbed by other income generation system.

## **11.0 SUSTAINABILITY: ON PROGRAMME EXIT**

### **11.1 Environment**

#### **11.2 What are the spin offs of the present interventions**

There was no document on EIA. There is a need for Social and Environmental Impact Assessment (SEIA). This will cover the issues such as impact of Shelter construction in terms of depletion of non renewable and renewable energy and emission of CO<sub>2</sub>. Explore the possibility of carbon credit with the emitters. The climate change issues should be integrated with the EIA. HFA will be the cross cutting issue

Make EIA as a mandatory part of development programmes- funding needed for in-country capacity building in this regard.

Issue of inland river transportation of construction materials also needs review to understand the present status of depletion and emission.

#### **11.3 Sustainability on programme exit**

Grant based housing to be handled carefully- otherwise it may spoil habit and create social tension.

Examine peoples' technical capacity -whether they are in conformity with the structural safety and DRR requirements- accordingly , amending the existing manuals and ICT materials.

Peoples' collaborative efforts could be nurtured through BRCs by keeping room for participation of local people. BRCs trained people will generate domestic level employment as well as help in earning foreign bringing money from foreign countries.

There are trained carpenters, VDC in place and there is a general awareness of the communities on disaster safety. However, these should be nurtured by institutional capacity building and strengthening especially on account of capacity building of construction workers and their certification system.

## 12.0 FUNDING

Non uniformity of funding needs special attention. The exact rationale for these variations must be communicated with the beneficiaries otherwise this may lead to misunderstanding among the communities.

There is a strong need for calculating a realistic area specific costs which are agreeable to government and the donors. This could be based on the implementing agencies' recent experiences. This will help in achieving the target of providing shelter for the affected people in a phased manner through a clearly understood long term plan.

For some people grant based system will work, though it is sustainable to enhance livelihood opportunities to increase their shelter affordability. There could be a need for Policy review to create enabling environment for affordable housing.

The concept of incremental shelter has been proved to be a most sustainable approach. Options such as facilitating small amount of loan many times with short payback period could be explored. All across the developing countries the general trend is to build/expand/transform as and when one gets money to spend on shelter. This calls for an appropriate design and matching construction technology to allow incremental growth. Owing to the lack of that, rain water seepage through the joints will be a perennial problem. There is a need for supporting this through appropriate funding, architectural design and technical support through the RBC.

Shelter sector remains inadequately funded and there is a need for international humanitarian assistance from everyone.

Funding for maintenance of the cyclone shelters to be treated as important as the supply of new ones.

## 13.0 ADMINISTRATIVE AND MANAGEMENT (GoUM)

### 13.1 Standards

Urgent need to publish an updated national building code in the light of recent disasters. A suitable design approval mechanism may be developed within the existing institutional system.

### 13.2 Policy decision

Land tenure issues need to be addressed at policy level and at local level to ensure security and to meet donor requirements. MSWRR & MOC (2010) report suggests that land tenure issues to be consulted with local authority and obtain their local approval.

rate of storm resistant construction could be increased if certain donor restrictions on assistance for construction could be waived or lifted

strong need for computerised database on housing, with appropriate Ministry as a custodian

GoUM to encourage Architecture and engineering institutes to emphasise disaster and climate change as "must know" competencies.

SEEDS ASIA (2010:41) reported that *"it was also found that in many cases women have been excluded from safer construction & DRR trainings"*. This, along with disability issues need special attention.

Enabling policy/strategy to create BRC at local level which will act as Local level institutional support

There is a need for a long term planning for shelters of 50 years life span. However, in its present state of economy, even supply of shelter of 5 years life is extremely difficult. There is a need for benefit cost analysis of whether semi permanent shelters with periodic maintenance is more cost effective than constructing an incremental shelter of more permanent nature. This is a serious issue and the national and international technocrats and planners should examine these to come up with a practical solution of shelter with least maintenance and disaster safe.

