

Assessment of Rohingya Emergency Shelter Efforts May-Sept 2018

Report + Photography: Kevin Rowell, November 21 2018



By: ©Kevin Rowell November 21 2018

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Opening

This report documents the in-country reviews of the emergency shelters built and was conducted between October 15th and October 26th, 2018. In addition, field inspections and interviews were conducted with NGO Staff and in country actors, all of whom showed transparency in sharing documentation of their process.



Children at play on the edge of a bamboo bridge.

Findings

Every construction project involves changes. Designs are constantly being adapted to available materials, site conditions; and timelines are constantly adjusted. Proper oversight, following best practices, and the ability to react and adjust are just a few indicators of a builder's or an organization's competence and integrity.

Building projects like these, given the social and environmental realities, are challenging, as these projects have multiple factors that influence the outcome of each iteration. Care must be taken to move wisely when adjusting protocols, workflows, and designs. Concurrent adjustment invariably affect other project parts, some in adverse and unforeseeable ways.

The general condition of the Rohingya communities remains out of the control of the implementing organizations. The legal regulations and social patterns common to displaced persons camps such as this, makes for an incredibly complex scenario for well-meaning agencies.

During this review, we received reports acts of impropriety in the construction process related to the handling of beneficiaries. These include accusations that homeowners were inappropriately engaged in the leveling of their own land, or were required to supply building materials, for which they should have received compensation. These allegations were passed on to a protection specialist for further review. Conclusion of those findings will not be included in this report, though aspects may be referenced in the report for clarity.

Overall, the projects reviewed in this study represent a bold vision to help an at-risk community living on foreign soil in an adverse situation. Every effort has been made to have this document reviewed for accuracy, though errors and omissions are possible in any such review.

Context

Large-scale disasters often gain the attention and support of international agencies, including government, non-governmental organizations, religious groups, secular nonprofits, and other humanitarian actors. Over the last several decades, larger organizations, such as the United Nations, Red Cross and Red Crescent, and the International Organization of Migration (IOM) have been responsible for helping nation states adapt to crisis while advocating for the rights of affected populations and providing varying levels of material support. Ultimately, the host country of the migration maintains the largest influence over the response of internal and external humanitarian actors. That country's laws, regulations, and policies will control the humanitarian actors' efforts to the extent they are enforced. Forgoing host country approval puts outside actors in a position of threatening the nation state's rule of law and can easily be viewed as illegal. This behavior typically results in expulsion of the organization. At times, it has also adversely affected the perception of other aid organizations' efforts in a region.

Massive population migrations often strain a country's ability to provide care and services for its resident population. In a country with limited resources, this can be especially true. Many nations choose to develop strong border policies that call for immediate forced deportation of illegal migrants, regardless of the threat to their lives. In this case, the Government of Bangladesh has accepted the Rohingya refugee migrants, though the terms of that acceptance are still unfolding.



Communal tools sit on top of a shelter's roof while not in use. In the distance various colors of tarp roofs dot the landscape.

Response Coordination

No single actor in this project has full control over its portion of implementation. Instead, in partnerships such as this, the donor drives the scope of the humanitarian work, the oversight organization monitors work progress and disburses funds, and the implementing partner manages the core work. This project of refugee shelter provision in Bangladesh must be viewed in terms of the broader changing context of implementation across all of the refugee camps.

Below is a brief description of the oversight systems in place, both in terms of country and in camp oversight:

- The Government of Bangladesh (GOB) has put in place strict regulations in regards to how Rohingya refugees may receive aid, shelter, and compensation.
- Inter Sector Coordination Group (ISCG) has been the main facilitation body between government and non-government organizations at the highest level. It helps organizations identify and achieve short- and long-term goals.
- International Organization for Migration (IOM) and United Nations High Commissioner for Refugees (UNHCR) are implementing partners with general oversight of the camps from the NGO and international aid sector, while Refugee Relief and Repatriation Commission (RRRC) monitors the camps on behalf of GOB through its Camp In Charge (CIC). The CIC has an office embedded in each camp and provides local governance, overseeing all sectors acting in their camp.
- Various NGOs and program partners may act inside of specific camps on an approved and co-ordinated project basis. Typically these efforts are coordinated through CICs.
- For Rohingya refugees living in the camps, their local community leadership is overseen by a Majhee. (Majhee is a high social category in Muslim societies.) These Majhee were put into place early during the migration through assignment by the Bangladesh Military. Typically, the Majhee in a neighborhood will be the primary point of contact for any community needs in that camp.
- The Majhee is the one person through whom residents may receive access to work with NGOs or acting partners. They act as primary contact for managing labor arrangements.
- The Majhee has the authority to determine which home should be built first, or to identify who receives benefits in a community.

