A HOLISTIC APPROACH TO

Supporting Resilient (Re)Construction in Remote Fijian Communities

Habitat for Humanity® Fiji

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NEW ZEALAND
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Front Cover: Levuka-I-Daku, Matuku Island, Lau
Back Cover: Yadua Village beach at low tide, Gau Island, Lomaiviti

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Contents

Pictured is a Rotuman *bure* in Losa Village in the district of Itu'ti'u

Preface

Remote communities in Fiji face enormous challenges when it comes to housing; these challenges are only being made worse due to the effects of climate change, increasing rates of rural-urban migration and inaccessible supply chains.

As a result, many actors (both shelter and non-shelter alike) offer housing assistance to these communities. Unfortunately, well-meaning intentions do not always translate into local empowerment or a sustainable housing supply chain. Additionally, assistance is often too focused on the construction itself and fail to recognise the context and timeline in which the build is implemented.

Habitat for Humanity Fiji along with Habitat for Humanity New Zealand have recognised that all assistance in remote communities across the Pacific should be informed by local contexts, be responsive to community challenges and ultimately reinforce community capacities. Stakeholders across the sector in Fiji also agree with this sentiment and have contributed to the discussion on the 'Way Forward' - which is presented in this publication.

This research offers a holistic approach for Shelter and non-Shelter Stakeholders who want to assist remote communities in affordable and appropriate (re) construction efforts to build resilient homes. These guidelines aim to present tangible opportunities to improve local capabilities when it comes to building in remote Fijian communities.

These learnings have already made significant impact within Habitat for Humanity Fiji's shelter program and with their publication, we hope that readers will be able to take on board the voices of the community as well.

Masi Latianara
National Director, Habitat for Humanity Fiji

Acronyms

APTC	Australian Pacific Training Coalition
BBS	Build Back Safer
CSOs	Civil Society Organization
DISMAC	Disaster Management Committee
HFH	Habitat for Humanity
HFHF	Habitat for Humanity Fiji
IEC	Information, Education and Communication
NGO	Non Government Organisation
NLTB	TLTB – iTaukei Land Trust Board
PFID	Partnership for International Development
TC	Tropical Cyclone
TVET	Technical and Vocational Education Training
TnK	Turaga ni Koro

Glossary

Bou: King or Direct Post

Buabua/Boutu/Fagraea Gracilipes: A Local Fijian hardwood

Bure: A traditional Fijian house, built of traditional materials like thatch

Hahe'e: local Rotuman timber

I-Taukei: Indigenous Fijian

Magimagi: Coconut fiber ropes or sinnets made from the husks of green coconuts

Mataisau/Lemaki: Traditional carpenter

Mataqali: Fijian Clan

Na bitu: Bamboo

Niu: Coconut tree

Solesolevaki: Communal Cooperation

Soli: Financial contribution/Fundraising

Talanoa: A traditional group discussion in Fiji and other Pacific Island nations, often free-flowing, which may involve consumption of kava

Turaga ni Koro: Village Headman

Uto: Breadfruit tree

Vakacokotaki ni vale: Reconstruction of houses

Vale Lolo / Kubu Lolo: A traditional Fijian *bure* type found in the Lau group, inspired by Tongan design

Vale Vakavavalagi: Contemporary House

Vale Vakaviti: Traditional Fijian *Bure*

Veivakavaletaki: Housing / Construction

Wame: A type of wild creeper that is used to tie the joint together

Yaqona: Kava plant

Introduction

30,000 HOMES WERE DAMAGED OR DESTROYED BY TROPICAL CYCLONE WINSTON IN 2016, REPRESENTING THE GREATEST LOSS TO FIJI'S HOUSING STOCK BY A SINGLE EVENT.

Shelter Cluster assessments, following TC Winston, indicated that much of the housing damage was experienced by low-income households and came from the limited use of appropriate structural design principles. Reasons for this include lack of access to appropriate building technologies, materials and skills, compounded with the complex logistics required to transport materials and tools to affected island communities. Furthermore, the National Building Code (which requires structures to withstand the design wind speeds of a Cat 3 storm) is not enforced in rural and informal communities, nor does it represent affordable or localised construction methods. These factors restricting the disaster responses of the Shelter sector and community resilience, disproportionately affect remote and island communities.

To tackle these issues, Habitat for Humanity Fiji began the four-year 'Stand Strong' project in 2018 to improve the level of resilience of Fijian communities to disasters through improved shelter conditions. Funded through New Zealand's Partnership for International Development Fund and supported by Habitat for Humanity New Zealand, the research component of the project aims to outline the current best practise for supporting remote communities in Fiji in reconstruction and construction efforts.

"The problem is you and the solution is you, we are the difficulty and solution itself"

– Mr Kauata, Itumuta, Rotuma discussing the challenges to rebuilding homes post-disaster

This publication highlights, not only the challenges that remote communities face in all stages of construction, but more importantly to shine a light on the existing capacities and locally-identified solutions to these challenges. By giving priority to the community voice, Habitat for Humanity hopes to frame the recommendations for shelter support initiatives in a way that reinforces existing community capacity. This community-centred approach allows the shelter sector to analyse assumptions and biases to ultimately promote sustainable community resilience with appropriate, affordable and accessible shelter support.

Methodology

SITE VISIT

Research team consulted 27 communities across 6 provinces [1]

[1] This project mainly concentrated its research on the areas that were not covered during the TC Winston Shelter Cluster Response.

'Fijian Communities', for the purpose of this research, is as formal iTaukei and Rotuman villages as these are the community types consulted.

Provinces	Community Names
Naitasiri	Delailasakau Village Nawaisomo Village Korovou Village
Kadavu	Levuka Village Mataso Village Mokoisa Village Nakoronawa Village Solotavui Village Tiliva Village
Lomaiviti	Lawaki Village Lekanai Village Naigaini Village Navukailagi Village Tovulailai Village Yadua Village
Yasayasa Moala	Dravuwalu Village Levuka-i-daku Village Tovu Village Vadra Village Vunuku Village Yaroi Village
Rotuma	Noatau District Oinafa Village Tuakoi Village Lopta Village Itumuta District
Ba	Navala Village

DATA COLLECTION:

- Participatory Focus Group Discussions and Talanoa Sessions in the 27 communities, with a total of 629 respondents, 33% women, 67% men and 16 people with disabilities.
- Household Structural Surveys on 120 Adaptive house structures due to their different structural designs and techniques.
- Turaga ni Koro (Village headmen) Surveys with 24 village headmen.
- Semi-structured Interviews with 11 representatives from Fiji's Government, NGOs, Construction Industry, and Hardware Companies.
- Literature Review on 246 published research papers and projects, found largely through online sources but also from documents shared by persons consulted in the course of the wider project.

REMOTENESS

An important part of the community selection and analysis was to consider the concept of Remoteness. For this research, the term 'Remoteness' was defined three ways in order to understand how it affects (re) construction efforts.

1. Geographic Remoteness – community is located far from places like hardware stores and construction companies, thus home construction requires complex logistics
2. Financial Remoteness – lack of finances to fund construction (including purchasing materials, funding labour and paying for logistics)
3. Technical Remoteness – lack of skills, tooling and technology to build resilient

These three characteristics were used to identify communities to survey with Commissioners, Provincial Councils, and District Offices. These characteristics were also presented to each community during the focus groups as a way of framing discussions on (re)construction efforts.

Travelling from
Nakoronawa Village
to Vunisea, Kadavu

Background

HOUSING IN FIJI

The Republic of the Fiji Islands occupies an archipelago of 322 islands. Just over 100 islands are permanently inhabited, with the vast majority of people staying on the two major islands, Viti Levu and Vanua Levu.

Security of tenure can vary according to form of land title. Over 90 percent of land is held as native title, with the iTaukei Land Trust Board (TLTB) responsible for administration and development. There are over 200 informal settlements across Fiji, accounting for 30% of the urban population.