## 8.3 GUIDELINES ON A FEW IMPORTANT ISSUES

The recommendations put forward above will be supported by the following guidelines on a few cross cutting interventions. These have been based on the present appraisal and the success stories in other developing countries.

### 8.3.1 BUILDING RESOURCE MAPPING

Building Resource Mapping (BRM) exercise means placing the material and human resource along with the available infrastructure and the context of a particular place on the existing land-use map (preferably on a GIS). The context means the setting where the building is going to be constructed, e.g., the geo-climatic condition, the pattern of living of the people etc, which form the basis of architectural design. BRM is a tool for the key decision makers to plan for sustainable social infrastructure. It helps in planning, designing, implementing, maintaining and eventually replacing buildings, when it is too expensive to maintain. BRM maps the various human and material resources, political and social condition, the road condition, availability of water, electricity etc. of the place.

One of the important aspects of BRM is to identify the available materials and the level of construction skills in a place that determine the cost effective, socially relevant (livelihood) and environment friendly technologies.

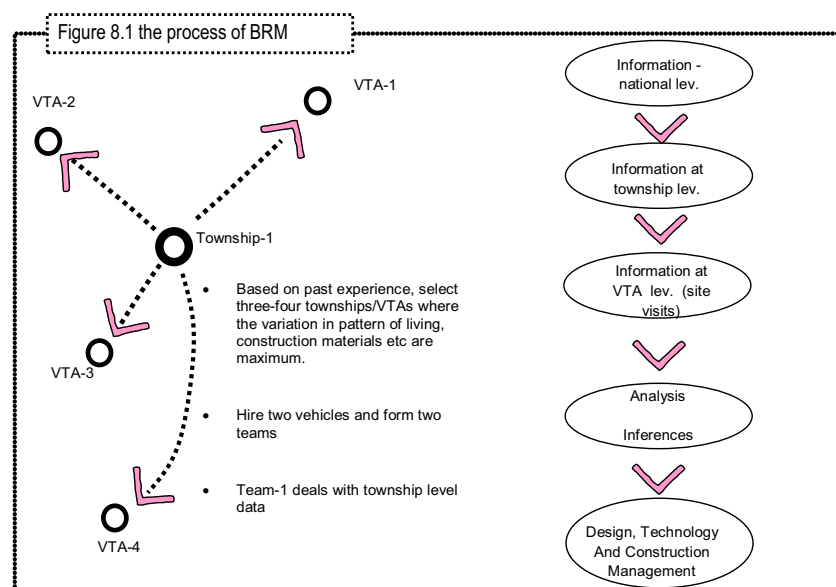
BRM should provide information on the vernacular or traditional technologies of a place. Traditional structures have been developed by people of a particular place through a long evolutionary process of trial and error and are therefore, time tested. Many of them deserve to be reviewed and checked if the systems could be transformed to suit to the present day code requirements. Across the world, there are ample examples of revitalizing traditional technologies to suit to the present day needs that made people feel proud of their heritage. Following is the list of information that should be gathered in BRM exercise.

Table 8.1: List of data for BRM

Sl no	Activity	Sl no	Activity
1	History	9	Water
2	Climatological data	10	Building Materials
3	The district at a glance	11	Technology Audit
4	Soil Types	12	Building Skill
5	Electricity	13	Pattern of living
6	Local festivals	14	School level information
7	Harvesting Seasons	15	Local Institutions – e.g. NGOs
8	Occurrence Of Natural Disasters	16	Community

### IMPORTANT STEPS

1. Checklist- source of data and best source of data
2. Identification and training of people
3. Inform the district and circuit level regarding the objective of BRM and involvement of the personnel and logistic arrangements
4. Carry an Arial photo of the area and camera.