At the time of this reporting UNHCR was working to correct severe issues in the Majhee leadership throughout the camps. Complaints of corruption and abuse of power have been explicit and ongoing. The hope is to hold democratic elections in the near future to address this. IT IS CLEAR FROM BENEFICIARY TESTIMONY THAT CORRUPTION ON THE COMMUNITY SIDE OF COORDINATION HARMED EFFORTS IN THE DELIVERY OF SHELTERS AND RESOURCES.



Critical infrastructure like roads, drainage systems, potable tube wells, toilets, showers, stairs and bridges have been installed to assure accessibility, hygiene and general population safety.

Standards

The specifics of each emergency response unfolds organically with the actors who are available to address the affected community needs. Past learning on this point inspired the creation of the Sphere Standards. These stand as guidelines rather than strict rules of aid provision and intervention.

“The Sphere Project – or ‘Sphere’ – was initiated in 1997 by a group of humanitarian non-governmental organizations (NGOs) and the International Red Cross and Red Crescent Movement. Their aim was to improve the quality of their actions during disaster response and to be held accountable for them. They based Sphere’s philosophy on two core beliefs: first, that those affected by disaster or conflict have a right to life with dignity and, therefore, a right to assistance; and second, that all possible steps should be taken to alleviate human suffering arising out of disaster or conflict.”

— The Sphere Project

In the case of the Rohingya refugee effort, the primary objectives were clearly the preservation of lives by providing shelter adequate to survive the monsoon season. With our observations of the condition of the homes in the post monsoon season, it can be noted that these main goals were achieved and the essence of the Sphere Standards were honored.



A Non-Food Item (NFI) Distribution center is pictured. The vast majority of structures in the camps are made of bamboo.

Shelter and Non-food Aid

In the initial year of response, most of the shelter construction occurred through the coordination of camp management teams or through distribution of materials through the Non-Food Item (NFI) distribution centers. We visited NFI centers and were shown sample kits that agencies had distributed. One kit was typically provided per household, free of charge. They included a land erosion control kit that contained sand bags and tarps, and an Emergency Shelter Kit (ESK), which included a tarp and rope.



Tie-down Kits were supplied initially to help further support the emergency shelter provisions and their resistance to monsoon season. They typically consisted of rope, metal rebar stakes, and sandbags.



Upgraded Shelter Kits released in December, 2017 contain rope, wire, nails, tarps, sandbags, and as available an allocation of 4 Borak and 60 Mulli-Bamboo.

All of the kits included the opportunity for community members to review training materials at the point of distribution as well as tool loaning programs. It is understood that beneficiaries would perform the actual work in most instances. This helped to assure the beneficiaries had what they need better their homes and communities. Strategies such as this facilitate participatory solutions proven to increase the beneficiaries' adaptation to their new home and community.

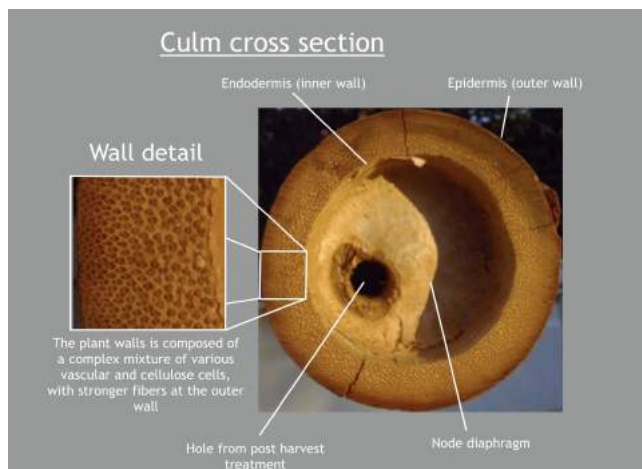
At the time of this writing, a large sector of the refugee population remain in emergency shelters and have not yet received any upgrade in their shelter.



