Long-term Performance of Post-Disaster Housing Reconstruction Projects

Dear Readers....

In the month of May 2017, unprecedented heavy rains severely impacted fourteen districts in the western and southern parts of the country. This resulted in vast scale destruction of assets, the loss of nearly two hundred lives and displaced several thousand people. The recent landslide and flood incidents shows the significant challenge faced by Sri Lanka on post-disaster reconstruction and recovery process. Such disasters exposed people to different kinds of risks and stresses such as poor quality of housing, lack of employment opportunities in newly settled areas, lack of proper infrastructure facilities and fragmented relationship with the host community, etc. In this context, sustainability of post disaster housing reconstruction is vital to ensure the long-term satisfaction of a relocated community. Hence, we are happy to invite you to read the 2nd issue of Research bulletin under the theme of “Long-term sustainability of post disaster reconstruction projects.” We sincerely hope that the readers will enjoy reading this edition of research bulletin. We welcome your feedback and ideas for future action and inclusion for future practice.

Best Wishes,
Eng. (Dr) Asiri Karunawardena
Director General, NBRO

Natural and man-made disasters are a global phenomenon, but one that is of particular concern to countries such as Sri Lanka, which is vulnerable to and gets affected by such events frequently. Recent flooding and landslides that caused significant causalities, displaced thousands, and caused extensive damages to property and the economy are a stark reminder of how damaging these events can be. Often, these events require repair and re-construction of damaged property and even resettlement of affected communities. Whilst urgent action is a necessity during the aftermath of a disaster event requiring re-construction, considering the long-term requirements of the recipients therein is necessary to provide sustainable permanent housing provisions. With this objective in mind, a collaborative research project was launched last year to investigate how previously delivered post-disaster housing projects have performed in the long-term, and identify how the current policy and practice can be enhanced from the essons to be learned. We are delighted to bring you this newsletter containing a range of articles on post-disaster housing, including articles reporting findings from the said research collaboration.

The overall theme of articles in this newsletter is planning and delivering post-disaster housing in a way that they perform and satisfy the requirements of recipients in the long-term, going beyond achieving the immediate, short-term objectives. We believe that these articles will address the dearth of reported work on long-term aspects of post-disaster housing. We propose that lessons to be learned from the post-disaster housing context will also be relevant for post-war and social housing contexts as well, as these too have to be delivered with a long-term view. This newsletter comes at a time in which housing projects are required to be planned and delivered in Sri Lanka for those affected by the recent disaster events, post conflict, as well as extensive social housing for deprived communities. As such, we genuinely hope you will find the articles in this newsletter useful in your line of work. We hope to keep this discussion going forward, and would welcome your comments and suggestions. We genuinely hope you will find the articles in this newsletter useful in your line of work.

Best Wishes,
Dr Gayan Wedawatta
Aston Logistics and Systems Institute
Aston University, UK
A Construction of Evacuation Centres in Aranayake, Badulla and Wattala

At time of disasters, families affected by disasters often occupy public places such as schools and temples. It causes various socio-economic issues and interrupt the functioning of such public places. As a result, the Government of Sri Lanka decided to build evacuation centres in Aranayake, Badulla and Wattala to ensure the safety of the disaster affected families. These evacuation centres were constructed by the Ministry of Disaster Management with the financial assistance from Asian Development Bank (ADB) and the technical guidance of National Building Research Organisation (NBRO).

Features of an evacuation centre designed by NBRO includes a community hall to accommodate nearly 120 individuals and facilities such as an office room, store room, area for food preparation, wash room facilities, toilet facilities, a play area for children and also a parking area, if sufficient space is available. Floor area of the evacuation centre is approximately 6100 Sq.ft.

Content

Page 03
Lessons to be learned and recommendations for long-term sustainability of post-disaster housing projects

Page 05
Longitudinal Study on Long term Performance of Post Tsunami Housing: Case of Galle, Sri Lanka

Page 06
The Policy adopted for Kegalle District Resettlement Programme

Page 07
Resettlement of High Risk Communities in Disaster Prone Districts

Page 09
Exploring Opportunities and Obstacles of the Relocation of Meeriyabedda Landslide Victims in Makabdeniya Estate

Page 11
Analysis of community satisfaction level of the Post Disaster Housing Reconstruction Projects

Resettlement of May, 2017 Flood and Landslide Victims

In May 2017, central and southern half of Sri Lanka was affected by severe landslides and floods which had taken nearly 203 lives and another 90 have gone missing. 500,000 people were affected. Subsequently Government of Sri Lanka has initiated the resettlement of families living in hazard prone areas of Ratnapura, Kalutara, Galle and Matara Districts. Families accommodate in high risk landslide prone areas have been identified by NBRO. These families will be relocated in safer lands allocated by Divisional Secretariats with the consent of NBRO. Resilient house plans which are adaptive to landslides and flood are prepared by NBRO. These plans had been approved by the Parliament and the Cabinet of Ministers.

Editorial Committee

Kihan Sugathapala
Director, Human Settlement Planning and Training Division
Clarence Perera
Consultant, R & D Programme, NBRO
Eshi Erango Wijegunaratne
Scientist, Human Settlement Planning and Training Division
Jude Prasanna
Scientist, Human Settlement Planning and Training Division

Graphics
Dushan Anuradha
Scientist, Human Settlement Planning and Training Division

This themed newsletter is brought to you as part of a collaborative research project between the National Building Research Organisation (NBRO) Sri Lanka, Aston University and University of Huddersfield; co-funded by the Chartered Institute of Building (CIOB) Bowen Jenkins Fund.
Lessons to be Learned and Recommendations for Long-term Sustainability of Post-disaster Housing Projects

Dr Gayan Wedawatta¹ and Prof Bingunath Ingirige²
¹School of Engineering and Applied Science, Aston University, UK
²Global Disaster Resilience Centre, University of Huddersfield, UK