### THE OUTPUTS OF BRM

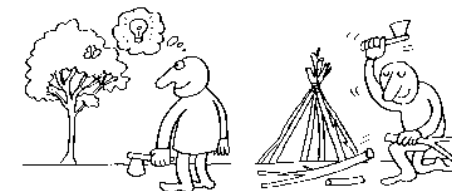
#### Design

- Orientation of building
- INSULATED ROOF AND WALL



#### Technology

- Local materials based
- footing
- wall
- roof



#### Construction Planning and management

- Construction schedule as per season
- Consider harvesting and holidays
- Payment before the festivals



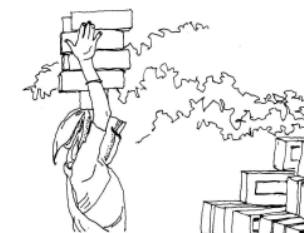
#### 9.7.1. PUBLIC HEALTH

- *USE OF SOAK PIT*
- Tube well depth



#### HRD considerations

- Hands on training of masons





### 8.3.2 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

Investment on housing has impacts on the socio-economic and environment at local level. The issue of income generation in housing production largely depends upon the production method and transportation of materials, construction technology, types and intensity of human resource requirements. Labour intensive technologies provide more money (than cement-steel based systems) to the construction workers HH level. The following figure shows the domain of Social and Environmental impact Assessment (SEIA).

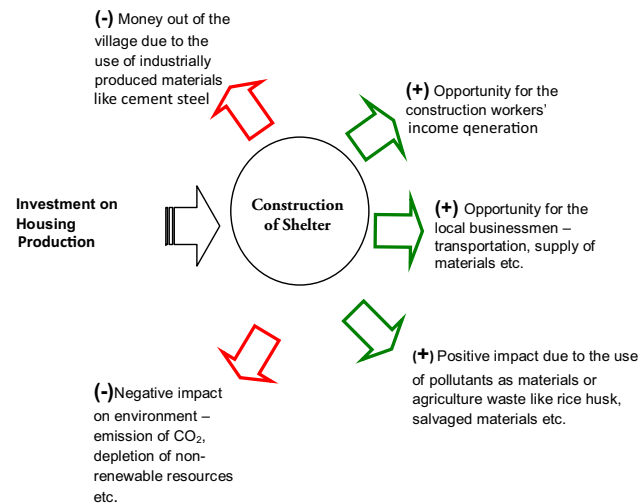


Figure 8.2: Impact of investment on housing production

### 8.3.3 COST EFFECTIVE TECHNOLOGIES

There are at least four ways of reducing cost of a building

- appropriate design
- use of cost effective construction technologies foundation, wall and roof,
- appropriate procurement of materials and manpower and construction management during implementation
- skilled construction workers.

The co-ordinated combination of these will lead to affordable housing. One way of ensuring that these four take place is through establishing building resource centres at local level. The use of innovative technologies based on local materials and ensuring skill development of the local construction workers supported by a strong construction management will make housing affordable.

The most important issue is suitable building materials in the local contexts, which needs a resource mapping exercise. Skilled engineers and architects will be required to analyse the resource mapping data and recommend appropriate technologies for the area which is more durable and cost effective

compared to that of the local market based systems. There is a need for generating data bank on appropriate construction technologies in Myanmar. This, along with the resource mapping exercise, will enable the planners to suggest cost effective and environmental friendly systems which are income generating as well.

The issues such as analysis of rates for the innovative technologies and their code provisions should be arranged for well in advance. This was and has been the major problem in the neighbouring countries for the dissemination of innovative construction systems in the government engineering departments.

### 8.3.4 BUILDING RESOURCE CENTRE: Decentralized Small Building Resource Centre

Owner-driven shelter supply, repair and retrofitting appeared to be a sustainable way in Myanmar considering its socio-cultural heritage. The trained carpenters and the community members can form a small production unit, which will have less overhead and complexity. They are easy to manage with limited managerial skills. Above all, these will create enhanced livelihood generating opportunity for the local people. However, one needs an enabling environment to promote and make this concept successful.

