EARTH ARCHITECTURE IN UGANDA

Pilot project in Bushennyi
2002-2004

CRATerre Editions

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Pilot project in Bushennyi
2002-2004

Project to promote forms of architecture that respect the environment and are accessible to disadvantaged populations in Uganda

MAE, MCNG / OSI Projet n° E 010005
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CRATerre Editions

TRADITION AND MODERNITY, BUILD A BETTER FUTURE

Anyone who has had the opportunity to study traditional societies will have noted the strong relationship that these societies have established between their culture and their environment.

For instance, in African mythologies, natural elements are associated with gods and divinities and settling in a place require making a pact with the spirit(s) of the place. How could any community prosper within its natural environment without ensuring that its components would also have their own chance to survive? The gods would immediately make you know in their own way. Therefore, consciously or unconsciously, most of the communities were perfectly aware that they could not stay long in a place if they would not ensure that their environment could regenerate. Isn't that concept what we would call today Sustainable Development?

Conflicts, foreign influences, trade, slavery, colonisation and globalisation have brought about new ideologies, new aesthetics, new materials and techniques, new social organisations. Besides that, growths of populations or concentration in specific areas have entailed high pressure on land and drastic changes of attitude, resulting in severe environmental problems.

In the mean time, the building industry is a sector with high potential for local and national economies as long as employment and qualification strategy is considered straight from the beginning. There is a tendency at international to consider that high-tech and industrial solutions have to be promoted as they either do not require skilled people or people at all. This approach leads to unemployment and poor workmanship. It results in the fact that money invested often «by-pass» local communities or has a limited impact on them.

The modernist approach has had always the tendency to make us believe that human can free himself of its natural environment and the formal education system has often blindly promoted foreign models in a very detrimental way to the local ones. It has also extracted from communities their best individuals, those who would probably have been the ones who could have invented new solutions, adapted to the new situation. In these conditions, traditional models have often been depreciated and the know-how attached to it partly lost. New initiatives, if sometime ingenious, remain often poorly adapted, from the social, technical, cultural or environmental points of view. This evolution is peculiarly clear when looking at the evolution of human settlements and architectural models.

As it is the case in many countries, the situation in Uganda is that traditional architecture is gradually vanishing, replaced by foreign models. If the higher strata of the population have managed to adapt to those, often loosing some of the qualities of the traditional models, many people seek to adopt these models but with too limited means

This booklet presents an initiative that has taken place in Uganda in response to these problems. The hypothesis is that traditional architecture can be a basis on which one can develop a new local architecture that addresses contemporary expectations and needs of the population but also better respects the environment and therefore contributes to the establishment of a sustainable development process.

Thanks to the support of the French Ministry of Foreign Affairs and of the European Union, the project was implemented since 2002. A strong partnership was established, comprising institutions at the local, national and international level. A study of the local conditions was carried out, with focus on identifying the "intelligence" and limits

CRATerre-EAG

of both, traditional and "modern" models, as well as the existing potential at the local level, in terms of raw materials, human resources, and also educational capacities and needs. New models were conceived with the objectives:

- to meet contemporary needs,
- to maximise the use of the locally available materials in a sustainable way,
- to make more efficient the use of the needed industrial materials to ensure affordability and sustainability
- to foster qualification and jobs creation

The three-year project has been very dense with many activities developed. The new architectural models and the building techniques developed have been review by all stakeholders. The models obtained prove to be efficient and are seen as a real contribution to the quest of establishing a sustainable development process. Since the first achievements, interest of the beneficiaries is increasing and numerous demands are expressed. Individuals and local institutions copy the architectural models developed trhoughout the project.

There is a great enthusiasm in Bushenyi district and a strong wish to continue the project to meet the needs of the district population in terms of skilled artisans and variety of buildings. Beyond that, other districts have been aware of that project and whish to implement a similar development strategy in their own areas. To respond to these new demands, a second phase of the project is under design with the stakeholders to submit a project proposal to supporting agencies.

All the project partners are strongly committed to implement the results of the project and to continue to use this development approach and methodology, gradually considering other parts of the country. At national level, addressing the issue of norms and standards is also considered. The institutions involved are very complementary, allowing a comprehensive know-how transfer and an efficient capacity building in the direction of professionals and decisions makers, towards a better contribution of the building industry to the sustainable development of the country. This common effort is a key factor to ensure success and achievements in striving for the improvements of the conditions of life of people. This model can be a base to be recommended to develop strategy aiming at, in particular, solving similar housing problems in other parts of the world.

CONTENT

ARCHITECTURE OF SUSTAINABLE DEVELOPMENT

1 HOW CAN RESOURCES BE USED?

ACTING FOR DEVELOPMENT

More than 2/3 of humanity live under precarious conditions. Working to develop housing worthy of and accessible to the greatest number of people entails proposing solutions to one of the most serious situations of our era. However, current materials and technologies remain out of reach for most of the world's population.

USING LOCAL RESOURCES

Earth architecture can be found on every continent inhabited by man. Extending this heritage, improving traditional methods and restoring local building practices and know-how to their rightful places entails validating the feasibility of an alternative capable setting up the conditions of a sustainable economy.

DEVELOPING THE SCIENCE OF LOCAL MATERIALS

Modern requirements for controlling processes used to produce construction materials cannot rely on empirical know-how as a reference, however well they have proved themselves. Professional and public recognition of earth architecture has required developing a specific science of construction techniques and materials

DYNAMISING LOCAL PRODUCTION SECTORS

These sectors have to put the potential supplied by the natural, human technical and cultural environment to good use. Dynamising these production sectors must ensure the implementation of standards, legislation and finance to favour their development and the creation of local social and economic benefits.