Previous research has shown that permanent re-construction following a natural disaster is often inefficiently managed, uncoordinated, slowly initiated and tend to overlook the long term requirements of the affected community (Lloyd-Jones, 2006). Given that the hardest hit communities would have lost their homes and properties or would have seen their properties being significantly damaged, time leading up to receiving a permanent housing solution is a period subjected to extreme trauma and stress for disaster victims. For housing providers including local and central governments, post-disaster housing is a politically sensitive issue that requires extensive funding. Under such extreme conditions, long-term performance and the satisfaction and requirements of occupants are issues that are often overlooked by policy makers, practitioners, funding bodies, and occupants themselves. Whilst criticism is often levelled at government institutes, previous research has demonstrated that property-owners themselves tend to focus on immediate recovery and reinstatement, and overlook long-term requirements in their haste to re-instate properties as soon as possible. Whilst urgent action is a necessity during the aftermath of a disaster event requiring re-construction, adopting a long-term approach therein is a must to provide sustainable permanent housing provisions. Revisiting post-disaster permanent housing schemes that have been occupied by the recipients beyond the short to medium-term can suggest valuable lessons for future practice. Lessons to be learned therein can shape how such housing provisions are planned, delivered and maintained in the future.

Accordingly, a survey was conducted involving original residents of 3 post-disaster housing projects; projects in which the residents have occupied their properties in excess of 10 years. Based on information collected from the relevant local authorities, the percentage of original housing recipients still occupying their houses is 79%, 56% and 73% in Case study projects 1, 2 and 3 consequently. Whilst the percentage of original recipients remaining is acceptable in Projects 1 and 3, this is quite low in Project 2. As noted by Da Silva et al (2010), initial occupancy rate in post-disaster housing projects is a proxy for quality or acceptability to beneficiaries. Similarly, rate of occupancy of original recipients can be a proxy for long-term satisfaction of the recipients. Whilst a certain level of transfer of ownership is to be expected given the changes in circumstances such as economic status, employment etc, a considerably higher rate could be an indication of the level of dissatisfaction or the property provided not meeting the requirements of the recipients. This seems to be the case particularly in project 2.

Launched to relocate flood victims in Rathnapura district in 2003, Project 2 is the oldest of the 3 projects surveyed and belongs to pre-tsunami era. Following the Boxing Day tsunami in 2004 and the massive housing projects that ensued to house those affected, both policy and practice on post-disaster housing have seen extensive transformation. Higher percentage of original occupants remaining in their houses in the 2 housing projects belonging to the post-tsunami period could be an indication of the fact that the process has now become more occupant friendly, compared to the context before.

In general, respondents included in the survey expressed their satisfaction over a wide number of aspects surveyed. Sample approached in the study were the original recipients who have been the victims of a disaster event and have received a permanent house as part of the selected project. There obviously is some bias here as the least satisfied recipients may have already left their houses. However, the survey provides a good account of the satisfaction levels of those who are still occupying their houses, thus an indication of the level of performance of the housing project. Although level of satisfaction was positive in many aspects, the level of satisfaction was not strong in majority of those aspects. For e.g. although the recipients were in general satisfied about plot size, provision for alterations, size of the house and number of rooms, the level of satisfaction was minor when the Likert options are statistically analysed. When the factors included in the survey are categorised as 1. Physical and technical, and 2. Socio-economic and 3. Infrastructure and services, the aforementioned particularly applies to physical and technical aspects of the house. Recipients were dissatisfied about quality of building materials and quality of workmanship in project 3, which is a donor-driven project. Overall, further improvements seem to be required in delivering a house that satisfy requirements in terms of physical and technical aspects of the house.

The aspects about which the occupants were most satisfied about included availability of educational opportunities, religious places, transport facilities and healthcare facilities. This means that the relevant infrastructure facilities have been put in place adequately in all 3 of these projects. The exceptions are the availability of recreational facilities and public safety / security particularly in Projects 2 and 3. Adequate recreational facilities such as parks and play area and measures to safeguard public safety including adequate policing seems to be aspects that require improvement in post-disaster housing projects. Residents in Project 2 (Rathnapura) were particularly concerned about illicit drugs trade and related social issues in their settlement – thus lack of public safety. Comments from the survey participants suggested that drainage and waste disposal as aspects that require major improvement. These are in line with the general situation in Sri Lanka, as waste disposal and drainage are aspects that lack proper planning and consideration. Forming village committees in association with the relevant local authorities and first responders could be an effective way of providing a platform for the local residents to raise and address these concerns. Occurrences where such committees have been particularly effective both as a way of identifying and addressing community concerns as well as responding to future disaster events were noted in Bangladesh (Wedawatta et al., 2016).

Aspects the occupants were most dissatisfied about were the issues related to their economic status. Occupants expressed their dissatisfaction about the availability of space to carry out livelihood, ability to use home for income generation, and availability of employment and income generation opportunities. This suggests that there is an urgent requirement...
to consider the livelihoods of housing recipients and employment opportunities in the region when planning post-disaster housing projects. Adverse socio-economic changes including reduced employment opportunities, income, and empowerment of women have been noted as issues with post-disaster resettlement projects (Burnell, 2011). A number of respondents reported having significant land for cultivation before the disaster event and losing this land due to the event. Being farmers traditionally, they now have lost the ability to engage in their usual farming activities as the limited land area in the current settlement does not permit such activities. Employment opportunities for women too was noted as particularly low. If a strategy to provide vocational, self-employment training and support was integrated in to the housing project, there is potential for these aspects to be improved. Post-conflict re-construction work facilitated by the United Nations Human Settlements Programme (UN-Habitat) in Northern Sri Lanka where the construction and repair of 17,945 houses were completed seems to be an instance where these aspects have been considered and addressed (UN-Habitat, 2015). It is clear from this case as well that a fundamental requirement is active community involvement from the very beginning; in order to identify their occupations, how the houses should facilitate their income generation, and alternative income generation activities, required training etc. Whilst extra work is required upfront, such an approach can improve sustainability of resettled communities and reduce dependency on aid, government in the long run. Tafti and Tomlinson (2015) concluded that the two sectors central to the recovery of households – housing and livelihood – as disintegrated following a different sequence. Lower-income groups were found to be the hardest hit by this fragmentation. Further, Burnell (2011) in her review noted that the shelter sector lacks clear definition ‘with little progress being made to incorporate livelihoods and sustainability into its core principles’. This seems to have been the case with the surveyed projects as well.

