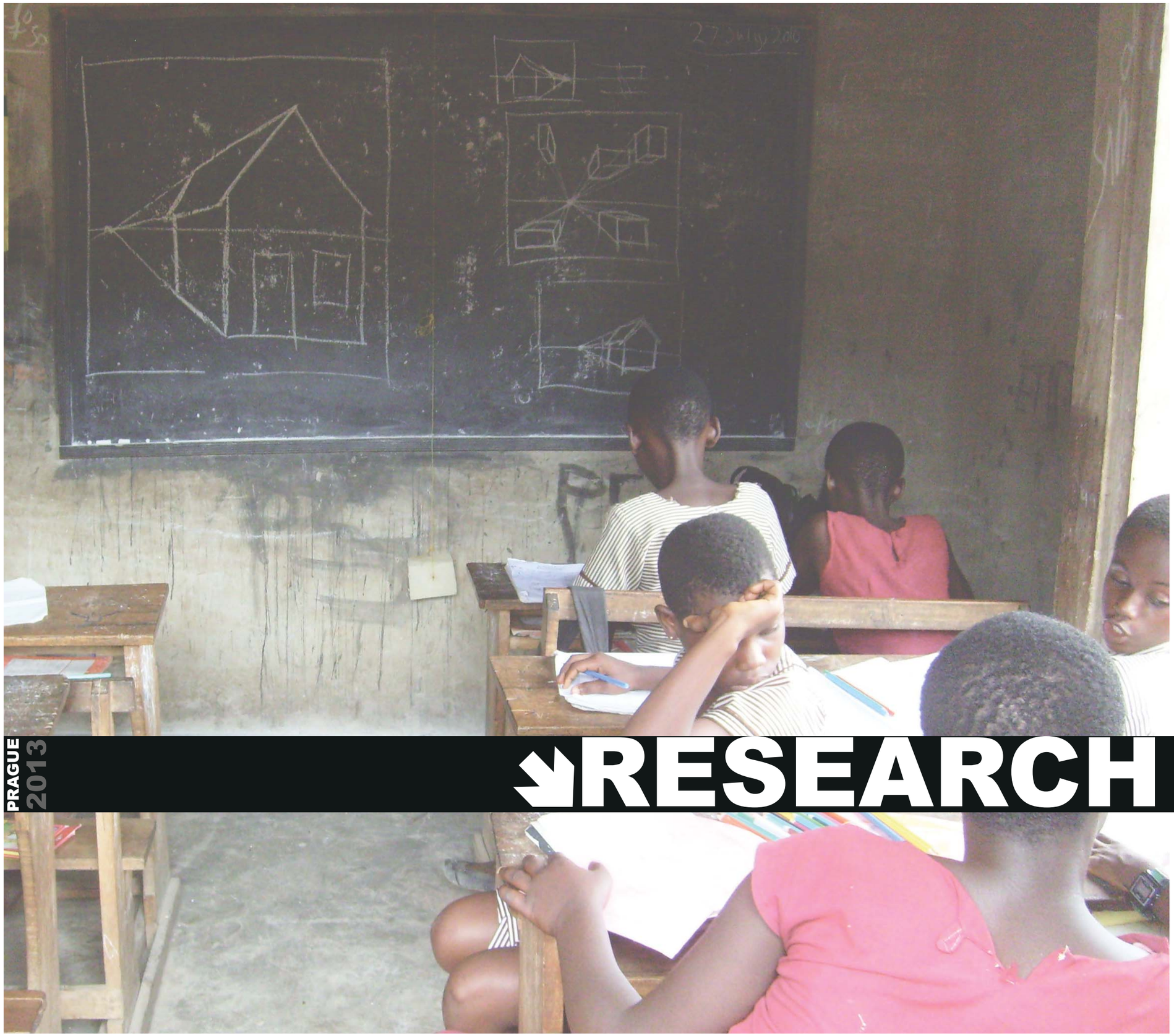


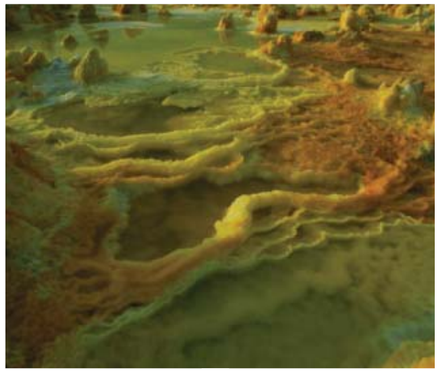
PRAGUE 2013

RESEARCH STUDY

REDESIGN OF SCHOOLS IN ETHIOPIA

PEOPLE IN NEED

CIGLER | MARANI ARCHITECTS












SCENE ETHIOPIA

...WHAT MAKES A DIFFERENCE











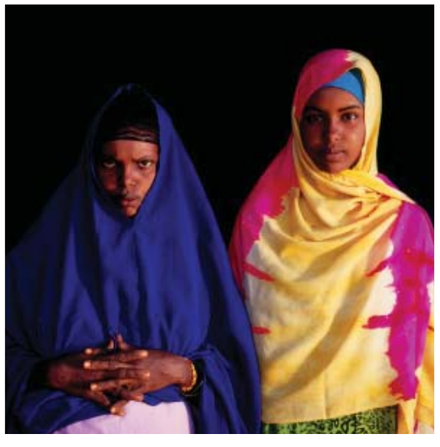


LIFE ETHIOPIA ...WHAT MAKES A DIFFERENCE












PEOPLE ETHIOPIA ...WHAT MAKES A DIFFERENCE

WORLD

...WHAT MAKES A **DIFFERENCE**

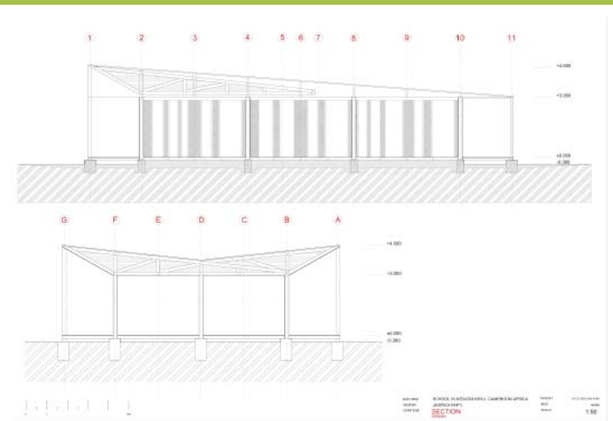
SCHOOL REFERENC

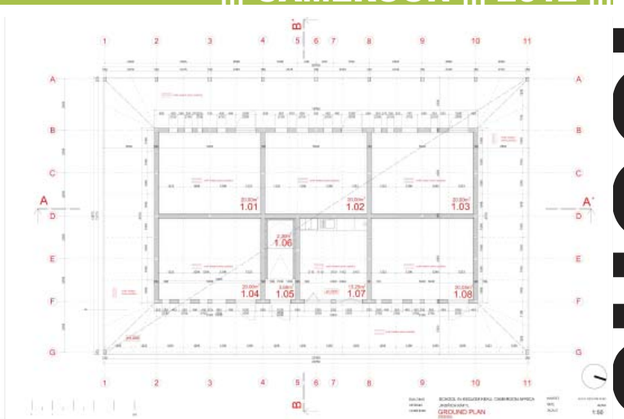
SCHOOL REFERENCES

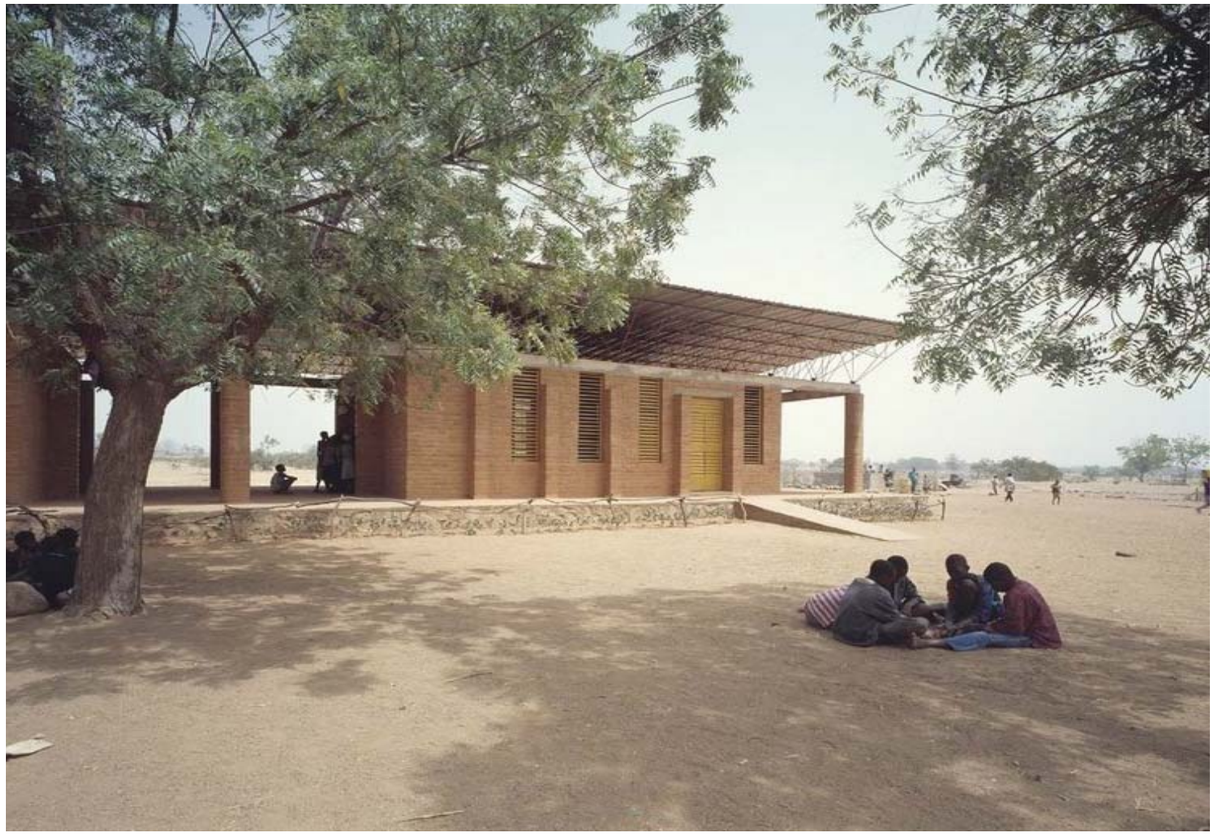
SCIENTIFIC-EDUCATIONAL CENTER, KEDJOM KEKU ||| JINDRICH RAFTL ||| CAMEROON ||| 2012 |||

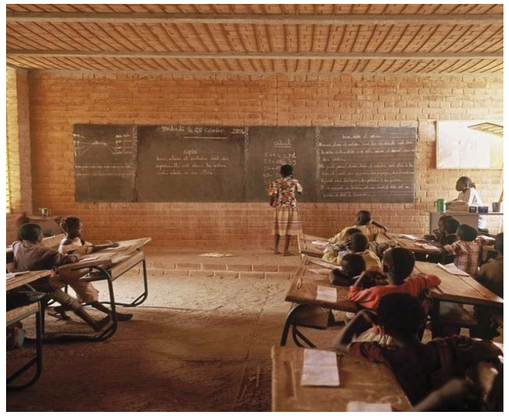
There is a tradition of simply earthen constructions that comes from the lifestyle of local farmers who moveswi their fields after few seasons. They dig a pit, stuff the clay into casts, dry the bricks and cover the roof with dry straw. The dwelling is complete in few days, inhabitable till next moving. On the contrary the school is designed as permanent construction that should represent the sustainability and the development. It should inspire the farmers to more lasting settling and to farming way that avoids destroying of the rainforest.

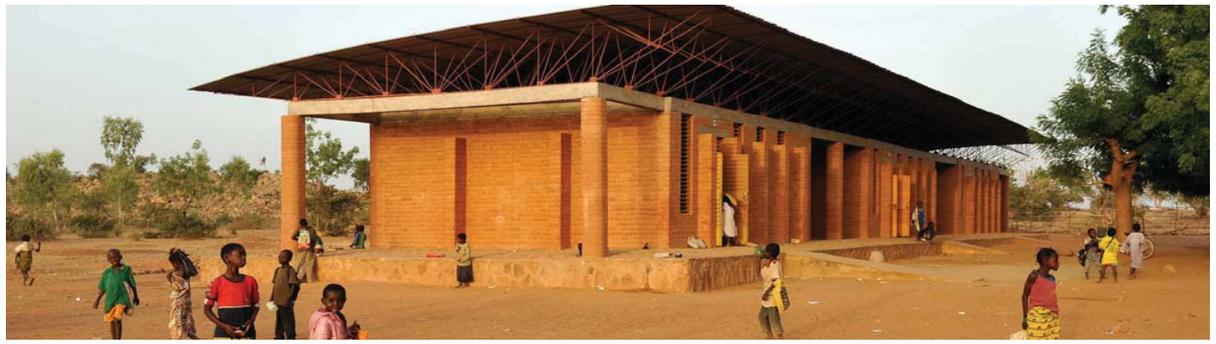
The transparent disposition enables an independent running of two blocks - classrooms and research centre with accommodation for scientists. The simple shape with peripheral terrace makes the construction easier even in the extreme conditions and suitable for local climate - hot sunny days followed with heavy rains. The climate conditions have influenced the roof sructure - the truss beams separate the topcoat from living rooms - the air circulating in this gap prevents from overheating. The roof slope conducts the rainwater in one spot to be filtred and reused. The wall structure consists of wooden frames with stuffed soil and bamboo weave. The material is local - the clay comes from the near stream as well as te stones to the foundations, the wood is eucalyptus (introduced as an alian that produces secondary metabolits that obstructs the original plants to spread), the ceiling is made with mats of chopped bamboo. Only the roof is zinc corrugated plate used because of the durability.









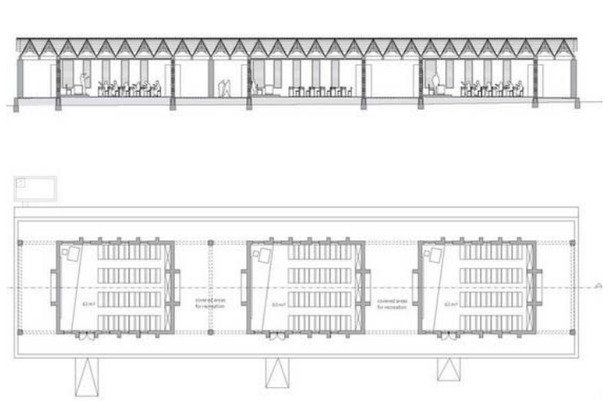


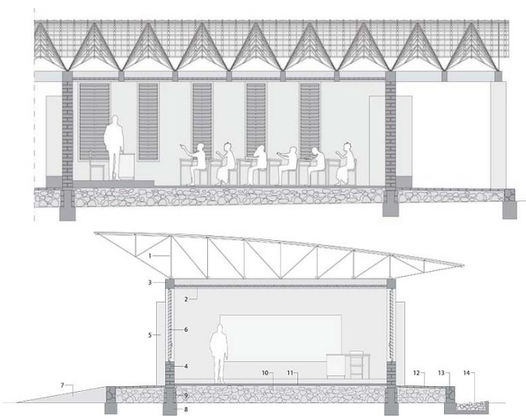
||| PRIMARY SCHOOL, GANDO ||| DIEBEDO FRANCIS KERE ||| ||| BURKINA FASO ||| 2001 |||

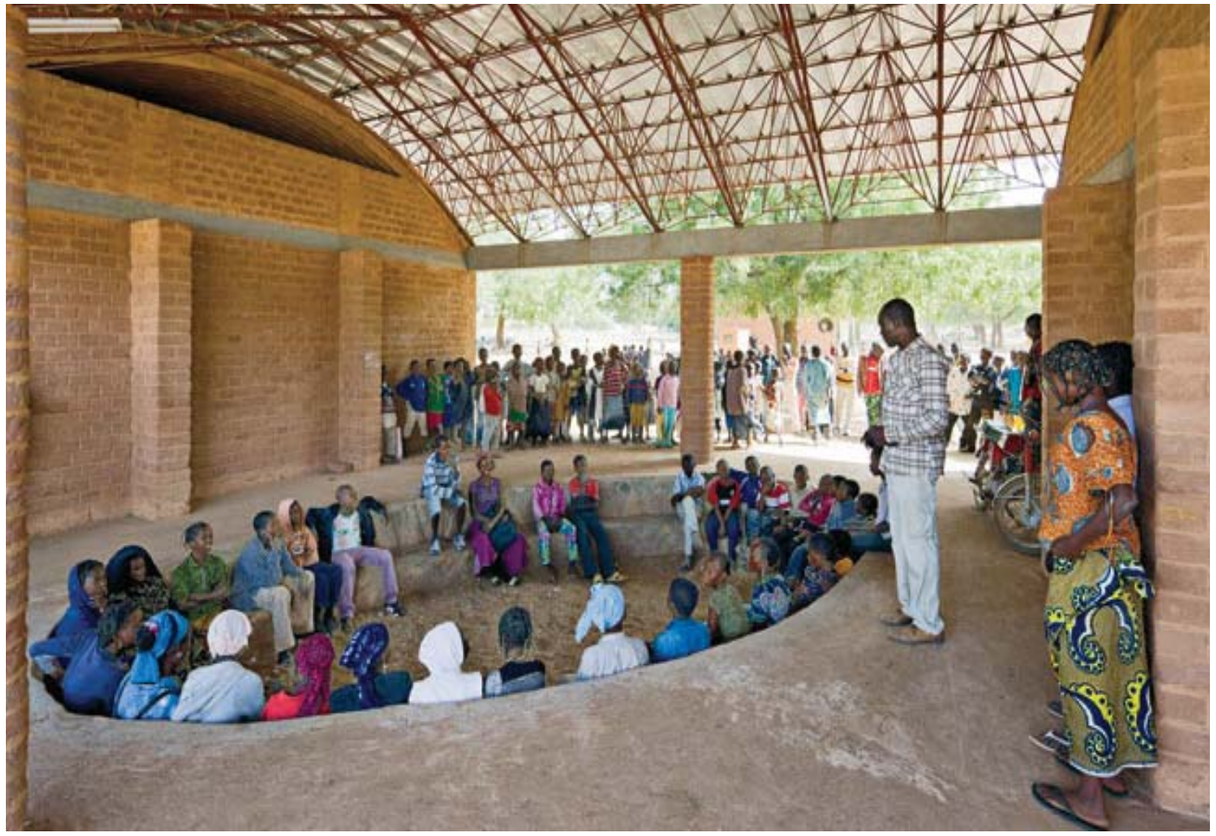
To achieve sustainability, the project was based on the principles of designing for climatic comfort with low-cost construction, making the most of local materials and the potential of the local community, and adapting technology from the industrialized world in a simple way. It was also conceived as a standard model that could be copied within the community and would raise awareness of the merits of traditional materials.

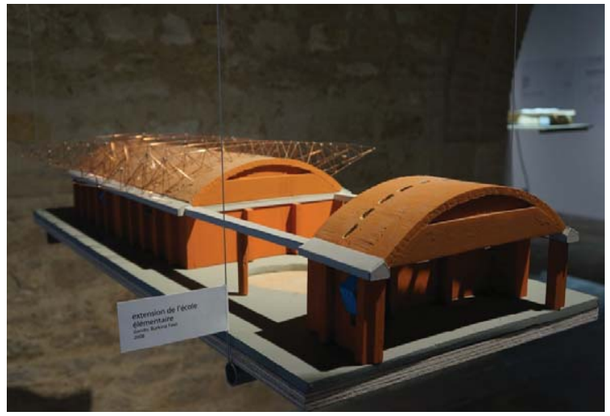
Climatic considerations determined the building's form and materials. Three classrooms are arranged in a linear fashion and separated by covered outdoor areas that can be used for teaching and play. The structure comprises traditional load-bearing walls made from compressed earth blocks absorbing heat. Concrete beams run across the width of the ceiling, and steel bars lying across these support a ceiling also made of compressed earth blocks. The corrugated metal roof sits on a steel truss, allowing cool air to flow freely between the roof and the ceiling. The roof also has a large overhang, which shades the facades.

