

C.6 Haiti - 1982 - Shelter report

Case study: Report on shelter capacity

Country:

Haiti

Disaster:

Hurricane Allen

Disaster date:

1980

Number of houses damaged:

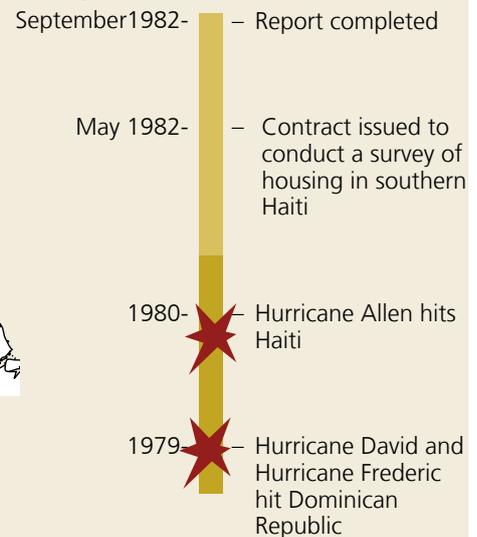
Relatively limited damage

Occupancy rate on handover:

No shelters were built or repaired in this programme. Concerns were raised about limited preparedness for future disasters in Haiti.

Shelter size:

Various


Project timeline

Summary

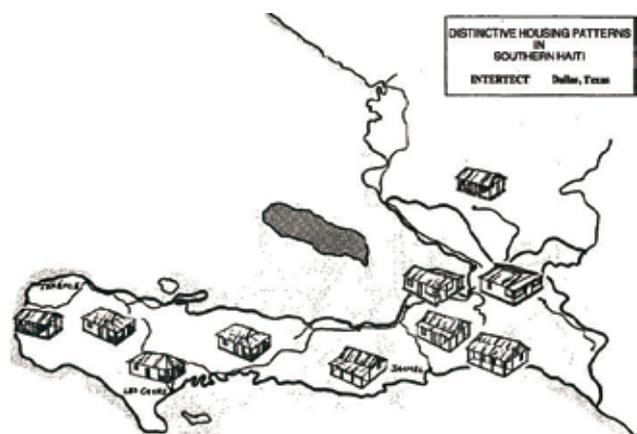
This report was written by Fred Cuny / Intertect in 1982. It summarises the different types of housing in southern Haiti. It goes on to suggest low-cost improvements that can be made to the houses in southern Haiti. Although the suggested housing upgrade programmes were not implemented, the suggestions remain relevant today. Illustrations from the document were copied for public information literature following the 2010 Haiti earthquake.

Report highlights

- Identified some simple messages for safer construction. Some of these have been copied and re-used following the Haiti Earthquake in 2010.
- Highlighted the impacts of deforestation on housing lifetime, strength and affordability.
- Outlined the threats to housing (wind damage, tidal surge, flooding, landslide fire and earthquake). It suggested hazard zoning to prioritise sites for intervention
- Classified rural housing types and suggested simple improvements and retrofitting that was possible for each type of housing.
- Identified some key messages for those constructing houses to improve the safety and quality (e.g. house shape and location, hurricane strapping, small eaves).
- Outlined programme approaches to improve housing quality, as well as looking at the capacities of various organisations to implement them. The approach suggested was:
 - Identify implementing organisations and a coordinator.
 - Develop strategies to reduce the cost of housing improvements through the involvement of local cooperatives (where families work together to construct their houses). This would increase financial assistance (through mechanisms such as subsidised and soft loans) and would reduce

materials and tool costs through subsidies or establishment of local manufacture.

- Establish a training programme for builders.
- Develop public awareness about the need to improve housing and how it can reduce household costs.



Housing patterns in southern Haiti
Illustrations: A. James Viet. and Juliana Marek



The report analysed risks to buildings and which projects could best reduce them.

Context

Between 1950 and 1982, eight hurricanes and numerous tropical storms hit Haiti. In August 1980, hurricane Allen passed the coast of Haiti, killing at least 200 people, and causing significant but localised damage.