The focus group discussion with the policy makers and housing providers shed further light on survey findings. In particular, the following observations were made by the resource persons participating the focus group discussions:

- Focus of post-disaster projects in Sri Lanka is often on the technical side of things, and social aspects including behaviour of people are not afforded due consideration.
- The need to consider long-term requirements like family expansion and the ability to expand houses at a later stage.
- At the local level, houses are normally constructed by workmen who lack formal training and expertise. These workmen should be provided with necessary technical knowledge as currently this aspect is largely ignored. This is specially the case is owner driven projects.
- Lack of consideration of people’s livelihood activities in planning and development of post-disaster, as well as social housing projects.
- Lack of a masterplan in housing re-construction.
- As part of the masterplan, the need to pre-identify land for potential resettlement projects as post-disaster housing is required in the country on a continuous basis. Then these developments can be part of a coherent development initiative rather than sporadic resettlement projects.
- Whilst necessary policies are available at a national level, regulations and enforcement strategies are required to ensure implementation.

- The need to monitor progress of housing projects, review completion reports, and monitor post-occupation performance continuously by a central authority.

Much of these issues are in line with the survey findings. Additional issues such as the need for regulations to enforce policy, need of a masterplan etc were identified and discussed.

Key recommendations to emerge from the study include:

- True and active community involvement in the process from the very beginning of the process. It is clear that recipient requirements needs to be clearly identified and addressed from the beginning, as opposed to just providing ‘a house’. It is also worth remembering that most of the recipients have had permanent houses before so do come with expectations as opposed to social housing where the recipients may not have had a permanent shelter before.
- Income restoration of housing recipients to be integrated within every housing project. 70% of the survey participants had their previous homes fully damaged whereas the rest have suffered partial damages whilst suffering further economic damages. 55% of the participants stated that their economic situation is now worse off that it was before, with only 21% stating their economic status is now better off. This is consistent with the dissatisfaction expressed as discussed above about income generation opportunities. Therefore, assessment of occupations of the housing recipients, facilities required to undertake their income generation activities, potential alternative employment, vocational training required and financial assistance have to be integrated within the overall re-construction programme. Consideration of recreational facilities.
- Drainage and waste management was noted as an issue in these housing projects. In future projects, sustainable waste management technologies needs to be considered and implemented.
- Whilst the residents were generally satisfied about the infrastructure facilities in the projects surveyed, this was not the case with regard to recreational facilities such as parks and play grounds. This suggests that there is a need to include such facilities within post-disaster projects.
- Development of a masterplan for post-disaster housing re-construction integrating current best practices and lessons learned from previous projects.

Detailed analysis of the survey and focus group findings will be made available via the project website. 

www.post-disaster-reconstruction.info.

References


Longitudinal Study on Long term Performance of Post Tsunami Housing: Case of Galle, Sri Lanka

Dr Nishara Fernando
Senior Lecturer, Department of Sociology, University of Colombo

Tsunami was an unheard and unfamiliar word to Sri Lankans prior to 26th December, 2004, and the authorities were unprepared or equipped to handle a disaster of this magnitude. The government had to make crucial policy decisions with regard to post-tsunami reconstruction and rehabilitation. In hindsight, these decisions have both positive as well as negative outcomes 13 years later. This article attempts to explore the long term impact of tsunami relocation based on the research conducted in several relocated settlements situated far from the city of Galle, Sri Lanka using a longitudinal study design. Four relocated settlements (namely China Charity Village, Salzburg, Harithagama and Kadiragamar) were selected to conduct fieldwork for this study.

Buffer zone vs planned relocated settlements
The buffer zone regulations were imposed with the intention of safeguarding people from future tsunamis or other coastal hazards. It was also reinforced to provide them an opportunity to improve their living conditions in safe areas away from the sea. One could argue that it is not the policy that has created problems but rather the forced migration of tsunami displaced families to settle down in unplanned settlements far from their homes. This situation exposed them to new stresses and risks. Without their previous support systems they found it difficult to successfully cope with the new situation which made them vulnerable to poverty or chronic poverty. The donated houses were constructed rapidly in a short amount of time to expedite the transfer of displaced people from transitional shelters with minimal facilities on to permanent shelter. It is also evident that most of the displaced wanted to stay closer to their previous homes located in the buffer zone. They did not want to move into remote areas with new socio-economic and cultural conditions. Moving away would expose them to conflicts with local communities and create difficulties in finding good neighbors. Forcing people to move out of their homes had aggravated their existing issues and problems. Although it must be noted that government officials did not have an option than offering government land to donors to build settlements but inspection and monitoring of construction to ensure the quality of the houses were not sufficiently carried out by the government officers.

Relocation failure
Multiple factors have impacted the relocated people and as a result there are tsunami settlements today with less than forty percent of original beneficiaries. The government faces a problem when issuing deeds to tsunami beneficiaries as a reasonable proportion of them have moved out by illegally selling, renting or closing their houses. Some of the families have locked up their house and left the settlements by with the intention of selling the house after obtaining deeds from the government. This situation has attracted second or third generation of original inhabitants to buy houses from the tsunami relocation settlements for a bargain as the environment, socio-economic and cultural conditions are ideal for their living standards. Government decided to relocate families whose houses were partially or completely destroyed due to the tsunami within the buffer zone. The affected communities received a new house for their partially destroyed one from a tsunami settlement but as stated before most of them wanted to sell it after obtaining the deeds because they have renovated their original house within the city. Reduction of the buffer zone regulation from 100 m to 45 m within the Galle city area allowed some families to stay in the city while having received a house within a relocation settlement. This was like winning a lottery for some families. From this group some wanted to earn an extra income by selling or renting the house they received from the government.

Although guidelines were issued by the government on construction of relocation settlements there were settlements which did not meet the minimum level of required standards and had substandard facilities. This created divisions among the tsunami relocated persons. It was a positive outcome that squatters or unauthorized inhabitants living within the buffer zone also received houses from the relocation settlements. However, it is not clear whether they are the same ones who have moved back to the buffer zone by selling, renting or vacating their houses 13 years after relocation. It is not possible to completely stop people from moving out of the settlements for various socio-economic and personal reasons. Nevertheless, when over half of the beneficiaries move out or have vacated their houses it is vital to explore the reasons as it is a sign of relocation failure.

