



2015

# SUSTAINABLE

## HOUSING RECONSTRUCTION

in the Eastern Democratic Republic of Congo



**GNSH** GLOBAL NETWORK FOR  
SUSTAINABLE HOUSING



**UN HABITAT**  
FOR A BETTER URBAN FUTURE

# **SUSTAINABLE HOUSING RECONSTRUCTION**

in the Eastern Democratic Republic of Congo

**2016**



# ACKNOWLEDGEMENTS

HS number: 009/17E

Coordinator: Christophe Lalande

Principal author: Emma-Liisa Hannula

Design of the prototype house: Emma-Liisa Hannula

Figures: Gregoire Paccoud

Photos: Emma-Liisa Hannula

Contributors: Jean Emmanuel Mihigo Mupfuni, Olivier Moles, Oumar Sylla, Covadonga Murias

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Design and layout: Vilma Autio

Editor: Vilma Autio

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Cover picture: Women making compressed earth blocks. © Emma-Liisa Hannula/UN-Habitat

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# 1 | Background of the UN-Habitat Green Affordable Housing Project in the Eastern Democratic Republic of Congo (DRC)

*Due to a more stable phase in the prolonged conflict of the Eastern Democratic Republic of Congo, UN-Habitat recommends the initiation of permanent reconstruction and moving away from emergency shelter in the area. The reconstruction process is recommended to reflect the local political, socio-cultural and physical context of the area and build on sustainable use of local building materials. In addition, generation of employment and local economic development through participatory processes and capacity building of community members is a key objective.*

## 1.1 The political development in the Democratic Republic of Congo

Following the colonization by Belgium, the Democratic Republic of Congo (DRC) was declared independent in 1960. For 32 years, political power was in the hands of the Mobutu regime during which time Congo was renamed Zaire. In 1998 the Mobutu regime was replaced by the Kabila regime which is still in power today. The majority of foreign armed groups that supported Kabila's regime in its rebellion phase retained in 2002. In 2003, a transitional government took power followed by a constitutional referendum in 2005. However, frequent attacks of militias representing different ethnic groups are still a reality in the DRC today. The regions of North and South Kivu have experienced continuous conflict since the early 1990s. In 2012, a militant group called "M23" took control of several towns in the region. The M23 movement was defeated in late 2013 by national military forces of the DRC assisted by the United Nations Stabilization Mission for the Democratic Republic of Congo

(MONUSCO). Since then, the government has been in charge of the political decision making process in the region with a strong role given to the provincial government for the Eastern DRC.

## 1.2 Towards reconstruction

Several years of unrest in the Eastern DRC have resulted in a significant amount of Internally Displaced People (IDPs) as well as the destruction of most of the housing stock and infrastructure networks. In the border region between Rwanda and Uganda a large amount of IDPs will still be in need of housing in the near future. Following the defeat of the "M23" militant group and after their displacement, Eastern DRC residents have started to return to their former villages or safer locations such as along main roads. However, as most of the housing stock has been destroyed, the majority of returnees are living in tents. The majority of the United Nations Agencies and Non-Governmental Organizations are providing emergency shelter support to returning IDPs. However, there have only been a few permanent housing projects implemented in the area. The international community of the Eastern DRC is recognizing the need for permanent reconstruction and several agencies<sup>1</sup> are currently planning on strategies to start permanent reconstruction programmes.

<sup>1</sup> *United Nations Development Programme (UNDP), Food and Agriculture Organization of the United Nations (FAO) and UN-Habitat have developed a concept note and a strategy document on community resilience capacity. In this strategy, the use of local sustainable building materials is promoted instead of the current unsustainable practices, such as the use of plastic sheets as construction material. A working group from NFI-Shelter has also expressed interest in developing shelter solutions using environmentally sustainable local building materials.*



### 1.3 Physical context in the Democratic Republic of Congo (DRC)

The population of the DRC is ca. 79 million people with an urbanization rate of 42.5 per cent (estimation in March 2016)<sup>2</sup>. The capital city of the DRC is Kinshasa and the provincial capital of the Eastern DRC is Goma which is located at the border to Rwanda. Roads inside the country are in bad condition and often unsafe. More traditional and widely used transportation means are boats and river transport. However, Goma is well connected to Eastern Africa due to its location on the Rwandan border.