GENERATING JOBS

Acting for development means setting up lasting conditions and ensuring the concrete development of positive socio-economic repercussions for the populations concerned. The sector of earth architecture, from craft to industrial levels, has shown its capacity to dynamise the primary sector of local economies, thereby attracting investment in other economic sectors.

3 HOW CAN CULTURES BE VALORISED?

KNOWING THE VALUE OF ARCHITECTURAL HERITAGES

Architectural heritages embody great cultural signification that gives identity to the persons that built them and their symbolic and social values, both intangible and tangible. Recognition of these values underlying cultural signification is an indispensable element of sustainable development.

ENHANCING HERITAGE

The stakes of conserving and enhancing earth architecture heritage are highly pertinent in sustainable development and the "global alliance" for the recognition, preservation and transmission of cultural diversity.

2 HOW CAN THE HABITAT BE IMPROVED?

➜ ASSISTING THE PROGRESSION OF TRADITION BUILDING PRACTICES

The history of architecture shows that building methods have undergone permanent progress. Even though these methods were satisfactory at the time of their conception, expressing intelligent understanding of the relations between materials, structure, form, use and the environment, they should nonetheless always be subjected to review in order to adapt them to the evolution of societies and their environment.

➜ INVOLVING POPULATIONS

One of the most important elements of sustainable development projects is getting populations involved, whatever the activity might be. To achieve this, all projects are defined, carried out, evaluated and developed in relation with all the parties implicated.

➜ RESPONDING TO THE DIVERSITY OF CONTEXTS

There is no simple way of transferring building practices, which must be done by taking into account the strengths, weaknesses, limitations, potentials and opportunities that identify and characterise each context of action.

➜ CONTRIBUTING TO THE PRODUCTION OF QUALITY HOUSING

When satisfying their requirements for housing and facilities, contemporary societies demand solidity, comfort and minimum maintenance. These criteria can all be amply satisfied by earth construction materials provided they are used properly. Many architectural projects using earth in both industrialised and developing regions, meet the expectations of populations and the requirements of modern architecture set out by legislation and standards.

4 HOW CAN ACTION BE TAKEN?

➜ LINKING RESEARCH, EXPERIMENTATION AND DISSEMINATING KNOWLEDGE

Every project has to permit new experiments on simple, economic and paraseismic structures and the forms for inexpensive housing. This relationship between research and experimentation should be extended by considerable activity in the sector of cultural, scientific and technical publication.

➜ GUARANTEEING COHERENCE BETWEEN ACTIONS

Improving the quality of living conditions, conserving and passing on diversity and reducing the depletion of non-renewable resources are concepts and objectives that cannot become realities in societies unless they rely on efficient planning, implementation and assessment methods, in which the analysis of contexts is both active and consolidated. This must be done by generating social and economic repercussions for local populations and by setting up the conditions permitting local populations to take responsibility for development projects in the long term.

➜ PROGRAMMING FOR THE LONG TERM

The application of an iterative approach to projects, with four phases of activities:

1. Preliminary studies;
2. Technical design and definition of a development strategy;
3. Implementing the activities on site;
4. Evaluating the actions and impacts of each project on the social and economic environment.

This repetition of the project cycle permits qualitative and quantitative improvement throughout the implementation phase to achieve the targets set.

BACKGROUND

In 1992, the Ugandan Government adopted a strategy aiming to help local population to be more involved at the level of funding, constructing and maintaining public infrastructure. In 2002, the classrooms backlog was up to 26000 units in the country while most of teachers were remaining without decent accommodation.

Within the recommendations given by the government the following aspects were referring to the sector of publics and private building construction.

- ➜ To protect the natural environment
- ➜ To promote training at all levels.
- ➜ To initiate Demonstration projects
- ➜ To develop researches to promote the use and improvement of local products and skills.

In 1999, Makerere University Kampala (MaK), Department of Architecture, initiate a programme aiming at implementing earthen architecture in their syllabus to fit with this policy. A first programme (1999-2001) was established at MaK aiming at univerity embedment with the objective to develop pedagogical material to include earthen architecture and low-cost housing in their curriculum. A feasibility study was also carried out in Bushenyi district with RPWRD (1999) to see how earthen architecture can help to solve deforestation problems due to building construction activities.

The Rukararwe Partnership Workshop for Rural Development (RPWRD) is an Ugandan NGO established in 1986 in Bushenyi district concerned by social and environmental issues. They came to the conclusion that building construction activities are one of the main factors bringing deforestation in Uganda.

In fact, most of public buildings in Bushenyi district are made out of locally made fired brick while this technology required a minimum of 16 m3 of wood fuel to fire the necessary quantity of bricks to complete a single classroom. Fire brick is also the material that everyone expects to use for building their houses. If this dream has to be achieved, this is a minimum of 2 000 000 m3 of wood that will be required for Bushenyi district needs only.

Both institutions, MaK and RPWRD contacted CRATerre-EAG, a French organisation specialised in earthen architecture, to support and contribute to their objectives through a specific programme.

FEASIBILITY STUDY
EXISTING

TRADITIONAL ARCHITECTURE IN UGANDA
Wattle and daub house

TRADITIONAL ARCHITECTURE IN UGANDA
Kasubi Tomb

TRADITIONAL ARCHITECTURE IN UGANDA
Church

WATTLE AND DAUB

89% of the Bushennyi population live in wattle and daub house (timber frame structure in-fill with earth). The life span of this type of construction is in average 25 years (due to the degradation of the timber structure). If the country wants to maintain its housing stock as it is, 136,000 trees are needed every year.