Change of identity
Relocated people were often referred to as “tsunami villagers” or sometimes based on their place of origin (Ginthota community or Pettigalawatta community) by host communities. Relocated communities consider these new identities as negative identities. Issues with livelihoods springing from lack of opportunities in new areas and distance to the sea have created many problems at the household level arising from increased expenditure and decreased income. 12 years after the tsunami, some of the people have purchased small motor bikes or three wheelers to commute to the city but majority still complain about the distance to the city. Therefore, policy makers, planners and implementers who have employed relocation as a natural disaster risk reduction strategy need to think about how to avert these long-term negative impacts in the future. In order to make relocation a success a set of guidelines on sustainable relocation has to be designed considering relocation as a long term process which needs close monitoring.

Conclusion
In this context, this study stresses the importance of relocating disaster affected people into planned settlements closer to their homes along with common and individual infrastructure facilities adhering to policy guidelines. This is why the author stressed the importance of community-centric relocation policy guidelines to successfully relocate people, ensuring their safety against another tsunami or (or other coastal hazards) poverty and chronic poverty. These people centered policy guidelines need to be formulated with the aim of minimizing relocation.
failures by considering the four stages of relocation (prior, immediately after, two years after and long time after). It is envisaged that adherence to these guidelines would make the relocation process more successful and effective to enhance the lives of the relocated communities.

The Policy Adopted for Kegalle District Resettlement Programme

Anuruddha Vijekumara
Scientist, Human Settlement & Planning Division
National Building research Organisation

In the process of Kegalle district resettlement, GOSL initiated the process in two main phases as 1. Temporary re-settlement and 2. Permanent resettlement of families. In these two phases, several government and non-governmental organizations were involved in providing various services for affected families.

Initially, all the affected and at risk families in the district were temporarily resettled in identified public places (schools, temples, and public grounds) until the completion of land identification process. There were two emergency evacuation centers which accommodated 65 landslide affected families.

Around 860 families were temporarily resettled in temporary shelters (Tents). International Organization for Migration (IOM) and Shelter Box were involved in providing transitional shelters in selected lands.

The resettlement program for permanent resettlement of families were introduced with an objective to provide housing for families affected by landslide on May 26, 2016 in Kegalle District.

In this resettlement programme beneficiaries were selected by the relevant divisional secretaries (DSDs) from;
- Directly affected families of the landslide events of May 2016
- Indirectly affected families whose houses became at high risk due to extreme rainfall in the district in May 2016 and as identified by NBRO

The Resettlement Programme offered two options:
Option I - Donor Driven Housing Construction
Option II- Home Owner Driven Housing Construction

NBRO identified 1962 families living in high risk areas in the district by September 2016 and earmarked them for resettlement. The beneficiaries were given two options and most of the direct victims were given houses constructed by the donors to reduce the burden on the direct victims.

In the home owner driven housing programme beneficiaries were given two sub-options. In the first option a land plot of approximately 10 perches will be provided from the already identified lands and the beneficiary was allocated Rs 1.2 Mn in cash to build the resilient core house. In the second option, building on their own suitable land was allowed and an additional Rs 0.4 Mn was given as an incentive. The programme was focused on achieving the following two objectives;
- To complete a core-house for the beneficiaries with the Government financial assistance
- To ensure a disaster resilient house is constructed

Concept of home owner driven housing construction programme

The concept is to construct the ‘Core-House’ with the Government assistance and to ensure the use of public money (Government Assistance) in the housing construction under the Resettlement Programme to the ‘Build Back Better Concept’.

Features that incorporated in a core house:
- Minimum floor area of 650 sq. ft.
- Resilient foundation and a superstructure (As directed by NBRO)
- Two bedrooms
- A kitchen
- A permanent roof and
- A water seal toilet and the septic tank

Implementation arrangement

The resettlement program is being implemented under the leadership of District Secretary of Kegalle with the assistance of Divisional Secretaries. Resettlement Unit of National Building Research Organisation will provide technical support during the implementation phase to ensure the completion of a disaster resilient core house with mandatory features.

Operational procedure

Land Selection – NBRO’s Kegalle District office along with Resettlement Unit of NBRO gave its recommendations during land acquisition and land subdivision. In the suitability of selected land for resettlement.

House Plan – House plans designed by NBRO and approved by the Cabinet were recommended for housing construction. Beneficiaries also could have their own house plans with the approval of NBRO. However, in addition to the NBRO approval training and awareness on the house plan preparation and estimations were provided.

House Construction – NBRO closely supervised the house construction along with Technical Officers (TOs) of DSD. Further, NBRO provided the necessary guidelines in resilient house construction. While providing required technical assistance on request, formats to release of financial installments were issued to Technical Officers of respective divisions.
After completion of the resilient core house the beneficiary is requested to obtain a certificate before releasing the final installment. NBRO and DSD coordinated with the donors assisting the program as and when required.

Financial Assistance For House Construction – Beneficiaries of the program were granted Rs. 1.2 Mn for house construction in five (05) installments based on the stage of completion. Beneficiaries who have obtained the approval for Individual

Resettlement Sites (IRS) were granted a lump sum of Rs. 0.4 Mn to acquire land for house construction. NBRO approval on these lands were checked before releasing the grant. DSD will scrutinize the ownership of the land.

Construction, monitoring and fund releasing – Technical Officers of relevant Divisional Secretariats will monitor the house construction and recommend to release the stage completion installment.

Resettlement of High Risk Communities in Disaster Prone Districts

Danushka Jayathilake
Scientist, Human Settlement & Planning Division
National Building research Organisation

Background
NBRO has identified ten districts in Sri Lanka as landslide-prone, namely – Badulla, Galle, Hambantota, Kegalle, Kalutara, Kandy, Matale, Mataara, Nuwara Eliya and Ratnapura. Studies of the NBRO indicate that unplanned human settlements and infrastructure development activities have resulted the increasing trend of landslides observed in the central highlands of the country. NBRO as the national focal point for landslide risk management has identified the importance of overall human settlement planning as a development guidance and risk management tool.