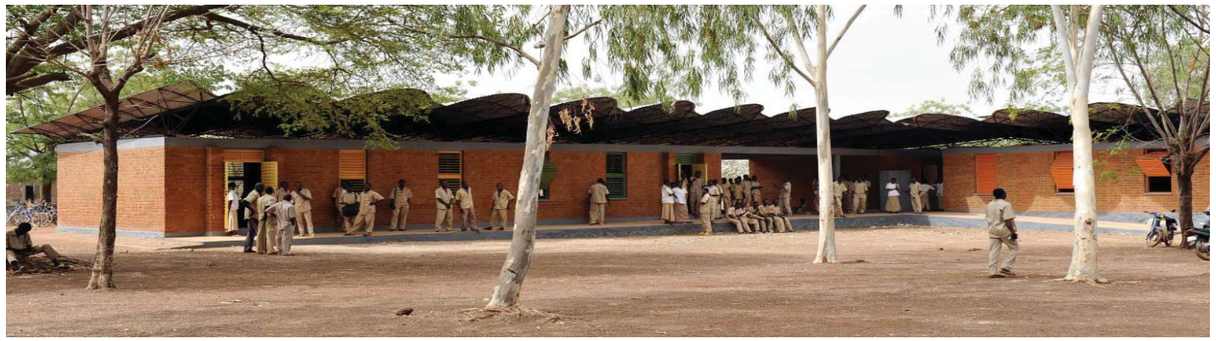
The roof form was dictated by practical considerations: it was not possible to transport large elements from afar, nor to use cranes. Instead, the architect devised a process whereby common construction steel bars were used to create lightweight trusses, with corrugated metal sheeting laid on top to form the roof. All that was necessary was to teach people how to use a handsaw and a small welding machine.









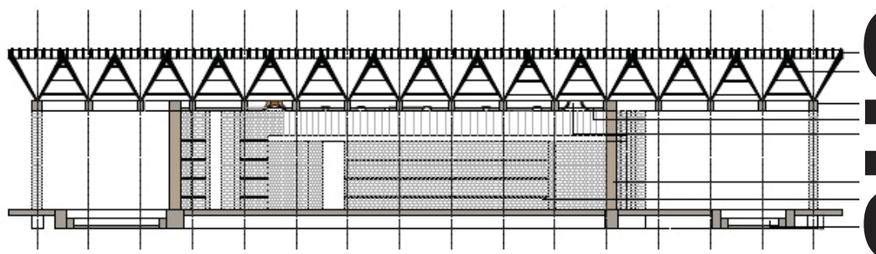


||| SECONDARY SCHOOL, DANO ||| FRANCIS DIEBEDO KERE |||
||| BURKINA FASO ||| 2007 |||

The primary objective of this project was to design a sustainable building appropriate for the climatic conditions in this part of Africa. Laterite stone, which is abundant in this region, was chosen as the main building material. The building is oriented along an East-West axis and the roof has a substantial overhang in order to reduce the amount of sunlight received by the walls. The building consists of three classrooms, a computer room and office space. There is also a covered outdoor "conversation pit", of comparable size to a classroom. The students can sit here during break times.

Natural ventilation is achieved by means of slits in the suspended ceiling, the incline of the corrugated metal roof and the shuttered windows. This is a more sustainable solution than the often-copied western model of construction, for which artificial air-conditioning would be required in this part of the world. Diminishing fossil fuel resources and increasing energy prices mean that self-sufficiency is crucial, especially in a country like Burkina Faso, which is ranked in second to last place on the UN poverty list and has to meet its complete energy demand by means of import.

This entire project was carried out in cooperation with young people who were trained in previous projects sponsored by "Schulbausteine für Gando e.V". Through this working model, the local workforce gained not only a newfound appreciation of traditional building materials, but also further experience, training and education.



SCHOOL REFERENCES

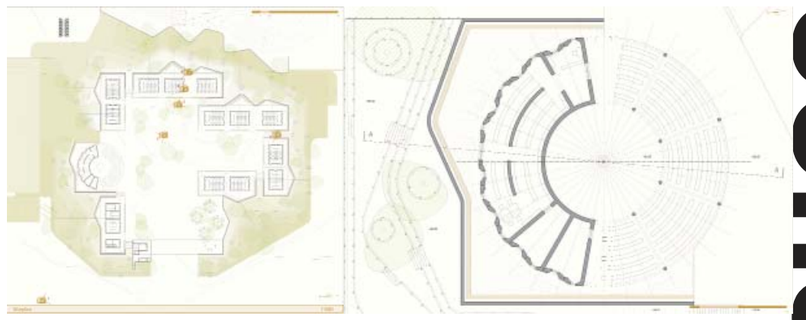
||| SECONDARY SCHOOL, GANDO ||| FRANCIS DIEBEDO KERE |||
||| BURKINA FASO ||| 2012 |||

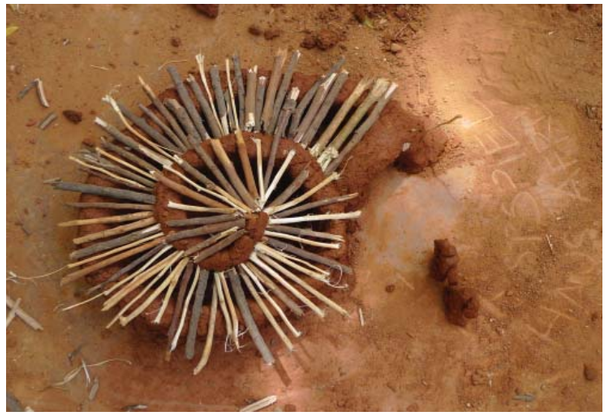
The secondary school in Gando gives graduates of the primary school access to further education, and therefore enhances the sustainability of the educational opportunities in Gando. The extreme weather conditions in this area complicate studying in buildings without air-conditioning. This is why all interior spaces in the secondary school are embedded in the newly designed landscape in order to create a shadowed oasis.

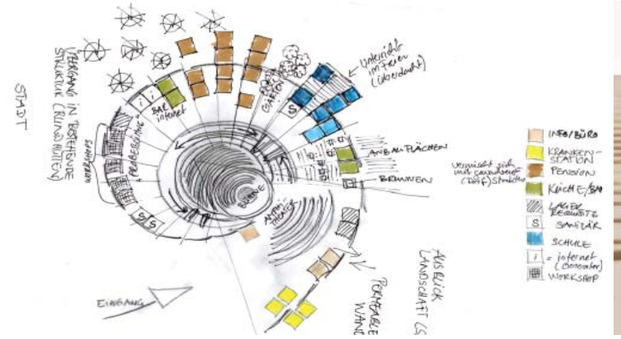
The project seeks to use resources sustainably in order to provide natural ventilation without any use of vvelectricity. Low-tech, cost-effective pipes in the ground work as a sustainable, passive geothermal cooling system. The rich vegetation at ground level pre-filters the incoming air. This air is channelled through the underground pipes to cool the rooms via holes in the floor. The hot air in the classroom rises through openings in the ceiling into the space between the ceiling and roof cladding. The large, overhanging roof allows the wind to circulate freely in the space between ceiling and roof, providing a rapid exchange of air. Pressure differences between inlet and outlet increase the natural flow of air. Rain water will drip into the pipe from a basin integrated in the landscape.

Due to extreme deforestation the region is now facing the expansion of the desert. To prevent the ground from becoming dehydrated, collected rainwater irrigates the trees recently planted around the school buildings. This specially developed low-cost and low-tech climatic concept works in extremely hot regions of the world, such as the Sahel in Burkina Faso.

Natural ventilation creates a comfortable indoor climate and maintenance costs are kept to a minimum.The form of the school is inspired by traditional rural compounds in Burkina Faso. These round structures are embedded in the countryside, sheltered towards the dusty and hot wind from the East but open to the fresh breeze coming from the West.







||| OPERA VILLAGE AND SCHOOL, LAONGO ||| FRANCIS DIEBEDO KERE |||
||| BURKINA FASO ||| 2009+ |||

When Francis Kéré first heard the idea of an opera house for Africa, he thought that it was crazy. But when he met Christoph Schlingensief, the initiator and visionary of the project "Opera House for Africa", he knew that it was no joke. Although Burkina Faso is one of the poorest countries on earth, it is also a country with a strong sense of national pride. What many people don't know is that Burkina Faso is the centre of African film and theatre. Christoph Schlingensief managed to convince Francis Kere that an art project which helps to shape or awaken the cultural identity of a group is important for the development of a country. And if Francis were to construct this building with his methods, integrating local people, using local materials, involving people and taking their concerns into account, then this project would also be right for such a poor country. Burkina Faso suffered major flooding at the end of August 2009. At the time, Francis was travelling with Thomas Goerge, Christoph's stage designer, in Burkina. A few hours after the water had receded, Francis and Thomas tried to look at a site in the capital, Ouagadougou, that Christoph had identified as a possible location for the opera house. However this site, located on the boundary between official and informal settlements, didn't exist anymore. It had been completely washed away by the floods. After this experience, Francis and Christoph realized that the opera house project should no longer be the main topic of discussion. They began to develop a way to help people rebuild their homes by designing a suitable housing prototype.

The Opera village is being constructed on a 12-hectare site on a little rise in Laongo, one hour car drive from the capital of Burkina Faso and overlooking the West African landscape of the Sahel zone. The main infrastructure connection is the main road to the west of the site, leading to Ouagadougou. A festival theatre, workshops, medical centre and guest houses are planned, as well as solar panels, a well and a school for up to 500 children and teenagers with music and film classes. Central to the project is the festival hall with the theatre inside. This stage and auditorium were designed and constructed for a piece of theatre in Germany and not used again afterwards. Now it is going to be transformed in Burkina Faso to meet the needs of the Opera village.

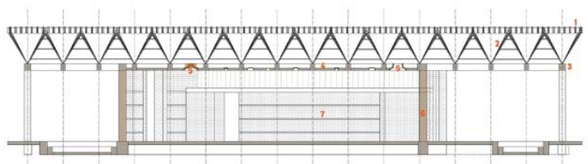
The support construction of the stand and the rotating stage will be maintained. The seat rows and interior walls will be covered with Burkinabe fabrics. The theatre will be completely enclosed by a 15m high covering to shelter it from the outside conditions. Simple basic modules, which vary in quality and function depending on the equipment they house, comprise the entire village. Most of these modules will be self-constructed. Local materials such as clay, laterite, cement bricks, gum wood and loam rendering will be used for construction. For reinforcing elements such as beams, columns, ring-beams and foundations, concrete will be used. Due to the massive walls and large overhang of the roofs, air conditioning could be discounted in most buildings.

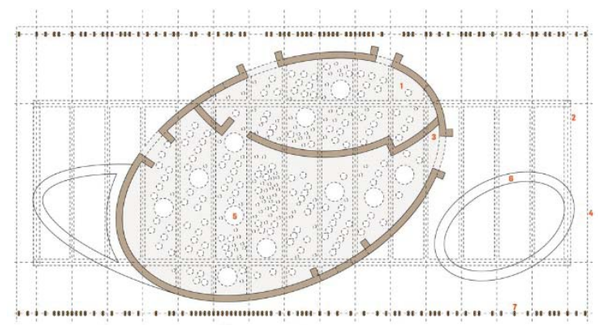
||| SCHOOL LIBRARY, GANDO ||| FRANCIS DIEBEDO KERE |||
||| BURKINA FASO ||| 2012 |||

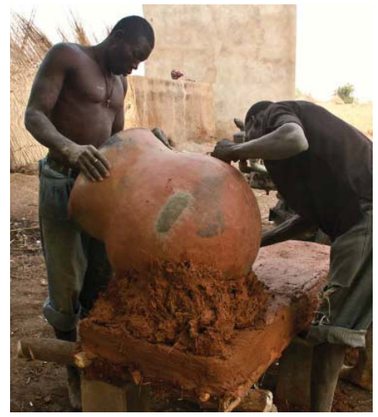
The library building forms a joint between the first school building and the extension and thus shelters the schoolyard from dust-carrying easterly winds. The library will be open to everybody, not just pupils of the school. It will be a place for village elders to pass on knowledge and traditions down the generations. As in the school buildings, the main construction material is compressed earth blocks. The geometry of the building is however different; in contrast to the strictly rectangular school, the library has an elliptical shape.

The library's ceiling is an innovative feature that makes good use of local technology. Clay pots, traditionally made by the women of the village, were brought to the site and cut, so as to be open at both the top and bottom. The pots were then cast into the concrete ceiling to create holes for light and ventilation. A rectangular corrugated iron roof sits above this ceiling and extends out beyond the library to create a separate shaded area for study or relaxation. As the metal roof heats up it draws the air from inside the library up and out through the holes in the roof, ensuring a comfortable rate of air circulation. The rectangular area around the library is enclosed by a facade of thin eucalyptus columns.

Eucalyptus is thought of as a weed in Burkina Faso; it dries out the soil and provides very little shade from the sun, so normally it is burned as firewood. This fast growing, hardy plant is an appropriate building material for a country such as Burkina Faso, which suffers from desertification due to deforestation. Some of the eucalyptus façade elements are arranged to form alcoves for sitting and relaxing in the shade. The interior quality of the library and surrounding space is pleasant, cool and airy – ideal conditions for learning, thinking and studying.







SCHOOL REFERENCES

||| WOMEN´S ASSOCIATION CENTRE AND SCHOOL, GANDO |||
||| FRANCIS DIEBEDO KERE ||| BURKINA FASO ||| 2012+ |||

The programme of the building includes a classroom, a meeting room, an office, a kitchen and sanitary latrines. Furthermore the centre contains a storage room for agricultural goods and household effects. This offers possibilities for the women to store their harvested goods, then process them further and sell them later at the market to secure their own incomes. From October to May, the building will be used for educational purposes. Classes for adults will take place from 7am to 2pm. In the afternoon until sunset the building will be open to the village community and used by the women's association for various activities. During the rainy season, from the end of May until the end of September (which is the high season for agriculture), the building will be used for information and campaigns, which can be initiated by the village community, the regional government or foreign organisations. During the rainy season, the women's centre will be the only facility which offers dry, weather proof space for social events and storage of goods. The building should incentivise the government and other non-governmental organisations
to allocate more professionals in the fields of healthcare, development, agricultural technology, education, water management and forestry.
The target group of the project is a community of up to 300 women from the village of Gando and the surrounding area of the province Boulgou in Burkina Faso. This area includes about 2,500 people, most of whom make their livings as subsistence farmers. In this region, women are bearing the brunt of poverty. Up to 97% of the women over 15 years old are illiterate. To break the vicious circle of poverty and depression, the women want to form a strong social and economic union. The women's association centre will improve their quality of life in a sustainable way by providing a platform for them to develop their economic and educational situation, and share information about health, nutrition and agriculture. The village community will contribute to the building through voluntary efforts, which will keep construction costs low.










||| HOME FOR HANDICAPPED CHILDREN, TEBOGO ||| ANNA HERINGER ||| ||| SOUTH AFRICA ||| 2005 |||

Living Tebogo - A project of the University of Arts, Linz/ die Architektur/ Prof. Roland Gnaiger and BASEhabitat in cooperation with SARCH and Education Africa

"Tebogo - the first solar passive energy house in the southern hemisphere!" Wolfgang Feist, Germany

The aim was to plan and to build a joyful and comfortable place for the therapy of almost fifty handicapped children in the township Orangefarm close to Johannesburg.

Without the use of external energy the new buildings show a crucial improvement of the thermal comfort. Unlike the surrounding buildings, mostly shacks with an indoor temperature from 2 C° - 45 C° the new buildings reach a thermal comfort that reduces the temperature fluctuation inside to 9C°(18 C°-26 C°). The building materials were collected directly from the township: earth, concrete blocks, clay, straw, timber, grass mats.

Concept and Impact: Twenty-five students were responsible for the design, technical planning, sponsoring and constructing. In six weeks a dining area with kitchen, therapy rooms with sanitary units and a generously dimensioned pergola were erected together with local workers.

The project goes beyond constructing and training in ecological building methods – it also contributed to intercultural and mutualsocial understanding. For us participants from Austria it was a great learning opportunity to grow in our sensitivity and responsibility as architects and as human beings.

“Today we can erect buildings in which no outside energy is needed to provide a pleasant internal climate, buildings that use the resources of their location rather than destroying them, that enrich the environment and offer people new challenges and new work. To achieve this we do not need more responsibility, nor must we restrict ourselves or do without something. All that is necessary is additional intelligence, more teamwork, more sensuality, joy and beauty.”

(Prof. Roland Gnaiger, Head of Department Architecture and Design, University of Art Linz)



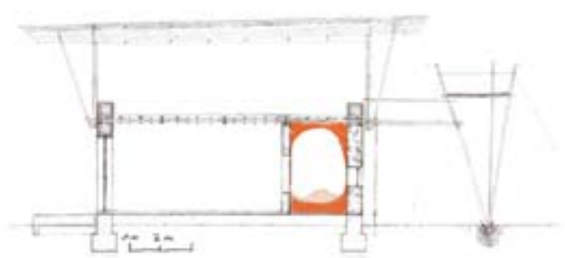
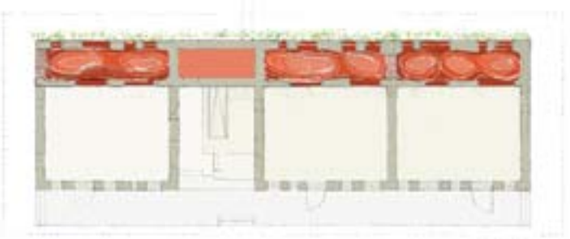
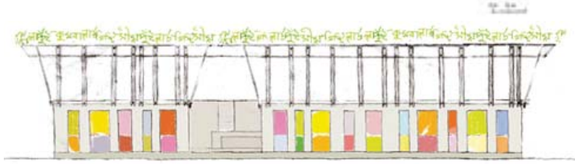






||| METI - HANDMADE SCHOOL, RUDRAPUR ||| ANNA HERINGER |||
||| BANGLADESH ||| 2005 |||

“This joyous and elegant two-storey primary school in rural Bangladesh has emerged from a deep understanding of local materials and a heart-felt connection to the local community. Its innovation lies in the adaptation of traditional methods and materials of construction to create light-filled celebratory spaces as well as informal spaces for children. Earthbound materials such as loam and straw are combined with lighter elements like bamboo sticks and nylon lashing to shape a built form that addresses sustainability in construction in an exemplary manner. The design solution may not be replicable in other parts of the Islamic world, as local conditions vary, but the approach – which allows new design solutions to emerge from an in-depth knowledge of the local context and ways of building - clearly provides a fresh and hopeful model for sustainable building globally. The final result of this heroic volunteer effort is a building that creates beautiful, meaningful and humane collective spaces for learning, so enriching the lives of the children it serves.”
(Jury of The Aga Khan Award for Architecture 10th Circle)









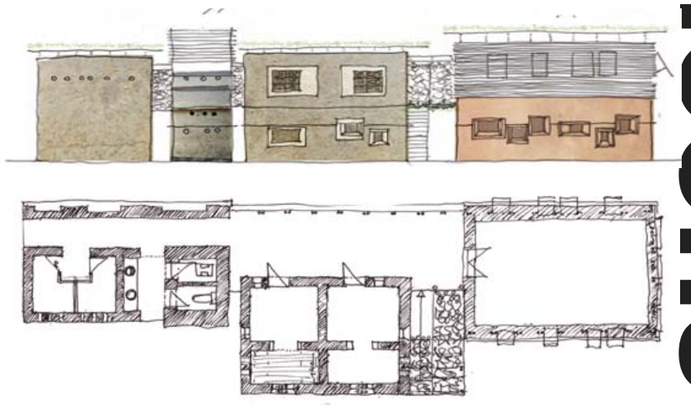

||| DESI - VOCATIONAL SCHOOL, RUDRAPUR ||| ANNA HERINGER |||
||| BANGLADESH ||| 2008 |||

The DESI building is a model for a new and appropriate way of living in the rural areas of Bangladesh: an improved living standard that keeps the traditional level of sustainability. It is not the money that makes the main difference, but the care for a good craftsmanship, planning and design. It's a fair architecture that motivates to a technical development of traditional building methods, instead of advertising the consumption of expensive and imported materials. In place of a cement-plastered brick wall, a sophistic woven bamboo wall becomes a sign a of prestige.