FIRED BRICKS

This building material is the most popular for public infrastructures. Fired brick remain the dreamed material for those who want to build their home. However, fired brick production is one of the factor greatly contributing to deforestration in Uganda.

ADOBES

New building technologies, such as adobe have recently appeared in the district.

FEASIBILITY STUDY
PROBLEMS IDENTIFICATION

PROBLEMS RELATED TO WATTLE AND DAUB

1. High consumption of wood for each construction that contributes to deforestation
2. Limited life span due to timber rotting directly in contact with the ground, which leads to regular reconstruction of this type of structure
3. Lack of structural stability due to the absence of bracing in the construction
4. Inappropriate and costly technical solutions (the cement plastering does not stick to the earth walls)

1

2

3

4

PROBLEMS RELATED TO FIRED BRICKS

1. Use of wood fuel to fire bricks that make deforestation problems worst

2. High cost of this technology which make difficult for everybody to afford it or to finish their buildings

3.Poor quality of construction and of bricks (durability problem)

FEASIBILITY STUDY
PROPOSED SOLUTIONS

EARTH ARCHITECTURE
Wattle and daub house, France

IMPROVED WATTLE AND DAUB

The proposal developed as part of the project framework is to protect the timber structure of the wattle and daub building. Bracing systems are introduced in the building systems. A specific research work will be carried out to develop appropriate plastering for wattle and daub.

EARTH ARCHITECTURE
Adobe house, USA

ADOBE

Adobe is a well known technology in the district, as well as in the whole country as it is a necessary phase to produce clay bricks. The raw earth for adobe is fairly available. The challenge is mainly to change the building material perception to move out from its «material of the poor» image's. Architecture, technical details and finishes will have to be particularly well designed. Involved artisans and owners of earth building should be proud of achievements.

EARTH ARCHITECTURE
CEB house, Mayotte

CEB

Compressed earth blocks (CEB) are proposed in this programme, mainly as an alternative to fired bricks. A CEB wall of very good quality is 20% cheaper than a fired bricks wall of equivalent quality, of about the same cost as a fired brick wall of inferior quality and 15% more expensive compared to the one of poor quality.

PARTNERS

RPWRD

The Rukararwe Partnership Workshop for Rural Development is an NGO, which was established in 1986 in Bushenyi district.

RPWRD is commonly dealing with more than 30 associations representing more than 1000 members.

One of its main objectives is to restore the dwindling forest cover, which has been subjected to population pressure over several decades.

Through the efforts of implementing the afforestration programme, RPWRD has, over the years, realised that tree planting initiatives alone will not help to restore the vegetation unless it is complimented by alternative measures to dissuade people from cutting down trees. One such measure was to introduce a technology of building structures without necessarily cutting down trees for burning bricks. Earth technology is by no means new in Uganda; in fact some people estimate that it is as old as mankind on this earth. But, because Institutions have not concentrated on improving and modifying it to serve the present developmental challenges, it has been neglected in favour of other building technologies.

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ROLE AND INVOLVEMENT IN PREPARING AND IMPLEMENTING THE ACTION

1 **Feasibility study**
RPWRD initiate the feasibility study which took place in 1999 and whiles this action has been designed.

2 **Fundraising**
Based on the feasibility study results and in connection with CRATerre-EAG and MaK, RPWRD developed the project proposal and submit request to different funding agencies. Bushenyi district, Misereor, The French Government and the European Union answer positively and agreed to fund the action.

3 **Implementation; demonstration and field training**
Identification, selection and fundraising for demonstration building opportunities
• 11 publics buildings between January 2002 and July 2004 have been constructed
• 4 demonstrations for rural housing improvement between January 2002 and July 2004 have been put up
Identification and selection of trainees
• 60 artisans trained during the action period
Training
• 4 trainers are available within RPWRD team
Production of services
• Production and selling of earthen building materials
• Capacity to design and build demonstration building
Research
• Plaster

4 **Implementation; formal education on earthen architecture**
On site training of technical teachers.

5 **Implementation; dissemination**
➜ Dissemination of promotional material developed within the action.
➜ Production and dissemination of cap, tee shirt etc... to help to promote earthen architecture.
➜ Organisation of promotional events.

6 **Implementation; monitoring and evaluation**
➜ Yearly project evaluation.

ROLE AND INVOLVEMENT IN PREPARING AND IMPLEMENTING THE ACTION

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1 Feasibility study

In 2000 and under their own programme of activities, MaK and CRATerre organise conjointly a mission to Bushenyi to complete the information collected during the feasibility study that help to design the action.

2 Fundraising

MaK took care of the salaries of lecturers involved during the project.

3 Implementation; demonstration and field training

- Opportunities have been given to 6 students to have practical training on building site (Four 2 weeks training and Two 3 month one's).
- More than 20 students got the opportunity to visit the different demonstration building constructed during the action.
- Design of building to be done within the project has been used to organise exercise in Design Portfolio subject.
- One lecturer from MaK attend a 2 weeks intensive training in Bushenyi
- Five lecturers from Mak got the opportunity to visit the different demonstration building constructed during the action.
- Mak organises a 5 days intensive training on architecture for 4 artisans from RPWRD
- Research

4 Implementation; formal education on earthen architecture

- Earthen architecture is now compulsory in third year of the curriculum of MaK architecture department
- MaK department of architecture is organising every two years a post graduate diploma where Earthen architecture is one of the main subject
- MaK lecturers were involved in designing the pedagogical material developed for technical school project partners.