Two years later, concerned by the potential for a large scale disaster in Haiti, Oxfam contracted Intertext, an American firm specialising in housing reconstruction and disaster preparedness, to write a study on hurricane risk to housing in Haiti. This was presented to the Haitian Disaster Preparedness Committee, which had representatives of the Red Cross, Catholic Relief Services (CRS), Caritas and CARE).

In 1982 Haiti was already suffering considerably from deforestation. There had been limited reforestation projects, although there were some questions asked about the appropriateness of the species of tree being used. The species planted were fast growing to promote soil stability and work as fuel sources, but were generally



Risk of strong winds can be increased by topology



Risk of storm surge.

not good for construction.

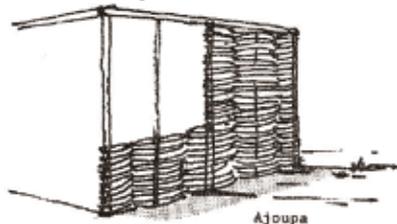
Risks in Haiti

The report discussed the following threats to housing, which remain the major concerns in Haiti today:

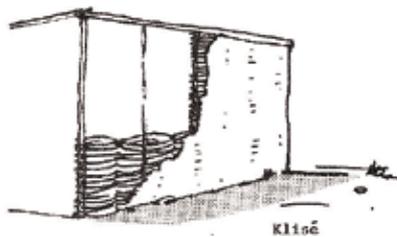
- Hurricanes and tropical storms threaten housing in four ways:
 - High winds can lead to damage or collapse
 - Storm surges (known as tidal waves) flood low-lying coastal areas
 - Rain fall during the storm can cause flooding or can cause land slides, mudslides or other land displacements.
- Earthquakes
 - The most susceptible houses are heavy, low-quality masonry buildings. These were exactly the types found in the south.
- Fires
 - The risk was highest in urban areas, and dense squatter settlements with inadequate cooking facilities and no electric lighting. It was noted that one recent fire in Port-au-Prince had left thousands homeless.
- Termites and other insects
 - can weaken timbers

Housing typologies

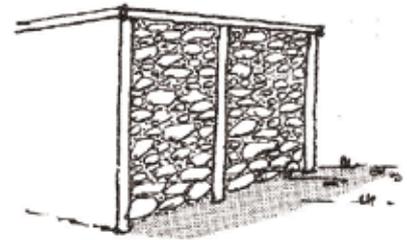
Materials commonly used in rural housing:



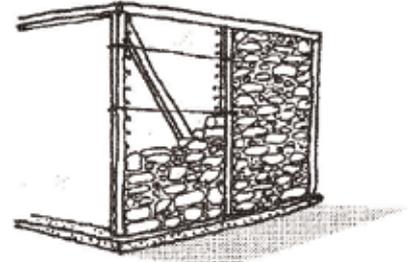
Kay Ajoupa (wattle or reed houses). Wood pole frame with woven cane or sticks as walling. Lived in by the poorest Haitians.



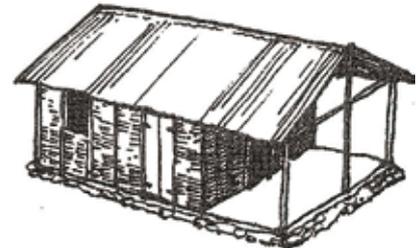
Kay Klise (wattle and daub house): Wood pole frame with woven cane or sticks and mud render as walling



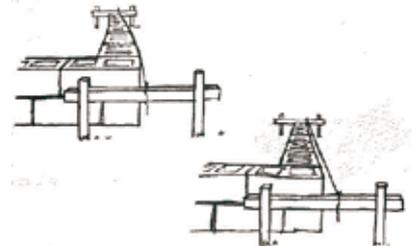
Kay Mur (stone nog): Small stones are cemented between a wooden frame. This was the most popular type of housing found in the south of Haiti.



