Building back stronger

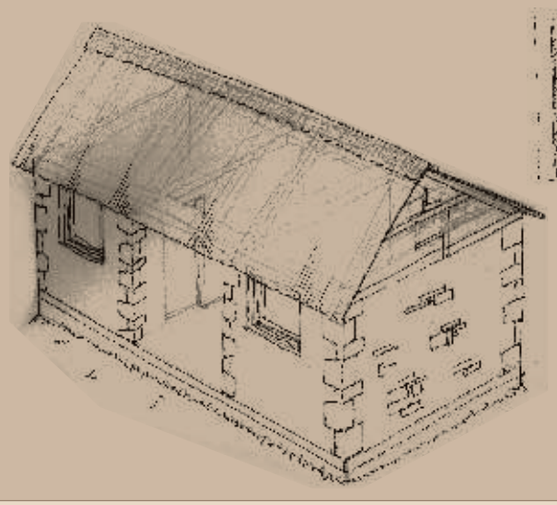
Aungi: a village restored...

"Reuters/Shannon Stapleton, courtesy www.alertnet.org"

CASA

Relocating down to their fields after the 1991 earthquake

The plan for reconstruction



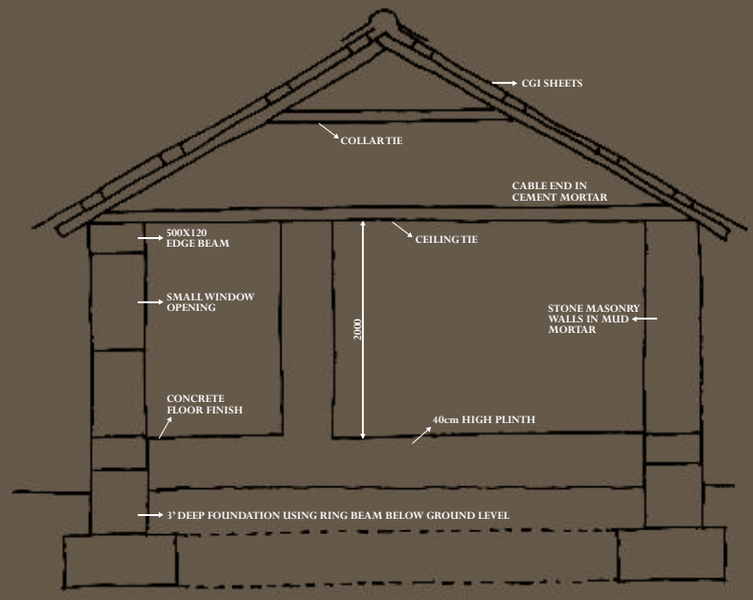
Layout plan

The scenario in 2012

Rebuilding Aungi

When the earthquake struck in 1991, the small village of Aungi did sustain damage. Yet, retrofitting and small reconstruction could have restored the houses. The major problem was the threat of further landslides, forcing a relocation of the village to their farmland below.

However, traditional village planning was retained to a large extent. Although houses were built on the fields of various individuals, they have been located so that the entire settlement remains compact. Plan sizes conform to those in the old houses, ensuring that spatial characteristics do not become a problem. The only departure was that these structures were all single-storied.



At the same time, traditional materials have been intelligently blended with modern techniques to bring about a sturdy, earthquake-resistant structure without losing the identity of a traditional home. Stone and mud mortar was reinforced with vertical beams and concrete bands at strategic levels. Heavy timber rafters supported a CGI roof.

Mason training

"Mortar is now cement-based so there is no mud mortar any more. The strength of a house depends on `vertical beams' (khade beam). We build both khade and pade (horizontal) beams in a house and put plinth and roof bands."

- Ramlal, Head Mason in the village and former trainee in the CASA mason training programme

As part of the initiative, training programmes were conducted for 80 professional masons on earthquake-resistant construction techniques. This has been seen to have had an impact on the way construction is done.

Making the house their own

"The houses were very strong. I didn't change anything in the structure. For with the addition of the special stones in the corners, it can withstand any earthquake."

Over the last 21 years, Devender Singh Rawat and his family have personalised this house with re-plastering and decorations. The tin roof has been replaced by concrete and a kitchen built outside according to their needs.

Enduring lessons

In fact, the lessons have stuck even with those who were very young at the time. For example, the water shortages on construction sites in this region often meant that cement is not properly cured – a necessity for it to set properly and gain full strength. This leads to concrete buildings that look great, but are actually weak. Deepak, one of the house owners, extends his home using these techniques; showcasing how the knowledge is slowly becoming embedded in their construction culture.

- Owner driven reconstruction: Projects where the design, materials, processes are all decided by donor agencies are commonly known as donor-driven; and reconstruction where the community takes the lead in design and implementation is known as owner-driven. In reality, there are many shades in between. Yet programmes that are closer to owner-driven have greater sense of involvement from residents and thus greater acceptability.
- Consent, consultation and participation are various ways of involving the local community in a rehabilitation programme. Consent is the weakest, since most needy families agree to whatever external aid is offered. Consultation involves talking to the families, but decisions are still mostly taken by the aid agencies. True participation involves all families taking part in design, material selection, construction and monitoring. Projects where architects and engineers sitting in far away cities design the houses based on short field visits are least likely to be liked by home-owners!
- Low-cost and no-cost solutions: Using rubble from old collapsed buildings and freely-available local building materials (such as stones) can be very effective in saving costs and reducing the environmental impact. Furthermore, there could be ways of making buildings safer without any additional cost. For example, in Aungi, the shelter design included doors that opened outwards. These would be easy to throw open in case of an earthquake where people were stuck inside. The same doors opening inwards will be far more difficult to open and could be the cause of tragedy.
- The complexity of mountain hazards can be seen in the way that one event sparks another. Earthquakes and cloudbursts lead to landslides; and even developmental work such as road or dam construction can lead to landslides. The landslides themselves lead to long-term erosion and subsidence risk across large areas. The construction of the Maneri dam nearby is Aungi's latest grave peril - an example of how investments and assets are put at risk due to mindless construction. Such development is almost like a second wave of disaster for Aungi.

Traditional can be modern and safe too!

The earthquake in Aungi was a testament to the fact that RCC is not necessarily superior to traditional methods. Houses in the area were built using normal stone and mud mortar. Yet, despite the 6.6 magnitude, the death toll was relatively low. The reconstruction was modelled on traditional lines; simply adding deeper foundations, vertical reinforcements ('special corner stones') and concrete bands for greater earthquake resistance.