The climate in the Eastern DRC is tropical, hot and humid but due to its high altitude temperatures can drop significantly. The largest natural hazard of the Eastern DRC is formed by the active volcanoes such as Nyiragongo, which erupted in 2002 covering 40 per cent of Goma under lava. There are also issues with water pollution, major deforestation with soil erosion in deforested areas and environmental damage related to mining.

### 1.4 Land and housing sector context in the Democratic Republic of Congo

The housing and infrastructure sector in the Eastern DRC has been underdeveloped during the past thirty years and there is very little national capacity relating to these areas. The building sector in the DRC is in bad condition due to decades of unrest and destruction. No sustainable housing strategy has been developed so far.

Since 2008 UN-Habitat has executed a comprehensive land mediation programme in the DRC to pave the way for future housing reconstruction. UN-Habitat has provided direct implementation through a land mediator; support for land administration, reconciliation, helped solve land disputes in the context of an institutional vacuum and supported capacity building of different stakeholders.

<sup>2</sup> Central Intelligence Agency (n.d.) 'Congo, Democratic Republic of the', available from: <https://www.cia.gov/library/publications/the-world-factbook/geos/cg.html>, Accessed 23.3.2016

### 1.5 Sustainable Housing Practices in a Reconstruction Context: General Overview

The building sector is a major producer of greenhouse gas emissions contributing to climate change: it is estimated that the building sector is responsible for 40 per cent of global energy consumption, one third of global greenhouse gas emissions and a significant amount of other forms of pollution. At the same time, the building sector has a very high potential to affordably reduce the use of energy and greenhouse gas emissions in the near future.

Reconstruction is a good opportunity for improving the sustainability of the housing stock as large amounts of housing units are being rebuilt every year in different parts of the world. Housing reconstruction does not need to mean rebuilding houses exactly as before. Instead, the principle of "building back better" can be applied by, for instance, increasing the environmental sustainability and disaster resistance of buildings. In addition, reconstruction situations are good opportunities for decreasing the embodied energy of buildings by prioritizing the use of local sustainable building materials instead of imported materials. It is equally important to build the capacity of communities, local practitioners and authorities as well as civil society to use sustainable building materials and construction techniques by using participatory processes and holding construction trainings. This can generate local economic development and employment opportunities.

In addition to skill development, participatory reconstruction processes can help residents to cope with trauma and build up community networks. The specific needs of vulnerable groups such as the indigenous pygmy peoples in the context of the DRC should be acknowledged as they often face discrimination and thus deeper poverty and loss of cultural ties. It is also important to see housing development as an integrated process relating to land, finance, labor, infrastructure and basic services and the relationship of housing to other sectors (urban design/planning, economic development and job creation) in addition to the actual housing construction.