Kay Melange (spanish wall): Similar to Kay Mur, (above) but stones are smaller and a board is used as a guide during construction. Illustrated here with a suggested improvement of cross bracing



Kay an Planch (wood house): Wooden houses made of locally available timber or wood salvaged from urban construction sites. Deforestation had made wood scarce, so more houses were using palm wood.



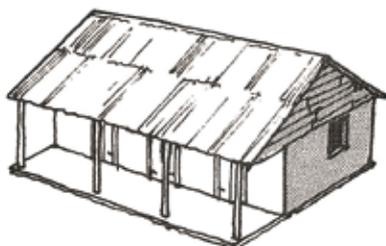
Kay an Bloc (block house) Houses made of cement block. These suffered from poor quality blocks and mortar as well as poor quality construction

The document noted that wooden houses tend to be more heavily damaged by hurricanes than other types of construction. Many of them, including those built by development agencies were poorly anchored to the ground

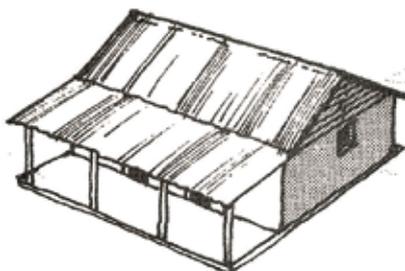
Housing layouts

Different configurations of roofing and veranda lead to differing strengths of shelter. The designs with highest risk are where the veranda allows wind to get underneath, damaging the entire roof.

Safer designs are those where the veranda roofing sheets are separate to the main roof—damage to the veranda will not affect the main roof.



The arrangement below is preferable to the one above. If the verandah (above) was damaged by hurricanes the entire roof would be compromised, whilst in the verandah below damage to the verandah would not affect the rest of the roof



Technical proposals

The vast majority of existing buildings, could not be economically retrofitted or modified at a cost anywhere near affordable to homeowners. The report focussed on emergency measures to make buildings safer, even though they would be unlikely to survive wind-storms.

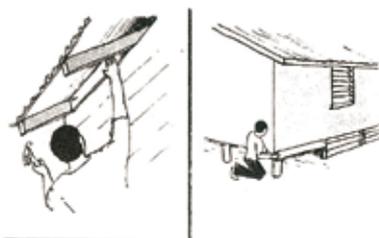
Emergency repairs

Specific recommendations for different types of housing were made. In general, the recommendations (for buildings with timber structures) are as follows.

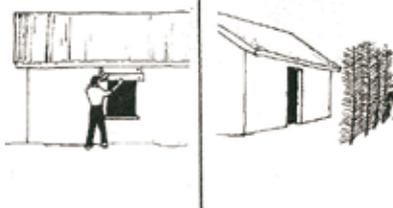
- Increase the number of nails to fasten the roof.
- Add diagonal bracing to the framing.
- Strengthen connections between the roof and the wall by using metal straps or wire
- Board-up windows when a

hurricane approaches

- Place heavy objects on the roof to reduce suction.
- Seal areas below houses on blocks or piers with stones and mud to prevent air from entering underneath houses and lifting them off their foundations.
- Seal openings between roof and walls to prevent wind from entering the eaves.



Hurricane preparedness: blocking gaps in the eaves and under shelters, securing walling and roofing sheets



Hurricane preparedness: shuttering windows, building protective screens in front of openings and bracing corners of buildings

For new-build

Use timber treatments for timbers in contact with the ground

- Bury primary columns a minimum of 24 inches (60cm)
- Cross-brace the structure with galvanised wire or timber (depending on the building type).
- Use diagonal bracing in roof structures.
- Place diagonal braces on top of frames in each corner.
- Use hipped roofs.
- Design verandas to use separate sheets from the rest of the roof.