5 Implementation; dissemination

- Organisation of promotional events.
- Dissemination of promotional material developed within the action

6 Implementation; monitoring and evaluation

- Yearly project evaluation.

PARTNERS

MaK

The department of architecture at Makerere University was established in 1984 by the Ugandan University Council. But it was not until October 1989 that the first student intake was realised. Since that time, the department has grown strength to strength despite enormous challenges along the way.

Actually, the department is a respected component of the university community with extensive international links. Students enrolment is now 85 (40% are female), and there is a dedicated team of 16 full time members of the academic staff.

By 1994, a total of 70 students have graduated from this department.

The school philosophy is: "In search of a sustainable and contextual architecture".

The department of Architecture aims at being responsive to and finding appropriate solutions for the local social, economic and physical environment while remaining relevant in the global professional context.

Training of students at MaK, school of architecture is carried out at four main levels. Architecture science and theory subjects, studio course work, project work and practical training in firms and on building sites.

The following are the major subject areas:

- Physical environment
- Social environment
- Building technology and services
- Theory and structures
- History of architecture
- Theory of architecture
- Design portfolio
- Computing.

In the past, the horizons of architecture education have often been limited to principles of construction and the aesthetics of design and decoration. It is our mandate to stimulate architects on what the impact of their work will have on the future of the society they have to serve.

Students must be able to empathise with the cultural base of Uganda's and Africa's civilisation and bridge the vast gap between it and the predominantly western idioms and technology.

The vast majority of Ugandan's are rural dwellers and are poor. The architect can have a valuable role in third-world rural development being the professional who both enables development to take place and raise its standard.

Technology, as taught in architectural curricula, is not persuasively linked to materials and techniques that are available and appropriate in many regions of Africa; instead it is often linked, at least implicitly to architectural forms found in western countries and the technologies that support those forms.

PARTNERS UTC

Uganda technical college Bushenyi, formally know as Kahaya Technical School is located at 46 km on Mbarara road an it is just 7km before reaching Bushenyi town.
The institution was founded by the Ankole Kingdom on 15th may 1956. It was by them called "KAHAYA MEMORIAL TRADE SCHOOL". In 1974, the institution was promoted to the standard of technical school "KAHAYA TECHNICAL SCHOOL" and it was offering Uganda Junior Technical certificates. In 1982, under the leadership of Mzeewakazi, Mr Ephraïm Kukomo, the institution was promoted to technical institute "BUSHENYI TECHNICAL INSTITUTE" admitting students who had passed Uganda Junior Technical certificate and Ugandan certificate of Education. Two years later, in 1984, the institute was promoted to a technical college "UGANDA TECHNICAL COLLEGE, BUSHENYI".

The college offers the following programme at Diploma level

- Diploma in building and civil engineering
- Diploma in water engineering
- Diploma in architectural draughtsmanship
- Diploma in Electrical engineering
- Diploma in mechanical engineering

175 students are actually taught at UTC, Bushenyi and 22 lecturers are involved in teaching them.

Earthen architecture can help UTC to achieve its mandate due to the following:

- These technologies are cost effective, especially in terms of utilisation of locally available materials.
- They are environmental friendly since it is expected to significantly eliminate the current practice of using wood for firing bricks

- They involve a significant number of people in form of labour; this labour is part of poverty reduction
- They will eventually lead to improved standards of living.

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ROLE AND INVOLVEMENT IN PREPARING AND IMPLEMENTING THE ACTION

1 **Feasibility study**
UTC Bushenyi has been part of the discussion carried out during the feasibility study in 1999.

2 **Fundraising**
UTC took care of the salaries of lecturers involved during the project.

3 **Implementation; demonstration and field training**
➜ Transfer of technologies
- Two teachers got the opportunities to follow different on site training session. All together, total duration of these training sessions last 4 month.

➜ Research
- Plaster

4 **Implementation; formal education on earthen architecture**
➜ Analysis of existing curriculum
➜ Development of pedagogical material
- UTC teachers have been involved in the development of specific pedagogical materials adapted to their institution means and goals.

➜ Training of lecturers
- The two teachers involved in the on site training organised a 2 week intensive training in direction of their colleague aiming to sensitize them to the basics of earthen technologies and architecture.

➜ Introduction of earthen architecture in the formal educational system
- UTC acts as a pilot school in testing the introduction of earthen architecture and technologies within their actual technical curriculum.

5 **Implementation; dissemination**
➜ Dissemination of promotional material developed within the action

6 **Implementation; monitoring and evaluation**
➜ Yearly project evaluation.

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ROLE AND INVOLVEMENT IN PREPARING AND IMPLEMENTING THE ACTION

1 **Feasibility study**
KTI Bushenyi has been part of the discussion carried out during the feasibility study in 1999.

2 **Fundraising**
KTI took care of the salaries of lecturers involved during the project. The institution organise fundraising to be able to construct 2 demonstration building within its compound.

3 **Implementation; demonstration and field training**
➜ Transfer of technologies
- Two teachers got the opportunities following their on site participation during training session. All together, total duration of these training sessions last 4 month.

➜ Research
- Plaster

4 **Implementation; formal education on earthen architecture**
➜ Analyse of existing curriculum
➜ Development of pedagogical material
- KTI teachers have been involved in the development of specific pedagogical materials adapted to their institution means and goals.

➜ Training of lecturers
- The two teachers involved in the on site training organised a 2 week intensive training in direction of their colleague aiming to sensitize them to the basics of earthen technologies and architecture..