Bamboo

Bamboo is a natural plant material that grows in tropical and some temperate climates, and though it has properties similar to wood it is considered a grass. Bamboo grows much faster than wood-producing trees, and some species can be used structurally for building. It grows through a complex root system called a Rhizome. Like most natural materials, it is susceptible to breakdown by exposure to elements UV, rainfall, molds, termites, beetles, and various other conditions. Supply chain control and post harvest preservation and treatment can aid in longevity. At the time of writing this report, IOM confirmed that treated bamboo was still **not** available in the region at any scale, and that plans were in process for development of bamboo treatment facilities for early 2019.

Bamboo was brought in from suppliers all over the country, with every acting in-country organization attempting to source material at the same time. The supply chain was strained throughout the process and remains so today. IOM recently identified that approximately 22 million bamboo poles have been utilized in the shelter and infrastructure development in the camps to date, all untreated with variable quality controls from harvesting to allocation.



This image details the physical structure of the inner portion of a bamboo culm.



This image details the physical structure of the outer portion of a bamboo culm.

I visited supply yards serving the public and private sector. Unlike developed building material and supply markets there are little material standards in place in the region. It is difficult to say if this due to a lack of knowledge in country or market pressure pushing lower quality bamboo poles into the material pipeline.



A local vendor is seen looking over a recent shipment of bamboo. Numerous vendors such as this exist outside the camp in the surrounding areas. They sell poles to the general public and serve as an informal secondary market for materials.

Given the conditions, it is not surprising that the material quality is questionable across pipelines. Moving forward this is something the refugee response community will need to correct. IOM is currently working with the GOB Agroforestry Ministry to address some of these supply chain issues through improved practices. Recognized bamboo materials standards will greatly improve the reliability of shelters over time.

The lightest green material in a pile of bamboo likely represents poles 1-3 years old and while they might have an acceptable diameter (typ. 2.5-4”), the fiber quality of these young poles is more susceptible to shrinkage, cracking and deterioration. 3-6 year old poles are easily identified by a more pronounced fungal patina that for both Mulli and Borak would typically only develop after multiple years of exposure. The oldest poles may be 7-10+ years old, but more important than age, is the point at which the parent rhizome ceases to provide the culm/pole with nutrients. Once this occurs, the poles essentially begin to degrade in place and begin showing signs of cracking and discoloration even before harvest. For the sake of this assessment it can be said that non ideal-aged material, can be found across the entire supply chain.



Borak - Bambusa Balcoa - This load of around 300 poles was dropped in a camp distribution yard in Camp 4 on the day of one of our visits.

There are two bamboos most commonly observed in the markets, though over 32 species are known to be present in the country.

Melocanna Baccifera — Known locally as Mulli Bamboo is widely used for secondary construction elements. In these Rohingya refugee structures they were typically used in roof assemblies as whole or partial poles (splints) or woven into panels to be used in wall construction. Their small diameter and thin walls lend themselves to easy crafting with simple hand tools.

Bambusa Balcoa —Known Locally as Borak bamboo, the poles are typically used in smaller structures as columns and beams. Wall thickness and general stability make these poles suitable for solid “fish-Mouth” as well as “peg and lash” methods of joinery typical in the region.



A flag in the foreground adorned with a block number marks the Mahjees shelter. In the distance a community member stands on the roof of a shelter to spread laundry for drying

Observations on Quality and Methods of Shelter Construction

The condition of the bamboo poles in homes surveyed was, dry and in most instances, typical of natural breakdown, by UV exposure to the elements, and natural aging. The presence of beetles and termites was pervasive in all structures in all of the camps that were observed. The exact amount of deterioration varied greatly. This can be attributed to the materials' age at harvest, time of harvest, the construction style, location of the finished shelter, and season of completion.

The construction quality of the shelters demonstrates a good understanding of the physical properties of the materials. Solid practices in design implementation, and standardized execution. Modest discrepancies that were discovered during inspection are not expected to impact the project's intended 6-month to 1 year serviceability from the time of completion, excluding extreme environmental exposure. All of structures reviewed, as well as the majority of other buildings in the camps, are meant to provide basic protection during normal weather patterns. But none of them are expected to survive the direct impact of cyclone force winds.

IOM and UNHCR are working with agencies to protect refugees in each camp from cyclones by constructing cyclone-resistant community shelters to the extent the GOB has approved this level of intervention. In addition, steps are currently underway to move forward with more durable interim designs that have just recently been approved by the GOB. These new designs have concrete based foundations, robust cross-bracing and well-designed connection details.