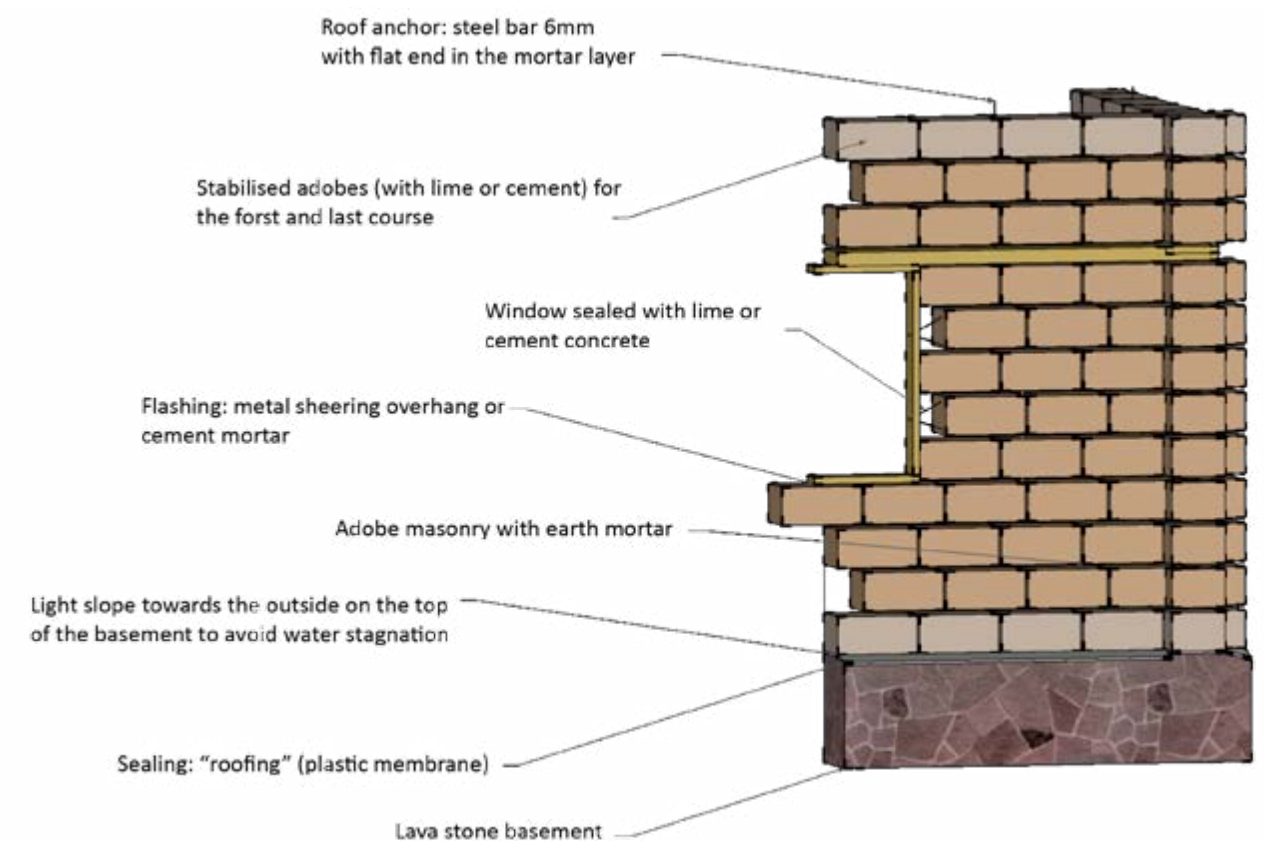
### 1.6 Specific context of the reconstruction areas: Masisi and Ruthshuru

#### Building tradition in Masisi

The Masisi area has been hit hard by the Eastern Congolese conflict. The UN-Habitat Goma office has been involved in land mediation in the area since 2008. Even if the majority of the people in the Masisi area are still living in temporary shelters, some villages have been active in building their own permanent houses. Many houses in the Masisi area are constructed with mud construction especially adobe blocks (Figure 1) or wattle and daub (Figure 2). Thatch roofs are the most common roofing solution. Foundations are often made with wooden poles or stones. There are natural spring water sources in the area.

In some areas of Masisi projects relating to reconstruction have already been implemented by United Nations agencies and NGOs. For example, the Norwegian Refugee Council conducted a project which provided building materials to a beneficiary family whereas the actual construction of the house was the responsibility of the beneficiary herself. The building was made up of a wooden structure with soil infill, sand and earth plastering and metal sheeting for the roof.