The remaining 45% of the population, residing in rural and remote communities. The population of these communities have decreased by 5.3% in the last 10 years contributing to the rural-urban drift. Remote Fijian communities face unique challenges ranging from the lack of qualified carpenters, high reliance on purchased materials, unreliable transportation services to incomplete house structures. In the country, there is also a lack of affordable housing and a lack of awareness on alternative low-cost housing solutions. [2] [3] [4]

[2] Asian Development Bank 2016, *The emergence of pacific urban villages: Urbanization trends in the Pacific islands*, Mandaluyong City, Philippines. Online Available from: www.adb.org/sites/default/files/publication/201291/pacific-urban-villages.pdf

[3] iTaukei Land Trust Board 2018, *Land Ownership in Fiji*. Online Available from: www.tltb.com.fj/getattachment/Media/Brochures/Land-Ownership-in-Fiji-Booklet-(1).pdf.aspx?lang=en-US

[4] Fiji Bureau of Statistics 2018, "Release 1: Age, Sex, Geography and Economic Activity", *2017 Population and Housing Census*, Suva, Fiji

DISASTER RECOVERY IN FIJI

Nearly 50 years ago, the government response after Tropical Cyclone Bebe that devastated the whole country varied. The diverse range of shelter solutions resulted in setting the trends in housing designs across provinces. This is apparent in Kadavu, Lau, Lomaiviti and Rotuma who each received different assistance and now have differing predominant housing types and preferences. [5]

According to the Ministry of Economy's Disaster Recovery Framework (2016), due to the scale of the impact of TC Winston, it will be several years before production and livelihoods can be restored to pre-cyclone levels. They specifically state that "full recovery, and building greater community resilience, will be a long-term effort needing well-targeted and sequenced assistance to communities". However, there is no mention as to how shelter solutions implemented (by Government, CSOs, NGOs and communities) during Disaster Recovery have the potential to influence futures of housing stock preference in the country. [6]

BUILD BACK BETTER

Building back better is "the reconstruction approach designed to reduce vulnerability and improve living conditions, while promoting more effective reconstruction taking account of future risks from natural hazards (climate related and geological) and it underlines the policy commitment to improve the resilience of critical infrastructure… The *build back better* (BBB) concept signals an opportunity to decrease the vulnerability of communities to future disasters during post-disaster reconstruction and recovery". [7]

A Build Back Better Policy was also adopted by Fiji Government after TC Winston and has been incorporated into all Provincial Development as it is a comprehensive approach to promoting community resilience.

[5] Campbell, JR 1984, *Dealing with Disaster: Hurricane Response in Fiji,* Government of Fiji and Development Program East-West Center, Suva and Honolulu

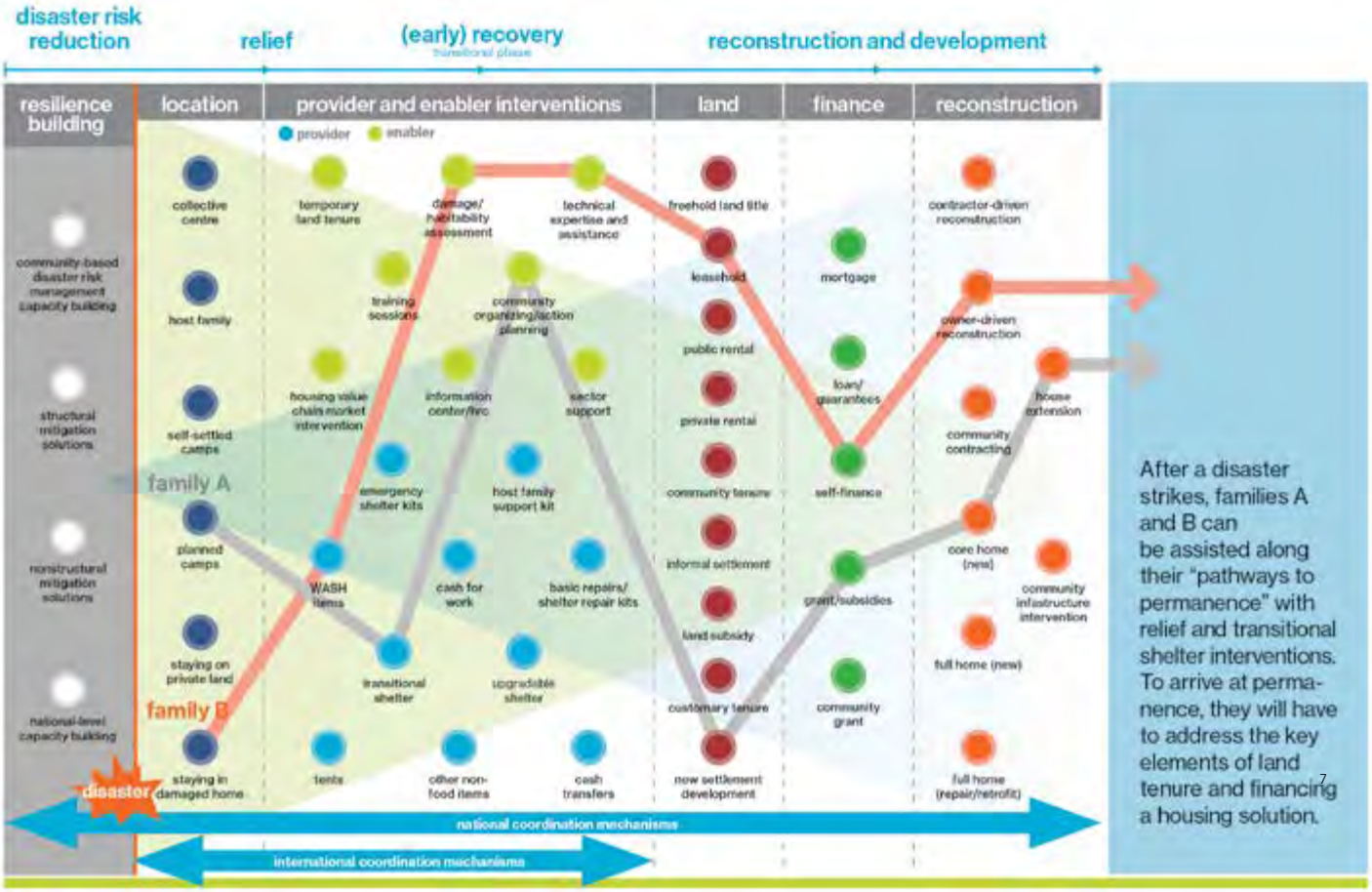
[6] Ministry of Economy 2016, *Disaster Recovery Framework: Tropical Cyclone Winston, 20th February 2016*, Republic of Fiji. Online Available from: www.reliefweb.int/sites/reliefweb.int/files/resources/DRF_Draft_6.pdf

[7] Mannakkara, S, Wilkinson, S, Potangaroa, R, 2014. 'Build back better: implementation in Victorian bushfire reconstruction', Disasters, Vol 38, no. 2, pp. 267–287

PATHWAYS TO PERMANENCE

Safe, decent shelter provides the platform upon which much of post-disaster assistance is built. Pathways to Permanence is the process of reducing vulnerability, increasing resilience and supporting disaster-affected families and communities using holistic program interventions that enable incremental progress toward the achievement of permanent, durable shelter and settlements.

