Secondary school with passive ventilation system

Diébédo Francis Kéré // Gando, Burkina Faso

Burkina Faso is amongst the poorest countries in the world. The village Gando – 5000 inhabitants – is situated 200 km from Burkina Faso’s capital Ouagadougou. Like many villages in West Africa, Gando suffers from the effects of globalisation. Whoever is born there, has little chance of accessing modern education. With an illiteracy rate of over 80%, the majority of the people has no alternative than agriculture. But thanks to the use of the knowledge, the village has slowly developed. I wanted to contribute, as an architect, to the agency of social change. In my material, I choose to make use of the materials which are available. Today, in the age of globalisation and computers, the trees and the hangars – those traditional meeting places, where knowledge was passed from generation to generation – are no longer able to supply all the answers.

In 1998, I founded the association “Schulbausteine für Gando” to raise private money and government support to start the development projects in Gando. The architectural idea was inspired by the trees and hangars for the transfer of knowledge, leading to projects in Gando. I didn’t change the appearance of clay, nor the materials were used. The secondary school project was inspired by the hangars and local materials, and the different construction techniques can further improve the performance. An important part of the village genetics is the recycling of clay, and we will consider this approach with further skills and knowledge to profit from the change of a globalised time.

Siteplan

Diébédo Francis Kéré

A building responding to local climate, economy and culture as the result

Architectural idea inspired by tree and hangar as meeting place

Implementation through passive system

Traditional hut

Traditional hangar

Traditional compound

Agriculture for livelihood

Traditional tree

Traditional building process

How far can traditional building structures... be applied to modern education?

DIÉBÉDO FRANCIS KÉRÉ
The village elders and the regional government. The community constructor: village community of Gando in co-operation with Schulbausteine für Gando e.V.

Social network and platform

The second and last of the school projects is to create a platform for meeting, learning and teaching. This is the most important part of the project, for it fulfills a positive ambition of community work throughout the country. It has the potential to become a jump-off for the young people who were trained by the village community. There are people involved in all the following projects:

- Primary school, Gando
- Secondary school, Dano
- Library, Dapaong
- Reforestation
- Training center in Dapaong

The students are responsible for the newly planted trees and are given new know-how. It is of a great importance to build and build the right kind of competence in the building process.

Local approval

This construction is an example of how authorities such as the village elders and the regional government can support and promote local and sustainable projects. The community was involved in all stages of the project.

Use of local resources and materials

Most of the construction materials are locally available granite stones for the basic, clay and lime bricks. This method, which is mainly used as Revolving, is an imported tree which does not lose its leaf and does not provide shade. It is one of the aims of the project, to demonstrate a sustainable usage of this wood.

School extension - finished in 2006

Location: Gando, province Togo, Burkina Faso, Africa
Architect: Deborah Chikeole, self-employed architect
Constructor: village community of Gando in co-operation with Schulbausteine für Gando e.V.

Sustainability through education

The deep motivation of the architect is to build in his home village Gando, in Burkina Faso. It is a need for secondary schools in the country because in the past, only primary schools have been supported financially by foreign institutions and the government of Burkina Faso.

On the construction sites, the traditional techniques are combined with new know-how. It is of a great importance to build and build the right kind of competence in the building process.

2000

2001

2002

2003

2005

2006

2007

2008

2010

2014

2015

2016

2017

Reforestation

Reforestation is part of the design and climate concept of the school projects. The trees and grasses filter the air before entering and create high-quality communal spaces.

Women association center - planning

Location: Gando, province Togo, Burkina Faso, Africa
Architect: Deborah Chikeole, self-employed architect
Constructor: village community of Gando, women association Songalala in co-operation with Schulbausteine für Gando e.V.

Ethical standards and social equity

Training of all and people from Gando underline the projects because they improve the living standards for everyone through education. The students are taught the importance of sustainability, local standards.

Identification

The participation and identification with the projects is founded on a very high and low level. This project helps to keep the independence of the building process.

Primary school - finished in 2001

Location: Gando, province Togo, Burkina Faso, Africa
Architect: Deborah Chikeole, self-employed architect
Constructor: village community of Gando in co-operation with Schulbausteine für Gando e.V.

Library - under construction

Location: Gando, province Togo, Burkina Faso, Africa
Architect: Deborah Chikeole, self-employed architect
Constructor: village community of Gando in co-operation with Schulbausteine für Gando e.V.

2000:

- Primary school, Gando
- Secondary school, Dano
- Library, Dapaong
- Reforestation
- Training center in Dapaong

2005:

- Secondary school, Gando
- Library, Dapaong
- Training center in Dapaong

2006:

- Primary school, Gando
- Secondary school, Dano
- Library, Dapaong
- Reforestation
- Training center in Dapaong

2007:

- Secondary school, Gando
- Library, Dapaong
- Training center in Dapaong

2008:

- Secondary school, Gando
- Library, Dapaong
- Training center in Dapaong

Secondary school with passive ventilation system

Gando, Burkina Faso
cool fresh breeze from the west

dry, hot, dusty harmattan from the east

Typical compound in Burkina Faso

Traditional entrance and climatic protection

Climate adapted typology according to the wind directions

Secondary school with passive ventilation system

Gando, Burkina Faso

KEKE ARCHITECTURE
Photovoltaic elements for the use of computers

Rainwater tank for irrigating plants

Passive air cooling through water pipes

1. Local tree species like mango trees shade the grasses in front of the openings and enable growth
2. Grasses clean the inflowing air from dust
3. Grasses and mango trees are irrigated through draining-off water
4. Dropping water cools down the incoming air
5. The grasses act as a shade for the inflowing air from the east
6. The pumped up groundwater flows to the ventilation duct through the plastic hose, which is embedded in the bench

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Gando, Burkina Faso
Secondary school with passive ventilation system
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Secondary school with passive ventilation system

Gando, Burkina Faso

Floor plan / School module 02
Participation in the construction work

Casting the wall element

Wall Elements made of Cast Earth

Construction of the Terracing

1. Foundation made of granite and mortar
2. Reinforced ring beam made of concrete
3. Concrete connection for reinforcing the wall elements
4. The shutterings for the wall elements are being set up, filled with cast earth and stripped the formwork the following day
5. Afterwards the ring beam is put in form and casted
6. At the same time, the formwork for the beam is set up and casted
7. The ring beams and the carrier beams are reinforced and hold the roof construction and the vaults
8. The wall elements contain of earth blend, sand, gravel and cement
9. The formwork for the vaults is being set up and the vaults are built.

After stripping the formwork, the vaults are being plastered with lime plaster from the inside.

Retaining wall made of granite and concrete

Ventilation duct made of concrete

Poles made of eucalyptus

Horizontal eucalyptus poles

Excavating the ventilation duct

Excavation is being filled back in

Filled-in earth is being compressed

The earth wall is fixed through gum wood | Mango trees are planted and watered by the community |
Grasses which clean the air and fix the earth wall are growing in the shadows of the trees |
The fixing wood disappears through termites and rain
| The earth walls are fixed through compression |
The trees grow and shade areas for new seedlings and grasses
| Grasses are displaced by bushes which grow higher and denser and take over the reinforcement of the wooden construction with their roots |
The roots of the trees hold the humus layer and thus the water resources on site

For several reasons and because of the importance of the project we ran late. In order to keep the timeline we have decided to use the wall using larger clay elements cast in place instead of the bricks. The components are similar to the bricks. The only difference is the added gravel. With one formwork we are able to build up the entire project.
This will not only help us to save time, it also allowed us to introduce a new technique. This underlines the innovative character of our approach.

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