➜ Introducing earthen architecture in the formal educational system
- KTI acts as a pilot school in testing the introduction of earthen architecture and technologies within their actual technical curriculum.

5 **Implementation; dissemination**
➜ Dissemination of promotional material developed within the action

6 **Implementation; monitoring and evaluation**
➜ Yearly project evaluation.

PARTNERS KTI

KTI is located 16 km along Ishaka – Kasese high way branching off at Kayembe Trading Centre.

It is a tertiary institution which admits students after senior 4 or other level. Here they pursue courses of their choices in the following departments:

- Bricks, Block laying and concrete practice
- Carpentry and joinery
- Motor vehicle technician
- Electrical installation
- Plumbing

There are actually 8 teachers involved in KTI. Total number of student is more than 200.

KTI decide to be part of the project because of the following:

- To acquire skilled knowledge which would be utilised to improve lives of people, students, staff by using local affordable materials surrounding.
- To help to prevent deforestation and atmosphere pollution by finding alternative to the use of fired bricks
- To enable teachers acquire more skills and pass them to students.
- To acquire technical knowledge and skills of utilizing local material with minimum expense.
- To train students who would be able to create their own job locally

PARTNERS

CRATerre-EAG

CRATerre-EAG, the International Centre for Earth Construction, is a scientific organisation within the School of Architecture of Grenoble (EAG). Since its creation in 1979, CRATerre-EAG is actively contributing to the promotion of scientific and technical knowledge on earthen architecture.

Three main working programmes :
- study and preservation of the earthen architectural heritage,
- human settlements and sustainable development,
- resources and environment,

are developed through four interrelated fields of activity: education, research, implementation and dissemination, gathering the experience of international experts in architecture, engineering, sociology and anthropology on different projects set up in more then 70 countries the world over.

CRATerre-EAG is the Centre of Excellence of the UNESCO Chair on Earthen Architecture, aiming to accelerate the dissemination of scientific and technical know-how on earthen architecture amongst the higher education institutions and in scientific-technical centres.

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ROLE AND INVOLVEMENT IN PREPARING AND IMPLEMENTING THE ACTION

1 Feasibility study

Under the request of RPWRD and thanks to French Embassy in Uganda CRATerre-EAG took part in 1999 to the feasibility study that helps to design the action.

2 Fundraising

According to feasibility study results and in connection with RPWRD and MaK, CRATerre-EAG develops the project proposal and submited request to different funding agencies. Bushenyi district, Misereor, The French Government and the European Union answer positively and agreed to fund the action.

3 Implementation; demonstration and field training

- ➜ Transfer of technologies
  - Identification of raw materials
  - Production process
  - Production management
  - Construction process
  - Construction design
  - Quality control
- ➜ Transfer of methodology
  - Site analysis
  - Affordability
  - Implementation strategies
- ➜ Training of trainers
  - On site training
- ➜ Research
  - Plaster
  - Rural housing design

4 Implementation; formal education on earthen architecture

- ➜ Analyse of existing curriculum
- ➜ Development of pedagogical material
- ➜ Training of lecturers

5 Implementation; dissemination

- ➜ Design of poster and brochure.

6 Implementation; monitoring and evaluation

- ➜ Yearly project evaluation.

BENEFICIARIES

➜ DIRECT BENEFICIARIES

227 people trained during the project, and from 2004, 155 students to be trained each years

Institution who gain new skills within their teams

- MaK, department of architecture
- KTI
- UTC
- RPWRD
- Bushenyi District

Personal trained during the action:

- 60 artisans selected within Bushenyi district.
- 2 engineers from Bushenyi district.
- 6 Lectures from Mak (department of architecture, 2 teachers from UTC and 2 teachers from KTI).
- 4 technicians from RPWRD.

Persons to be yearly trained as a consequence of the action

- Every year, students from Mak (department of architecture, 15 per academic year), UTC (60 per academic year) and KTI (80 per academic year) will get access to formal knowledge on earthen architecture.

Community that benefit from new public building services

- Kagari community (4 classrooms and 2 teachers office)
- Itenbero community (2 classrooms)
- Kyietebe (3 accommodations for teachers)
- Kyahamunga Technical institute (2 classrooms)
- Nyabubaare (1 dormitory)
- Rugaga (3 accommodations for teachers)

➜ INDIRECT BENEFICIARIES

The whole population where the project has been active Bushenyi district, about 35000 people.

Communities where artisans have been trained

- Nyabubaare
- Kyamuhunga
- Bumbiire
- Mitooma
- Rweengwe
- Kanyabwanga
- Karungu
- Kakaanju
- Kitagata
- Buhwezu
- Shema
- Duhinda

Association or institution connected to project partners

- 11 parents association, 5 women association and 6 youth association that are connected to RPWRD
- All technical institute and technical college in Uganda

Community from where students trained and that will be trained in the future are coming from