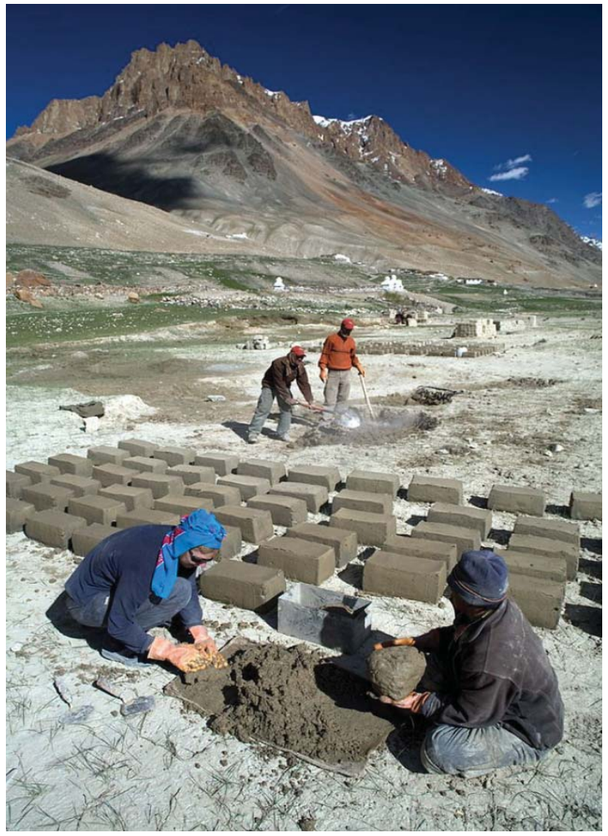
DESI (Dipshikha Electrical Skill Improvement) is a vocational school for electrical training. The DESI building houses two classrooms, two offices, and two residences for the school instructors. There is a separate bathroom with two showers and two toilets for the teachers and a bathroom facility with toilets and sinks on the ground floor for the students.

Solar panels produce 100% of the building's energy needs. A solar thermal heating system provides warm water. The toilets have their own two chamber septic tank. This is the first time that sanitary units have been built into earth houses in Bangladesh, proving that mud and bamboo are flexible enough to accommodate modern lifestyle requirements.

The building is a perfect balance of high tech and low tech – very basic building methods are combined with modern, alternative energy power systems. Because the building is passively heated and cooled and optimizes natural light and ventilation, the relatively small solar panel and battery system provides all of the power the building requires.



SCHOOL REFERENCES



SCHOOL REFERENC

||| SURYA PRIMARY SCHOOL, KARGYAK ||| JAN TILINGER |||
||| INDIAN HIMALAYAS ||| 2009 |||

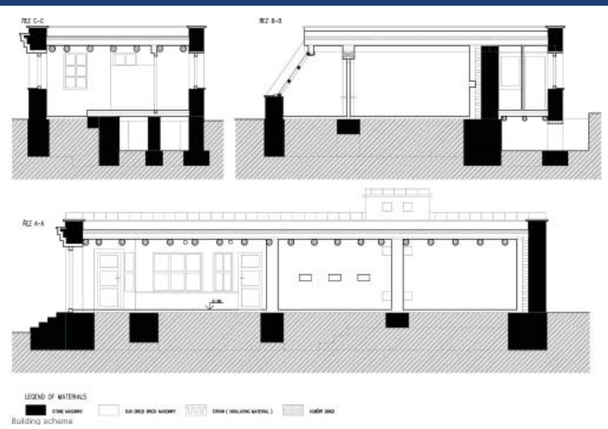
Kargyak (elevation of 4200 m) is the highest situated village of Zanskar, geographically isolated and without basic infrastructure. The nearest road today ends in the 80-km distant village Padum, which is an administrative centre of the region and a trip from Kargyak to of Padum takes four days by walk.

There are more than 300 sunny days in a year; in winter the temperature can drop down to -40°C. For five months every year the village is isolated from the rest of the world.

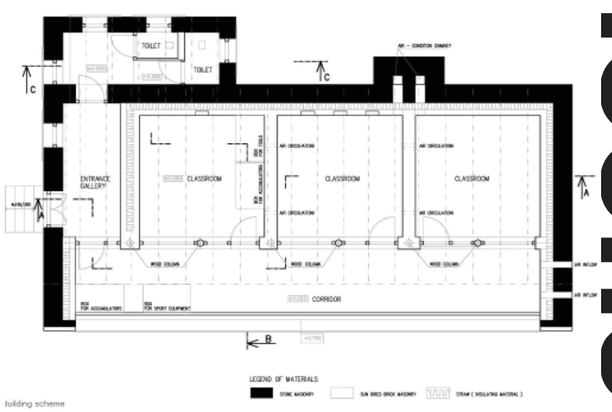
The SURYA school project is to provide a basic education for eighty children in Kargyak and surrounding villages. The special construction of the building uses solar light and provides the house with comfortable temperature of minimal 15°C throughout the year. This will allow school attendance during the long winter months. Then the winter holiday can be moved to summer time when most of the children are helping their parents with the harvest and therefore unable to attend classes. This project has grown out of our team's repeated visits to the region and consultations with the local people, regional officials and foreign specialists.

The construction of the solar school is based on graduate work of Jan Tilinger. His graduate thesis entitled "Ecological School" is a complex solution for the school construction.

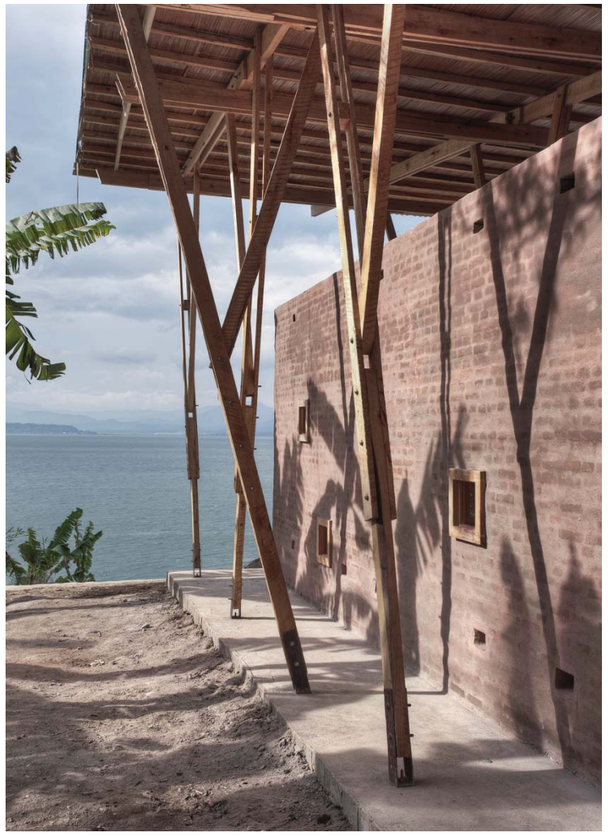
The design takes in consideration local architectural traditions, use of natural materials and potentials of solar radiation. The project started in 2007, with the villagers supplying the labour and the Chief engineer providing technical instructions.



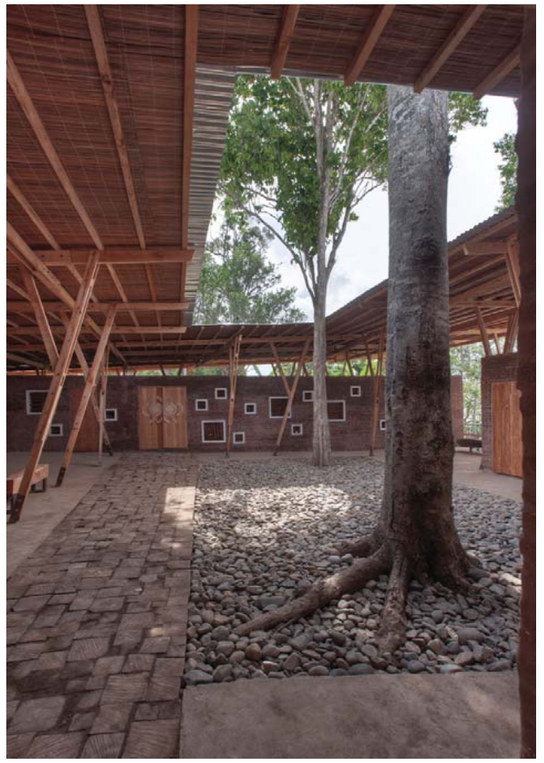
Building scheme

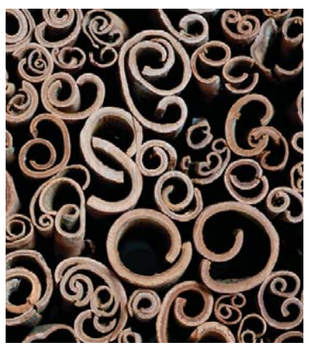


Building scheme



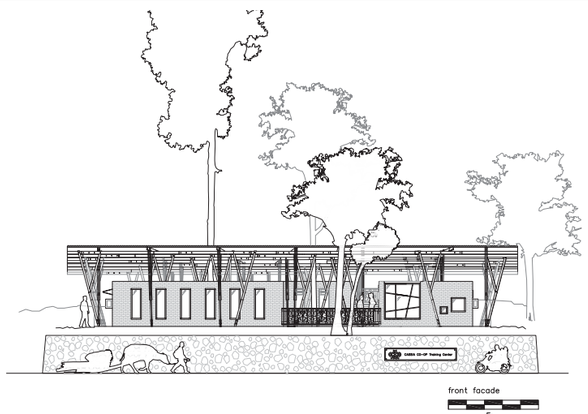
SCHOOL REFERENCES

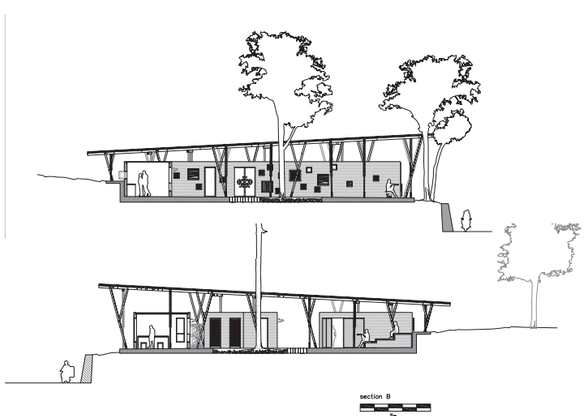
||| CASSIA CO-OP TRAINING CENTRE, SUMATRA ||| TYIN TEGNESTUE ARCHITECTS |||
||| INDONESIA ||| 2011 |||

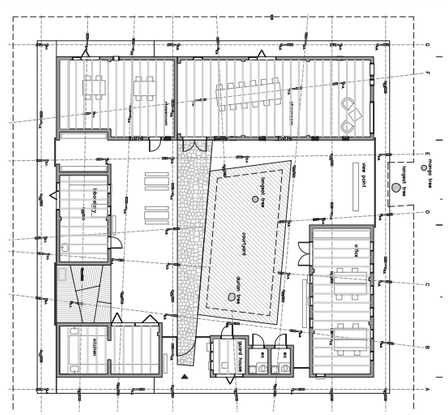
It is an space for education for local cinnamon farmers in Sumatra. The centre is located in an area where 75% of the worlds cinnamon production takes place, and large factories can be found in the vicinity.

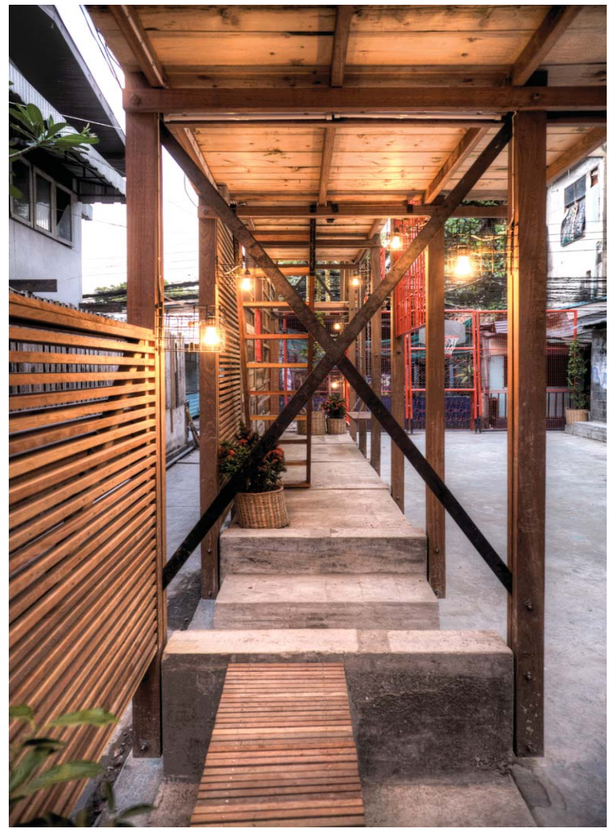
The main goal of the 600 sqm facility is to give the local farmers and factory workers training in sustainable farming and a general education about the processing of cinnamon, from the raw bark to the finished product packed and ready for export.

The client Cassia Co-op wants the centre and the future factory to present cinnamon production in a more ecological, sustainable and socially viable way. By offering the employees safe working conditions, decent wages and health insurance Cassia Co-op will challenge the conventions.



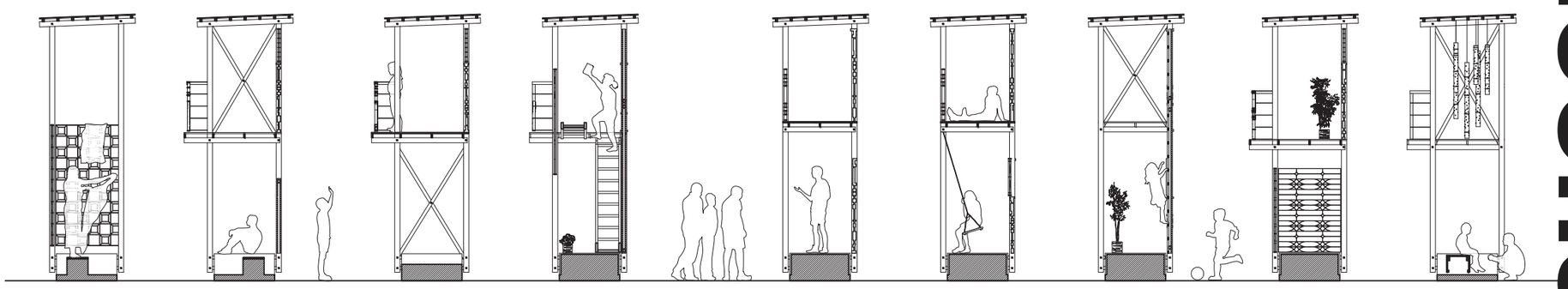






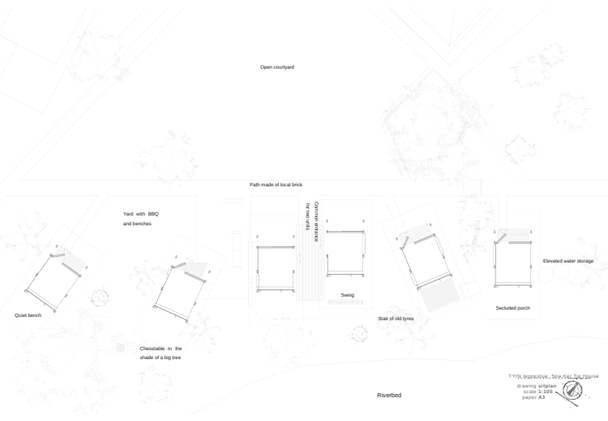
||| KLONG TOEY COMMUNITY LANTERN, BANGKOK ||| TYIN TEGNESTUE ARCHITECTS ||| ||| THAILAND ||| 2011 |||

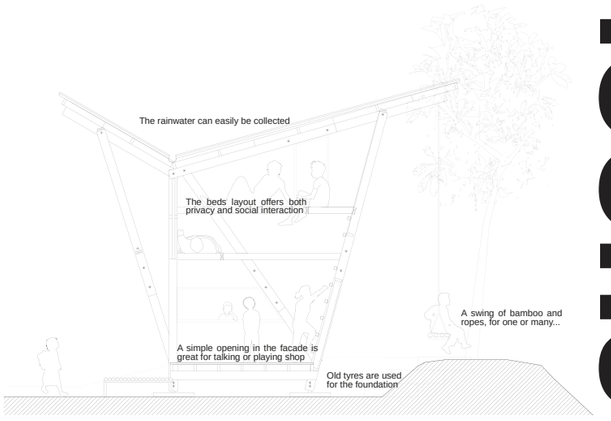
Klong Toey is currently the largest and oldest area of informal dwellings in Bangkok and more than 140.000 people is estimated to live here. The area has great social challenges which lead to high rates of violence and crime. A year of preparation period allowed the team to design and build the structure in as little as three weeks. The project's main functions are a playground for children and a common gathering place for adults.
The basic idea behind the project is that Klong Toey Communty Lantern can be part of a long term strategy acting as a social tool to improve community conditions in a positive development. Fifty small points of light are set among the pillars - Klong Toey Communty Lantern a convenient, safe and exciting lantern, both practically and figuratively.



||| ORPHANAGE SOE KER TIE HOUSE, NOH BO ||| TYIN TEGNESTUE ARCHITECTS |||
||| THAILAND ||| 2009 |||

The main driving force behind the Soe Ker Tie House was to provide the children with their own private space, a place that they could call home and a space for interaction and play.
The buildings were named “Soe Ker Tie Haus” by the Karen workers, the “Butterfly Houses”. The most prominent feature is the bamboo weaving technique, which can be found within the construction of the local houses and crafts. All of the bamboo was harvested within a few kilometres of the site.
After a six month long mutual learning process with the locals in Noh Bo, the SKT House was completed in 2009 consisting of 6 sleeping units, housing 24 children. Important principles like bracing, material economisation and moisture prevention, may possibly lead to a more sustainable building tradition for the Karen people in the future.

