

“TRANO MAFY ORINA, FIANAKAVIANA VOAARO AMIN’NY VOINA”

How to Guide; Strengthening a Traditional House for Cyclone and Flood resilience with local material - Madagascar

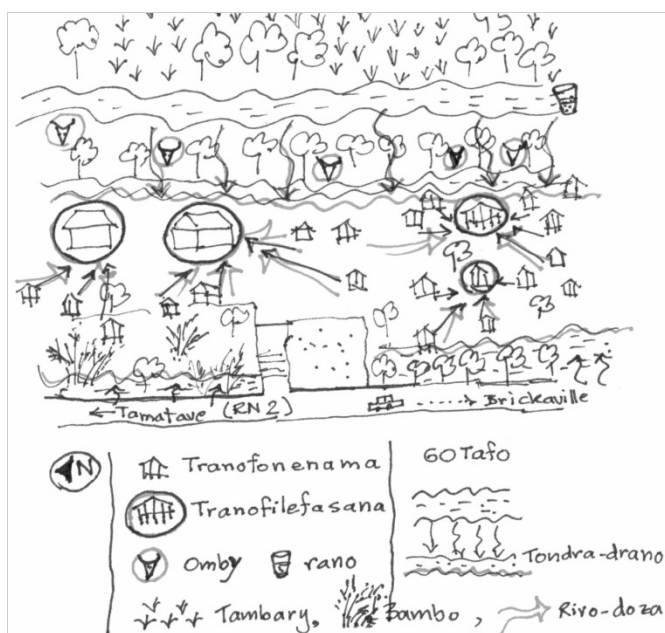


This guide offers you general guide to strengthening your traditional house.

By constructing, repairing and strengthening houses you will be able to prevent loss of life and household items in the event of cyclones. Not all traditional houses will be able to resist the strongest of cyclones and highest of floods, thus it is important to make **Community Settlement Evacuation Plan** before the cyclone season.

Community Settlement Evacuation Plan

- 1. Identify safer and stronger buildings in the community for evacuation;** Identify known buildings which has resisted previous cyclones and floods for example; “semi dure” structures on higher ground which are protected from winds, do not forget to consider the size/capacity of such structure.
- 2. Make community evacuation plans and community agreements:** for example, In case of weak cyclone community will go here..... and in case of strong cyclone the community will evacuated here....
- 3. Strengthen and repair designated community evacuation buildings regularly.**
- 4. Do not forget to;**
 - a) Plan safe refuge areas / shelters for livestock (cow, chicken, etc.)
 - b) Plans for storing safe drinking water above flood levels
 - c) Store food, medicine and other essentials in safe places



A semi-dure refuge house



Silo above flood levels

5. Trees can protect against wind and flood damages:

- a) Plant trees and bamboos around the village, they can act as wind shields and prevent soil erosion.
- b) Falling trees can be dangerous. The distance of a house from a big tree should be equal to its height.
- c) If there are big trees near your house, then trim the branches to prevent damage to houses before the cyclone season.

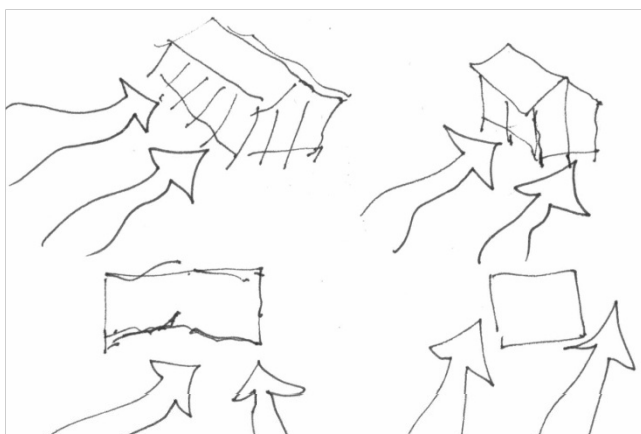


Planning a house: What type of house do you plan to build?

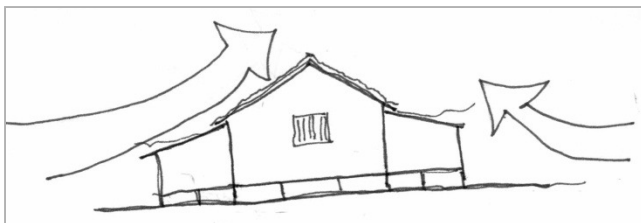
Both types of traditional houses Loha Vazaha and Loha Gasy can be made structurally stronger to increase cyclone and flood resilient.