NBRO as a research and development institution has been studying about the landslide prone communities since early 1990’s and it has been continuing updating its capacity. NBRO has been constructing disaster resilient model houses for disasters like, landslide, flood, tsunami and high wind to reduce the impact of these disasters on human lives. Recent studies permitted NBRO to develop rapid assessment methods to identify high risk communities for disasters. As a result of field investigations, NBRO has identified 14,860 most vulnerable buildings to landslide disaster within the aforementioned ten districts.

<table>
<thead>
<tr>
<th>Districts</th>
<th>No of High Risk Buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Badulla</td>
<td>6,418</td>
</tr>
<tr>
<td>Nuwara Eliya</td>
<td>3,496</td>
</tr>
<tr>
<td>Kandy</td>
<td>1,282</td>
</tr>
<tr>
<td>Matale</td>
<td>210</td>
</tr>
<tr>
<td>Kegalle</td>
<td>824</td>
</tr>
<tr>
<td>Kalutara</td>
<td>929</td>
</tr>
<tr>
<td>Mataara</td>
<td>591</td>
</tr>
<tr>
<td>Ratnapura</td>
<td>757</td>
</tr>
<tr>
<td>Hambantota</td>
<td>343</td>
</tr>
<tr>
<td>Total</td>
<td>14,860</td>
</tr>
</tbody>
</table>

Table 1 – Identified high risk buildings at district wise

Having identified communities living in high risk areas prone to landslides NBRO contemplates in initiating a program to resettle/relocate occupants in identified houses. The National Physical Planning Department (NPPD) has been declared areas above 300m altitude in the central highlands as Central Environmental Sensitive Areas by National Physical Plan - 2030. These areas represent a special resource complex with distinctive topography, soils, climate and vegetation. These areas have recommended for implementing environmental conservation programs, and are exclusion zones where construction or development projects will not be permitted. Therefore existing settlements in the areas will be demoted and will not be considered in selecting the resettlement locations under this project. The total cost for this five year resettlement project will be LKR 21 billion including livelihood development activities.

Project Objectives
- Development of resilient townships/settlements for vulnerable communities
- Introduction of resilient building codes/regulation
- Reduce the number of families living in high risk landslide prone areas
- Reduce the number of deaths and economic damage due to landslides
- Reduce response & post-disaster reconstruction cost

Implementation Arrangements
In order to protect the identified 14,860 families from landslide and flood hazard by either mitigation or resettlement, a suitable program has to be implemented. Application of mitigation measures for the most of the high risk landslide areas will not be cost effective due to technical constraints and hence, resettlement in safe locations remains as the most viable option. Reconstruction of affected houses with resilient features in the same location would be the most viable option for flood prone areas. Therefore, a project has been formulated to resettle families in the identified high risk areas in safer locations and to reconstruct flood affected houses in the same location with resilient features.

NBRO is in the process of identifying houses located in high risk landslide prone areas in the aforementioned ten districts. Landslide affected/high-risk houses will be constructed in safer locations. Also, NBRO will ensure the flood affected houses are reconstructed with resilient features to withstand the future hazards of the particular areas. A similar mechanism is being implemented in Kegalle district in the resettlement program for recent landslide victims.

Selection of lands for the resettlement will be carried out through divisional secretaries with the approval of respective district secretaries and the Land Bank of NBRO will facilitate fast expedition of this work.

Long-term Performance of Post-Disaster Housing Reconstruction Projects
The selected lands will be investigated and approved by NBRO on their suitability. Subdivision of land will be done under the supervision of NBRO. Also NBRO will advise on land preparation ensuring minimum disturbance to the existing terrain and avoiding unnecessary cuts and steep slopes.

Considerations for designing a new resettlement site
When designing a new settlement, planners and authorities should bear in mind that there is no specific model or prototype for a layout plan. Each site has different particularities in terms of topography, size, context, access, etc. Aspects such as roads and plot arrangements, will of course depend on the site condition. The layout here presented (Fig. 4) is by no means a model to follow, it only intends to illustrate an example of how houses and roads could be arranged as well as the type of social infrastructure (parks, places of worship, etc.) that may be required.

It is imperative to note that the people to be resettled must be fully involved in the designing and planning of their relocation site. Their active engagement is required not only to increase their motivation and empowerment but also to create opportunities for public learning where community members can share their knowledge of the area and express their needs and concerns. Community participation can thus ensure that the new resettlement will effectively and appropriately respond to the needs of the people.

Considerations in the design:
• Sense of identity and belongingness of residents
• Hierarchy of elements
• Location of social infrastructure
• Site Topography, including levels, contours, views, orientation, wind, etc.

1. Evacuation/Community centre
2. Place of worship
3. Open public space / market
4. Children’s playground
5. Nursery (if required)

Following guidelines will be followed for the planning of resilient settlements considering the local situation of the respective area. These threshold levels have been defined according to the guidelines developed by Council for Scientific and Industrial Research (CSIR), South Africa.

<table>
<thead>
<tr>
<th>Facility</th>
<th>Minimum Population</th>
<th>Maximum Travel Time</th>
<th>Maximum Walking Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursery school</td>
<td>500</td>
<td>10 min</td>
<td>750 m</td>
</tr>
<tr>
<td>Primary school</td>
<td>3,000 - 4,000</td>
<td>20 min</td>
<td>1.5 km</td>
</tr>
<tr>
<td>High School</td>
<td>6,000 - 10,000</td>
<td>30 min</td>
<td>2.25 km</td>
</tr>
<tr>
<td>Mobile clinic</td>
<td>5,000</td>
<td>40 min</td>
<td>1 km</td>
</tr>
<tr>
<td>Clinic</td>
<td>3,000</td>
<td>10 min</td>
<td>2 km</td>
</tr>
<tr>
<td>Parks/Playground</td>
<td></td>
<td>10 min</td>
<td>500 m</td>
</tr>
<tr>
<td>Library</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community centres</td>
<td>500</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Threshold levels of infrastructure facilities
Source: Guidelines for Human Settlement Planning and Design – CSIR
Implementing Organizations
The project will be implemented by National Building Research Organisation in collaboration with District Secretariats, Divisional Secretariats, other relevant stakeholder organizations and communities in the villages.