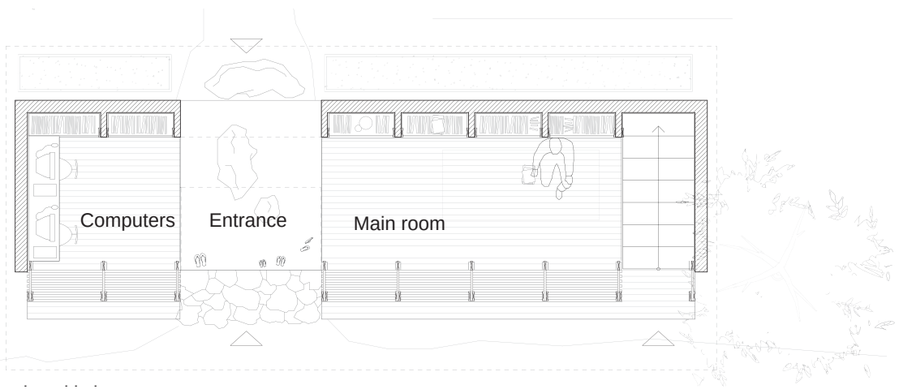




||| SAFE HAVEN LIBRARY, BAN THA SONG YANG ||| TYIN TEGNESTUE ARCHITECTS |||
||| THAILAND ||| 2009 |||

The Library stands on a concrete base casted on a bed of large rocks gathered on-site. The walls consist of plastered concrete blocks and cool the building during the day while the open bamboo facades provided ample natural ventilation. Iron wood make up the solid frame construction and serves as a comfortable floor for the children to play on.

The most important thing to the Tasanee is that her children have food and an education. The library enables the children of the Safe Haven Orphanage to have a space to do homework, use a computer with internet and read books. The new building has also attained the important role of a gathering space and is frequently used for making crafts and playing games.

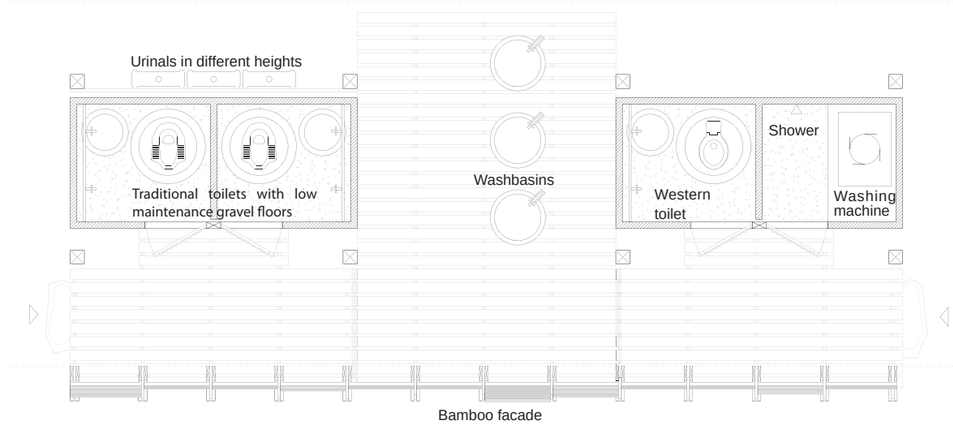


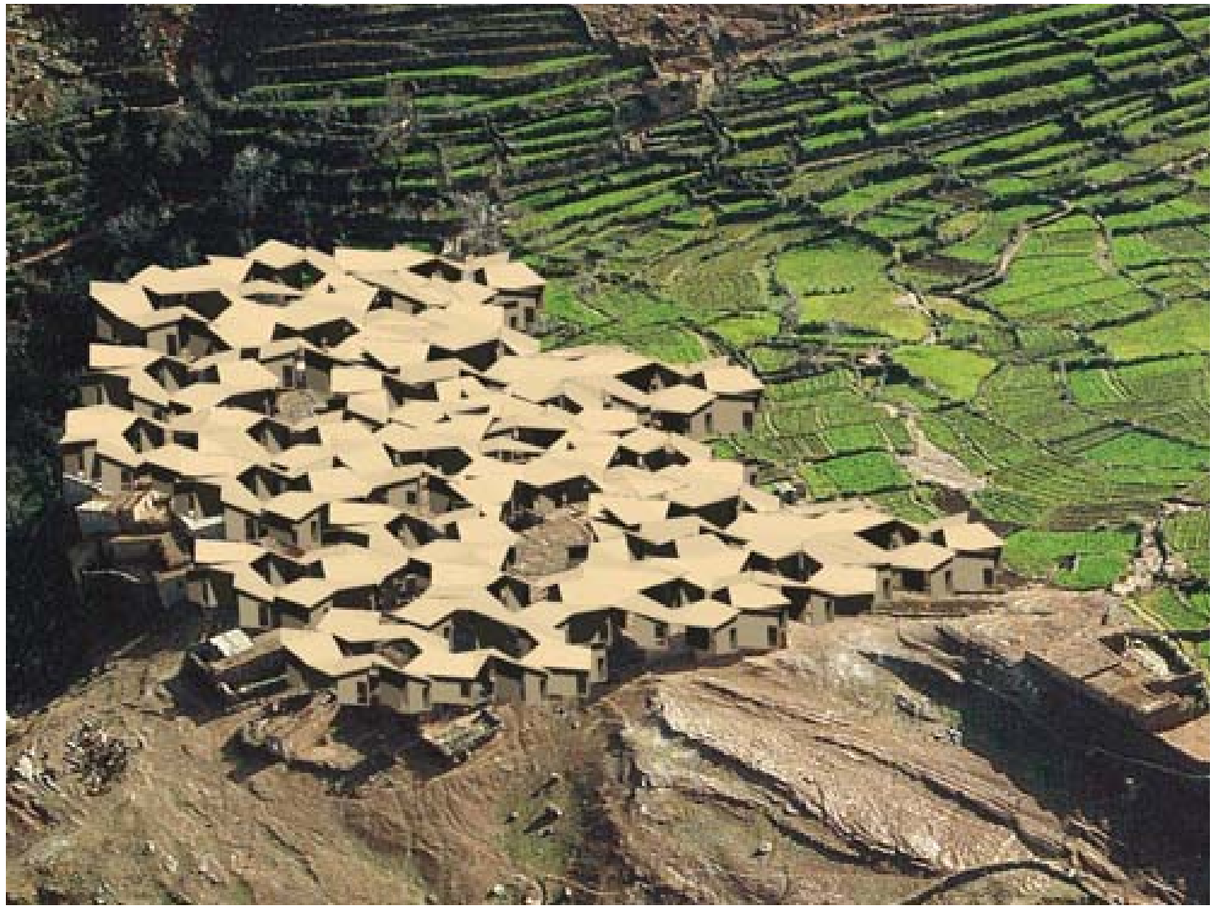
||| SAFE HAVEN BATHHOUSE, BAN THA SONG YANG ||| TYIN TEGNESTUE ARCHITECTS ||| ||| THAILAND ||| 2009 |||

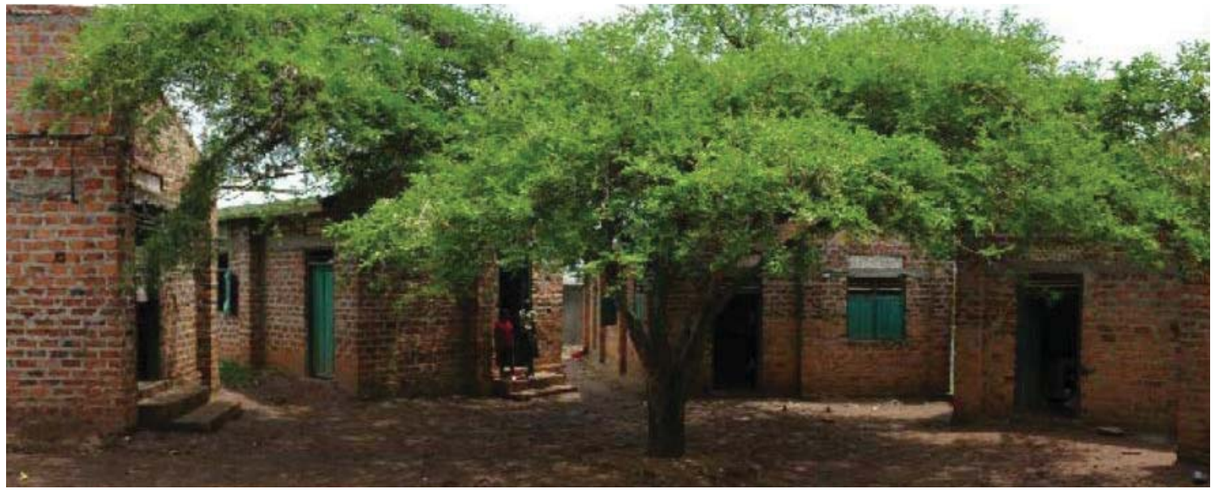
The new sanitary building houses the basic needs of the orphanage; the toilets, personal hygiene facilities and laundry. The internal structure was already built and became the framework for the project.

The existing sanitary facilities at Safe Haven Orphanage were narrow, dark and have concrete flooring that accumulated water and dirt. With this bathhouse we have tried alternative solutions that hopefully will be an important asset in the future development in the district.

The climate of northern Thailand makes good personal hygiene essential to prevent diseases, especially for small children. With this bathhouse TYIN wanted to create well functioning and dignified facility for personal hygiene.







||| SCHOLL AND ORPHANAGE ||| KOJI TSUTSUI ARCHITECTS |||
||| UGANDA ||| 2004 |||

An NGO hired Tsutsui to develop housing in Hokkaido for a neighborhood of homes devastated by earthquake. He was woking on community and encouragement. He devoted his time to urbanism planning and with it he began moving between continents. He has designed School and HOme for HIV children in Uganda. Accoding to the architects there were basically the same concept, but contrasting site conditions.

The orphanage in Uganda is a collection of rectangular one-room buildings with in-between spaces for play, rest or gathering. Because the rural site was devoid of resrictions, sutsui arranged the pieces in aring to allow for continued growth.

Situated on an open plain, the 2000-square-foot Annular Orphanage opened in 2007. Because the vast site was devoid of any man-made infrastructure elements, it forced to literally think outside the box. Designed for children orphaned by AIDS or HIV, it consists of eight huts loosely encercling a tree. The one room buildings contain the various programme but also defien interstitial outdoor spaces. In the absence of urban site constraints, Tsutsui created a set of design rules for the masterplan and individual buildings that will also facilitate future growth.

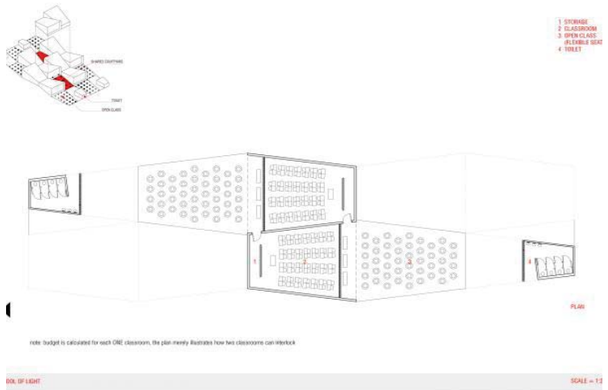
SCHOOL REFERENCES

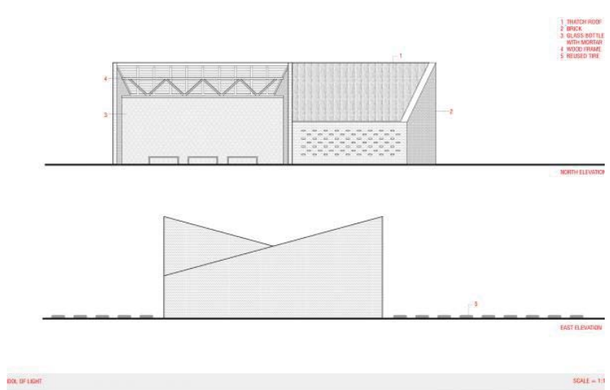
PROJECT REFERENCES

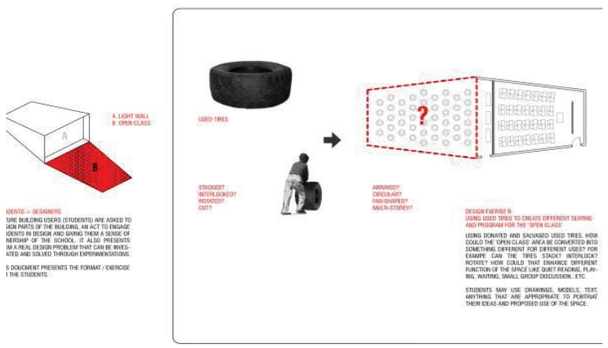
DIFFERENCE

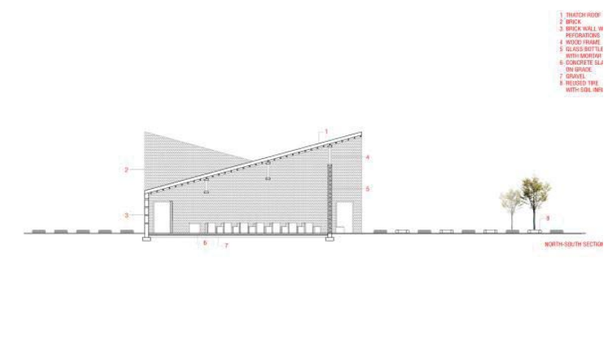
...WHAT MAKES A

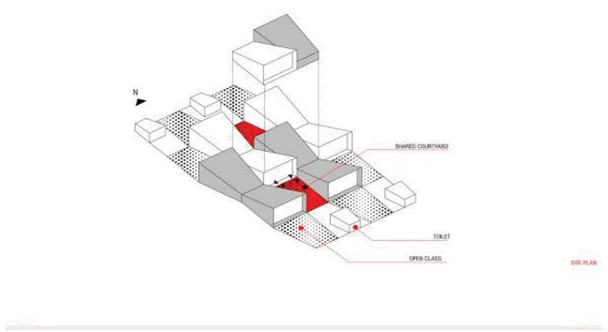
WORLD

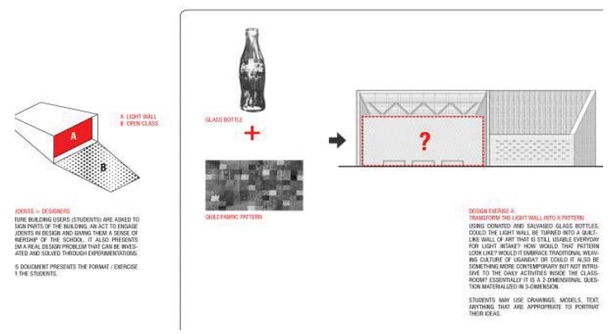












||| EXTENSION OF PRIMARY SCHOOL - RECYCLATION |||
||| UGANDA |||

SCHOOL OF LIGHT

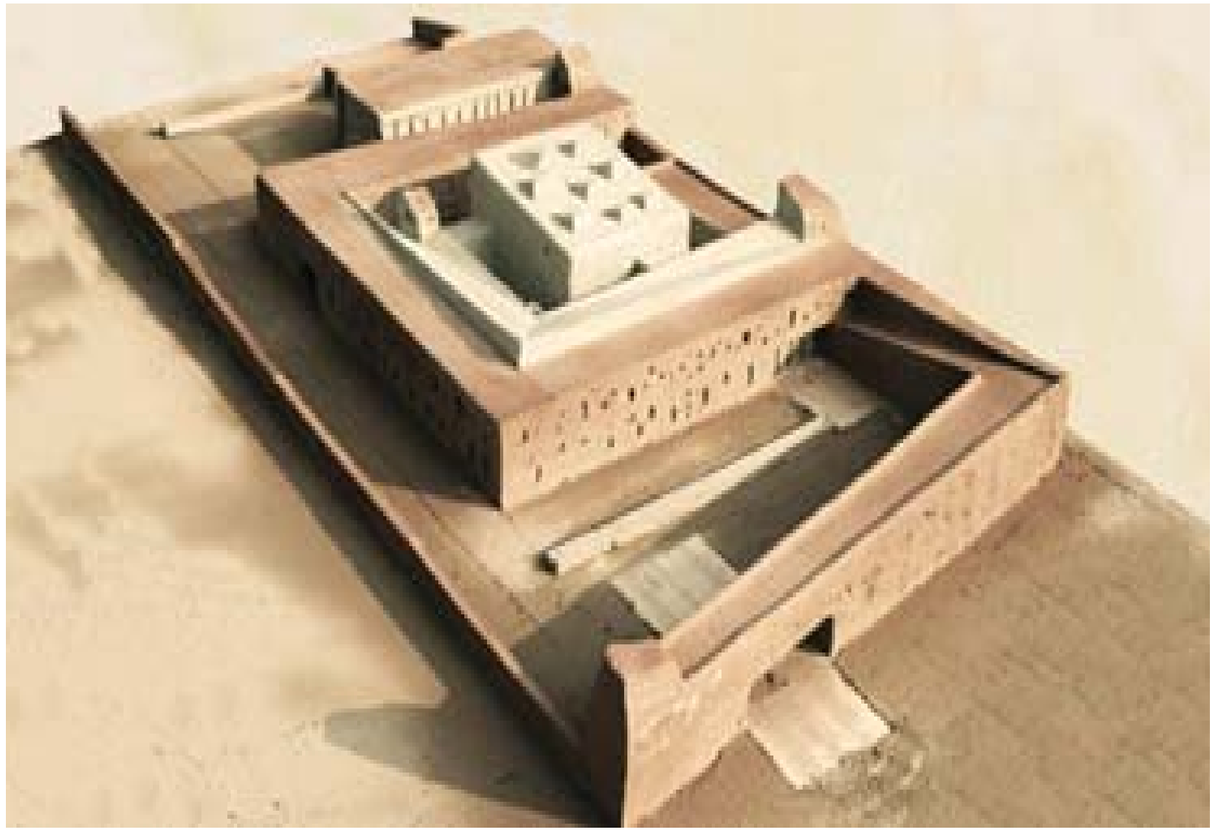
A school is a safe haven for school children and teenagers, particularly in the context of Africa. School of Light is a project that strives for the making of a place with a sense of belonging and ownership for the children and teenagers who do not just consider it as a place to study, but an integral part of their life and part of their neighborhood. Schools that are currently built are often dark, isolated from the outside, overcrowded and use building materials that do not engage with traditional building methods. School of light is a project that embraces and maximize light intake of the classroom and uses reused and traditional building materials. Through the use of readily available materials and reused materials, material cost is saved to construct a larger classroom with more generous space where an abundance of light comes through the glass bottle 'light wall'. Each classroom also has an outside component 'open class' where instruction can take place outside the classroom. This informal space also becomes a flexible program space for children and teenager after-school and can be arranged differently for different functions. Engagement of the space by children and teenager is the goal.

LIGHT WALL

Glass is an expensive and luxurious material in the context of rural Uganda. "Light Wall" is a concept to flip this preconceived notion and utilize used glass bottle as a cheap light transmitting material that can be easily stacked and built like brick with mortar. Preliminary lighting analysis shows that with the additional of light wall, accompanied with the geometry of the proposed design, "school of light" out-performs traditional classrooms four-fold in terms of daylight intake. The geographical location of Uganda near equator also allows the "Light Wall" to be facing either north or south for diffuse daylighting.

OPEN CLASS

"Open Class" is the outside component of the school. Each classroom, through the donation or salvage of used tires, has an exterior seating component with no additional construction cost. With weather permitting, this "Open Class" could expand a teacher's tool and diversify a child's learning experience. For example an English teacher can arrange the tires in a different way to hold small group discussions. The covered area outside the light wall could also become a stage for an informal drama, with the tires arranged in rows as seats. The possibilities are endless.