This strategy places affected families on a path to durable, permanent shelter solutions using incremental stages as needed (e.g. erecting an emergency shelter, accessing or affirming land rights, improving a transitional shelter solution, defining next steps for a disaster-damaged house, or expanding a new core house solution). [8]



[8] Shelter Cluster Fiji 2019, *Fiji Shelter Handbook: Inclusive and Accessible Shelter Planning for Fijian Communities*, Online Available from: www.reliefweb.int/sites/reliefweb.int/files/resources/fiji_shelter_handbook_final_7.05.19.pdf

(Re)Construction Stages

When analyzing previous shelter responses and discussing construction in communities, the structure that is being built, is generally the priority concern. However, throughout the research remote communities expressed that the challenges faced during (re)construction efforts more often revolve around the context for the structure and not the structure itself. The following Chapter will demonstrate that a holistic understanding of construction in remote communities (beyond the structure) is necessary to improve community shelter resilience. Each section will present a distinct community challenge and corresponding solution, as well as opportunities to support these remote communities in (re)construction.

INITIAL STAGES

Supply Chain

“

E sa rui dredre veikeimami na kauta cake mai nai yaya ni vale mai tauni me yaco mai neimami koro, baleta mada ga na boto keimami vakayagataka tiko e sa rui ka lailai.

Transporting the materials to our community is very difficult for we are using small engine boats to do this.

- Man from Nawaisomo Village

Dua na dredre levu i nakoro sai koya na kena kau cake mai na i yaya ni tara vale ena Bilibili.

One of the biggest difficulty is transporting the construction materials up the river to the village using bamboo rafts.

- Man from Delailasakau Village

”

Construction material supply chains is an important element that directly affects housing designs and should always be considered when it comes to resilient (re)construction.

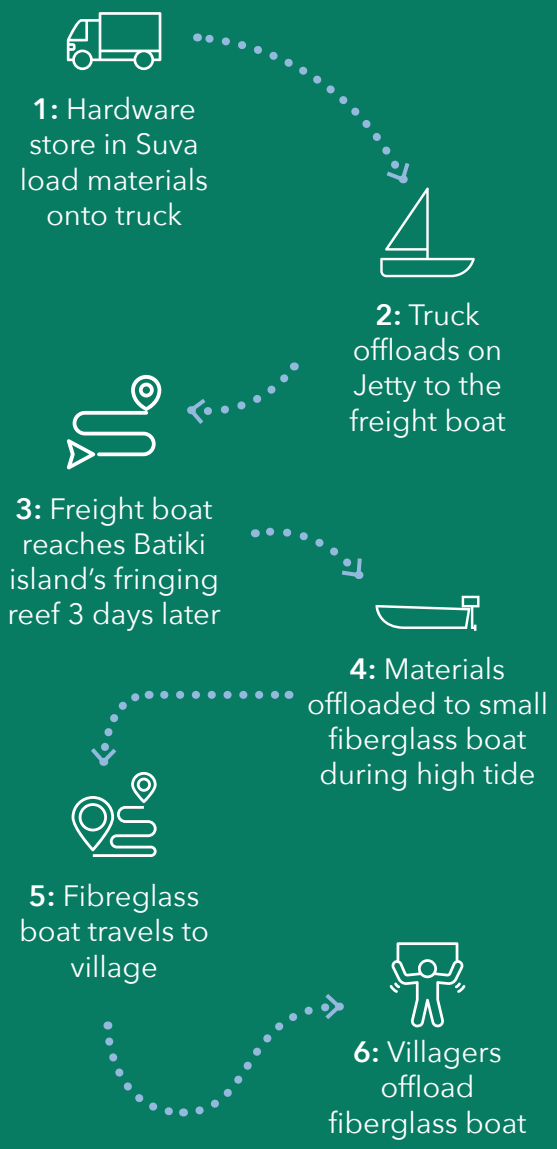
Assessment saw a substantial variance of construction material supply chains between profitable construction companies and remote communities. A profitable private organization that was consulted for this publication was Golden homes. This local housing sector provides quality prefabricated homes using materials imported from Russia and pre-treated in China, before being used in Fiji. **This is the sort of supply chain that is completely inaccessible to remote Fijian communities.** It is extremely difficult for remote communities to transport materials from the hardware stores on the mainland to their village, or find local resources on their land. This can be seen in the following page’s discussion on Naigani Village

RECONSTRUCTION DELAYS IN NAIGANI VILLAGE

2016's TC Winston brought with it, not only damaging winds, but also destructive storm surges. Unfortunately, these tidal waves swept away all of Naigani Village on Batiki Island, Lomaiviti and three years later, community members are still living in temporary makeshift homes. One of the major challenges observed in this community was the complex logistics involved in receiving construction materials. The steps followed for delivering construction materials to Naigani village are heavily reliant on weather, boat availability and tides.

As incomplete sets of materials were received following TC Winston, youths of Naigani Village had no choice but to travel to a nearby island to collect local untreated timber. At the time of this writing, youth were still waiting for an appropriate barge to assist with the transport of the harvested timber back to Batiki island.

< The incomplete and unused materials received as a part of the Help for Homes Initiative in Nagiani Village, Lomaiviti. This photo was taken 3 years after TC Winston.



OPPORTUNITIES

- Promote use of locally-available materials with resilient supply chains, to decrease reliance on purchased material supply chains.
- Awareness in communities on reliable suppliers, their processes, payment methods and choosing quality goods and materials. For example, the Cash on Delivery payment method.
- Stakeholders to be made more aware of the challenges faced by remote communities in accessing purchased materials

Dravuwalu village,
Totoya island, Lau

Materials

“

Sa rawarawa vei keimami me keimami vakayagataka ga na kau me vaka na bitu kei na kau tale eso e rawa ni tara kina na vale mai na voli yaya mai ni vale mai tauni.

We would rather use bamboo and other local timber to build our house then buying it from town.

– Man from Nawaisomo Village

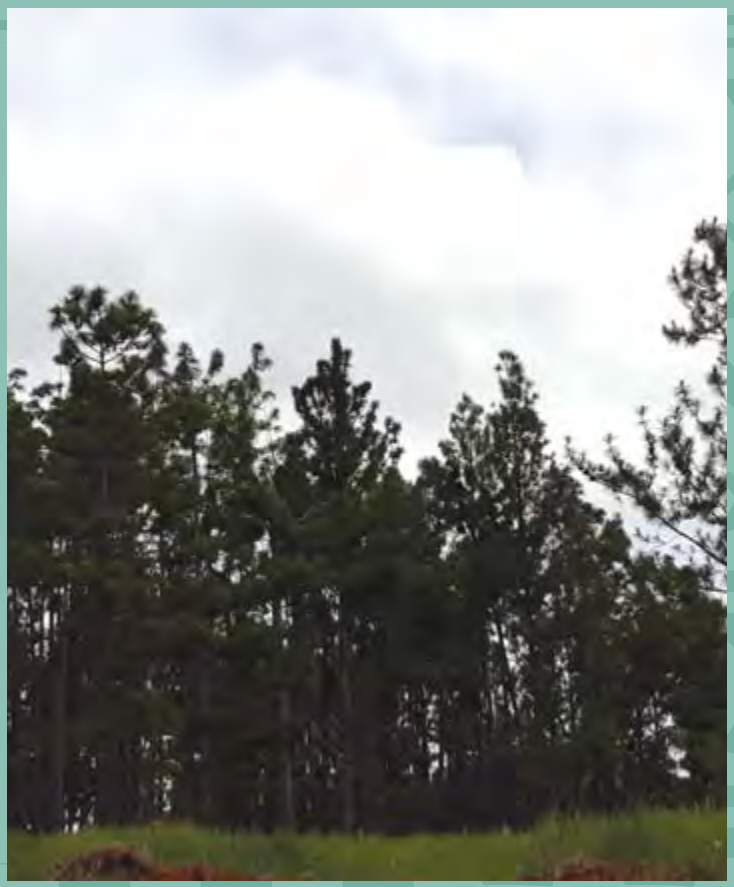
”

All remote communities face enormous challenges in receiving purchased materials from hardware store to help with (re)construction. However, it was observed that remote communities seem to fit into two categories with regards to access to local materials (as shown in the diagram below).