Choosing a site location; If you are constructing a new house select areas which are safer from floods and protected from high winds.

House size, shape and height



Do not build a long rectangular house, as it can be damaged very easily by high wind

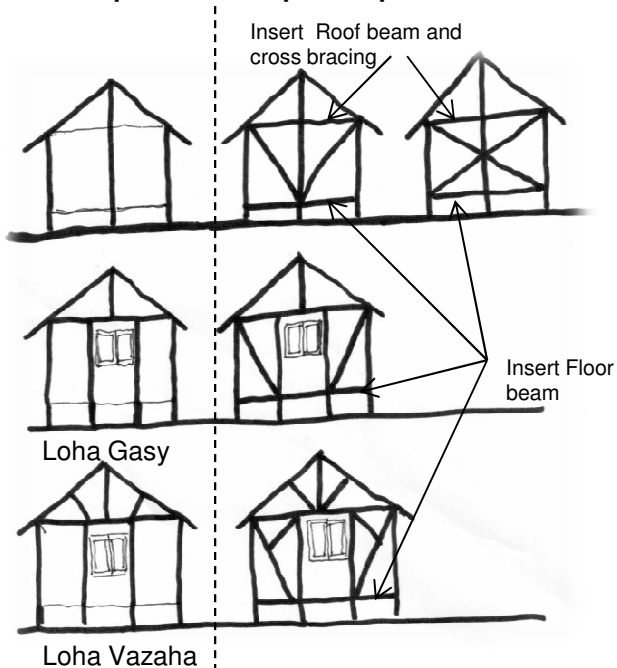


Extensions and verandas act as a windbreaker



Angle of the roof should be within 30 to 45 degrees

Current practice Improved practice



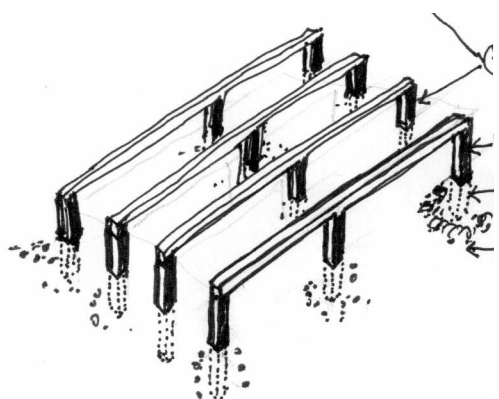
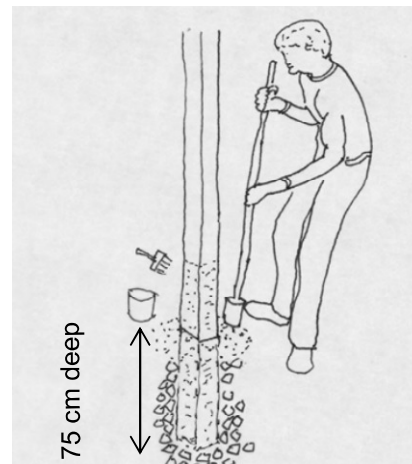
Do not build a tall house as it can be very easily damaged by wind



Do not use high pitch roof as it can be easily damaged by wind

House part 1: Strengthening foundation and floor

- Footing (tongony) and pillars should be buried at least 75 cm deep underground
- A mix of 5-10 cm crushed stone should be compacted under and at the sides of the footing for stability and drainage.
- Use dry wood, paint them with 'huile vidange' and then wrap with plastic and before burying on the ground
- Do not put d'huile vidange or plastic wrapping if the wood or bamboo is not dry