Figure 1: Adobe wall





**Building tradition in Rutshuru area including Kibati and Buvira<sup>3</sup>**

The Rutshuru area was a major scene of the conflict between the government and the “M23” militant group that ended in late 2013. During the conflict, the majority of inhabitants fled but many have now returned to their original housing sites. The housing conditions in the area are very poor: most of the community members live in temporary shelter such as tents or quickly built structures made of any building material available.

When approaching Rutshuru from Goma, differences in traditional housing constructions can be observed between villages depending on the kind of building materials that can be found locally. The most common traditional way of building is using “sticks” (10 to 20cm in diameter). Often the bearing structure of the “stick structure” is poles that are either placed on the ground or dug into it. As preservation treatments such as oil are usually not available, the wooden poles are often rotten. A common way of protecting the sticks/poles from water in the foundation of houses is to use stone masonry or piled up stones 30 to 80cm high.

In the villages close to Goma such as in Buvira where a demonstration house of UN-Habitat has been built, most houses have stick or timber structures. These structures are commonly enclosed with any material locally available such as planks, banana or eucalyptus leaves, small stones, earth, metal sheets, plastic bags or tent covers obtained as emergency aid.

Due to the eruption of the volcano Nyiragongo in 2002, lava stone is largely available with little or no cost. Lava stone walls are therefore a common practice in the area, either used for the entire wall or built up to a height of 60 cm as a joint foundation and wall solution. A few concrete structures with various infill materials such as hollow concrete blocks, burned bricks and adobes can be seen. The most common roofing

material is metal sheeting.

When advancing further from Goma in the direction to Rutshuru, for example in the area of Kibati and in Rutshuru town itself, plank houses become rarer while wattle and daub houses (Figure 2) become more common. Sometimes bamboo is used on top of earth in wattle and daub houses as a protective outer walling material.

There is a lime production site in the area and lime blocks are commonly used as construction material especially around the lime production site. Houses made of adobe blocks are also common. Roofs are most commonly made of thatch or metal sheeting.

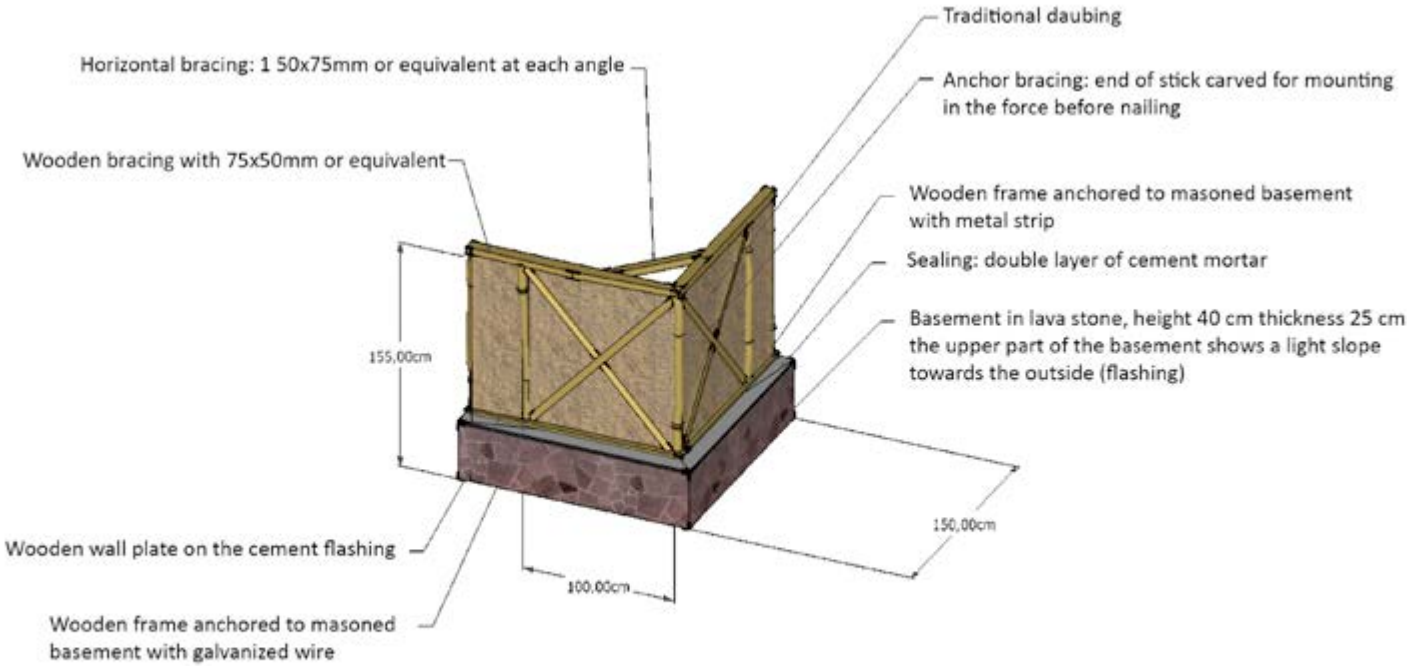
In the Rutshuru area from Goma up to Rutshuru town, finding water is an issue making water harvesting systems an essential part of any reconstruction programmes. There are still land mines in the area which makes securing the area before any housing reconstruction of crucial importance. There are already some reconstruction projects implemented by NGOs in the area, many of them timber structures.