THE NAROCAKE PINE SCHEME

The Narocake Pine Scheme is a community based wood processing scheme that was initiated by Government and currently managed and owned by villages of Lovu, Vadravadra and Yadua consisting of 11 *Mataqali*. Construction timbers from the scheme is supplied to every community member in the three villages who is ready to construct a new home provided he purchased corrugated iron roofing, strapping and nails.

Even though Yadua has access to this pine scheme, the villagers still face challenges. This includes traveling long distances to gather pine for construction, purchase materials such as nails and roofing iron from hardware retailers from the mainland and transporting these materials to the island.



In communities with access to local timbers, harvesting enough for local construction efforts still relies on ensuring that there are enough people strong enough to assist in their collection. According to one woman in Vunuku Village on Moala Island:

“

Sa dredre na kena lai kau mai na kau mai veikau, baleta sa ra tu ga I nakoro na qase ka ra sa lako tabagone i Viti levu ena vuku ni vuli kei na cakacaka.

Young people have moved to Viti Levu for further education and employment, only old people are staying in the community which is making it harder to look and bring local timber from their forest.

Women, Vunuku, Lau

”

As the strong local trees require more human resources to harvest, this community in particular has moved toward using easier to access, yet considerably weaker trees, in constructing their homes. Trees like *Uto* (breadfruit) and *Niu* (Coconut) are being used more and more for structural members despite the strength grade of these timbers not meeting structural specifications. This results in less resilient homes being constructed across the Yasayasa Moala group.

A table of local timbers currently in use in remote communities. Note that some have yet to be tested for their structural characteristics (see the blanks in the table). Other timbers, after being tested, have been found to not be suitable for construction as load bearing elements (despite their use in communities as such).

Both local and purchased construction materials are in varied supply and accessibility across remote Fiji. Chosen Materials should reflect the local skills, housing designs and accustomed construction techniques to ensure that their use enhances and doesn’t inhibit shelter resilience.

Timbers Table [8]

Local Timber	Scientific Name	Green	Seasoned (19% M.C)	Stress Grade	Status
Buabua / Boutu	*Fagraea Gracilipes*	S2	SD2	F14	OK for construction as load bearing elements
Kaudamu	*Myristica castanoefolia*	S6	SD6	F5	
Kauvula	*Endospermum macrophyllum (Euphorbiaceae)*	S5	SD6	F7	
Vala / Vutu		S6	SD6	F7	
Vesi	*Intsia Bijuga*	S2	SD2	F17	
Aftea					Testing to continue on these local timbers and their use in construction
Bauvudi	*Palaquium Fidjiense*	S6	SD7		
Dilo	*Calophyllum inophyllum*				
Hahua					
Koka / Tea	*Bischoffia javanica (Euphorbiaceae)*	S6	SD5		
Mavu/ Vau Dina/ Sa'a	*Macaranga macrophylla (Euphorbiaceace)*				
Nokonoko	*Casuarina equisetifolia*				
Pou	*Flueggea flexuosa*				
Sevua / Nawanawa	*Cordia subcordata*				
Tavotavo	*Macaranga graeffeana*				
Vavakana / Vavaioa	*Ochrosia oppositifolia*	S2	SD1		
Velau					
Coconut trunk / Tolo ni Niu	*Cocos nucifera*			F4-F8	Not OK for use in construction as any load bearing element
Mocemoce / Vaivai ni Valagi / Raintree	*Samanae saman*	S7	SD8	F4	
Uto / Kulu / Breadfruit tree	*Artocarpus altilis*				

[8] Alston, AS 1982, Timbers of Fiji: properties and potential uses, Fiji Department of Forestry, University of California.

OPPORTUNITIES

- Educate community members on the sustainable use of locally available materials for construction. This awareness should include viable treatment and processing techniques; forest management in terms of replanting and using the environment to preposition construction supplies; and which locally growing yet non-traditional timbers are viable for construction purposes (e.g. a lot of remote communities with access to Bamboo but are yet to use this material as a structural member in home construction).

- Further research and testing into the structural characteristics and use of local materials for construction in remote communities. These findings should be shared widely and incorporated into National Building Code and also promote the development of accessible hybrid materials.

- Partnerships and collaboration between all sectors to promote the sustainable use of local timbers in remote community. For example, planting of construction grade trees for the 4 million trees in 4 years' initiative.

- Sustainable Community-based timber processing schemes to be encouraged.

Nokonoko Tree in Tovulailai Village, Nairai Island, Lomaiviti

Finances

“

E dredre na bula vaka i lavo ni oti e dua na leqa tubukoso.

Always faced with financial problem after disaster.

Woman, Nawaisomo

One guy from Ahau, he cut all his *Hahe'e* [local timber] from here, shaped it nicely with a chainsaw and built a home with corrugated iron roofing, all from here… he saved all that money from buying the timber from Suva and bringing it here, and he cut it from the back here [pointing to the bush].

Man from Utuutu, Rotuma

”

Communities that experience remoteness in terms of finances face a lot of barriers in (re)construction efforts. The main sources of income for the remote communities consulted were sales from sustainable livelihoods and Government Pension or Social Welfare and sales from commercial farming of products like copra and *yaqona*.

Income generating activities that are popular among these communities profoundly rely on the land and sea, which are therefore particularly vulnerable to hazards that are exacerbated by damaging weather conditions (e.g. kava plantations which have a long 5-year growth period from propagation to maturity were completely decimated following TC Winston). When NGOs assisting villagers in the rebuilding of homes also provided income generation assistance, the recovery process can be faster than without income support.

As part of the coordinated effort to rebuild after TC Winston, the Help for Homes initiative was designed to give affected families some assistance towards rebuilding their damaged homes. Families that qualified were issued electronic cards to purchase materials for reconstruction.

Even thought the aforementioned initiative was not designed to finance the entire reconstruction process, the 'leg up' provided by the government had some significant gaps. The vouchers only covered purchased materials whereas the major costs associated with (re)construction in remote communities also include transport of materials and labour. There was also an increase in demand for construction materials after TC Winston so hardware companies were forced to increase the prices of construction materials that were in short supply. Therefore, many families in the communities consulted are still awaiting more construction materials and are living in temporary houses.

Communities experiencing financial remoteness need to be supported in ways that acknowledge the financial demands of (re)construction activities beyond buying construction materials.

COMBATING CLIMATE CHANGE IN NAVUKAILAGI

Navukailagi Village on Gau Island, Lomaiviti is a coastal community that is home to 84 people and sits below the sea-level, making it extremely prone to flooding. Most of the houses in the village are old wooden houses in need of repair.

Community members shared their community-based solution to climate change and the problem of high costs associated with rebuilding homes. Led by the chief, a community *soli* was held to encourage each household to put aside savings for home maintenance and repairs. The youths are also engaged in *solesolevaki* in farming every week and a proportion of the income generated from these crops will also be put towards the savings. This money is being set aside by the Development Committee to fund the Village Development Plan which aims to rebuild all of the old homes in by 2023. In addition to raising the house posts above the ground level, the community is also working on planting mangroves along their coast to mitigate against future coastal erosion events to further protect their homes.

Old home in need of repair in Navukailagi

Mangrove afforestation project, village initiative to control coastal erosion

OPPORTUNITIES

- When cash vouchers are provided as a form of relief and recovery aid for shelter, they should not be restricted to a limited hardware list but be unrestricted to cover logistics and labour costs

- Flexibility to be built into the National Building Code to facilitate cost effective or free alternatives that are available around the communities. For example, local materials and traditional construction techniques verified in a Rural version of the Code.

- Financial planning and management support to be provided to communities to encourage them to include housing financing in their use of soli or other community fundraising.

- Price control of selective hardware supplies to be more strict and identified for specific regions of Fiji.