PROJECT REFERENCES

||| TRAINING CENTRE FOR SUSTAINABILITY ||| ANNA HERINGER |||
||| MOROCCO ||| 2010 |||

The jury unanimously recognised the architectural quality of this project, as well as its modernity. Integrated into the local context, it proposes an interpretation of the archetypes of the rural ksars and the urban medersas. The jury was seduced by this humanist project that combines technology, culture and the socio-economic reality of the region. This architectural sculpture plays skillfully, both externally and internally, with the overlapping of volumes and light and shade."

The aim of this project is the transformation of natural, immediate available resources on the lowest possible level of entropy, with maximum benefit for the local population, into a beautiful architecture with a strong local identity. The purpose of the building is a teaching centre for sustainable construction.

The construction sector in Morocco is prospering, but there is a lack of models for sustainable construction that are appropriate in technology as well as sensitive to the cultural identity and the ressources of the context. The Training Centre for Sustainability in Chwitter offers the youth from the suburb of Marrakech a possiblity to learn a future orientated profession.

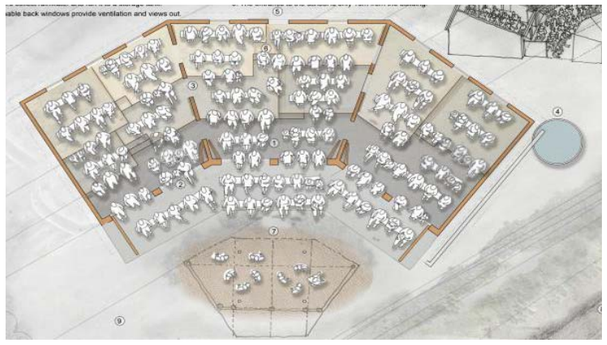
Analysing the local context we found that one major traditional building material for any kind of purpose and size, earth, is nowadays only used for fencing-walls and housing in poor, mainly rural areas. There is a lack of improved building technology to re-invent earth as adequate building material for modern structures. In this project we adopt traditional know-how supplemented with appropriate modern technologies in order to meet the needs in safety (including earthquakes) and comfort of the present society. The focus is on a global strategy for sustainability, not on sophisticated technical solutions that can be used by a minority of the world`s population. We want to promote a high level of sustainability based on an intelligent use of natural building resources grafted with modern technologies and passive design mechanisms, which motivates through a strong, modern architecture.

All structures of this project are formed out of earth with a diversity of techniques: simply replicable building techniques as well as modes of prefabrication. Morocco is a country of great culture in architecture and craftsmanship.

The masterplan shows a balance between indoor and outdoor areas. The diversity of public spaces ensures a large spectrum of atmospheres. The area is entered through a massive earth wall that embarrasses a spacious garden. The building opens up for patios,surrounded with intimate niches for contemplation or communicative exchange. There is no contradiction between tradition and modernity, poetry and function, economics and ecology and sustainability and beauty.

The design is inspired from two Moroccan archetypes: the rural ksar, as the compact place of community life and the urban medersa devoted to the training of students.

The project area is lacking public meeting places. The centre offers: a spacious garden, an exhibition hall, a cafe, a library and an auditorium that can be used also for the public.



||| EXTENSION OF BUNYONYI PRIMARY SCHOOL - HILLSIDE |||
||| UGANDA |||

The classroom design incorporates two significant innovations: Firstly the cranked plan with opening side walls enables its use as a large assembly or event space in addition to classrooms; Secondly that it steps up the hillside to reduce the amount of excavation. Either of these ideas could be adopted separately elsewhere, although they also combine well to create a form of amphitheatre.

The “Lake Bunyonyi Christian Community Vocational Secondary School” (Bunyonyi Community School for short) is currently a 240 pupil secondary school, with additional vocational training courses. It was set up in 2006 due to high demand in the local area, and is located on the shores of Lake Bunyonyi in the far south west corner of Uganda, close to Rwanda.

LEARNING ON THE HILLSIDE

The flat land is more expensive in a mountainous, rural area. With limited funds, the school has occupied a steep site. So far, in line with familiar construction methods, classrooms and dormitories are linear buildings along terraces. However it is very limiting on the school layout and planning. It also requires a lot of earthmoving, and leaves cut banks prone to erosion or in need of retaining.

The main concerns with existing classrooms raised by teachers and pupils were:

• Noise when it rains - It is proposed to lay the tin onto a boarded ceiling of timber planks (cheaper than ply / OSB) which saves on perlins and battens, prevents the reverberation by contact with the tin and offers sound absorption, as well as being cost effective.

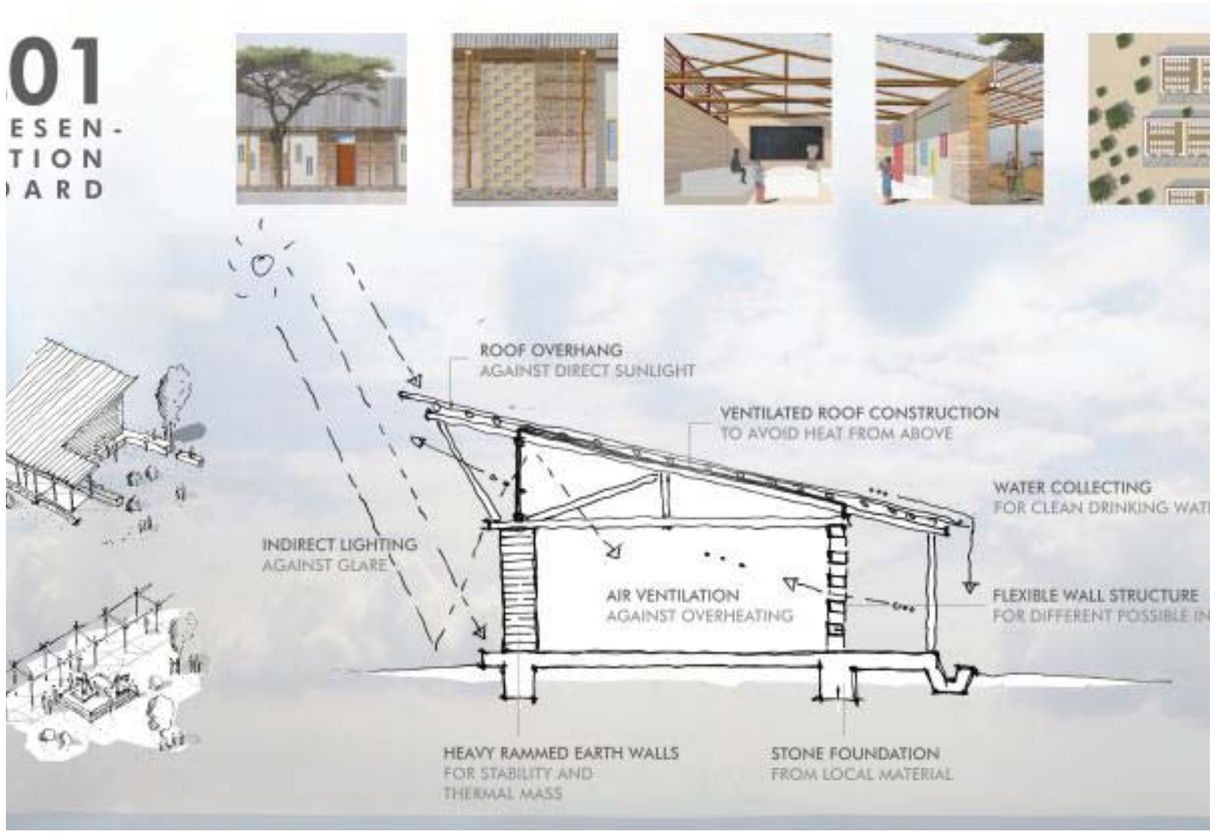
• Cold / drafty - The climate is very temperate at the high altitude and sometimes too cold (but rarely too hot). Current classrooms have open windows and the pupils were very keen to have glass. To minimise the cost of this, much of the light is provided by roof lights where clear polycarbonate is adequate and cheaper.

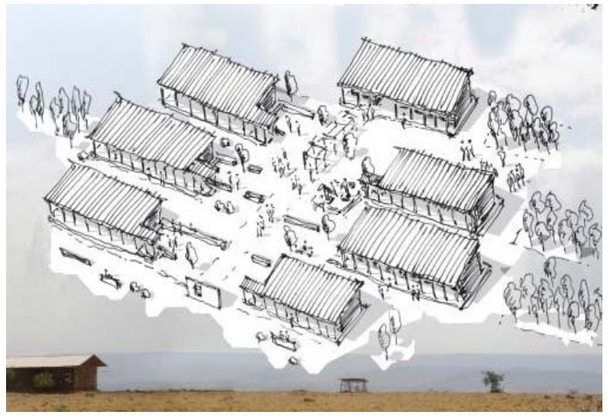
CONSTRUCTION & ENVIRONMENTAL DESIGN

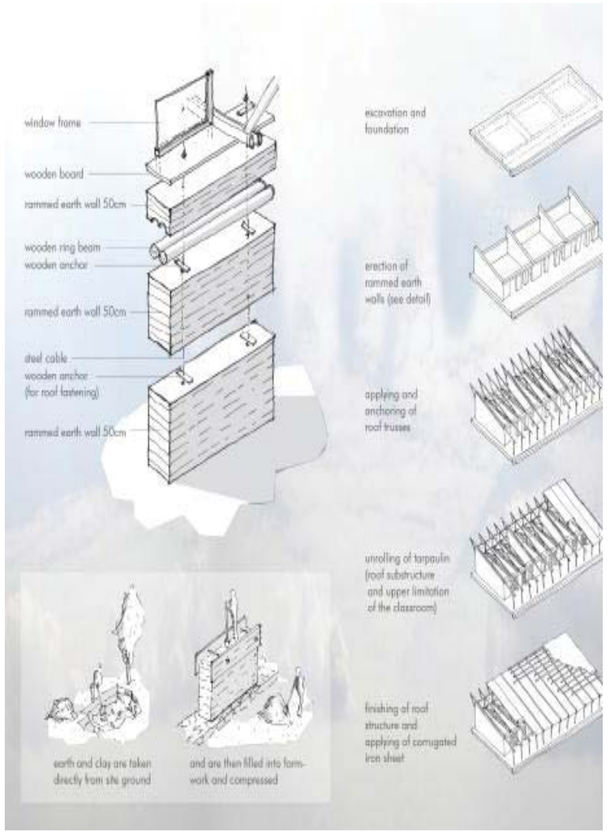
The types of construction and materials chosen are simple, local and cheap:

• Bricks are made by hand and fired on site • Timber is coppice grown Eucalyptus from adjacent to the site.

PROJECT REFERENCES



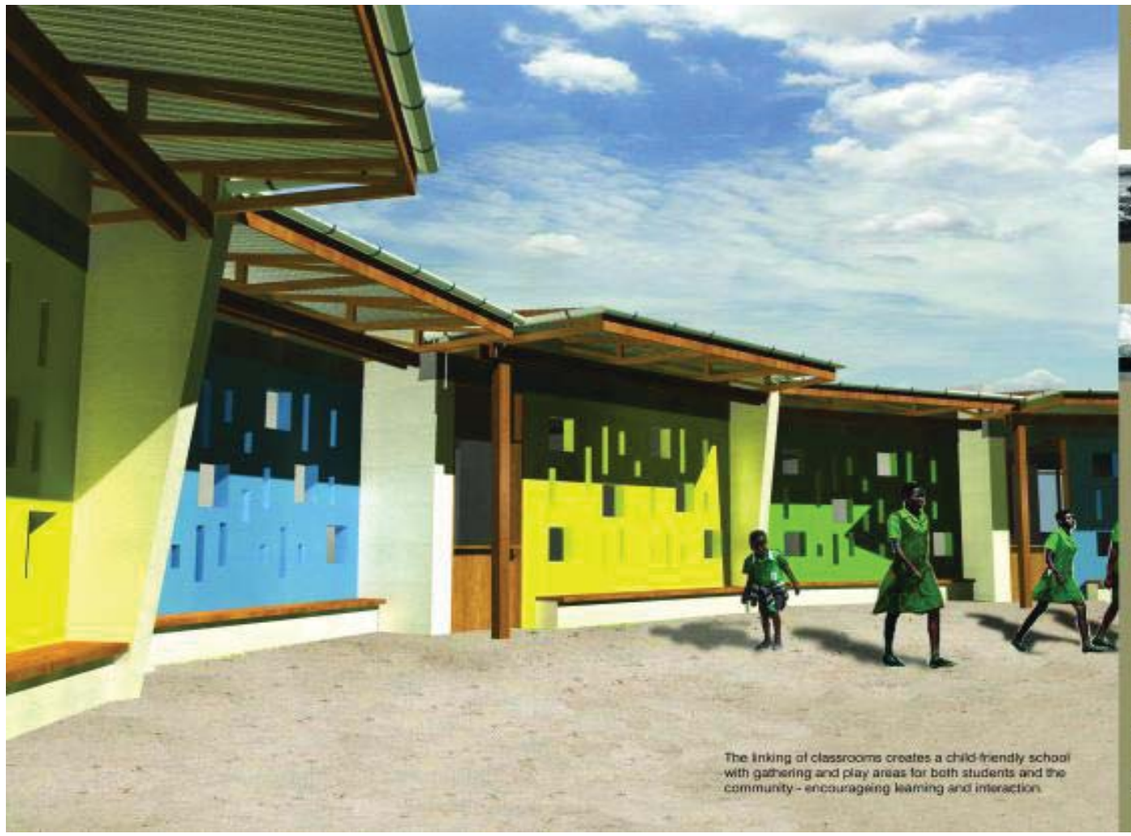


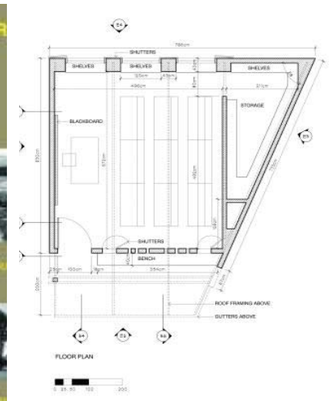


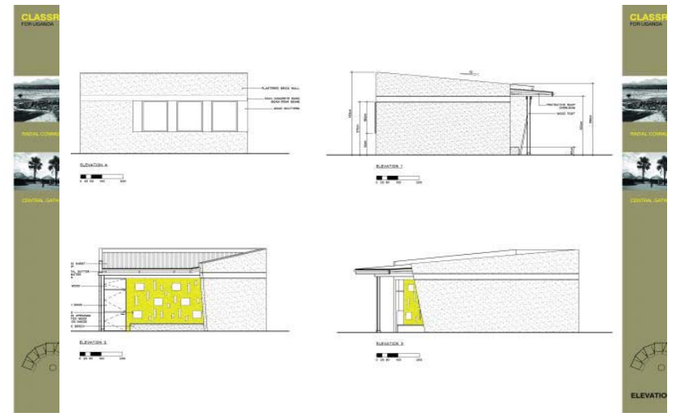
||| REDESIGN OF PRIMARY SCHOOL - MENSCHEN FÜ MENSCHEN |||
||| ETHIOPIE |||

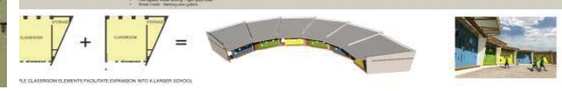
The project was initated by the German non-profit organization “Menschen für Menschen”, which does development aid exclusively in Ethiopia. The current school construction consists of a reinforced concrete frame filled in by concrete bricks and a steel roof. All of these materials have to be either imported or/ and transported to the site creating high costs.
Trying to reduce the cost and maybe get even better classrooms using local materials the organization asked our group to think about a new design adaptive to all different kinds of climate zones, topography and plots of land.
The approach is focused on different aims:
- Using local materials which are hopefully taken directly from the site or the surroundings the project not only try to reduces the building cost but also would like to revive a new appreciation towards the traditional building materials like loam/clay and timber.
- As the finished school buildings are handed over to the government and there won’t be anyone taking care of the facilities, the construction should also be durable and low-maintenance.
- Given the fact that the schools have to fit to any climate and region the construction must provide the possibility of changing certain elements according to the specific requirements.
Governmental classrooms in Ethiopia are extremely dark and not very durable, in many cases after 3 to 5 years they can’t be used anymore in a proper way. Therefore our classrooms also were supposed to be bright and provide a certain level of thermal comfort.
The proposed design consists of a heavy rammed earth wall structure filled by different exchangeable elements as loam bricks, wickerwork, etc. The roof is made of local wood (eucalyptus or bamboo) to avoid expensive and complex steel construction. Except for fasteners and other small items all building materials are locally available.

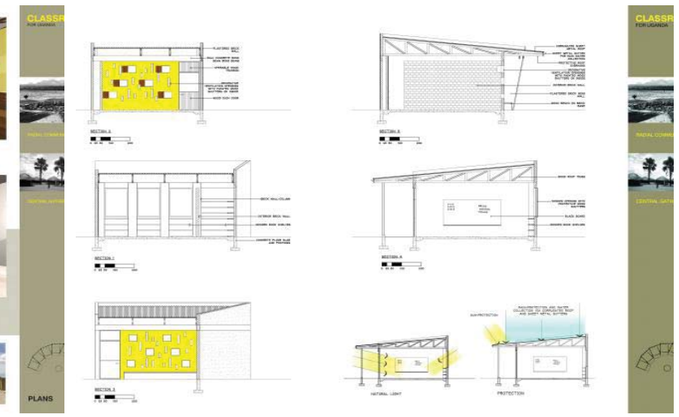
PROJECT REFERENCES

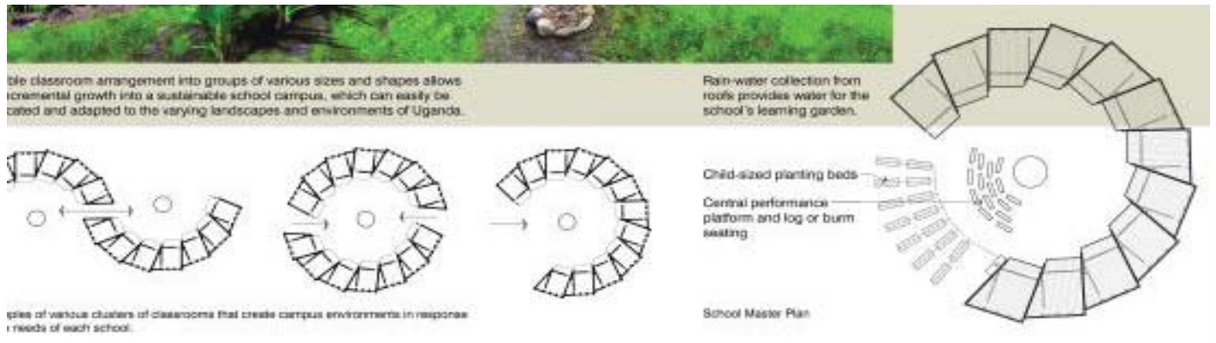












||| EXTENSION OF PRIMARY SCHOOL |||
||| UGANDA |||

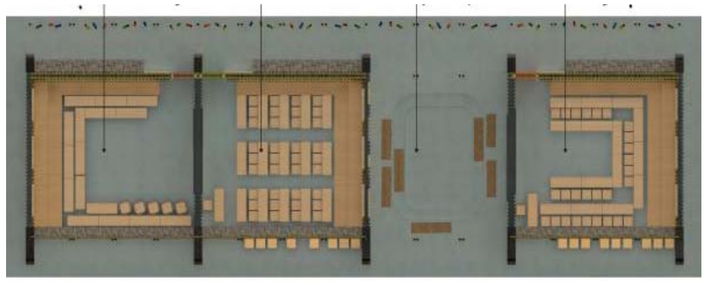
In recognition of the importance of Children and their education for the future of a community, the LINK classroom not only encourages learning and teaching, but also creates a focal point for the community. The shape of the classroom was designed for ease of connecting multiple links into an overall school-campus. The flexibility of linking the classroom components allows the school to grow as the student body increases or as finances allow. Assembling the links, based on a master-plan and anticipated requirements, into chains or clusters of LINKS, allows for the creation of gathering and performance spaces for the students as well as for the community. These central courtyards are the focal points of the semi-circles created by the linking of a series of classrooms.