Programme proposals

The report noted that extreme poverty in Haiti meant that for many families, housing was a low priority. Most families recognised that their houses would not survive a hurricane, but did not have the means to improve them and had not prioritised housing upgrade. In order to improve housing, cost reduction strategies should be implemented. These could include:

- cooperative activities – to share the workloads and inputs of skilled workers
- increasing financial assistance to improve houses; this could include loan guarantees, subsidised loans, soft loans and revolving loans
- reducing costs of materials through payment of subsidies, collective purchases, local manufacture, material trade-ins and support with transport costs

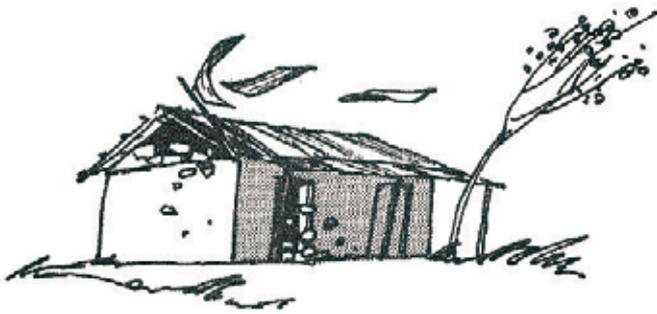
It also encouraged training prioritising young people, those moving to towns, and families participating in rural development programmes. It also promoted contractor training to improve construction quality. These various types of training would include:

- Theoretical training
- Hands-on practical training
- Construction of model houses
- Follow-on practice with supervision to ensure that new skills are learnt

Risks of doing nothing

The report warned that without housing improvement activities and corresponding changes in reforestation policies:

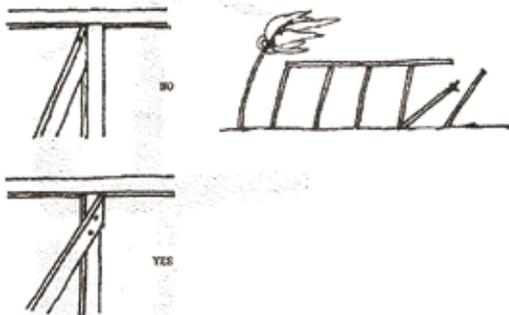
- housing would continue to deteriorate
- the number of people in vulnerable buildings would increase. As a result there would be a greater loss of life in future disasters
- houses would have a shorter lifetime and will need to be replaced more frequently
- low income families would need to increase the proportion of their income spent on housing repair and maintenance.



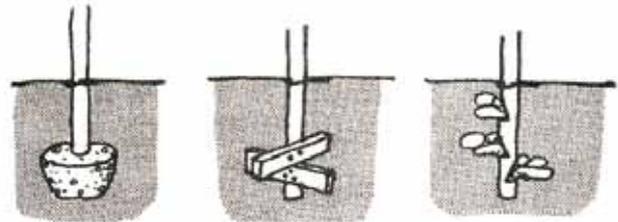
Risk of roof damage



Trees can help protect houses from wind damage



diagonal bracing can reinforce structures but should be correctly attached



Different foundation details

KI KOTE NOU PA DWE KONSTWI

MEN KI JAN NOU DWE KONSTWI

NON **WI**

KAY KI GEN FÒM KARE REZISTE PLIS ANBA GWO VAN

ASIRE W KE TOUT LOT KOTE KAY LA MARE YO SOLID TANKOU FONJASYON AK FOTO

ASIRE W TOUT KOTE TET KAY LA MARE SOLID

FÒK PANT TÈT KAY LA MEZIRE 30 RIVE 45 DEGRE

SEPARÈ TÈT KAY LA AK TÈT GALERÌ A

PYE BWA PWOTEJE KAY LA KONT GWO VAN

FENET YO DWE MENM GWOSE POT YO DWE MENM GWOSE

RANFÒSE TRIANG KAY LA

PÒT AK FENÈT JALOUZI PI REZISTANZ

...POU AYITI, REKANPE!

A KOTE GWO VAN KA PASE

B KOTE KI KA GEN INONDASYON

C NAN REN MÒN

Top: illustrations by: A. James Viet. and Juliana Marek from the 1982 report
 Bottom: Shelter cluster technical guidance following the 2010 earthquake in Haiti. There are many similarities between the two sets of drawings.