To a common villager the basic questions will be *can I build a home for my family*. S(he) at present has no idea on this and also does not have any access to such information leading to a situation where the HH lives in sub standard condition or spends more but does not get a complete shelter. BRC is a decentralized production cum resource centres that will provide all these information to an individual or group. The local level BRC unit will help them by providing information on loan, cost, design, training and supply of skilled human resources and materials. The unskilled labour component could be contributed by the community group. However, to make it happen there is a need for enabling environment, i.e., the government's assistance on finance, encouraging community groups/Self Help Group (SHG) to access housing through income related societies/groups.

The following needs to be considered in order to make BRC as an economically viable self sustaining institution without any external funding.

#### Finance needed for

Construction of work shed, training centre, godown and office  
Purchase of equipment, training material etc.

**Land** with easy access, water supply and power.

**Institutional frame-work :** To ensure freedom and flexibility in its working, each Centre is managed by setting up of an organisation in the form of a registered trust/Society or such other Act available in Myanmar.

**Marketing of the products :** As a kick start the Township authorities may assure market for use of the products manufactured/stored in the BRC for government projects.

**Involvement of non-governmental organisation:** NGOs can make significant contributions in the development of the BRCs such as in efficient management of operation. Dedicated professionals and social workers also may provide the required leadership and direct BRCs.

**Incentives:** The Government can help BRCs in river transportation of machineries and by tax exemption, training grants under various schemes. The government's fiscal incentives such as concession of tax.

**Status:** Capable Building Resource Centres should be recognised by Govt., Contractors associations, Polytechniques, Industrial Training Institutes for awarding proficiency certificates.

### Success of a BRC will largely depend upon the following

Building Resource mapping exercise in different geo climatic and climatic regions- analyse and recommend area specific appropriate construction technologies. The analysis will be a trade off among unit cost, maintenance costs, labour intensity and environmental impact of construction. Emphasise on local supply system – local materials

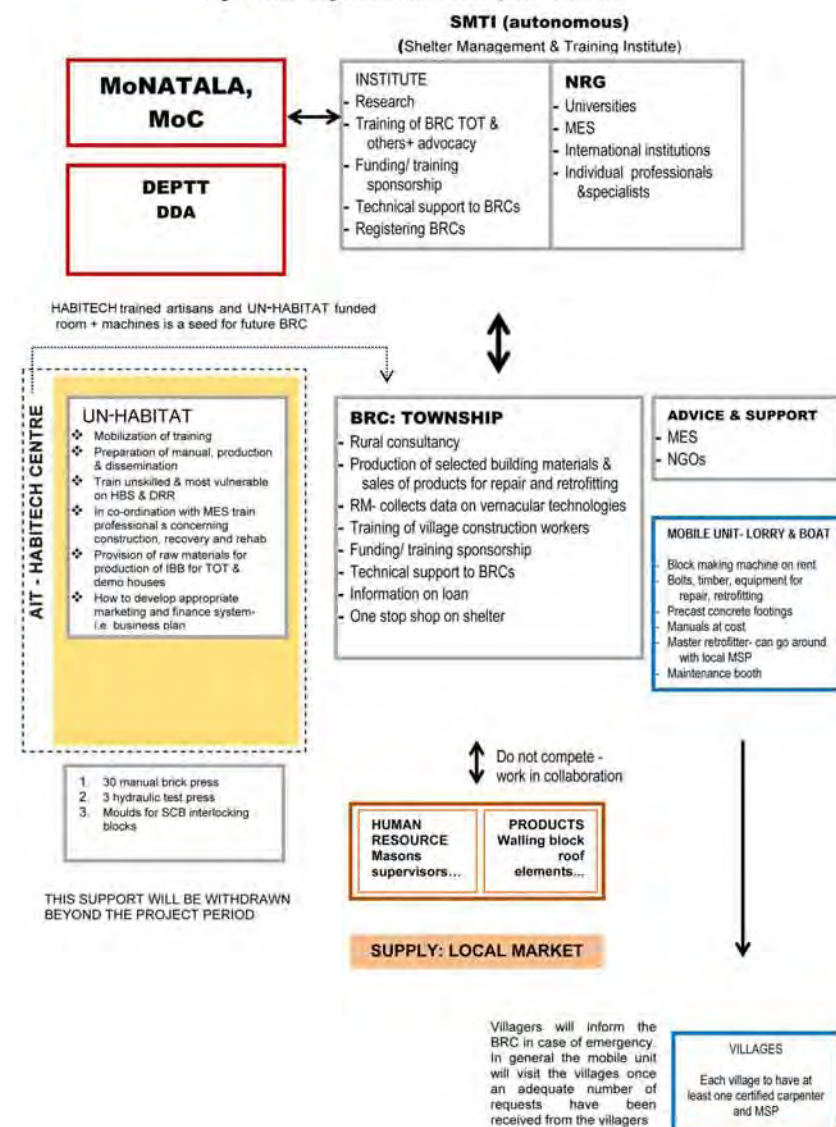
Market demand to be created by giving confidence that one can build home within budget, providing high quality space with affordable maintenance- resources for all these are available