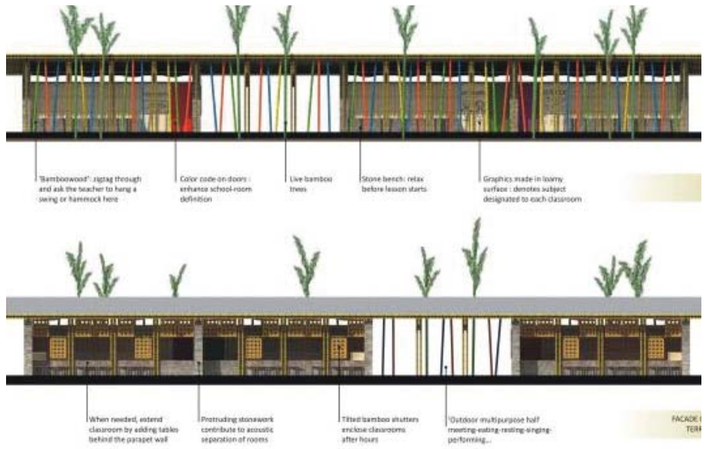
The school of LINK classrooms creates a connection between education and the people. It is an important component of the community, encouraging interaction and exchange. Each classroom link can stand individually, and allows students and teachers to concentrate on their pedagogic exchange in comfortable conditions. Made of readily available local materials traditionally used in Uganda, each classroom is fully enclosed by brick walls and a water-collecting sloped roof. Local laborers can erect the simple structure without any special knowledge. Additional classrooms can easily be added on as the need for more classrooms arises. List of materials used for LINK classroom:

• Standard size brick – walls and bench / • Mortar - walls / • Rebar - walls / • Concrete – floor slab, footings and ring beam / • Plaster – wall finish interior and exterior / • Paint – mostly light (white, beige or grey) and brighter color front elevation

• Wood framing elements: roof trusses, post, beam / • Wood finishing/security elements: shutters, door, bench, shelves / • Window – optional with glass / • Corrugated metal roofing – light grey color / • Sheet metal – flashing and gutters

To facilitate teaching, while maximizing student space, each classroom is provided with its individual storage space for educational materials, accessible only from within the classroom. The basic rectangular shape makes each LINK classroom flexible in its use; it can easily be adapted to serve as an office or library. The courtyard facing walls of each LINK classroom are painted in a different color for identity and also as an educational tool. But the learning experience extends beyond the LINK classroom; water is collected off the roof of each classroom and transported via the gutter linking the individual roofs, to a water storage cistern for agricultural training in the school garden or other applicable uses. Fresh air ventilation and natural light are plentiful in each classroom, and can easily be adjusted with individual shutters at all openings. The provision of a Dutch entrance door with an operable transom allows for additional flexibility in regards to light and air, while maintaining a secure classroom. To prevent disruptive noises from adjacent classes individual LINK classrooms are completely separated from each other.





||| ORPHANAGE||| MEEM ARCHITECTS ||||
||| NEPAL ||| 200X |||

PRINCIPAL DEVELOPMENT INCENTIVES

Seeing the roughness of Kavre's geography and its remoteness, one of the main incentives of the project was to avoid construction material supply from elsewhere. The project seeks to focus on use of local resources in a maximal possible extent. In a public building, preferring vernacular materials to import, much too often fashion-prone, impracticable and inappropriate, would also raise awareness in the local community of the merits of traditional architecture.

There is no power grid in the area and scores of time, there is no water supply either. The village doesn't have any craftsmen, everyone has to know how to build and repair his own house. These conditions were not to be neglected in the design. To achieve sustainability and affordability, we had to maximize potential of local community in participation. Vernacular architecture in material, construction and typology was studied in the initial phase of designing. Pros and cons of traditional and attainable school constructions were considered as shown below. While conceiving vernacular building as a starting point for the concept, we tried to re-think the usual techniques to increase level in quality and occupancy comfort.

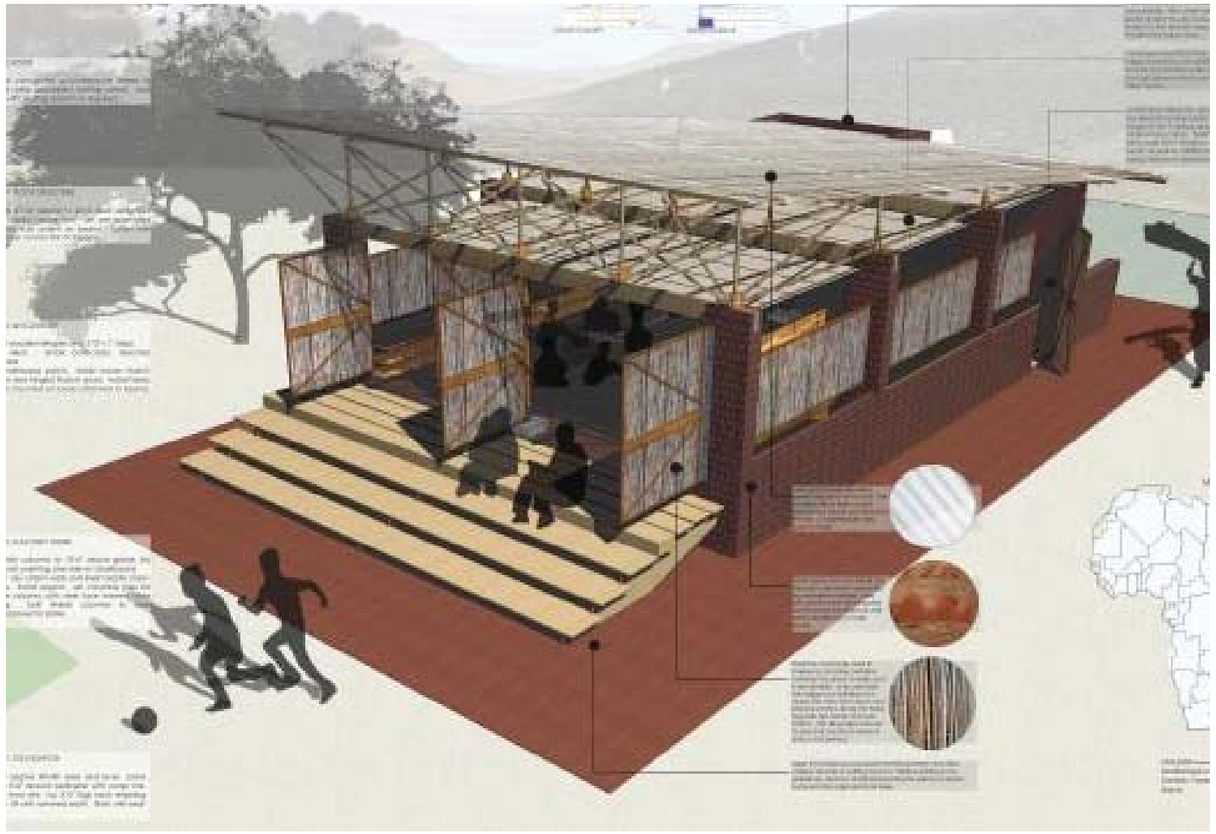
TECHNOLOGY - No water feeding, no power supply, insufficient fuel resources and no palpable prospect of improvement, this house could be dubbed a "zero technology school". Sometimes things are not perceived as absent here. Schools only operate during daytime so there is no need for artificial lighting. Dry toilets or winter chill are not desirable factors at school, but there is no fast remedy for cores of local schools. Getting hardened still works the best in this part of world.

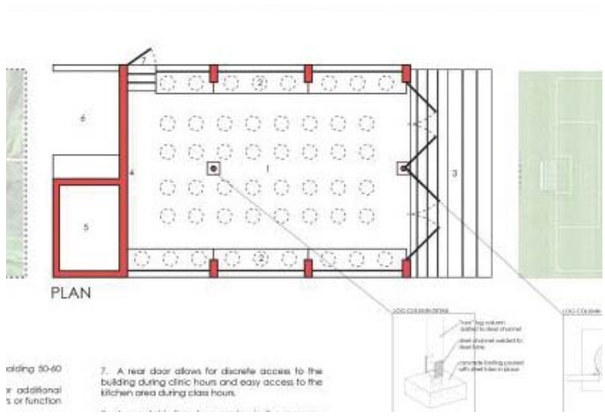
RAMMED EARTH - Although not typical for Tamang conventional architecture, rammed earth along with cob walling is an old traditional way of constructing in Nepal. Rammed earth technique was preferred to cob walling due to its durability and load bearing capacity. It was introduced in the project as an alternative to stone masonry with regards to above mentioned. Untreated rammed earth constructions are susceptible to corrosion when wet, so they were situated in rain-shielded sections of the house. Dirt is available throughout the district; its suitability, namely in reference to clay content, would be a matter of individual analysis. Where inconvenient, traditional stonework should be used.

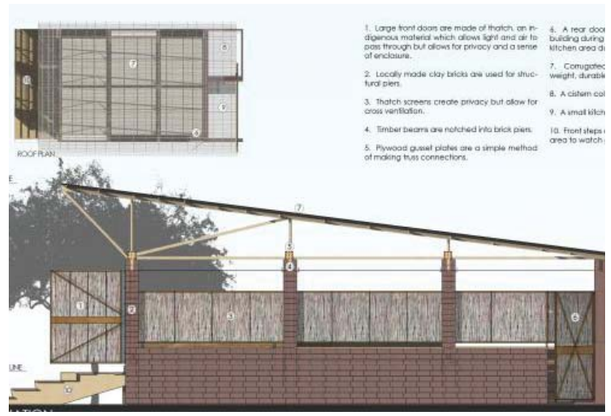
BAMBOO - It's growable in the region yet not overly widespread, in land-deficient Kavre food production has hitherto been preferred. When used for construction, bamboo has many qualities, speed of growth and lightness included.

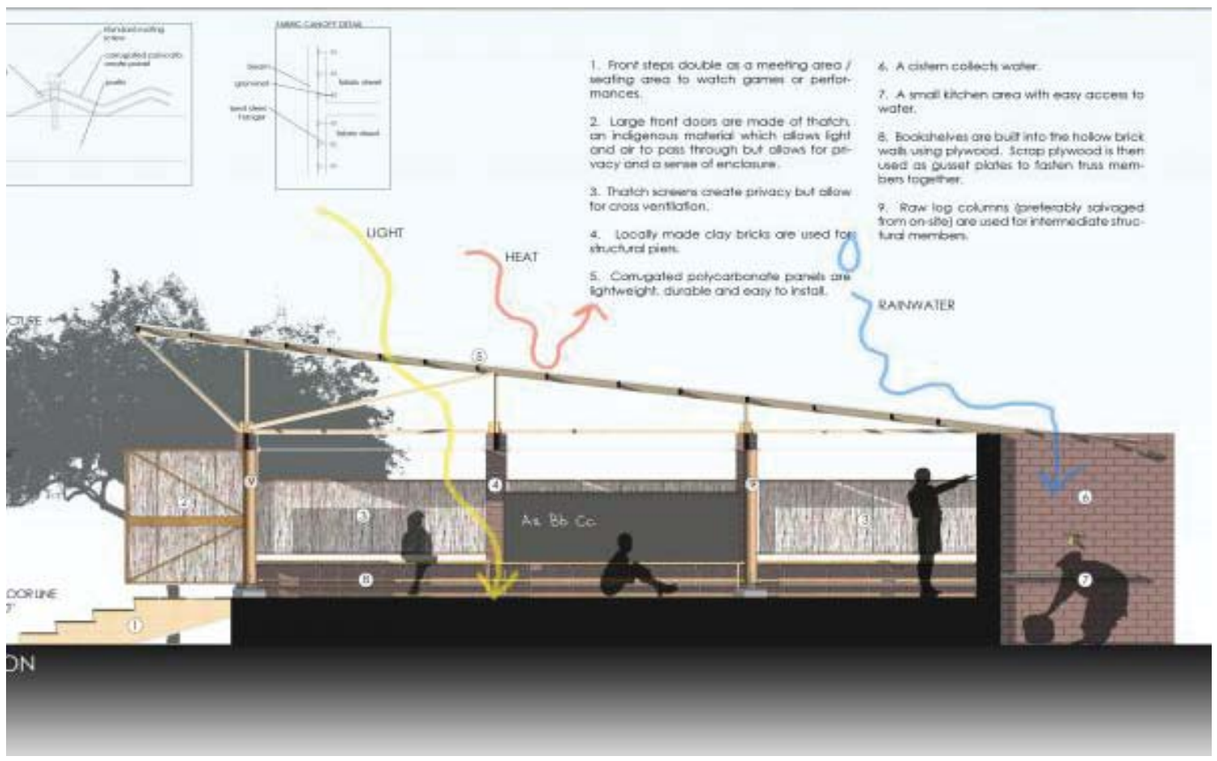
REED GRASS - Reed grass was once traditional to Nepal, yet it is no more considered complying for its high flammability and short lifespan.

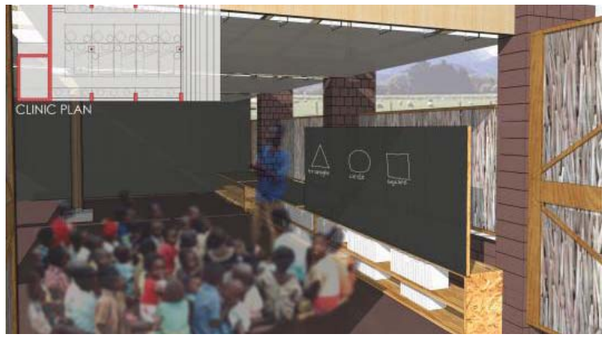
PROJECT REFERENCES











||| EXTENSION OF PRIMARY SCHOOL - MY BETTER CLASSROOM |||
||| MALAWI ||| 200X |||

My “Better Classroom” design aims to tackle a number of these difficult problems. The primary use of the building is that of education, however it is flexible enough to double as a temporary health clinic, civic center, market or any number of uses the villagers may find for it.

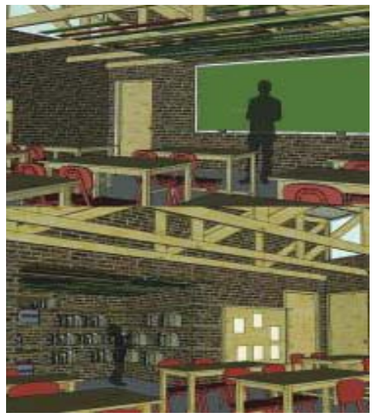
• Front Steps/Yard: The main “entrance” to the building is marked by wide steps and large, doors made with woven thatch screens. The doors are intended to create privacy when needed but be inviting when open. The main steps are to be used as an area for children to wait to be picked up by their elder siblings or guardians; a place for students to congregate before and after classes; and as seating for sports games or performances done in the adjacent field.

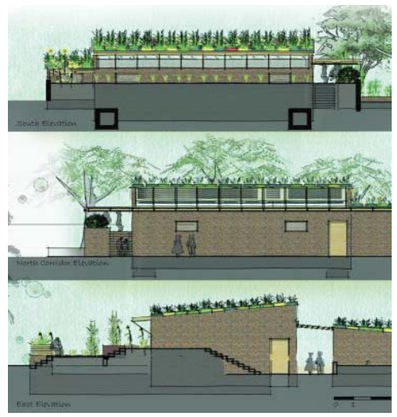
• Main Classroom Area: The classroom area was designed with flexibility in mind while having several practical elements. The hollow brick exterior walls have a plywood bench on top, which is hinged to allow for storage beneath. Underneath the benches are plywood bookshelves. To help with sound and sunlight transmission, light-weight fabric sheets are suspended from the beams by hooks (easily removable if needed).

• Kitchen/Garden: The design is intended as a prototype, with no particular site in mind.

• Materials: The primary building materials in Malawi are red clay bricks, which the villagers are comfortable using and fabricating. The main structural piers are made of these bricks, as well as the cistern in the rear, foundation walls and rear wall. Intermediate columns are made of un-sawn, “raw” log columns, preferably logs salvaged from on site. The main roofing material is intended to be translucent corrugated polycarbonate sheets. This material allows light to pass through but blocks out UV rays and heat. Additionally, corrugated roofing is easy to install and is long lasting. The main front doors, as well as screens on the side walls, are intended to made out of straw thatch. Malawians use thatch as a roofing material however it is prone to leaks and is not durable. Regardless, thatch is a beautiful material which allows light and air to pass through but creates privacy and enclosure.

• Sustainability: The building is inherently sustainable by using primarily indigenous materials. Elements which must be trucked in from off-site have been carefully studied to create as minimal a space as possible while still serving its function. The sloping roof sends rain water to a cistern in the rear, with spigots for easy access. The shape of the roof would allow for solar panels to be installed easily were the villagers to receive funding for them. Also, the upward slant of the roof facilitates chimney-effect cooling. The narrow footprint of the building also promotes cross ventilation.





||| REDESIGN OF PRIMARY SCHOOL - MENSCHEN FÜ MENSCHEN|||
||| UGANDA ||| 2011 |||

This classroom prototype provides a clean, cool and lighted space. A clean and safe environment, a few degrees below the outside temperature and with controlled natural light, will attract and retain students.

The main feature on the classroom is to use the soil thermal properties for cooling. The room is sunk below the ground level and the soil removed is used to fill up the terraces around the classroom. This allows the building to use the natural thermal inertia of the soil to cool and maintain an agreeable temperature inside. Natural ventilation is run through a “Canadian well”. The air goes deep under the surface, cooling down before entering the classroom. Hot air and Co2 exist by the openings near the roof .

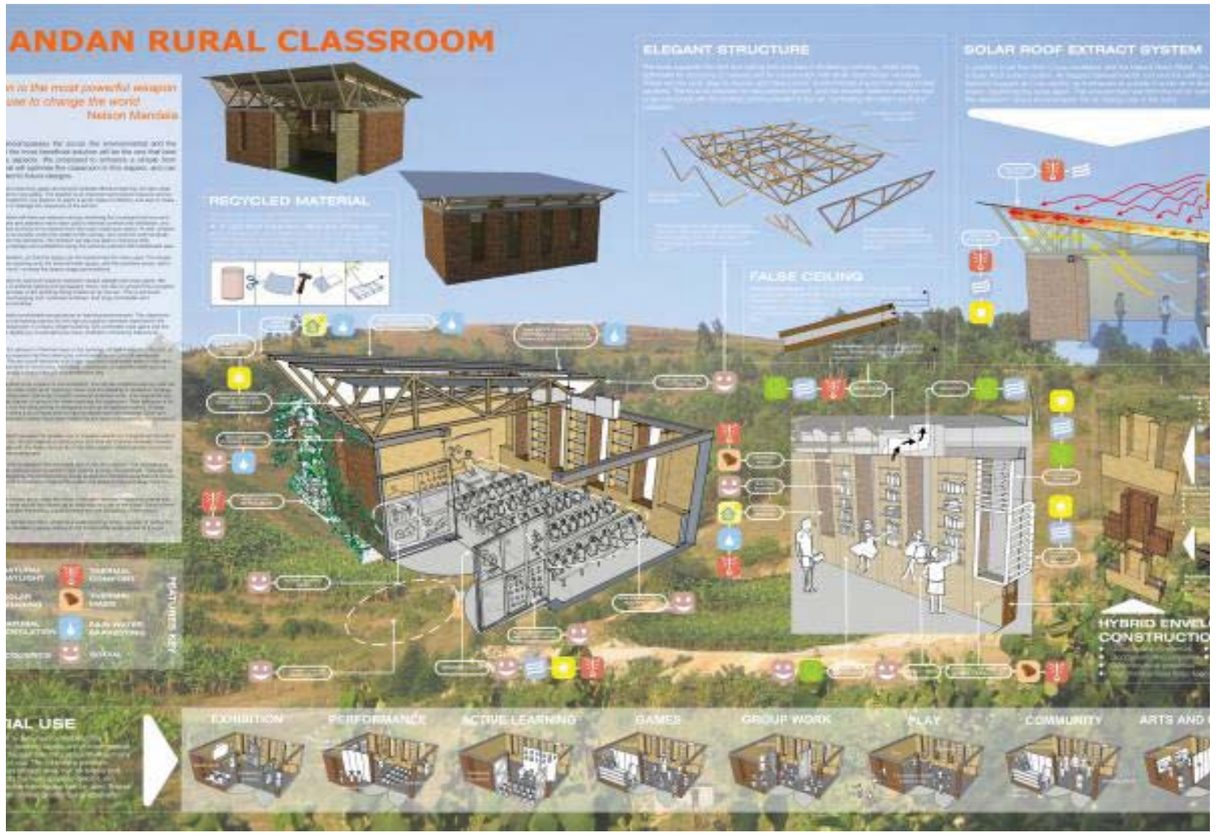
As budget permits, only the vision windows will have glass. The top openings will be frame with mosquitoes net and have operable shutters.