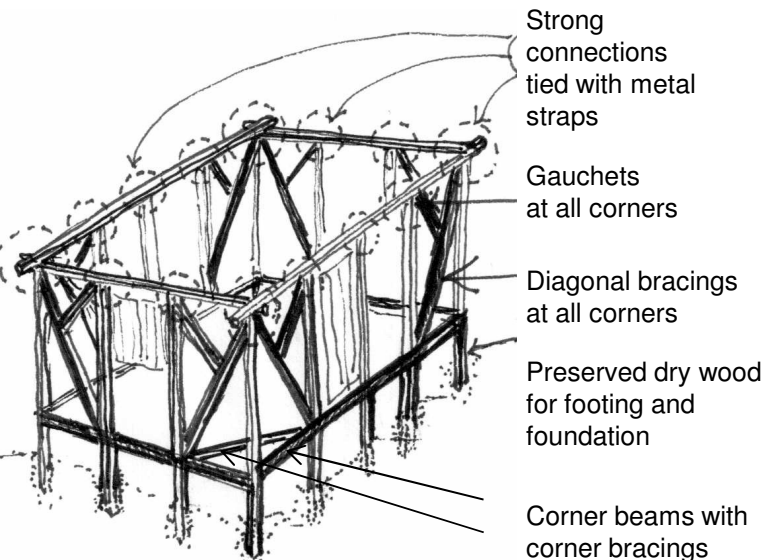
Tongonys should be dry and painted with huile vidange

Tongonys should be buried 75 cm deep

10 cm deep crush stones should be used before burying the wood

House part 2: Strengthening wall structure

- Wall structures should be strengthened with diagonal bracings, triangles or gauchets
- Use metal straps or strong ropes to connect each parts of the structure to the roof
- Strengthen floor frame by adding a rectangular beam, similar to the roof beam and add corner bracing to it



Strong connections tied with metal straps

Gauchets at all corners

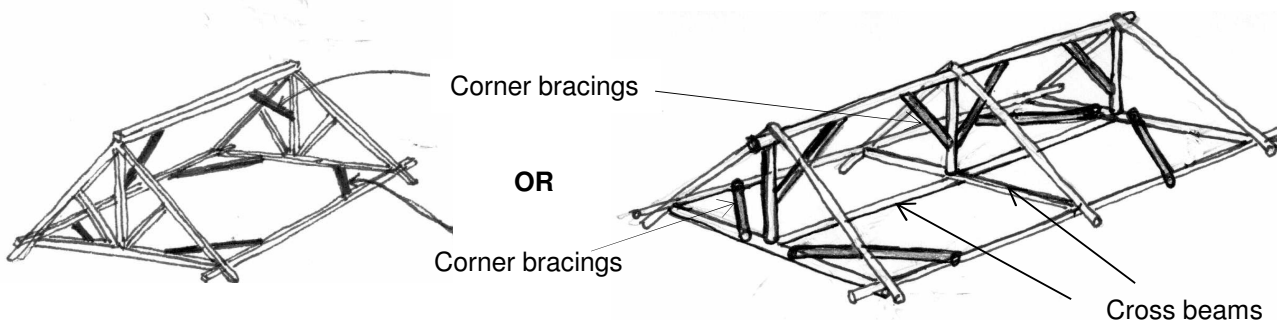
Diagonal bracings at all corners

Preserved dry wood for footing and foundation

Corner beams with corner bracings

House part 3: Strengthening roof frame

- Add corner bracings like gauchets and kios to strengthen the roof
- Add cross beams in the middle to use the roof that can be used as a storage space and also to strengthen roof span
- Connect the corners with strong ropes or metal straps



Corner bracings

OR

Corner bracings

Cross beams

House part 4: Roof cover

Thatched roof cover

- Roof covering should be well tied to prevent it from flying away.
- Use galvanised iron wire or strong ropes to tie to roof cover to the ground on a heavy pieces of rocks on all four sides of roof

Corrugated Galvanised Iron (CGI) sheets

- CGI sheet (minimum recommended between 26 to 29 gauge)