Maintenance support- supply multi-skilled people- maintenance booth

There is already a work plan for establishing HBS cottage industries in the peri urban areas on a pilot basis. Habitech Centre of Asian Institute of Technology (AIT) has been involved in technology transfer of their Habitech Building System (HBS), which consists of interlocking concrete blocks. UN-HABITAT funded this programme in which each centre will be run by six people with one representative each from six villages. Six persons will run the Habitech centre, which will be a profit making organisation, This could be the seed of future BRC. In order to have a Myanmar signature, a brain storming session was conducted at Yangon and the local people came up with the name Lo-Ta-Ya- Gayhar pronounced as Lotaya Geha meaning wish-need-get-home, in essence, meaning a one stop shop for home building and other ancillary services.



Figure 8.3: Proposed institutional system for BRC



### 8.3.5 MAINTENANCE MECHANISM

One of the most crucial issues in sustainable development is shelter maintenance. While an important objective of shelter supply is that the buildings should be of minimum maintenance, there is a need for periodic preventive/corrective interventions to let them survive for its whole life. In order to make it happen, the BRC should have a **Maintenance Booth**. This will provide appropriate materials and will have empanelled multi skilled people to attend the maintenance problems.

In general, buildings develop small defects first. If such defects go unattended, they turn out to be expensive maintenance problems in course of time. Such small defects can be, damaged structural in a small patch, water seepage, etc. Therefore, it is suggested that, a cadre of **multi-skilled human resource** be created at village level so that they could be engaged by the owners of shelters as well as local schools as called-on service providers. Such people should have basic skills of a) masonry repair, b) electrical fault rectification, c) disturbed plumbing and sanitary system.

Training of the multi-skilled people can be organized in the vocational training institutes or in the BRCs. A system of examination and certification should be evolved following some of the countries, who already have such experiences. Each multi-skilled person must have a tool box to enable her/him to carryout repair works. The following people could be trained for sustainable shelter maintenance.

- 1- Traditional mason/ carpenter
- 2- School drop outs
- 3- Any adult interested to get trained

The maintenance booths, which could be a part of BRC, can be evolved to a sustainable model for maintenance of healthcare, housing and school infrastructure. Inter Ministry interaction and collaboration will be required on a top priority basis to develop this system.

### 8.3.6 APPROACHES TO HOUSING DELIVERY MECHANISM

The good examples of housing production in the developing countries have been found to be mostly NGO- driven and linked with livelihood of the recipients through Self Help Group approach. The government may explore the possibility of encouraging nationwide movement on SHG formation and create an enabling environment to underpin the housing production and supply, especially to the poor. For the sustainability of such a community based system there is a need for entry through a programme. In the post GIRI interventions, NGOs or similar organizations can stay with the community for an optimum time period and exit when they develop adequate capacity to run on their own with minimum external support.

Government may consider creating an enabling environment rather than acting as a provider in housing. Appropriate incentives and campaign for disseminating knowledge on the benefits of healthy housing will increase demand for housing. Apart from these the following will encourage community-based housing supply.