In both Masisi and Rutshuru it was identified that logistics and costs could present problems for the sites furthest away from Goma thus making the use of locally found building materials especially important.



↑ Traditional house in Rutshuru area. © Emma-Liisa Hannula/UN-Habitat

Figure 2: Wattle and Daub wall



<sup>3</sup> This subchapter is written by Emma-Liisa Hannula and Gregoire Paccoud.





## 2 | Goal of the UN-Habitat Green Affordable Housing Project in the Eastern Democratic Republic of Congo (DRC)

### 2.1 Moving from emergency shelter to sustainable permanent reconstruction

The Buvira pilot house, funded by the UN-Habitat in the Eastern Democratic Republic of Congo aims to showcase the importance to move from emergency shelter to permanent housing reconstruction in the Eastern DRC and to facilitate the reconstruction in a way that supports local economic development processes, is economically feasible for returning Internally Displaced Persons (IDPs), does not harm the local environment, supports local socio-cultural ideas of living and fulfils needs related to housing.

The goal of the project is to showcase a sustainable process for reconstruction including consultations and needs assessments of local populations; construction trainings aiming to build the capacity of local communities to build permanent housing themselves, maintain housing themselves and potentially gain opportunities for construction related employment. Additionally, the project aims to showcase to community members, locally active organizations and authorities environmentally sustainable and affordable ways of building in the specific context of the Eastern DRC, in order to pave the way for sustainable reconstruction in the region.

### 2.2 Specific objectives of sustainable reconstruction in the Eastern DRC

The housing reconstruction aims to reflect the four sides of housing sustainability:

- Environmentally sustainable: Built out of local natural building materials, reconstructed houses have a low embodied energy and low pollution levels. Their construction and design fulfill the climatic and local disaster resistance requirements. Using alternative building materials other than timber is relevant as the area is suffering from major deforestation.
- Socially sustainable: Reconstructed houses are designed according to the needs of the target community based on consultations and needs assessments. The reconstruction has a strong training and capacity building component.
- Culturally sustainable: The selected building technologies are based on the building history and heritage of the Eastern DRC area with necessary technical improvements. Houses are built according to existing traditions related to the use of space, family structures and cultural preferences.
- Economically sustainable: The cost of reconstructed houses remains low to allow returning IDPs to build independently. When residents are involved in the construction process, the cost decreases. Using local building materials instead of imported building materials further lowers the cost. The estimation of the price of a house is based on a scenario where the monthly repayment amount of a housing mortgage does not exceed 30 per cent of the monthly income of the residents. The houses should allow incremental expansion to allow for

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