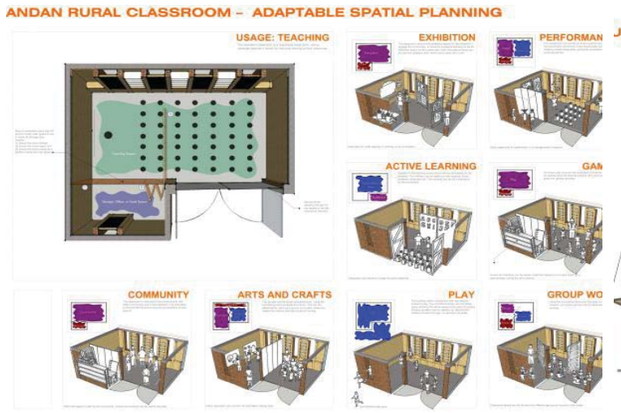
The project uses standard materials and construction methods available locally: brick walls, concrete floor, corrugated metal roof and wood trusses.

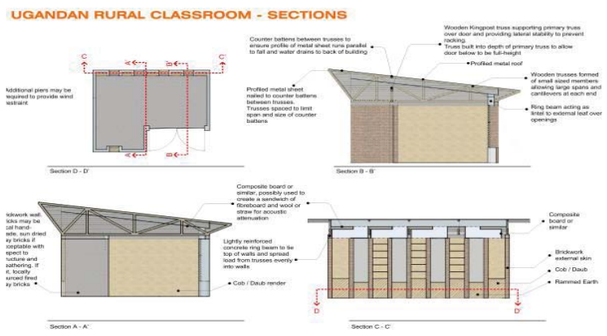
The green roof is built on corrugated metal. Old tires, painted in bright colors by students are filled with some reclaimed fabric on the bottom to retain the soil.

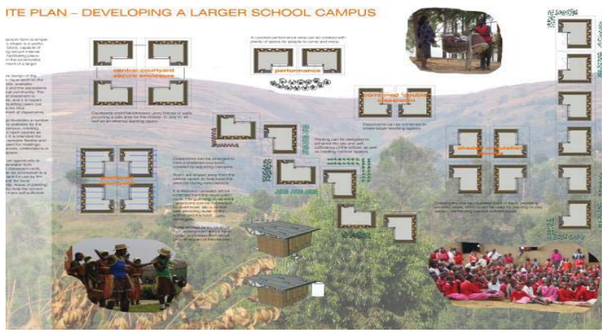
The terraces are cultivated with crops and ornamental plants. The garden is a teaching tool and the vegetation help avoiding heat island effect and erosion.

The classroom module can be repeated. A second classroom will be symmetrical to the first one, sharing the library, teaching aids and restrooms. The masterplan includes a playground and a plaza for the community. The different elements can be combined in various ways to accommodate the site.









||| REDESIGN OF PRIMARY SCHOOL - WINNER OF THE COPETITION|||
||| UGANDA ||| 2011 |||

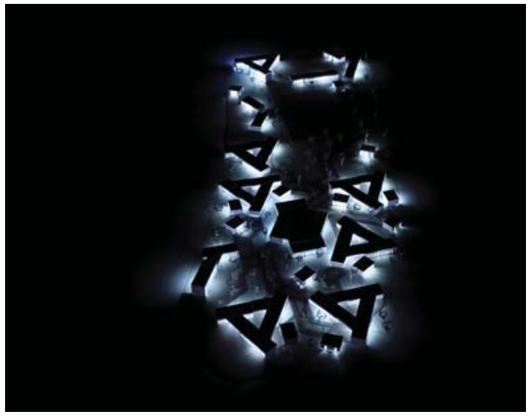
The design includes a teacher's annex that doubles as both a secure storage area and an office, allowing the teacher to store valuable commodities such as books and to store furniture when the teaching space is being used for community purposes. It includes a secure window that will provide daylight so that the room could also be used as an office space. The partition between the annex and the classroom is to be flexible enough as to allow the annex to be joined with the main room. The flat surfaces on doors and partitions that can be painted with blackboard paint and have the means to attach drawings and other work. This will allow the children to influence their environment and create displays they can be proud of. These areas could also be used for community announcements and communication. At rest, window seats will allow children to sit outside under the shade of the canopy, and the covered external areas will provide shelter from the elements. Another aspect of the design challenge is to produce a single classroom that can be used for incremental development of a larger school campus.

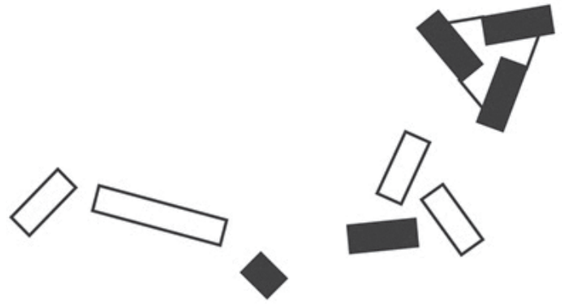
It is important to achieve an optimum balance between natural daylight and solar gains. It is necessary to avoid the use of artificial lighting during daylight hours, but to prevent the occupied space and the thermal mass of the building being heated up by the sun.The solar shading from high level sun is provided by extending the roof to form overhangs. This canopy should prevent direct sun shining through the windows or heating up the structure during the hotter parts of the day. The tall windows are chosen to maximise the penetration of daylight into the space, and it is inetnded to apply a light coloured surface finish to the inside of the space. The openable façade could also be a valuable source of light when weather conditions allow it to be open.

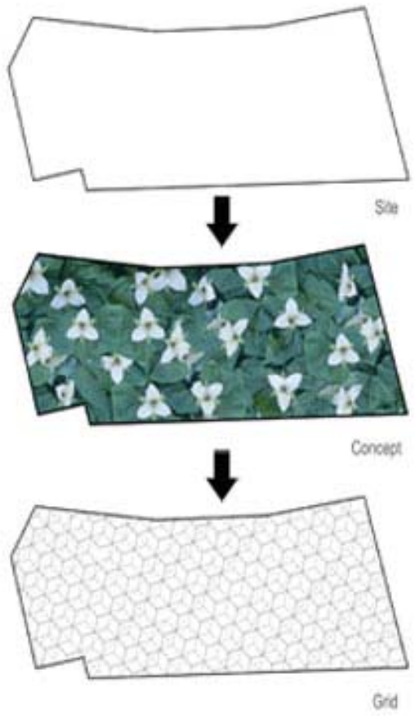
Thermal Comfort required to withstand water in the rainy season shall be constructed of fired bricks; daub, cob/adobe, or rammed earth shall be used to increase the thermal mass of the building in a cost effective way. The internal surface of the walls shall be coffered to offer a greater surface area for the air to interact with the thermal mass, which will lead to an increase in effectiveness. The external surface of the envelope will be flat, to avoid problems with water in the rainy season.Given the heat gains associated with the high occupancy densities expected in the space, we wish to remove heat as rapidly as possible; as such, a high ventilation rate is achieved by incorporating as many ventilation enhancing features as possible.

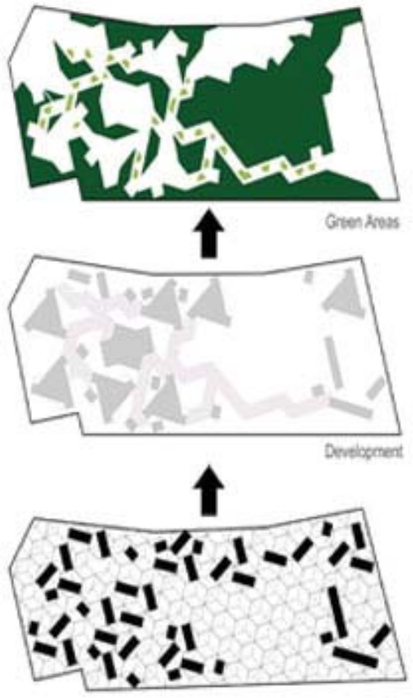
The classroom is to have high and low level openings which will create a passive stack effect, where by warmer, more buoyant air rises and exhausts through high level openings, which in turn creates a negative pressure that sucks in colder air from outside at low pressure. The main windows and the high level vents are situated on opposite sides of the space; this cross ventilation configuration allows air to flow across the space and encourages high ventilation rates.

PROJECT REFERENCES









||| THE MELAKU CENTRE, MEKELLE ||| XAVIER VILALTA |||
||| ETHIOPIA ||| 2010 |||

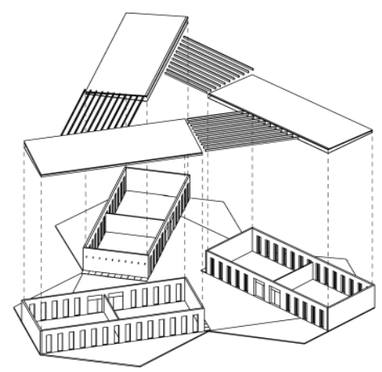
The Melaku Center will be new centre of learning, working and projection for the inhabitants of Mekelle, capital of Tigray, a region of the North of Ethiopia. It might be a reference model of sustainable development from the design of the buidings to the programme itself. The whole project will be an ecosystem of knowledge, development and natural resources.

A common parameter in the traditional African architecture is the use of the fractal scale - small parts of the structure tend to be similar to the bigger ones, for example, the circular villages are made of circular houses.

The project master-plan geometry is based in a fractal hexagonal grid that holds the different sizes of classrooms and services. The classes are organized in small groups of three or four pieces that have the shape of flower.

Natural Ventilation - All the learning spaces have natural ventilation from both sides and the porch to access them holds the solar panels that will provide the school of electricity. All the buildings hold a photovoltaic panel network that will provide the center of electricity. The energy produced will be send to the city.

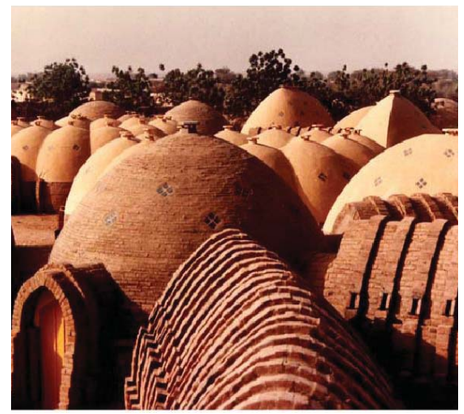
The landscape of the center will integrate local species and the students of the center will be the researchers and gardeners for the intermediate spaces.All the rain water will be collected in natural collectors and this will be used for drainaged of the gardening and for services.

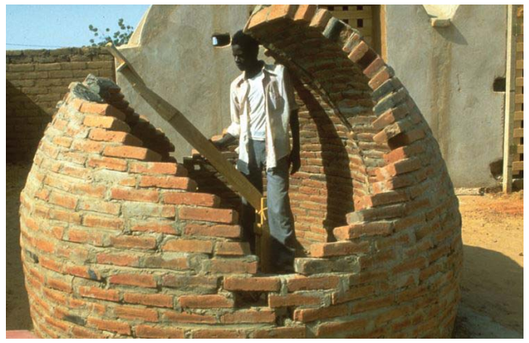


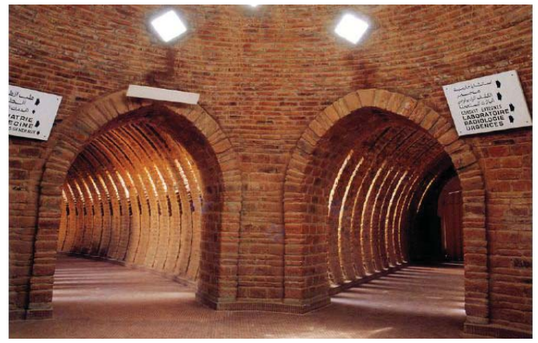
PROJECT REFERENCES

WORLD ...WHAT MAKES A DIFFERENCE

PRINCIPLE REFERENCES





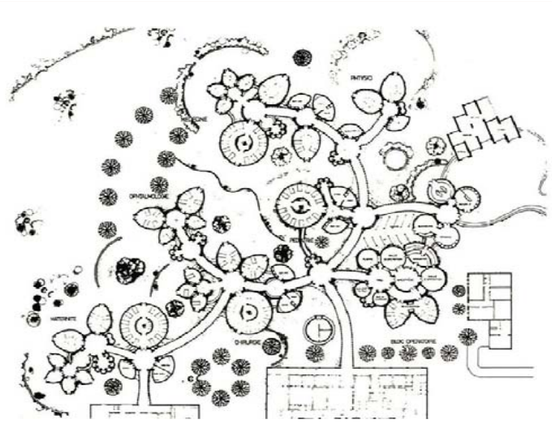


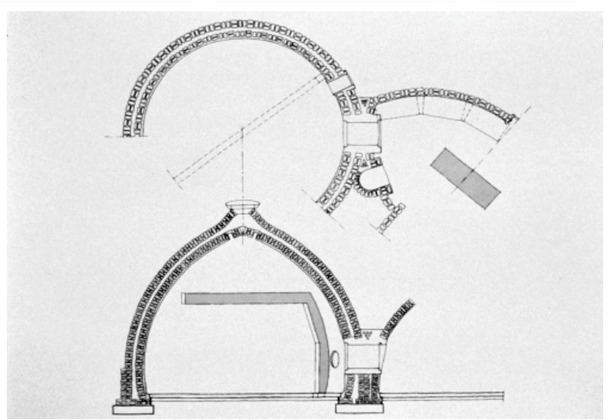
||| HOSPITAL, KAEDI ||| FABRIZIO CAROLA |||
||| MAURITANIE ||| 1984 |||

The Kaedi Regional Hospital is the largest health facility in Southern Mauritania, and one known for its innovative architecture. The hospital was designed by Frabrizio Carola of ADAUA, who used the project to develop both a new “urban vernacular” architecture and to train workers in new, low-cost and locally appropriate techniques in construction.

The new hospital (actually a large extension onto an existing concrete structure) involves the use of handfired locally made brick and a design based on a sequence of simple and complex dome structures. The extension adds 120 beds to the hospital, an operating theatre complex, paediatric, surgical and ophthalmic departments, a maternity and general medical unit, a laundry, kitchens, storerooms, a garage, and a workshop. The structure was intended to be both to be naturally cool even while letting in significant light from the outdoors.

The structural repertoire that emerged, after on-site experimentation with a number of domes and vaults, included simple domes, complex domes, conventional half-domes, pod-shaped spaces, and self-supporting pointed arches which form winding circulation corridors. The overall plan for the hospital extension was derived from these forms. Adequate natural light enters the complex through glass blocks set into the brickwork and from interstices left between the brick arches. The response of both doctors and patients has been positive, and the community takes pride in the fact that the facility was built by their own people.





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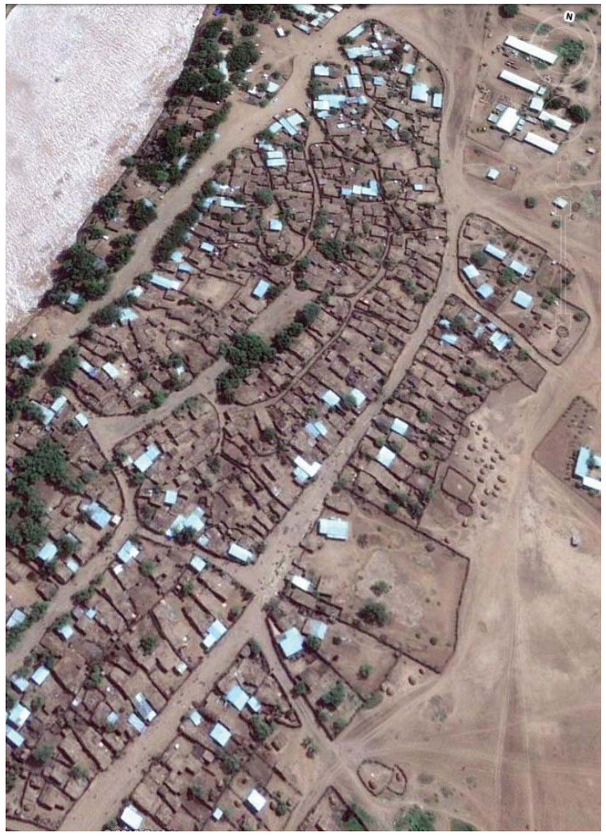
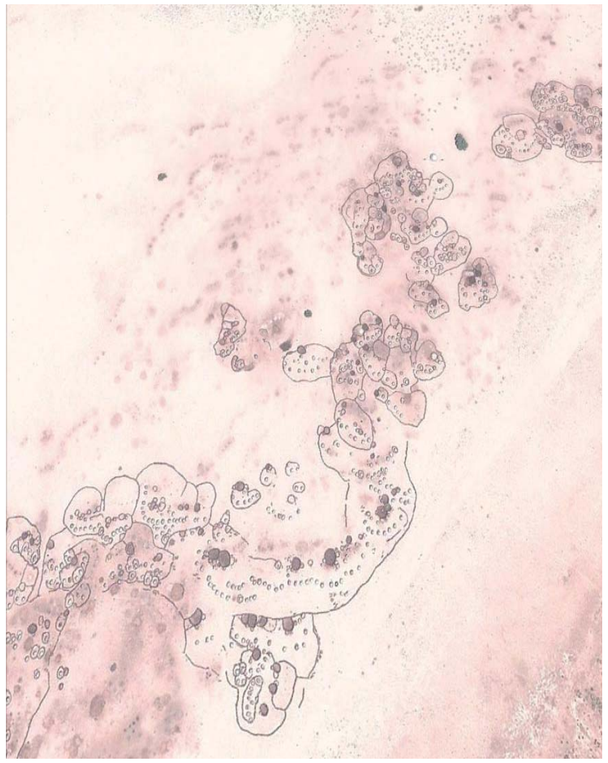
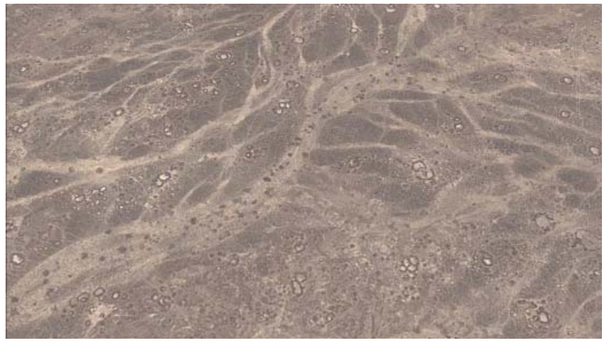
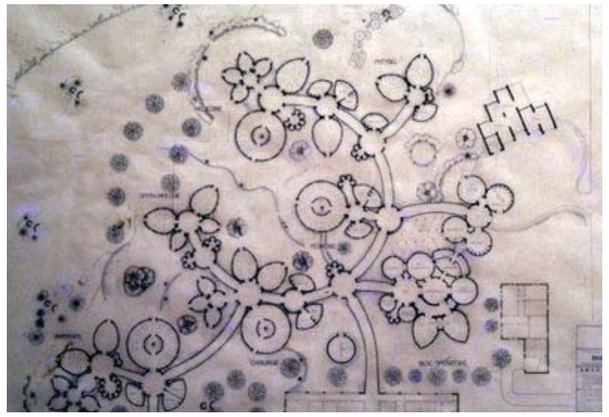