Communication and Cooperation

“

Veilomani, cakacaka vata, duavata kei na veitauri liga ena veivuke vakalevu kina noda bula ni vakacokonakataki.

Living in unity and working together to help in the reconstruction of our community.

Women of Tiliva Village, Kadavu, Tiliva

Keimami dau soli viyabaki, tiki ni lavo ka dau tikici me baleta na leqa tubukoso wili tale ga ke na cagilaba…

We do yearly community fundraising, part of the money collected is set aside for emergency purpose including cyclones

Josevata, TnK Mataso, Sanima, Kadavu

”

Maintaining proper communication channels is a challenge in remote communities, especially after a natural disaster. Coordinating the responses and interaction of community members is an even bigger task. Communities reported that constant communication is required in recovery tasks such as:

- gathering and sorting of materials that could be reused
- allocating activities such as checking on the wellbeing of vulnerable members of the community
- inspection of sanitation and hygiene facilities
- cleaning debris from water sources
- rebuilding of homes
- gathering edible root crops
- and so on

These activities are normally coordinated by community leaders with local government. Solesolevaki (communal cooperation) is practiced especially after a natural disaster for quicker recovery. Beyond the recovery phase, communication is still paramount for (re)construction activities. Without relying on outside assistance, project managers, or construction companies it is imperative that communities foster proper coordination and communication. Having a focal person or committee to coordinate the labour, collection and transport of materials, meals for the labourers, and all aspects of the construction is necessary for a build to run smoothly.

POST-DISASTER COMMUNICATION

“

Dua na dredre levu e dau sotavi ni kora na laba ni cagi qaqa sa i koya na dredre ni veilakoyaki vata na dredre ni vitaratara.

The biggest difficulties faced after a hurricane is travelling and communication.

Aminiasi Laveta, Levuka Village, Nabukelevu, Kadavu

”

In Activity 1 of the Participatory Focus Group Discussions, communities were asked to outline the main steps and subsequent challenges when trying to reconstruct their homes following a disaster. Eight of the villages consulted pointed out the issues of communication breakdown (no network services) as a major challenge to (re)construction following a disaster – this challenge was particularly relevant for the remote maritime communities in the Lau group. For example, Dravuwalu Village on Totoya Island and Vadra Village on Moala Island struggled to find telephone reception needed to contact DISMAC and other villagers for assistance because of damage to the telephone posts/lines. After highlighting this major issue, community members were then asked of their potential solutions. In terms of communication disruptions, communities agreed that proper coordination and cooperation was the best solution. In both villages, members of the community had to walk or travel by boat (depending on the tides) to neighboring villagers for reception in order to get assistance.

OPPORTUNITY

- Release research academically to promote further learnings throughout the sector and region
- Work from and build onto existing Village Development Plans
- Encourage pro-active community leadership and Solesolevaki as a form of communication and cooperation
- Cooperation to be enhanced between construction sector, government and communities and best practice models for (re)construction efforts from communities to be shared with other communities in order to replicate learnings.
- Respect and partner with existing community governance following proper traditional protocol, and work alongside government channels for decision-making (for example, the National Disaster Management Office and Cluster System)
- Create a community targeted set of guidelines on (re)construction in remote communities and general home maintenance and repairs.

BUILDING STAGE

Design

All housing in Fiji can be placed on a spectrum from Traditional ValeVaka-Viti to Contemporary Designs. More hybrid designs, that weave Traditional and Contemporary structural elements together, have been termed 'Adaptive' in the spectrum (shown below).

ValeVaka-Viti Traditional Construction – using all traditional and local methods and materials

Traditional Fijian *bure* in Navala Village, Ba Province.

Adaptive Traditional Construction - use of purchased materials but the overall designs remain characteristically Fijian/ Rotuman

V
ale-lolo in Vadra Village, Yasayasa Moala, Lau (shows a traditional Lauan *bure* design, but using purchased materials).

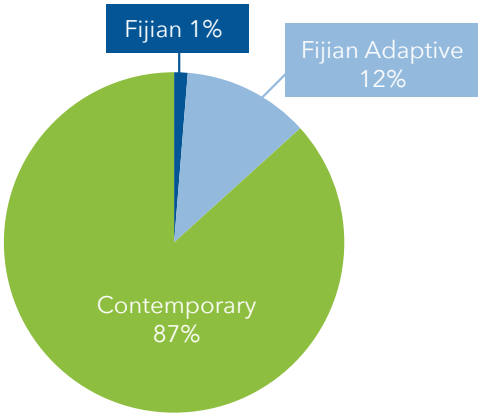
Adaptive Contemporary Construction - Contemporary houses that use locally sourced materials with purchased materials and/or some elements of traditional constructions.

Community Hall in Mataso Village, Kadavu (shows a contemporary structure that incorporates traditional techniques with a direct kingpost made from local hardwood *Buabua*).

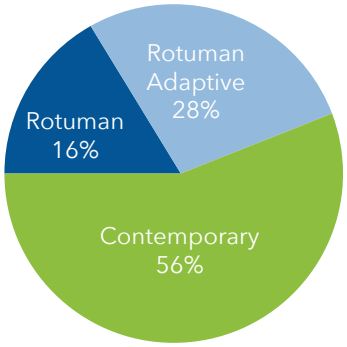
ValeVaka-Vavalagi Contemporary Construction, houses that are largely influenced by western design using purchased materials.

Contemporary Community Hall in Naigani Village, Batiki Island, Lomaiviti.

Traditional ↔ Adaptive ↔ Contemporary



Fijian Housing Construction



Rotuman Housing Construction

The charts show the respective proportion of each house construction category on the Spectrum in the communities surveyed in Fiji and Rotuma. Rotuma had higher levels of traditional Rotuman housing than in Remote Fijian communities (potentially availability of local materials and the high cost of transport needed for overseas purchased materials).

In all instances the availability of resources directly affects the house designs. All communities surveyed stated in the participatory activities that after a disaster, they use locally available resources to rebuild. Communities in Fiji were found to extend their temporary homes into permanent ones because they were unable to reconstruct properly. In instances where sufficient finances, materials and skills are available, communities have been able to move from the recovery phase of a disaster cycle to reconstruction. Housing design needs to be familiar to communities in terms of techniques, design and materials used to speed up the recovery and reconstruction process and to ensure their sustainability and appropriateness.

Fiji Red Cross incorporate the use of traditional and modern building skills in their contemporary designs. The organisation's core shelter plan is one of the models that uses 'direct post' with high roof and wooden windows and doors. This design type is taken from the ValevakaViti concept.

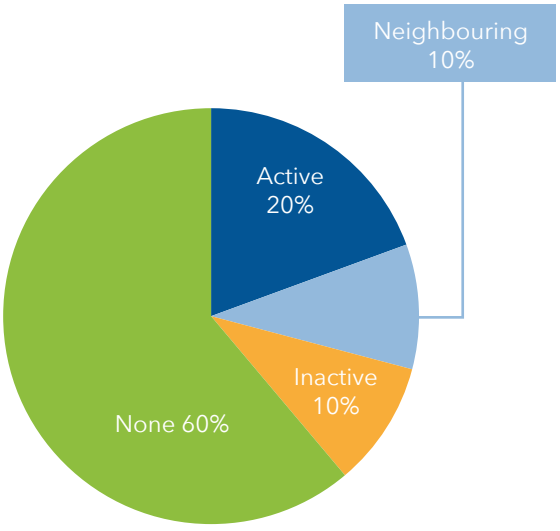
OPPORTUNITY

- Housing designs to reflect the diversity of wants and needs within a community (one size does not fit all)
- Incorporate traditional techniques and local materials into contemporary designs. For example, Architects to investigate adaptive designs / catalogue and engineers to verify the use of local materials and traditional techniques.
- Adaptive and traditional designs to be reflected in National Building Code.