- Bushenyi District and surrounding district
- The whole Uganda

Institution that are dealing with building programme

- Ministry of education
- Ministry of Environment

LOGICAL FRAMEWORK

OBJECTIFS - ACTIVITIES

		AIM OF ACTION	VERIFIABLE INDICATORS
GENERAL OBJECTIVE		➜ Favour access by the population to sound, sustainable housing that respects the environment.	➜ Progression of local building techniques towards those proposed by the project.
OBJECTIVE OF THE PROJECT		➜ Sustainably make available to local populations professionals (masons, technicians, engineers and architects) capable of proposing technical and economic solutions adapted to housing problems in Uganda.	➜ Numbers of craftsmen trained in the casual sector by the project then by the NGO RPWRD, partner to the project. ➜ Installation and implementation of a specific "economic housing" training course in the curricula of partner training organisations in the project. • Kyamahunga technical institute (training of masons) • Ugandan technical college (training of technicians and engineers) and • Makerere University Kampala (department of architecture). ➜ Number of masons, engineers, technicians and architects trained by partner teaching structures in the project.
ACTIVITIES	1	➜ 1-0 Local adjustment of alternative materials proposed ➜ 1-1 Design of adapted buildings ➜ 1-2 Construction of demonstration buildings ➜ 1-3 Training of all the project partners to produce, design, implement and maintain the technologies proposed. This work will be done during the construction of the demonstration buildings. ➜ 1-4 Teacher training	➜ **TECHNICAL RESOURCES** 1 compressed earth block press, 1 earth block press made locally, masonry material and equipment, construction materials, hire of a vehicle. ➜ **HUMAN RESOURCES** RPWRD: Two full-time technicians for the three years of the project. An accountant part-time for the three years of the project. MUK: Teachers and students, 227 days CRATerre: architect,10 days – project manager, 71 days - technician, 33 days - Trainer, 88 days
	2	➜ 2-1 Transfer of competencies to different partners • RPWRD, Training of the casual sector • KTI, Training of rural craftsmen and technicians • UTC, training of building technicians and engineers • "Makerere University, Department of architecture" training of architects; setting up similar projects ➜ 2-2 Formulation of a pedagogic "Economic housing" programme with local partners and the introduction of this programme in the curricula of local training organisations.	➜ **TECHNICAL RESOURCES** Masonry material and equipment, 2 compressed earth block presses made locally, Pedagogic materials to be formulated ➜ **HUMAN RESOURCES** KTI: 1 teacher for 21 days UTC, Bushenyi: 1 teacher for 21 days MUK: Teachers: 31 days, CRATerre: Architect, 27.5 days – Project Manager in Uganda, 36 days - Technician, 38,5 days - Trainer: 14 days
	3	➜ Awareness campaign aimed at target groups on the link between construction methods and deforestation.	➜ Use of technical resources found locally during the different missions in the field.
	4	➜ Setting up of material production units. Training in production and management.	➜ Training courses (human and technical resources required included in those necessary for activities 1, 2 and 3)
	5	➜ Setting up of an alternative materials production unit within RPWRD	➜ Training courses (human and technical resources required included in those necessary for activities 1, 2 and 3)

SOURCES OF VERIFICATION	HYPOTHESES
➜ Assessments; statistics; project assessment reports.	
➜ Follow-up of craftsmen trained during the project (survey sheets and assessment reports) and by continued training in the casual sector by the local NGO, RPWRD ➜ Follow-up of parent-teacher associations (survey sheets and assessment reports). ➜ Annual reports of partner teaching structures in the project.	➜ Flexibility of training curricula of partner teaching structures in the project in order to complete the subjects already taught with those proposed in the framework of the project.
➜ Quality control of the materials produced (technical reports attached to the assessment reports). ➜ Cost lower or similar to conventional local solutions (technical reports attached to the assessment reports) ➜ Quality of the constructions built (assessment reports) ➜ Number of craftsmen trained and testing of their competencies (competence sheet per craftsman filled according to the training actions carried out by the project).	➜ Availability and recruitment personnel with qualifications or who want to obtain them ➜ Pertinence and exactitude of information collected during the feasibility study ➜ Availability of local funds allocated to the construction of infrastructures (District and parents' associations). ➜ Efficiency of RPWRD co-ordinators. ➜ Interest of craftsmen and target groups.
➜ Curriculum of training centres (annual activity reports of training centres and assessment reports of the projects) ➜ Capacities of partners to take charge of the training activities carried out by the project. ➜ Setting up of similar projects by the Department of Architecture of Makerere University, Kampala.	➜ Availability of the funds necessary ➜ Pertinence of the technologies proposed
➜ Surveys on the populations performed during the assessment missions.	➜ Interests of target groups.
➜ Activity reports and assessment reports	➜ Motivation of local economic agents
➜ Quality control ➜ RPWRD activity reports	➜ Competency and stability of RPWRD's personnel.

➜ Interest of local political leaders in the dissemination of the technologies proposed.