NBRO has already identified the high risk communities through hazard mapping and field investigations. NBRO together with the Divisional Secretariats will select beneficiaries from the high risk communities in consent with District Secretariats. Land selection process will be conducted by District Secretariats through Divisional Secretariats and the suitability of selected lands will be ascertained by NBRO.

When selecting the lands for resettlement, NBRO will consider

National Physical Planning Policy (NPPP), Sri Lanka Comprehensive Disaster Management Plan (SLCDMP), other local and regional plans and guidelines, rules and regulations which are valid to the respective areas.

Type of houses provided to the communities will be decided based on the land condition and socio-economic condition of the beneficiaries. NBRO proposes to incorporate socio-economic aspects into the resettlement plans to ensure long term sustainability of the project. Construction of the detached houses will be carried out by owner driven method and other houses will be constructed by the contractors selected through competitive bidding.

Exploring Opportunities and Obstacles of the Relocation of Meeriyabedda Landslide Victims in Makaldeniya estate

Dr. Nishara Fernando1 & Jude Prasanna2
1Senior Lecturer, Department of Sociology, University of Colombo
2Scientist, Human Settlement & Planning Division, National Building Research Organisation

In recent times threat of landslides in Sri Lanka show an increasing trend which claimed hundreds of lives and destroyed properties. A massive landslide was triggered in Koslanda, Meeriyabedda estate in Badulla district in October 2014 victimizing 37 lives and buried around 70 line-houses, left over 275 people homeless. Soon after this tragedy, Government of Sri Lanka initiated a resettlement project for the victimized families to construct 75 housing units. The project was implemented by the District Secretariat of Badulla in collaboration with the Urban Development Authority (UDA), Sri Lanka Army, Ministry of Disaster Management, and National Building Research Organisation (NBRO). NBRO was responsible to: 1. assist in site selection, 2. guide on land development and resilient construction, 3. supervision and monitoring of land development, 4. monitoring of housing construction and construction of drainages and retaining structures.

This article presents the opportunities and obstacles brought into the relocation of Meeriyabedda landslide victims in Makaldeniya estate, where 75 housing units have been constructed by the Government of Sri Lanka. This article is based on the study conducted on the current performance of Resettlement of Meeriyabedda landslide victims in Makaldeniya estate. The study analysed displacement and relocation processes through the lens of Michal Cernea’s model on Resettling Displaced Populations (RRP model).

The data collected using household questionnaire survey with the occupants of all 75 housing units has explored both opportunities and obstacles brought into these community as a result of relocation from Meeriyabedda to Makaldeniya estate.

Opportunities
1. Minority (49%) of the respondents are satisfied with the location of the new settlement.
2. All the occupants were satisfied about the allocation of single housing units for each family. At their previous settlement they were residing in line houses, where more than one family resides together.
3. Major share (57%) of the respondents were satisfied with the floor area of the housing unit and number of rooms.
4. Majority (79%) of the beneficiaries were satisfied with the

with the materials used in building of the new housing units.
5. With respect to the orientation and privacy of the new housing units, majority (80% and 77% respectively) satisfied.
6. Major part (72%) of the community members praise the current location as resilient to disasters.
7. All respondents stated that they were yet to be given the deeds of the houses but all are hopeful that they would get them soon.
8. Respondents were satisfied with the sanitary facilities in the new housing setting.
9. All the housing units have access to individual water supply and electricity connections.
10. Main part of respondents were satisfied with the distance to the city center (76%), and satisfied with the access to infrastructure facilities such as hospitals and roads (74%).
11. Greater number of respondents (77%) also satisfied with the availability of the public services such as market and community center in or in the vicinity of the settlement.
12. Main part of respondents pointed out that there is no conflict with the host community (84%).
13. Majority is satisfied with the educational opportunities available at the new setting (68%).
14. With respect to health and public safety in the new setting, majority of the occupants are satisfied (74%).
15. Major part of respondents praise the improvement in child growth and level of hygiene.
16. Majority of beneficiaries (85%) have no future determinations of moving out of this settlement.

Obstacles
1. Majority (47%) of the respondents are dissatisfied with the plot size of their lands.
2. Majority of the relocated families (85%) experiences economic difficulties due to the loss of; harvest, livestock and other assets by the landslide as well as the relocation.
3. The location of the settlement has created a sizable distance to the workplaces. As a result, majority of respondents (73%) were dissatisfied were dissatisfied with the distance from the new setting to the workplace.
4. As a result of resettlement has created distance to the
workplaces longer, it has increased expenses on travel and fuel, making their lives more and more difficult.
5. Majority (85%) of the respondents were dissatisfied with the space available to carry out income earning activities, which they engaged in Meeriyabedda estate.
6. Occupants cannot use the adjoining lands as land is owned by the estate and the officials have prohibited from engaging in income earning activities which have negatively impacted their household income.
7. 49% of occupants not satisfied with the space available for expansion or alteration of the said housing units.
8. Majority (85%) of the respondents were of the view that their income has decreased after relocation. It is mainly due to the reasons of distance to the previous workplace, lack of new employment opportunities in the new setting and lack of skills and financial assets to begin a self-employment activity.
9. It is evident from household survey that, monthly expenditure of resettled households has increased as a result of relocation, owing to new household expenses on transportation and fluctuations of food prices.

The study noted a mix of opinions with regard to relocation. It presents the disaster affected community’s perspective on successfulness of the process as well as how they feel as it has been delivered to them. NBRO believes, findings of the study will guide the national, district, and divisional level decision makers to get comprehensive idea regarding opportunities and drawbacks generated in the context of disaster induced forced relocation.

Resettlement of Landslide Victims of May 2017

Kushan Vimukthi
Scientist, Human Settlement Planning & Training Division, National Building Research Organisation

National Building Research Organisation (NBRO) has experience on the resettlement of landslide victims since Meeriyabedda landslide which occurred on 2014 May. After a 3 year period a similar type of landslides were occurred in May 2017. The requirement for landslide resilient settlement concept emerged with this situation and suitable plans were developed for implementation. Additionally, several training programs and discussions were conducted with different communities, stakeholders and agencies. A resettlement framework was developed for mainstreaming all the resettlement activities under the Ministry of Disaster Management (MoD) and NBRO was appointed to provide technical inputs to achieve “build-back-better” status.