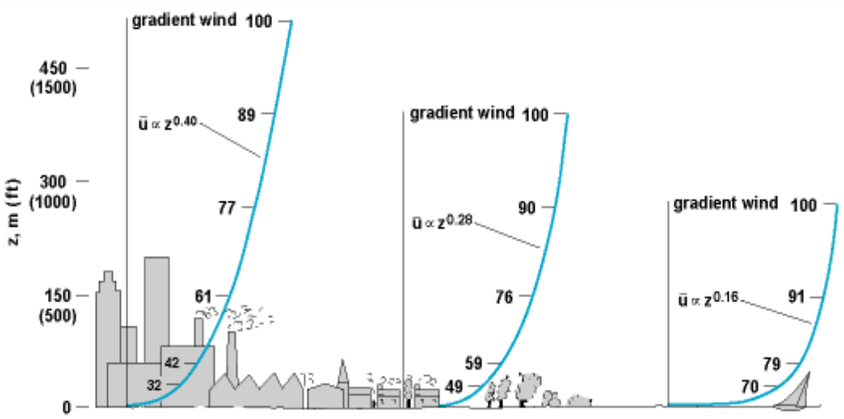


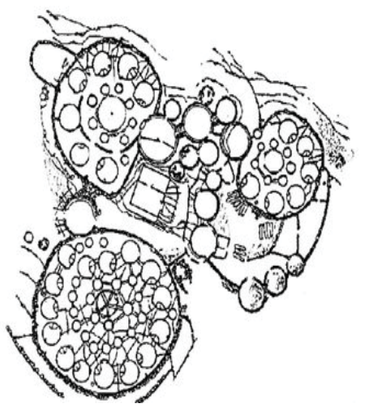


||| FRACTALS IN AFRICA ||| RON ENGLASH ||| ||| ZAMBIA, MALI ||| XXXX |||

Of course fences around the world are all Cartesian, all strictly linear. But here in Africa, you've got these nonlinear scaling fences. So I met a guy in Mali just outside of Bamako, and asked him, "How come you're making fractal fences?" And his answer was very interesting "Well, if I lived in the jungle, I would only use the long rows of straw b´cos they're very quick and cheap. It doesn't take much time, doesn't take much straw." He said, "but wind and dust goes through easily. Now, the tight rows up at the very top, they hold out the wind and dust. But it takes time, and it takes a lot of straw. Now, we know the farther up from the ground you go, the stronger the wind blows." And I measured out the lengths of straw, put it on a log-log plot, got the scaling exponent, and it almost exactly matches the scaling exponent for the relationship between wind speed and height in the wind engineering handbook...

One village in southern Zambia. The Ba-ila built this village about 400 meters in diameter. The rings that represent the family enclosures get larger as you go towards the back, and then you have the chief's ring here towards the back and then the chief's immediate family in that ring. So here's a little fractal model for it. Here's one house with the sacred altar, here's the house of houses, the family enclosure, with the humans here where the sacred altar would be, and then here's the village as a whole -- a ring of ring of rings with the chief's extended family here, the chief's immediate family here, and here there's a tiny village only this big.













A new urban land lease holding proclamation was passed by the Ethiopian Parliament recently.

An amendment made to the previous directive puts all old land possessions under the lease system as per the revised proclamation. The new law has not established whether lease payments will be required on previous holdings or if the new arrangements will just legislate a length of time for ownership according to lease arrangements.

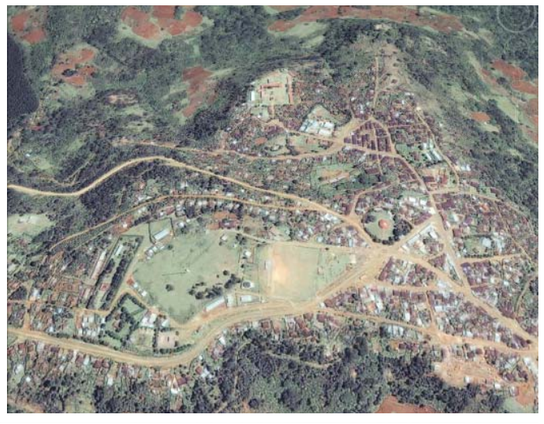
It is expected that the detailed principles for the conversion will be determined by the Council of Ministers as per rigorous investigation to be conducted and submitted by the Ministry of Urban Development & Construction.

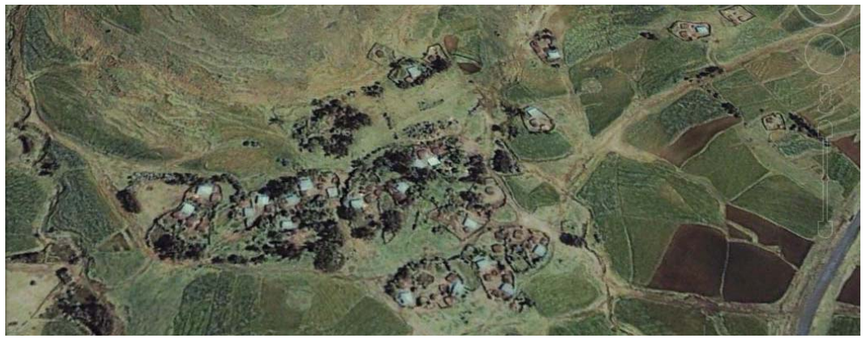
The new proclamation which supersedes all previous laws in this area also established time limits for construction on leased land. Consequently a limit of 24 months for small projects and 48 months for larger constructions has been set. Construction projects that fall in between are expected to be completed within 36 months. Extensions for construction cannot exceed 6 months for small projects and one year for medium to large constructions.

Other principles dealing with lease holdings as well as stringent punishment for government officials and other individuals engaged in corrupt practices with regards to land holdings were also established by the revised proclamation.





||| DEVELOPPING AND SPONTANIOUS URBANISM AND CITY PLANNING |||
||| ETHIOPIA ||| 2013 |||

Urban planning practices of many cities today are in constant mutation as spatial planning and/or urban design authorities seek to find sustainable solutions in recreating inclusive urban spaces. It is revealed that most public open spaces are less attractive and difficult to access. At a more general level, three major factors are to blame. These include absence of a land use (re)mixing strategy, weak development controls that have seen some open spaces giving way to illegal land uses and the general absence of quality infrastructure in existing open spaces. The most affected households reside in poor neighbourhoods. Only a spatial planning strategy that is guided by a known land use (re) mixing strategy would ensure improved accessibility to open spaces.

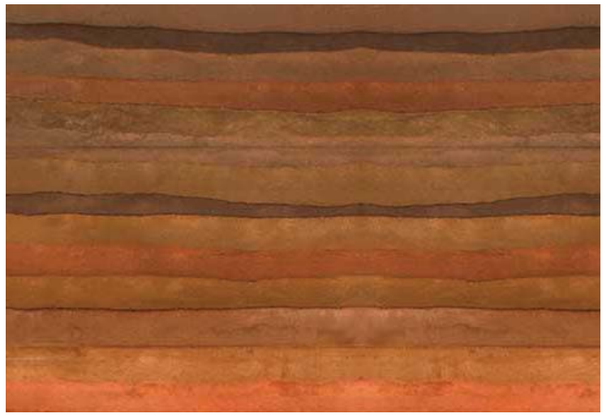
Ethiopia is experiencing one of the highest rates of urbanization in Sub-Saharan Africa. The influx of population to urban centres has led to severe overcrowding, water and sanitation issues, overtaxed social services, unemployment and food security issues. Recognizing the important front-line role cities can play in poverty reduction and economic development, the urban development agenda has become an integral focus of the Ethiopian government's development portfolio.

PRINCIPLE REFERENCES

MATERIAL REFERENCES

MATERIAL DIFFERENCE

...WHAT MAKES A WORLD



Rammed earth is a technique for building walls using the raw materials of earth, chalk, lime and gravel. It is an ancient building method that has seen a revival in recent years as people seek more sustainable building materials and natural building methods.

Rammed-earth walls are simple to construct, noncombustible, thermally massive, strong, and durable. They can be labour-intensive to construct without machinery (powered tampers), however, and they are susceptible to water damage if inadequately protected or maintained.

Rammed-earth buildings are found on every continent except Antarctica, in a range of environments that includes the temperate and wet regions of northern Europe, semiarid deserts, mountain areas and the tropics. The availability of useful soil and a building design appropriate for local climatic conditions are the factors that favour its use.

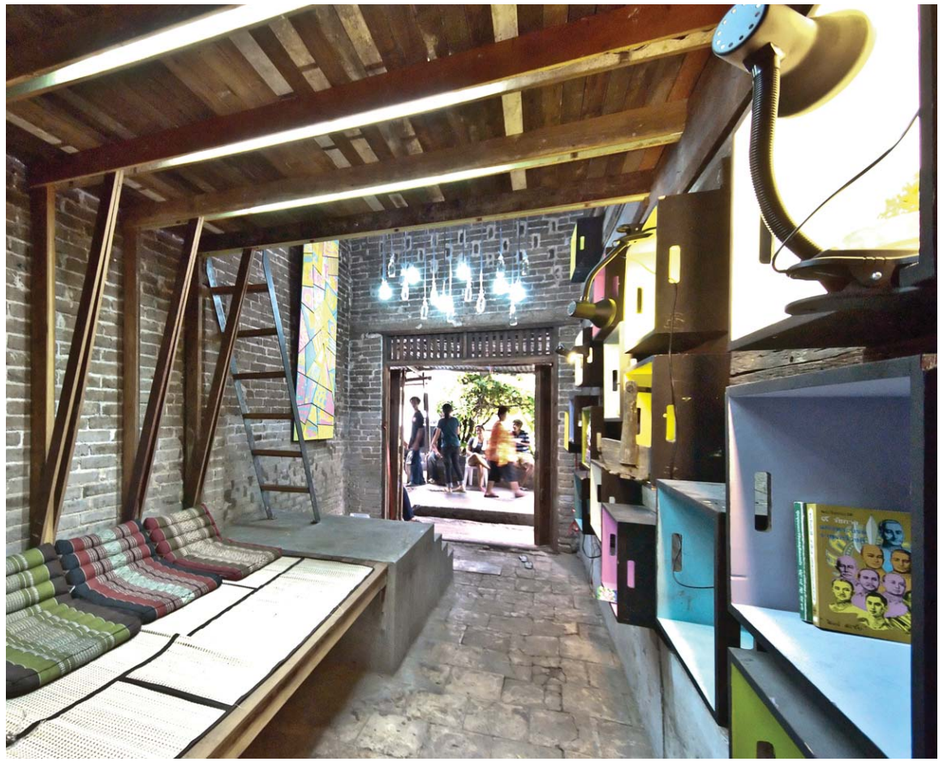
The construction of an entire wall begins with a temporary frame (formwork), usually made of wood, to act as a mould for the desired shape and dimensions of each wall section. The form must be sturdy and well braced, and the two opposing wall faces clamped together, to prevent bulging or deformation from the large compression forces involved. Damp material is poured in to a depth of 10 to 25 cm (4 to 10 in) and then compacted to around 50% of its original height.

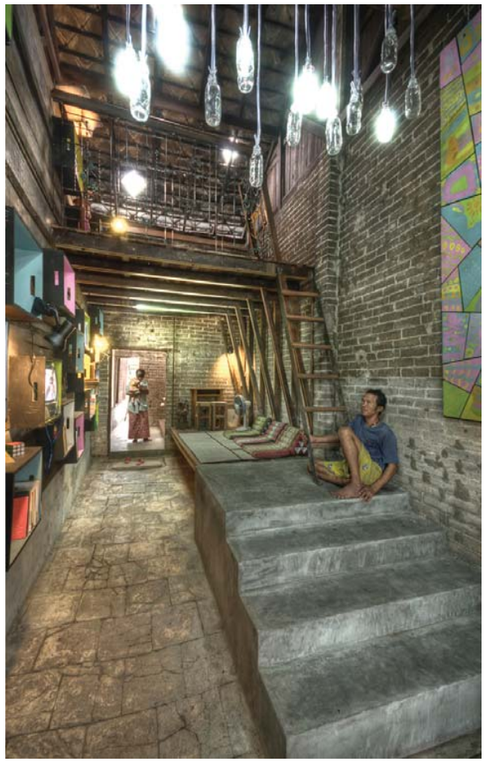
Because rammed-earth structures use locally available materials, they usually have low embodied energy and generate very little waste. Where soil excavated in preparing the building's foundation can be used, the cost and energy consumption for transportation are minimal.

Rammed-earth buildings reduce the need for lumber because the formwork is removable and can be repeatedly reused.

When cement is used in the earth mixture, sustainable benefits such as low embodied energy and humidity control will not be realized. Partial substitution of cement with alternatives such as ground granulated blast furnace slag has not been shown to be effective, and raises further sustainability questions.

The density, thickness and thermal conductivity of rammed earth make it a particularly suitable material for passive solar heating.



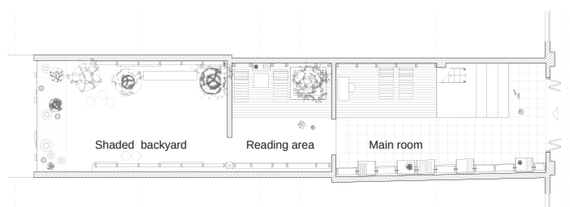


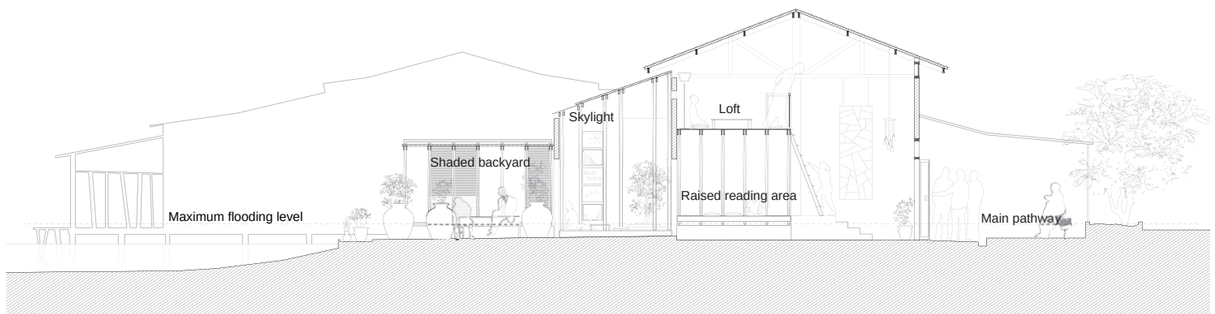
||| OLD MARKET LIBRARY, BANGKOK ||| TYIN TEGNESTUE ARCHITECTS ||| ||| THAILAND ||| 2009 |||

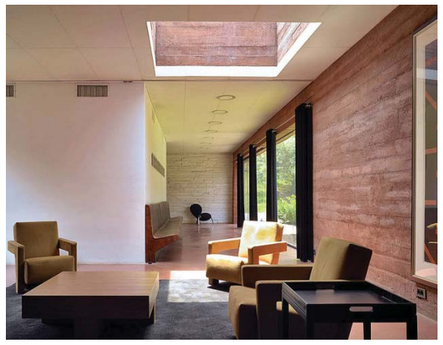
Min Buri is an area of Bangkok, which in recent years has gone from a lively origo into an almost slum-like area. The Old Market Library was built in a 100-year-old market building.

For this project to be successful it was important to involve the inhabitants actively throughout the whole process, from inception to completion. Initially we mapped the needs within the community. It wasn't always easy getting everyone involved, especially the adults. However when the project became more tangible this completely changed. We soon had a regular group that worked with us every day and who began to develop an attachment to the library, a sense of achievement and pride. It was important for us to use local and reused materials, which were already available to the community.

The refurbishment was a demonstration of what can be achieved by the inhabitants themselves, through own initiative, using local inexpensive materials and their own knowledge.



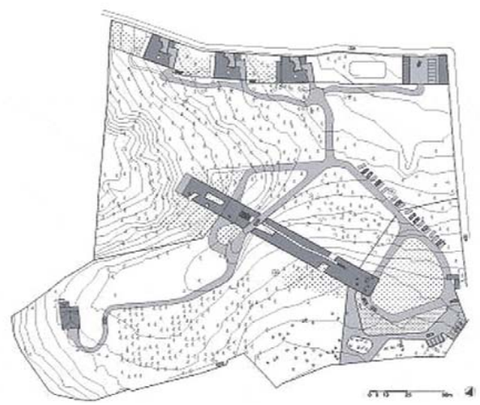




||| THE DUTCH EMBASSY, ADDIS ABEBA ||| DE ARCHITECTENGROEP |||
||| ETHIOPIE ||| 2005 |||

A new European embassy in Africa is often an imposed (or at least imported) affair, using materials and human resources brought from outside. The Dutch Embassy in Addis Ababa is different. It was realised entirely by local contractors, using the only widely available local material, concrete, coupled with Ethiopian stone and timber for the interior finishes. The brief required new buildings for the ambassador's residence, chancellery and staff housing, and the renovation of the existing deputy ambassador's house. Along the way (the project took eight years to realise) a small school was added to the programme of main building: 2,100 m2 (including ambassador's residence and chancellery), deputy ambassador's house: 540 m2, staff houses: 224 m2, school: 190 s m2, gatehouse: 65 m2

All buildings in the compound have reinforced concrete structures of varying spans and dimensions. The exposed walls in intense red-ochre are made of pigmented concrete. In colouring the concrete, the proportion of pigment (ferrous oxide) to cement is 1:20. The exposed concrete is finished with clear protective varnish. Floors in public circulation spaces are of the same material, but the final 70-millimetre layer of pigmented concrete is polished. All concrete work was poured in place, using a handmade formwork in natural wood. To give the concrete an individual touch, each of the 14-15 centimetre planks was slightly tilted to make recesses and projections and create a striated texture, which is accentuated under the play of sunlight and shadow. No standardised measure was specified for this purpose; the misalignment of the planks was done with a stick or by hand.A major objective of the project was to engage with the local workforce and building industry. This inevitably led to the choice of concrete as the main construction material. To minimise the use of imported materials, technical installations were kept to the bare essentials. Materials imported from Italy include pigment, sanitary fixtures, accessories, electrical fixtures, security glass, steel frames, gypsum cladding, and the office floor coverings (epoxy). Materials from local sources include cement, marble, timber doors/floors and interior finishing materials such as stone claddings and windowsills. Reinforcement was mixed: some elements were imported to meet Arup's standards, especially for the foundations.



...LET´S MAKE A **DIFFERENCE**

PRAGUE 2013

CIGLER | MARANI ARCHITECTS