- Horizontal beams are seated inside the fish mouth cut pillars. Typically, there is a node within a few inches of the bearing surface.
- Pillars are properly oriented with the larger diameter root end of the material at the bottom of the structure.
- Pillar-to-beam connections are performed by lashing through a hole that is cut below the highest node. Proper lashing is critical at these connections, as was observed.
- In nearly all shelters that were inspected, the synthetic rope used was of a high quality and consistent tying methods were utilized at critical connections. Multiple wraps accumulate friction which resists knots becoming undone from vibration during high winds. The rope utilized in the joinery appears to conform with the strength required of the components inside the structure, as designed.
- An open woven grid of split bamboo is over each roof membrane (black plastic over tarps). The grid is secured at its perimeter and in the field to full round bamboo members. The grid's purpose is to hold the black plastic and tarp down in wind.
- The roof edge detail was of a very high quality with the tarp interface at the edge of the roof appearing uniform, robust, and well tied. This critical detail will determine the durability of the roof as cyclone season approaches and sustained wind speeds are more frequent. The roof edges on the shelters are more robust than most other styles observed in the camp that were designed and constructed by other entities. This is likely the most critical detail to maintain as the tarps are most susceptible to wind damage along this edge. An education campaign is recommended to help assure that beneficiaries are able to monitor and repair roofs as wind loads increase heading into cyclone season.



A typical pillar to ridge beam connection, demonstrating consistent and quality craftsmanship.

Roof Assemblies

Variations were identified in the roof framing methods. Each variation has its own benefits, as illustrated and described below. As these shelters were built when only temporary structures were allowed by law, they are by definition not meant to be durable beyond 1 year and have no implied resistance to high wind loads or other unusual loads. They were built with community labor of variable skill, and with a design that evolved somewhat as field experience informed each iteration.



Method A: The purlins provide the primary support of the roof tarpaulin. In this variation the purlins are split Mulli bamboo with the cun side down, lashed to and supported by the bamboo rafters.



Method B: The bamboo rafters provide the primary support of the roof tarpaulin. This reduces potential for rainwater pooling because any draping of the tarp slopes continuously to the eave. The purlins are whole round Mulli bamboo, and



Method C: 4 to 5 Borak bamboo primary rafters are larger diameter and are spaced farther apart than in Methods A and B. Full round horizontal bamboo purlins are supported by and lashed to those rafters. An additional layer of sloping bamboo purlins run from ridge to eave, lashed to the horizontal purlins. This is a stronger system for downward loads, but reduces the distribution of wind uplift loads to fewer points – only where the fewer primary rafters are tied to the tops of the walls.

Tarpaulins and Roof Membranes

The roofs observed have at minimum of one 170-190 GSM tarp and one sheet of continuous black plastic as a surface layer to protect the tarp from UV exposure and incidental puncture. In the vast majority of homes reviewed, roofs contain two tarps as well as the black plastic.



This exterior view of the roof edge shows typical exterior battens, rafters and roof edge lashings, all of which protect the tarp from wind damage.

- The most critical connections to maintain will likely be the roof edge where upper rafters are bound to the roof edge as the tarp membranes are the most susceptible to wind damage at these points. An education campaign is recommended to help assure that beneficiaries are able to monitor and repair roofs as wind loads increase in the cyclone season.

Wall Panels

Wall panels and their weaving styles vary greatly based on the materials available and used. The tightness of weaving and aesthetics of panels vary greatly based on the thickness of the weave material as well as the wall thickness of the bamboo poles used. In most cases, raw materials are brought within close proximity of the camps before being woven into finished panels. We heard from several beneficiaries that their panels were made on site or in the camp.

In regions of the world with common bamboo practices, panels are typically woven while the material is green. The greater flexibility of the material with a higher moisture content lends itself to a high level of workability. All bamboo panels that are built with green materials are subject to shrinkage, as fibers contract as they dry.



The interior of this home shows the same wall panel construction when observed from direct exterior light on the lower left wall section and indirect interior lighting on the right wall section. Gaps or space in the wall weave can appear larger from a distance due to the lights refraction as it passes through the wall, close physical inspection is required to verify quality.

Most of the panels observed have direct soil contact along the base of the walls. This adds structural rigidity to bottom of the panel but also increases exposure to moisture and insect damage.



Damage has occurred from this wall panels direct contact with the earth. A combination of moisture wicking and insect damage has traveled through the lower 6 inches of the wall.

The tops of the wall panels are typically connected to the beams that support the roof. Additional mid-panel horizontal poles add rigidity and are connected to the main vertical posts.