A massive rainfall was received with the beginning of South-West monsoon and some area received over 600mm rainfall within 24 hours. Around 40 major landslides occurred damaging to properties and affecting the people in the districts of Rathnapura, Kalutara, Matara, Galle and Kegalle. Following table shows the summary of damage in May 2017.

**Overall disaster summary in Sri Lanka**

<table>
<thead>
<tr>
<th>People affected</th>
<th>230,571</th>
</tr>
</thead>
<tbody>
<tr>
<td>Families affected</td>
<td>56,529</td>
</tr>
<tr>
<td>Deaths</td>
<td>100</td>
</tr>
<tr>
<td>People missing</td>
<td>91</td>
</tr>
<tr>
<td>Injured</td>
<td>34</td>
</tr>
<tr>
<td>Safety shelters (7 Districts)</td>
<td>119</td>
</tr>
<tr>
<td>Individual in shelters</td>
<td>27,054</td>
</tr>
<tr>
<td>Families in shelters</td>
<td>5,440</td>
</tr>
</tbody>
</table>

**Table 3: Overall disaster summary in Sri Lanka**

Statistics of affected persons in Kalutara, Galle and Matara districts are shown below.

<table>
<thead>
<tr>
<th>District</th>
<th>Affected</th>
<th>Impact</th>
<th>Displaced</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Families</td>
<td>People</td>
<td>Deaths</td>
</tr>
<tr>
<td>Kalutara</td>
<td>8606</td>
<td>37,492</td>
<td>37</td>
</tr>
<tr>
<td>Galle</td>
<td>32,515</td>
<td>126,047</td>
<td>-</td>
</tr>
<tr>
<td>Matara</td>
<td>-</td>
<td>6,003</td>
<td>31</td>
</tr>
</tbody>
</table>

**Table 4: Affected persons in Kalutara, Galle and Matara Districts**

**Land Selection Mechanism**

The lands will be identified by respective Divisional Secretariat office and list of available lands was submitted to technical institutes for evaluation of suitability. In this process, lands were identified according to five main criteria;
1. Availability of water
2. Availability of electricity
3. Distance to market place, within 2.5km
4. Access to public transportation service, within 500m
5. Land slope below 16 degrees.

The above criteria will be further examined with other parameters. The descriptive land selection criteria is as follows;

<table>
<thead>
<tr>
<th>Land and land suitability</th>
<th>1. Location (GN, DS, local authority and access road)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Land using</td>
</tr>
<tr>
<td></td>
<td>3. Land description</td>
</tr>
<tr>
<td></td>
<td>4. Extent</td>
</tr>
<tr>
<td>Hazard potential</td>
<td>5. Slope</td>
</tr>
<tr>
<td></td>
<td>6. Flood</td>
</tr>
<tr>
<td></td>
<td>7. Land slide</td>
</tr>
<tr>
<td></td>
<td>8. Presence of boulders</td>
</tr>
<tr>
<td></td>
<td>9. Natural springs and streams</td>
</tr>
<tr>
<td></td>
<td>10. Soil condition</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>11. Access to water</td>
</tr>
<tr>
<td></td>
<td>12. access to electricity</td>
</tr>
<tr>
<td></td>
<td>13. road access</td>
</tr>
<tr>
<td>Transport and market</td>
<td>14. access to town center within 2.5 km</td>
</tr>
<tr>
<td></td>
<td>15. access to bus route within 0.5 km</td>
</tr>
<tr>
<td>Educational</td>
<td>16. access to school</td>
</tr>
<tr>
<td></td>
<td>17. access to gym school</td>
</tr>
<tr>
<td>Others</td>
<td>18. access to religious places</td>
</tr>
<tr>
<td></td>
<td>19. access to medical facilities</td>
</tr>
<tr>
<td></td>
<td>20. access to police station</td>
</tr>
<tr>
<td></td>
<td>21. access to post office</td>
</tr>
<tr>
<td></td>
<td>22. host community</td>
</tr>
</tbody>
</table>

The following criteria will be further examined with other parameters. The descriptive land selection criteria is as follows;

<table>
<thead>
<tr>
<th>Land and land suitability</th>
<th>1. Location (GN, DS, local authority and access road)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Land using</td>
</tr>
<tr>
<td></td>
<td>3. Land description</td>
</tr>
<tr>
<td></td>
<td>4. Extent</td>
</tr>
</tbody>
</table>

**Following diagram shows the steps for land selection.**

1. **GN wise land identification**
   - Inform

2. **Divisional secretariat office**
   - Inform

3. **District office**
   - District Secretary
4. **District Secretary**
   - Reject site
5. **Approved site**

**Figure 5: Steps of land selection.**
Kalutara land selection summary 2017

<table>
<thead>
<tr>
<th>No.</th>
<th>Site</th>
<th>District</th>
<th>Extent</th>
<th>Usable area</th>
<th>Overall area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arapara land site (Galle division)</td>
<td>Dodanduwa</td>
<td>1.7 acres</td>
<td>1 acre</td>
<td>9 acres</td>
</tr>
<tr>
<td>2</td>
<td>Prathal site</td>
<td>Dodanduwa</td>
<td>13 acres</td>
<td>8 acres</td>
<td>4 acres</td>
</tr>
<tr>
<td>3</td>
<td>Gangamawatha land site</td>
<td>Medawarapu</td>
<td>5 acres</td>
<td>4 acres</td>
<td>12 acres</td>
</tr>
<tr>
<td>4</td>
<td>Goyakanda land site</td>
<td>Medawarapu</td>
<td>1.2 acres</td>
<td>1 acre</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>New Chatte (Tempo division)</td>
<td>Malpelling</td>
<td>4 acres</td>
<td>3.8 acres</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>New Chatte (Bawatha division)</td>
<td>Medawarapu</td>
<td>3 acres</td>
<td>2.8 acres</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>New Chatte (Kandigala division)</td>
<td>Medawarapu</td>
<td>10 acres</td>
<td>10 acres</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Mahaththiy</td>
<td>Matugama</td>
<td>5 acres</td>
<td>4.5 acres</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Wewage land site</td>
<td>Matugama</td>
<td>0.5 acres</td>
<td>0.3 acres</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Malikandawa site 1</td>
<td>Bulathakanda</td>
<td>3 acres</td>
<td>2.8 acres</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Malikandawa site 2</td>
<td>Bulathakanda</td>
<td>11 acres</td>
<td>10 acres</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Malikandawa site</td>
<td>Bulathakanda</td>
<td>10 parcels</td>
<td>28 parcels</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Ranasinuwewa land site</td>
<td>Bulathakanda</td>
<td>5 acres</td>
<td>4.5 acres</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Wala-kalita land site</td>
<td>Palembantalawa</td>
<td>10 parcels</td>
<td>25 parcels</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Thiruwalawela land site</td>
<td>Palembantalawa</td>
<td>10 acres</td>
<td>5 acres</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Malegoda land site</td>
<td>Palembantalawa</td>
<td>4 acres</td>
<td>2 acres</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>82.35 acres</td>
</tr>
</tbody>
</table>