Thickness of CGI sheet

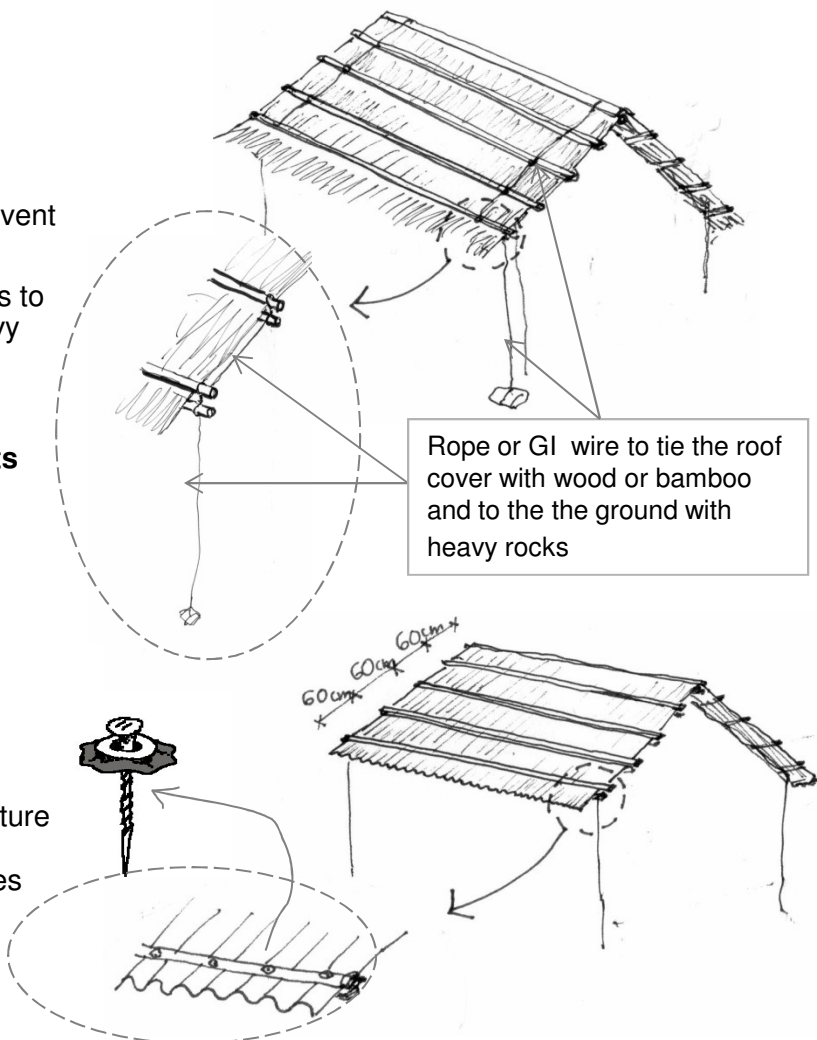
26 gauge=0.45mm

27 gauge=0.42mm

28 gauge=0.38mm

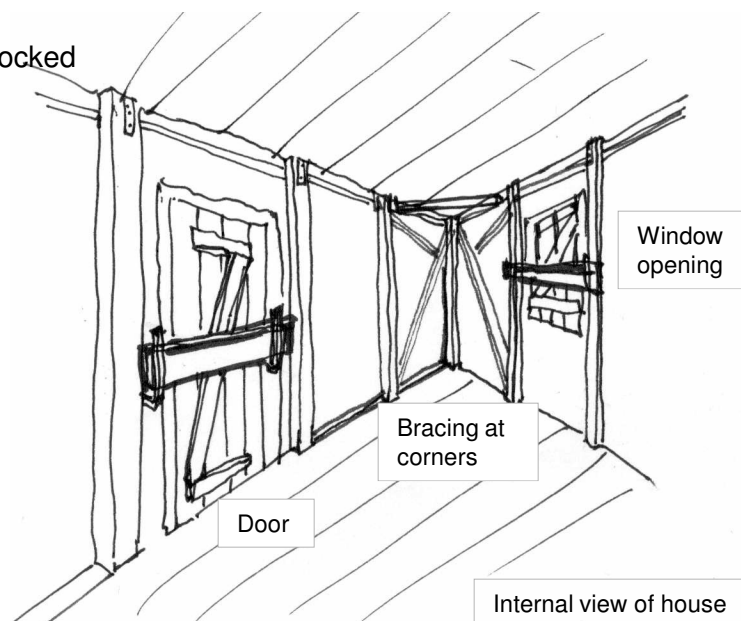
29 gauge=0.34mm

CGI sheet should be fixed to the roof structure with wooden strip above the CGI sheet to prevent it from flying off and causing injuries