Existing Skills

> One of the stumbling blocks in our community after disaster is the lack of experience in carpentry to build houses
>
> Man from Itumuta, Rotuma

'Mataisau' or 'Lemaki' is the iTaukei word for traditional craftsmen who are knowledgeable about traditional Fijian construction. These craftsmen still exist in a number of communities today and specialise in both traditional and contemporary carpentry. They pass down the knowledge and skills to the next generation within their clan. According to information gathered, youths have not shown any interest to learn this tradition and so this tradition is slowly dying out.

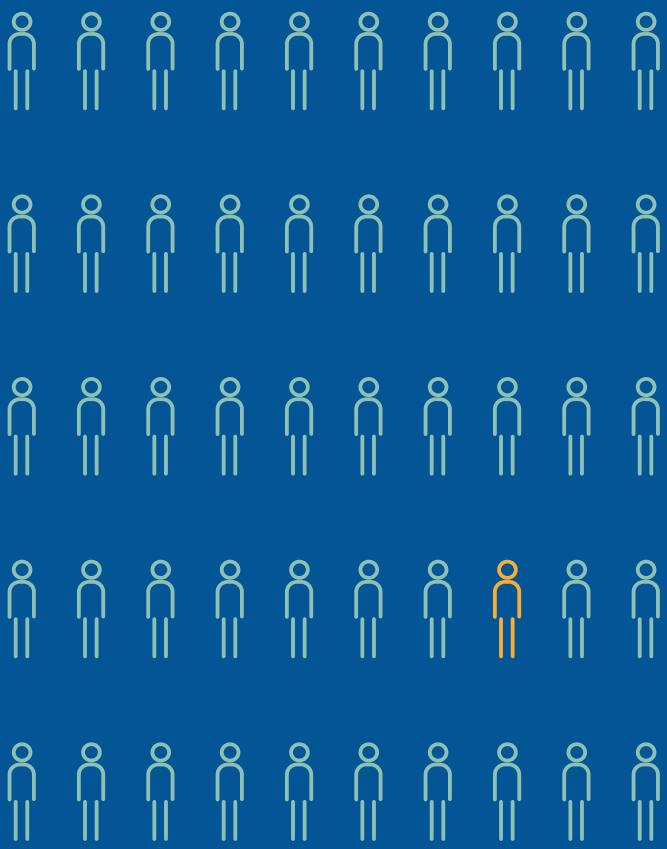


Mataisau clan in communities

The chart shows that only 20% of communities have active *Mataisau* to lead (re)construction work, and 10% of communities were relying on neighbouring communities to provide *Mataisau* expertise. One example of this is the community of Nakoronawa Village in Kadavu, they hired a *Maitaisau* from Solotavui Village (30-minute boat ride away) to assist in the reconstruction of their church (pictured). Access to local expertise in carpentry is crucial to any (re)construction work in remote communities as formal construction companies are not accessible, financially and geographically.

^Photo sourced from Department of Heritage and Arts 2018, "Built Heritage Assessment at Nakasaleka Methodist Church Circuit, Kadavu"

Beyond traditional carpentry knowledge, the research was able to determine the prevalence of contemporary construction skills in the remote communities surveyed. The numbers of carpenters identified in the communities translates to 1 in every 50 community members will have experience or qualifications in construction.



"In urban areas, 30 out of 50 members of the communities are Carpenters. Out of the 30, 10 members are not qualified, 20 are qualified, even when then they are qualified, their skills are not there yet... This is evident when they come here from other vocational schools, TVET. That is why not all construction in urban areas follow the Building Codes."

- Mr. Paka Wakanivonoloa of APTC

MAGIMAGI

"*Magimagi* (sennit) is braided from the husk of one of the largest coconuts called the *niu magimagi* (sennit coconut). The nut grows to 55cm long. No other types of nuts are used because their fiber is too short and too brittle. The segments of two nuts are placed on a husking stake into five equal longitudinal segments. The segments of two nuts are placed in one pile and thus can be counted easily. Stones are heated in an oven, spread out with a stick, and the husked segments of 100 to 200 nuts are placed on the stones. The husks are then covered with green leaves and earth. The husks may be left in the oven from three to 21 days. When needed, they are taken out of the oven through a small opening on one side, which is closed after the desired number of segments has been removed. Each segment is freed of its outer husk by hand and then is placed back upward on a block of wood (rubi ni *magimagi*) and beaten with a wooden mallet to remove bits of flesh, dirt and short fibres. The clean, long fibres are allowed to dry in the sun for about three hours. The good fiber is reddish in colour. When the dry fiber is pulled apart by the hand, it is ready to be braided."[9]

< Pictured is a man from Vunuku Village, Yasayasa Moala demonstrating how to weave *magimagi*. This skill is not being used much in communities now for construction purposes, but instead for generating income. Due to the time intensive nature of producing *Magimagi*, this material has been quickly replaced with others such as, strapping, fishing line and nylon rope to reinforce joints.

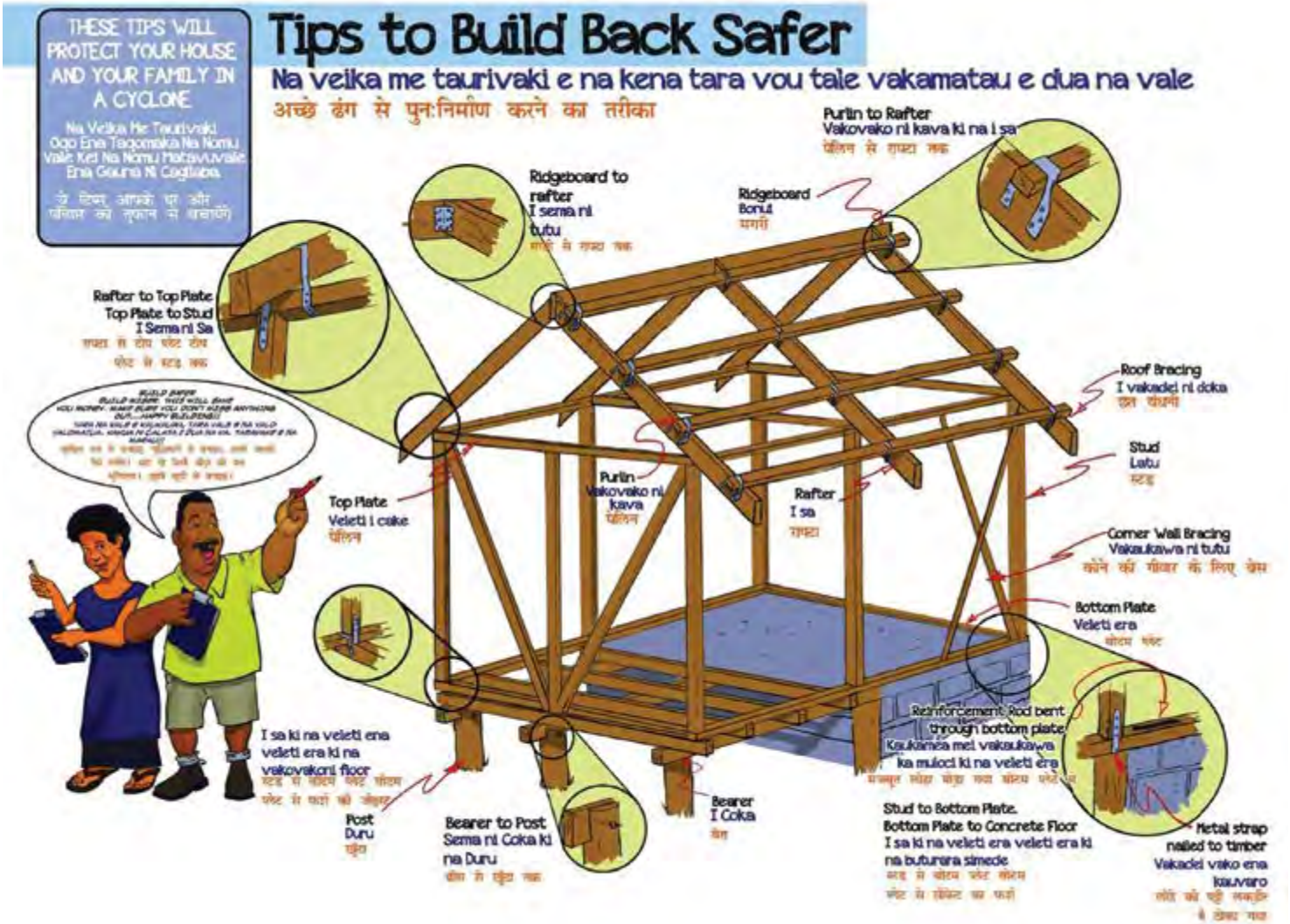
[9] Roth, G. ed. 1954, "Thompson-Southern Lau: An Ethnography", in House building in Fiji, pp.174-175