Table 6: Kalutara district land selection summary.

Discussion

It was observed that, government system does not directly follow the Resettlement Framework which was developed by Ministry of Disaster Management. The government approved 1.6Mn to purchase land and construct a core house. But responsible officials do not provide these information to community. Therefore, they took unnecessary pressure for providing the lands. Even though DS division is short of lands for resettlement, they will provide more than 10 perch lands lots.

1.2 Mn is allocated to construct a core house in government provided lands. Most DS divisions are only following this step. The donor driven resettlement programmes are not many and more programmes will not be expected for implementation in the future as well. Therefore, providing of 1.2Mn for housing unit is the perfect choice.

In this period, it has been planned to resettle the flood affected communities. However, there is still a certain probability to construct buildings with necessary features for flood victims. In the design, 100 year flood situation will be assured and it will be over-estimating situation in design.

Resettlement is considered as the last option and before that, living with hazard and mitigation practices will be considered. However, most Divisional secretaries are not aware of these options and they only think, providing of lands for those who are prone to hazards.

The awareness programmes on resettlement framework should be conducted in each district level to make aware the officers. In addition, resilient construction practices should be concerned to each DS level and that helps to avoid future problems.

Analysis of Community Satisfaction Level of the Post Disaster Housing Reconstruction Projects

Eshi Eranga Wijegunaratne\(^1\) and Dishni Tharika\(^1\)

\(^1\)Scientists, Human Settlement Planning & Training Division, National Building Research Organisation

Disaster is a critical incident which causes extensive human, material, economic or environmental losses and impacts. Considering past 10 years time, Sri Lanka experienced several of disasters (landslides, floods, droughts etc.) and people faced many difficulties with these kinds of disasters. Many relocation projects have been implemented in Sri Lanka by various groups of people like government/ Non-government organizations, institutions, NGO and INGO’s in order to help people who have met above-mentioned difficulties during disasters. Noteworthy, it is essential to ensure the sustainability of those projects in the long run. Therefore, it is important to have an eye on the implementation process of the reconstruction programs and study to assess negative and positive outcomes since outcome of a project directly affects the life style of resettled people.

National Building Research Organisation (NBRO) of the Ministry of Disaster Management is the one of the primary organizations working with natural disaster and related research work. As a component of a NBRO’S research programme, a research study was conducted on long – term sustainability of post – disaster housing reconstruction projects by selecting three case studies, in Akmeemana, Rathnapura and Hanguranketha. Main objective of the study was to investigate the long – term performance of post disaster housing construction and make suitable recommendations on effective and sustainable post - disaster housing re - construction. To assess the performance of users a household survey was carried out within each of the case studies. Selected three case studies were China Friendship Village – Akmeemana, Palm Garden Estate – Rathnapura and Johnston Estate – Hanguranketha. The research team completed a household survey that covers 119 households (China Friendship Village – 29 HH, Palm Garden Estate – 50 HH and Johnston Estate – 40 HH). This article deliberates about the survey findings in brief. The survey focused on five areas which come under Key Performance Indicators, such as physical evaluation, economic evaluation, social evaluation, disaster resilience and overall evaluation. Therefore, analysis has come up under these areas. According to the survey findings, none of the settlements had the same number of people who were settled initially as subsequently some of them had migrated.
elsewhere, seeking better educational and employment prospects and for other similar reasons.

![Figure 8: Number of persons accommodated in housing units](image)

When considering the overall satisfaction about the resettlement process in each of the case studies, more people are in a satisfactory level than who are in an unsatisfactory level.

![Figure 7: Percentage of overall satisfaction](image)

Since most of the people are in a satisfactory level, the research has revealed that there are both positive and negative reasons contributing. It is important to discover that the satisfaction level of each evaluation factor. Meanwhile people are positively satisfied with the availability of proper infrastructure facilities (better accessibility to roads, public water, schools, public market and etc.) and good quality houses (with proper ventilation, availability of the space in the house, availability of sanitary facilities etc.) better than their previous settlements. Most of the resettled people in each three case studies were previously having low quality houses than the current situation.

![Figure 8: Good Quality houses in Johnston](image)

In terms of economic evaluation, the study has revealed that income level of people has decreased and their expenditure has increased due to escalation of transportation costs etc. Hence satisfaction level of people in this respect is at a lower level. The situation is similar in all three case studies. When considering the disaster resilience aspect, community disaster preparedness is in a higher level in each three case studies and redundacy level is in a medium scale most of the time.

Furthermore, some people are dissatisfied with their current settlements due to several reasons, relating to many aspects like inadequate space to carry out livelihood activities, inadequate space for disposal waste in a proper manner, distance to livelihoods are longer than the previous, unavailability of proper drainage networks (in Palm garden Estate) fragmented relationship with neighbors (China Friendship Village), and deeds problems (in each three case studies) etc.

As a conclusion, the study has discovered that although most of people’s satisfaction level is at a higher level regarding relocation projects, still there are issues needing attention in order to increase the satisfaction level of each and every person who are relocated. Then only one can ensure the long term sustainability of a post disaster housing project.