House part 5: Doors and windows

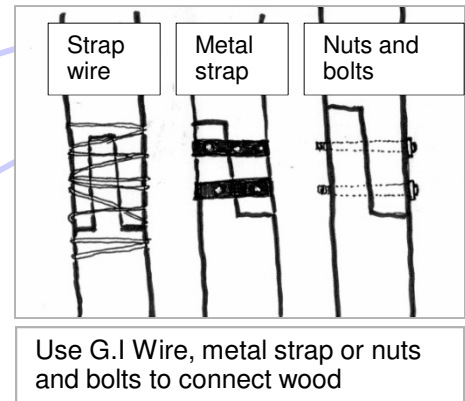
- Place doors or windows at centre of the building away from corners for additional strengths
- Keep doors and windows closed and locked during cyclone



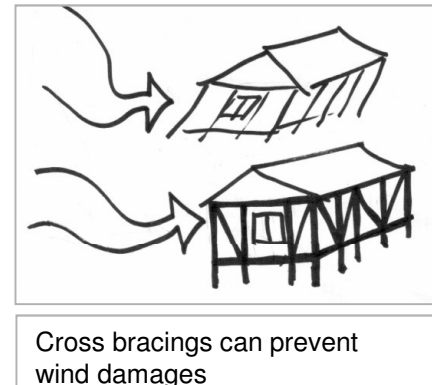
Three key points to consider for a strong and safe house

Point 1: Repair and strengthen your house

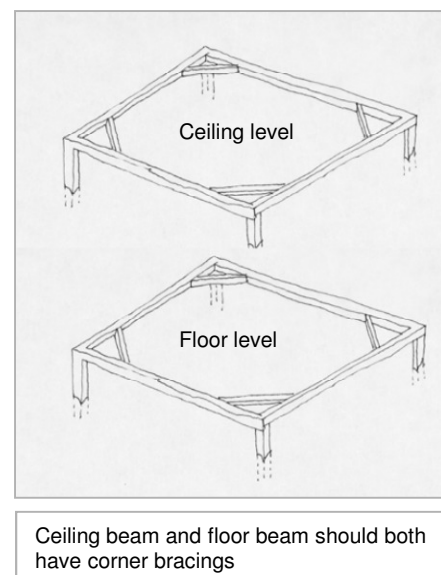
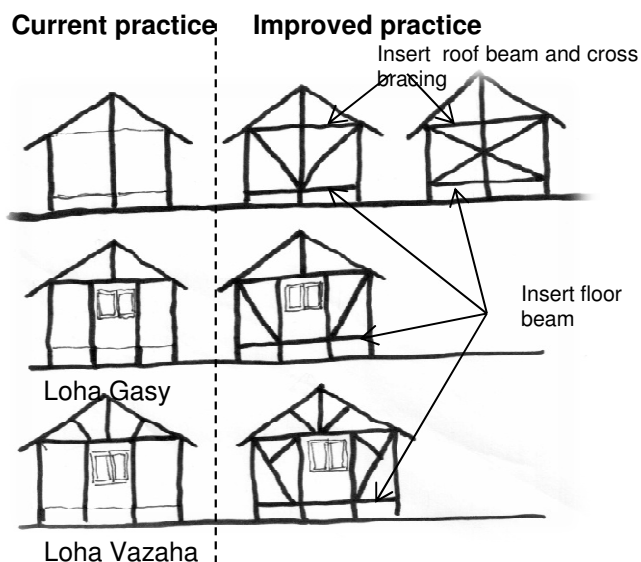
- Replace the rotten posts and connect the new posts well, before the cyclone season



- Use cross bracings or diagonal bracings (triangles and 'gauchets') to all corners and connect them well



- Strengthen floor frame by adding a roof beam or rectangular frame, similar to the roof beam and add corner bracing to it



Point 2: Preserve all materials to make them more durable

Bamboo and wood

- Bamboo can be used green and raw but it is better to use dry and preserved bamboo
- **Wood should be dried before use (Jeanne Ella- Ronald to check how long and how do you know when it is ready for use?)**
- Use d'huile vidange with petrole, to preserve dry wood and dry bamboo **(Roland please put the ratio)**
- Soak matured bamboo in water for a minimum of 3 to 4 days to let the sap out and then dry it for longer before applying d'huile vidange



Metal items

- **Roland: What type of paint???** Paint all metal items like nails, screws, CGI sheet to prevent rust

Other items

- Paint walls, windows, wooden and bamboo items to increase their durability.

Point 3: Connections of each parts of the house should be strong