BUILD BACK SAFER TRAINING

Habitat for Humanity Fiji Construction for remote communities is accompanied with 'Build Back Safer' training. This carpentry training in remote communities, coupled with the BBS IEC materials, provides guidelines on simpler construction techniques that make a home more cyclone-resilient. It also empowers communities to utilise available resources with traditional construction skills to rebuild resilient homes after a disaster.

^ HFH Fiji carpenter, Maria Dau, assisting female participants during a BBS training in Naitasiri

Training conducted by Shelter Cluster members also aims to be gender inclusive.



^ One of the BBS posters used in community carpentry training to demonstrate proper strapping techniques

OPPORTUNITY

- Localised Community Carpentry training for remote communities – trainings to incorporate Traditional, Adaptive and Contemporary construction styles, Build Back Better approaches and localised and translated IEC materials and teaching methods. Trainings should also promote active, socially inclusive, and gender balanced participation.
- (Re)construction support to take into account available tooling and skills necessary for the use and maintenance of tooling
- Traditional construction techniques and materials to be integrated into the formal education system

Construction

“

Sa dodonu me da tara na vale e kaukauwa, ka meda tiko vakavakarau ena veigauna kece ga.

We have to build resilient homes and always be prepared.

Youth, Tiliva

”

Time should be taken to evaluate potential challenges that may arise when building in remote communities. Factors such as tooling, weather and availability of Traditional Carpenters or *Mataisau* contribute to delay in build.

Remote communities do not always have reliable power supply (most communities used household solar panels), thus the construction process should be flexible enough to suit these restrictions, for example, only using hand tools or supplying generators.

Unpredictable Weather is always a factor that delays work in the field. Planning therefore plays a vital role in the consistency of work in remote communities. For example, Construction activities should only be carried out from May to October, outside cyclone season.

The occasional use of certain contemporary materials and structural systems, due to remoteness, can be directly attributed to the reduction in resilience to natural disasters. Local carpenters should be trained in traditional house construction and how to successfully bring the two typologies together.

OPPORTUNITY

- Use and fund local carpenters, materials and tooling at all times where possible, ensuring that local skills are fostered and capacity remains within the community
- Before and during construction identify hazards in the community. For example, ensure all local carpenters are provided with Personal Protective Equipment and site all construction in safe locations free from environmental and climatic hazards.

TREATING TIMBER IN THE COMMUNITY

“

Kedra nemi qase ni ra sa tara vale, ni sa dau ta kora mai na kacu, sa qai dau mai toni tu I waitui, ke mino mera dau boro ena waiwai se na loose oil ni bera na vagatakina…

Our elders when they use to build houses, once the timbers are cut, it is then soaked in sea water, if not then it is painted with loose oil before they are used.

Aminiasi, Levuka, Nabukelevu, Kadavu

”

Throughout the structural surveys, community members explained the different treatment techniques that they often used when treating local hardwoods. The most common treatment technique that we found were:

1. Seawater: Hardwoods submerged in seawater over a long period of time were said to be resistant to fungal attack and also add to the durability of the hardwood. Hardwood can be underwater for over 3-4 months depending on the type of hardwood and this also helps in the durability of the wood i.e. the longer the hardwood is submerged, the higher its durability.

2. Smoking: For this type of treatment, newly built houses specifically *bures* are smoked. That is, a pit is dug in the middle of the bure where a fire is lit. This fire is then covered with soil allowing only the smoke to escape the pit. The doors and windows are all shut to ensure that the smoke stays inside. The smoke then treats the hardwoods of the *bure*, killing termites and extending the durability of the wood and the lifespan of the thatching.

3. Loose (used) oil: Petroleum oil is used to coat hardwoods. It has been known to preserve the wood, help with waterproofing and keep any bugs and fungi away. This treatment method does not usually incur a cost, as communities use the loose oil from generators for this purpose.

4. Paint: Paint is added to hardwoods for preservation and prevention of termites and fungal attack purposes. Painting hardwood also add to the beautification of the home as a whole

5. Varnish: Varnishing hardwoods adds shine to the hardwood and prevents termites and fungus from entering. It also adds to the durability of the hardwood making it last for a long time. This is the most expensive treatment method that was observed.

Note that these treatment methods were provided by communities and have not been tested by Habitat for Humanity

FINAL STAGES

Maintenance and Repair

“

E levu vei kemi kila tu na tara vale mi mino ga ni vai vola…na vale mada ga ni nemi Koro ka mi tia ga mino ni dua I va I vola v kemi mi dana ga na ka dau jili tu…

Most of us know how to build, but none of us are qualified academically…we even built our Community Hall, none of us qualified, only experienced through seeing.

Josevata Nawanawaqa, TnK Mataso, Sanima Kadavu

”

People need to build with familiar techniques and designs to ensure resilience. According to data collected, the design life of a structure and its ongoing resilience and strength is directly related to the ability of the home owner to maintain and repair that home.

Houses constructed with purchased materials and built by organizations other than local carpenters were found to have been difficult to be repaired or rebuilt after being destroyed by disasters. Contemporary construction techniques or methods in remote communities need to be shared to the locals ensuring that in 30-40 years’ time, the local communities have the resources that will enable them to repair.

OPPORTUNITY

- Houses built in remote communities to be of simple structural design that would be easy to maintain and using sustainable supply chains. Home owners to also be provided with guidelines on how and when to maintain the structure to extend the lifespan and maintain the resiliency of their shelter.
- Insurance companies to offer a product that covers post-disaster repairs in rural and remote communities.
- Consider a star rating for homes constructed with criteria relating to meeting the building code, sustainability and resilience.

CONCRETE HOMES IN ROTUMA

It was noted that nearly half of the housing stock in Rotuma were concrete block homes, this method was popularised following Tropical Cyclone Bebe in 1972 when the New Zealand Army built homes using contemporary methods. The majority of these concrete houses that are still standing were found to have cracks and were in ruins, and not being repaired. Communities though, still believe that concrete homes like these are very strong, despite their age and poor condition.

47-year-old Concrete home in need of repair, Itumuta District, Rotuma

Sharing Knowledge

“

Me ra susugi na gone ena bula ni tiko vakavakarau, tiko bulabula ena veika kece ga.

It’s our responsibility to teach our children of preparedness and wellness, in all things.

Woman from Nawaisomo Village

”

Elders are the main custodians for knowledge sharing in Fijian communities through *talanoa* or through practice. Traditional cultures, values and knowledge are shared to the young ones to preserve their culture. The intangible cultural heritage of various groups in many parts of Fiji is diminishing due to the increasing rate of rural to urban migration and a lack of knowledge shared to the young people on *iTaukei* cultures and values. The construction of Fijian *bure*, and the use of local resources in some communities are some examples of the types of knowledge that is not being passed down through generations.