- ◆ Flexible loan condition for rural poor (credit card type minimum payment) linked to technical guidance and long and short term income generating activities
- ◆ Access to SHG based on social collateral
- ◆ Micro credit on reasonable terms – enhance income- strong habits and group behavior, additional finance could be leveraged for improved housing
- ◆ Loan based sustainable – however, repayment to be flexible to suit the varying income pattern
- ◆ Incremental design technology

There are many such housing delivery systems led by NGOs, CBOs, parastatals, private housing initiatives, etc. Most of them are working in their own context and driven by NGOs. There are a few common elements in these good practices:

- Based on local materials and locally produced systems
- Technologies are local skill-centred and unskilled labour intensive
- Cost of construction lower than the local market
- Provides information on accessing loans and instills confidence in the community that one can afford her/his own shelter within their financial abilities
- Provides technical and management support for implementation
- Ensures that the repayments by the beneficiaries are done in time
- NGO-Housing supplies are linked with livelihood

**Some Examples Of Housing:** It should be noted that cost effective technology alone cannot solve the housing problem and it needs an appropriate delivery mechanism for the poor people. While there are a few good examples in this respect, a further investigation is required for experimentation and piloting projects to suit the different zones and socio-economic contexts of Myanmar. At present there is adequate enabling environment created by the post NARGIS intervention in shelter. There are a few important issues that need attention to achieve “housing for all” such as lack of clarity on funding, lack of access to information/knowledge to the beneficiaries on finance technical aspects of housing and above all, cost effective and market based production. The following is a description of a few good examples (Gram Vikas, Grameen Bank, HUDCO/HSMI) which have addressed the problem at local level.

#### GRAM VIKAS

Gram Vikas (‘Village Development’) is an organization that has been working since 1979, to bring about sustainable improvement in the quality of life of poor and marginalised rural communities - mostly in Orissa, India. Their approach is to cover every single deserving family in the project village. Their focus is on poor, landless, etc, GV provides access to loans and technical support for constructions including training.

#### GRAMEEN BANK

The Grameen (village) Bank was launched in Bangladesh by Nobel Laureate Muhammad Yunus in 1976. GB was established as an action research project to examine the possibility of designing a credit delivery system to provide banking services targeted at the rural poor to enable them for income generating activities. GB provides loans without collateral and people organize themselves into small savings groups, overseeing punctual repayment by their members. Over the years, the practical experiences of the GB workers revealed that as the income generating capacities of the borrowers improved, their demand for living in improved conditions also increased. GB model has influenced many NGOs in India.



## HUDCO/HSMI

Housing And Urban Development Corporation (HUDCO) Ltd was incorporated on 25th April 1970. HUDCO India was formed to assist various agencies and authorities in upgrading the housing conditions in the country. Special emphasis was laid on the development of housing facilities for the lower income group (LIG) and the economically weaker sections (EWS) of the society. HUDCO provides financial assistance to individuals to enable them to acquire a home of their own through its HUDCO NIWAS HOME LOANS Scheme. The scheme provides a subsidized loan for 15 – 20 years for an EWS individual for a house at least of 25 sq.mts.

**Building Centre:** HUDCO through its training and research wing provides technical support to the beneficiaries who aspire to get HUDCO loan and build their shelters. Apart from that the Building Centres promotes and supplies cost effective construction technologies, conducts masons' training and certification. This is a centre that serves as a rural consultant, who are otherwise expensive to get access to. The philosophy of HUDCO building centres is to bring down the lab knowledge to the grass root level.

## SUMMARY OF GV. GB HUDCO

The NGO based housing supply is mostly livelihood-linked and supporting the soft issues such as how to access to loans. The HUDCO building centres are strong in cost effective technologies and livelihood generation (to some extent) through its production and supply of building materials. The NGOs adopt modified vernacular systems based less cement and steel intensive systems. HUDCO building centres are still cement and steel based because of the government engineering departments' mindset that permanent structure means cement, steel and brick based. While the NGOs' success stories suffer from over dependence of the communities on them, HUDCO building centres have a nationwide presence, though not as intimately linked with the community as the NGO.





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