TRANSFER OF TECHNOLOGY

1st YEAR

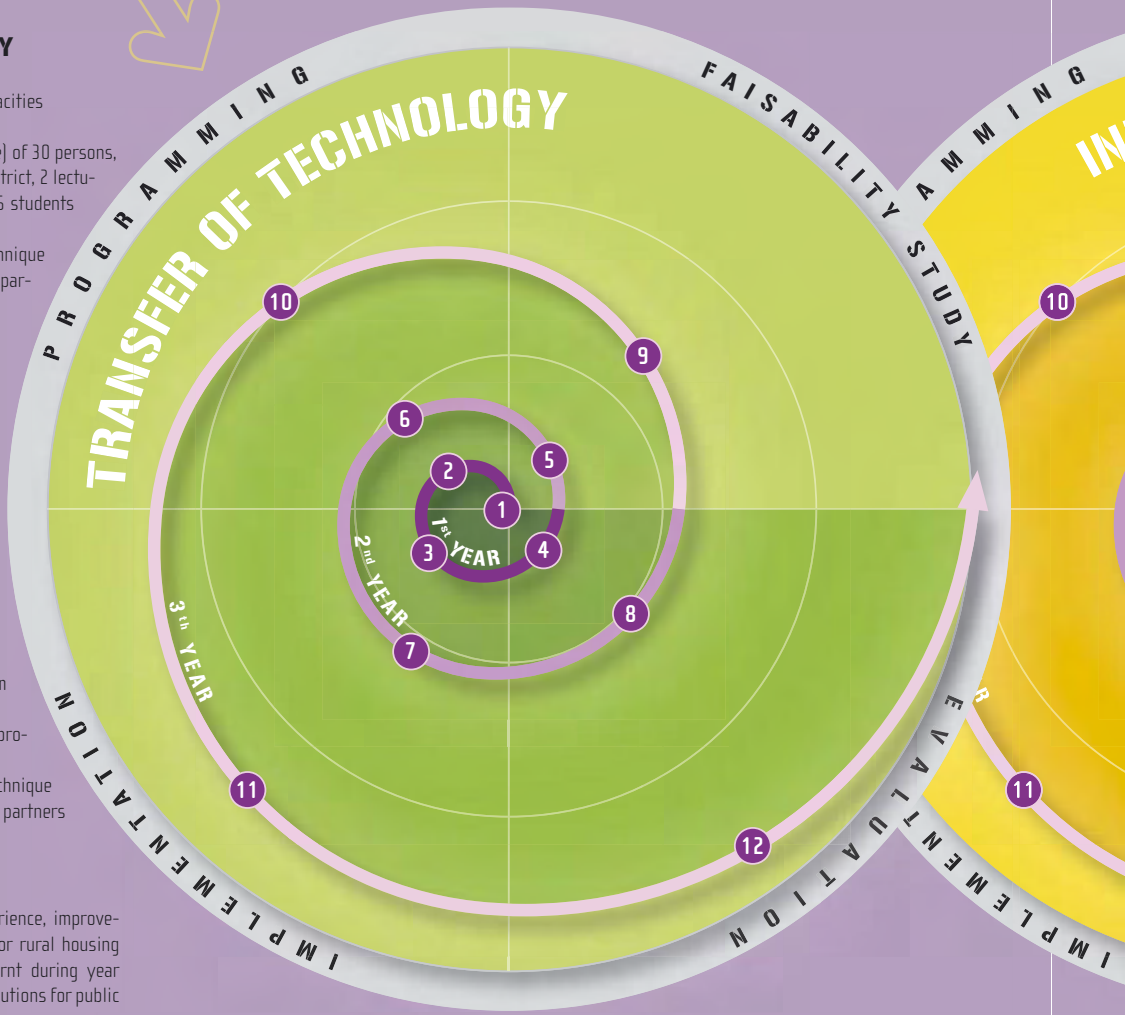
1. Assessment of existing skills and capacities
2. Programming of training session
3. Training (field of public infrastructure) of 30 persons, including 2 engineers from Bushenyi district, 2 lecturers from UTC and KTI, 1 architect and 6 students from MaK; 4 trainers from RPWRD.
4. Technical evaluation of proposed technique and evaluation of skills acquired by local partners (All partners).

2nd YEAR

5. According to year one acquired experience, development of relevant technical alternative for rural housing improvement. According to lessons learnt during year one, improvement of technical solutions for public building.
6. Programming of training session for rural housing (by CRATerre). Programming of training session for public building (by RPWRD)
7. Training (field of public infrastructure) of 10 persons, including 2 students from MaK (supervised by RPWRD).
Training of 5 artisans in rural housing improvement (supervised by CRATerre)
8. Technical evaluation of proposed technique and evaluation of skills acquired by local partners (All partners).

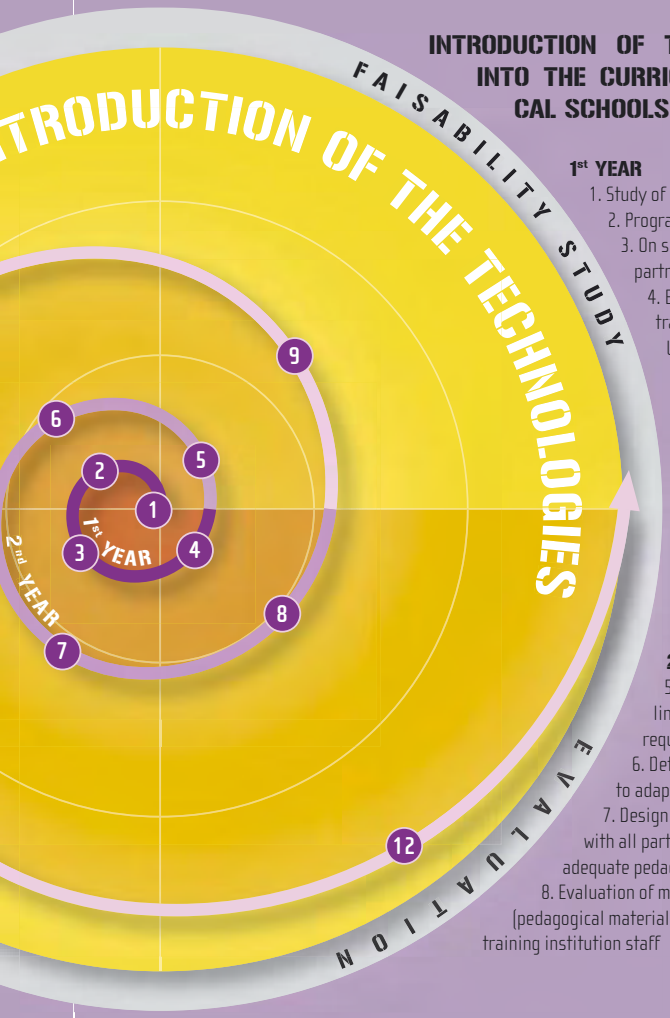
3rd YEAR

9. According to year two acquired experience, improvement of relevant technical alternative for rural housing improvement. According to lessons learnt during year one and two improvement of technical solutions for public building.
10. Programming of training session for rural housing and public building (by RPWRD; KTI and UTC)
11. Training (field of public infrastructure) of 100 persons, including students from UTC and KTI (supervised by RPWRD, KTI and UTC).
Training of 60 artisans in rural housing improvement (supervised by RPWRD and KTI)



12. Technical and social evaluation of proposed technique and evaluation of skills acquired by local partners (All partners) Design of next project step logical framework (All partners plus Ministry of education).