Solesolevaki was described by most communities consulted, as a means of sharing knowledge to the younger generation in Fijian communities. *Solesolevaki* is communal work where everybody participates in completing a wide range of community development activities. Often these activities are (re)construction activities, thus creating the space for elders to share with the young ones on Fijian *bures* and proper use of locally available construction materials.

Young generation should engage more with the elders to learn more about the iTaukei cultures in every community. Likewise, organisations should follow the lead of the Sawaieke Youth and support communities to run expos and workshops on iTaukei cultures, values and knowledge to enhance community resilience.

SOLESOLEVAKI IN NAVALA VILLAGE

Navala village in the district of Ba, is arguably the only village in Fiji that still constructs the traditional Fijian *Bure*. This village also uses regular *solesolevaki* when constructing these *bures*. Comparing Navala, to the other communities visited, nearly all the men are carpenters. This learning starts at a young age. During school breaks, children as young as 12 years old are included in *bure*-building activities during the regular *solesolevaki*.

The passing of the knowledge to young people is still very much alive in the village of Navala and elders vowed that this will be a continuous process to those that will come later in life for the betterment of their village. As one elder described: "working together, sweating together and labouring together as a community" encourages and boosts collective morale and works to preserve the culture.

> Pictured here is a group of men placing the Bou (kingpost) in a six-foot hole in the centre of the bure. The Vesi tree was harvested from nearby bush in the hills behind the village (also pictured) and will act as the main source of strength for the bure

STRENGTHENING CITIZEN ENGAGEMENT IN FIJI INITIATIVE WITH SAWAIEKE YOUTH

Young people in the district of Sawaieke in Gau recognized the importance of addressing the issue of preserving their cultural heritage, and wanted to take action before it was too late. They have taken the initiative into their own hands and created a platform for the young people of Gau Island to learn more about their traditional culture. Supported by UNDP's Strengthening Citizen Engagement in Fiji Initiative (SCEFI), young people in 8 villages in Gau were trained by volunteer experts on a range of traditional skills and activities, including traditional *bure* construction. The initiative raised awareness on the critical importance of preserving traditional knowledge and culture and led to the strengthening inter-generational relationships between young people and community elders. [10]

[10] Strengthening Citizen Engagement in Fiji (SCEFI) 2016, "Sawaieke Youth: Preserving Traditional Knowledge", Emblematic Stories, United Nations Development Programme, Suva, Fiji

OPPORTUNITY

- Train up community leaders on how they communicate and share knowledge.
- Make the sharing process "exciting" and accessible to the young. For example, using accessible technology, or radio campaigns to share knowledge and raise awareness.
- Share research on Adaptive construction in Fiji with communities through awareness and IEC materials; with the construction industry practically through testing and verification' and, with other researchers academically by marrying science with tradition and culture.

Focus Group Discussion in Noatau District, Rotuma

Way Forward

Below is a list of all of the identified Opportunities outlined throughout this research. This list represents a way forward for all who want to support remote communities in any (re) construction efforts, including Government, private sector, academic institutions, CSOs, NGOs and so on.

Sector-wide Collaboration

- Promote use of locally-available materials with resilient supply chains, to decrease reliance on purchased material supply chains.
- -artnerships and collaboration between all sectors to promote the sustainable use of local timbers in remote community. For example, planting of construction grade trees for the 4 million trees in 4 years' initiative.
- Cooperation to be enhanced between construction sector, government and communities and best practice models for (re)construction efforts from communities to be shared with other communities in order to replicate learnings
- Respect and partner with existing community governance following proper traditional protocol, and work alongside government channels for decision-making (for example, the National Disaster Management Office and Cluster System)
- Release research academically to promote further learnings throughout the sector and region
- Share research on Adaptive construction in Fiji with communities through awareness and IEC materials; with the construction industry practically through testing and verification' and, with other researchers academically by marrying science with tradition and culture.

Supporting Communities

- Stakeholders to be made more aware of the challenges faced by remote communities in accessing purchased materials, especially post-disaster times.
- Sustainable Community-based timber processing schemes to be encouraged
- When cash vouchers are provided as a form of relief and recovery aid for shelter, they should not be restricted to a limited hardware list but be unrestricted to cover logistics and labour costs

- (Re)construction support to take into account available tooling and skills necessary for the use and maintenance of tooling
- Work from and build onto existing Village Development Plans
- Housing designs to reflect the diversity of wants and needs within a community (one size does not fit all)
- Use and fund local carpenters, materials and tooling at all times where possible, ensuring that local skills are fostered and capacity remains within the community
- Houses built in remote communities to be of simple structural design that would be easy to maintain and using sustainable supply chains. Home owners to also be provided with guidelines on how and when to maintain the structure to extend the lifespan and maintain the resiliency of their shelter.
- Before and during construction identify hazards in the community. For example, ensure all local carpenters are provided with Personal Protective Equipment and site all construction in safe locations free from environmental and climatic hazards.

Community Trainings and Awareness

- Awareness in communities on reliable suppliers, their processes, payment methods and choosing quality goods and materials. For example, the Cash on Delivery payment method.
- Educate community members on the sustainable use of locally available materials for construction. This awareness should include viable treatment and processing techniques; forest management in terms of replanting and using the environment to preposition construction supplies; and which locally growing yet non-traditional timbers are viable for construction purposes (e.g. a lot of remote communities with access to Bamboo but are yet to use this material as a structural member in home construction).
- Financial planning and management support to be provided to communities to encourage them to include housing financing in their use of soli or other community fundraising.
- Create a community targeted set of guidelines on (re)construction in remote communities and general home maintenance and repairs
- Encourage pro-active community leadership and solesolevaki as a form of communication and cooperation
- Localised Community Carpentry training for remote communities – trainings to incorporate Traditional, Adaptive and Contemporary construction styles, Build Back Better approaches and localised and translated IEC materials and teaching methods. Trainings should also promote active, socially inclusive, and gender balanced participation.
- Make the sharing process "exciting" and accessible to the young. For example, using accessible technology, or radio campaigns to share knowledge and raise awareness
- Train up community leaders on how they communicate and share knowledge.

Further Research and Applications

- Incorporate traditional techniques and local materials into contemporary designs. For

example, Architects to investigate adaptive designs / catalogue and engineers to verify the use of local materials and traditional techniques.

- Further research and testing into the structural characteristics and use of local materials for construction in remote communities. These findings should be shared widely and incorporated into National Building Code and also promote the development of accessible hybrid materials.
- Flexibility to be built into the National Building Code to facilitate cost effective or free alternatives that are available around the communities. For example, local materials and traditional construction techniques verified in a Rural version of the Code.
- Adaptive and traditional designs to be reflected in National Building Code.

Other Sector Opportunities

- Traditional construction techniques and materials to be integrated into the formal education system
- Consider a star rating for homes constructed with criteria relating to meeting the building code, sustainability and resilience.
- Price control of selective hardware supplies to be stricter and targeted for specific regions of Fiji.
- Insurance companies to offer a product that covers post-disaster repairs in rural and remote communities.

"A world where everyone has a decent place to live."

Habitat for Humanity is an international not-for-profit organisation. The ultimate goal of Habitat for Humanity is to eliminate poverty housing and homelessness from the face of the earth by building adequate and basic housing. Furthermore, all of our words and actions are for the ultimate purpose of putting shelter on the hearts and minds of people in such a powerful way that poverty housing and homelessness become socially, politically and religiously unacceptable in our nations and the world.

Habitat for Humanity Fiji has been working in Fiji since 1991 to provide low-income families with safe, decent living conditions. HFH Fiji also assists communities with their poverty reduction goals by assisting them to build, repair or improve other community structures such as schools, water/sanitation systems, orphanages, and women's shelters.

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Nuku village foreshore, Moala, Lau

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