Conclusion

In order to truly understand the impact of any development project, one must look deeper than the structures themselves. In compiling this report, there have been glimpses into the challenges of the organizations and individuals who helped this project come into being, from the aid groups to the community members they serve. Relief work requires a balanced and mature perspective on the realities facing at risk communities. Relief work is the result of many teams of people each doing their piece to serve the affected communities. Care must be taken at each level to foster an atmosphere of mutual respect and open dialogue.



Relief and development work are meant to serve individuals and communities. It is a service, that at its purest state, is an offering to lift people up. It is most effective when beneficiaries accept the offering, and make it their own through personal touches and adaptation to family and community needs. This community ownership was observed extensively in the shelters and communities served in these projects. The signs that a community is engaged in its own care becomes readily apparent to experienced development workers. Homes and the surrounding areas are cared for the area around the front porch will be clear and inviting.

In homes where the beneficiary is engaged, the insides are well organized and clean. They show signs of an integrated culture that is adapting to adversity. It is most clear a project is effective when beneficiaries accept the offerings, and make it their own. This was observed throughout the homes in this project.



Inside of a shelter recipients home a sewing machine and fabric sit neatly organized. The male resident expressed joy at having a shelter and way to offer his skills as a tailor with his community and as a way to earn a modest living.

People are beginning to provide for themselves, they are innovating to survive and even thrive. Individuals and families have started small stores, are providing services like tailor shops, homeschooling and even a small bakery. People have begun to share skills as they did in their home communities. They are working together to plant food to provide sustenance for themselves and their families.

Children were seen playing in the streets laughing with each other and with strangers. People were “hanging out” in small groups outside in public at peak hours it was at times hard to navigate certain areas inside of a community simply because of human business in the streets.

This community inclusive of the agencies and individuals present is flourishing, despite immense challenges. The road ahead is long and no aspect of it is clear. For now the Rohingya in Bangladesh remain stateless restricted in travel and opportunities for education and lasting development. This situation on whole needs as much encouragement from the rest of humanity as can be gathered. May the words of this report offer some insight to this impactful project. May this project and those like it continue to benefit the Rohingya families they have sheltered through the storms thus far.



Children sit on top of a roof watching the neighborhood below. It was common to see children and adults walking on their roofs.

Maintenance, repair and improvements

All structures require maintenance, though these may not be designed to last through extreme weather conditions they can certainly be maintained and modified to help them fair better.



A close up of a roof shows the deterioration to the top layer of black plastic, the small amount of earth on the bottom edge is washed down from a sandbag put on the roof during the rains. The sandbags helped to reduce the uplift on the membrane during winds. This is an owner implemented innovation.

Core shelter interventions may include:

- Robust diagonal bracing in the wall and roof planes will add durability in the instance of sustained lateral loading, as occur in high winds.
- Meticulous and regular review of all lashings to assure tight knots and where necessary add additional redundancy.
- The continued review of the tarp roofs interface at the edge of the roof plan to assure the tarp end remains bound in the lateral splits. Additional frequency of cross ties between the upper and lower roof structure on this line will only serve to benefit the homes durability.
- For instances where insect presence is minimal, spraying a borax liquid solution especially on the exposed inner wall panels could slow and deter deterioration.
- The top layer of roofing grid in many instances is already showing severe UV deterioration, these would best be addressed before they become broken and then pose added risk for puncturing the membrane.



Looking out over the valleys the terrains impressive slopes dictate the orientation and placement of homes and critical infrastructure.

About the Author

Kevin Rowell has devoted himself to the study of sustainability, working extensively on international development particularly in Asia and Latin America. In 2004 he cofounded the Natural Builders, a contracting company that works around the world doing cutting-edge work in sustainable building technology, population management and strategic development. His passion for natural materials and their use in construction has shown through his work with groups such as the World Monuments Fund in preserving traditional architecture, and the United Nations where he has facilitated dialogues about the use of local materials in construction for development. He is a contributing reviewer of both the California California Straw building code and the ASTM Earthen Building Standard.

His work and articles have been featured in papers such as the New York Times, Home Energy (a building industry magazine), and documentaries that include the full-length PBS documentary “Dirt” alongside environmental activists Vandana Shiva, Majora Carter, and Wes Jackson. His lectures at industry conferences and universities, such as U.C. Berkeley, McGill University and conferences the world over are about engaging the audience to act on behalf of our planet. He works tirelessly to provide powerful ways for communities to engage locally and globally to create a more sustainable and peaceful world.

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