MÉTHODOLOGIE



INTRODUCTION OF THE TECHNOLOGIES INTO THE CURRICULUM OF TECHNICAL SCHOOLS IN UGANDA

1st YEAR

1. Study of Ugandan existing curriculum
2. Programming of training session
3. On site training of teachers from partners training institution.
4. Evaluation with teachers trained of link between existing Ugandan curriculum and basic knowledge required to properly build with local material.

2nd YEAR

5. Analyse of possibility to link existing curricula and required one
6. Determination of strategies to adapt existing curricula
7. Design of appropriate curricula with all partner; Development of adequate pedagogical material
8. Evaluation of material developed (pedagogical material and curricula) by partner training institution staff

3rd YEAR

9. Strategy design for implementing training of trainers activities
10. Programming training of teachers.
11. Local training institution to train their students
12. Evaluation of the programme and recommendation for a national implementation.

The project implementation methodology has benefited from CRATerre experience over 25 years of existence.
This iterative method is based on the successive implementation of the four following activities.

- Study and analyse of the building sector and its environment
- Design of relevant action and strategies to be implemented
- Implementation of activities
- Evaluation and analyse of results obtained to be able to design following activities
- Etc.

This cycle is repeated as often as it is necessary to allow a permanent improvement of technical proposal given to beneficiaries as well as to permit projects partners to build their own competencies progressively up to handle alls projects activities on their own.

The Bushenyi project:
Two main strategies were implemented

- Transfer of technology and methodology
- Introduction of the technologies into the curriculum of technical schools in Uganda

LOGICAL FRAMEWORK, RESULTS

RESULTS

	EXPECTED RESULTS
1	Use of techniques proposed in the target sectors ➜ Housing ➜ Classrooms ➜ Administrative buildings
2	2-1 Introduction of an "Economic housing" module within the project's partner training organisations
	2-2 Taking charge of similar projects by the Department of Architecture of Makerere University
3	The combat against deforestation
4	Development of networks for producing the materials proposed by the project
5	Creation of income for the NGO RPWRD

EFFECTIVE RESULTS

VERIFIABLE INDICATORS	SOURCES OF VERIFICATION	HYPOTHESES
The quantity of productions has increased regularly since the beginning of the project. 2002 - 2 productions 2003 - 9 productions (5 outside the project) 2004 – 13 productions (all outside the project)	Data existing in the field and in the reports of local partners	Local competencies are available Political support has come up against the problem that the technologies proposed do not conform to Ugandan standards at present.
This teaching is now officially part of the programme of the MaK architecture school. KTI and UTC teach this subject while awaiting for agreement from the MoE to make it obligatory.	Programme of training institutions	The experience acquired in the Bushenyi project shows that the incorporation of this subject is not made to the detriment of another and, on the contrary, it facilitates better organisation of all the subjects taught in the current curriculum.
Setting up of the next stage of the project in the district of Mbale. Similar perspective in the district of Arua and in Karamundja.	Annual assessment of the activity of the Department of Architecture of Makerere University.	The interest of national and international prime contractors has been confirmed. The MoE is an active partner of the programmed continuation of the Bushenyi project. The Ministry of the Environment has inaugurated the project buildings. The bilateral German cooperation wishes to join in the next steps of the project.
In the villages where the project has trained craftsmen, the populations sell baked bricks that they had started to stock in order to build faster in Adobe (technique proposed by the project). Thanks to the awareness campaigns organised in the framework of the project, we estimate that the entire population of the district is aware of the project's existence and objectives More than 100 craftsmen and teachers have been trained in the techniques promoted by the project	Local and national statistics on the market share of constructions using alternative technologies	The social and economic acceptability of the alternative technologies proposed has been proven.
Local production of brick presses is being set up.	Registry of enrolment of small business, District of Bushenyi	Pertinence of the techniques proposed, interest and financial and technical capacities of small local investors.
Progression of RPWRD's order book	Activity of RPWRD	Efficiency and rigor in managing the network. Development of the current market for the technologies proposed.

RESULTS
PUBLICS BUILDING

ECONOMICAL IMPACT

- Proposed buildings are answering Ugandan standards both in term of quality, durability and maintenance needs
- Range of cost per square metre of living space is between 45 to 55 Euros/m2 (60 to 70 Euros / m2 for conventional technologies of similar quality)
- As technologies proposed are based on the use of local material and skills, maintenance is more affordable (technically and economically) than conventional technologies.

ENVIRONMENTAL IMPACT

- Use of fired bricks is reduced from 52% to 85 % compared to a pure fired brick building. For each school where the use of proposed technologies will be preferred to conventional one, this is 13m3 of wood that will be saved.

SOCIAL IMPACT

- Ratio of money directly invested in the locality (labour and use of local material) is ranged between 26% to 35 % of total investment.(11% to 20 % for conventional technologies)
- More than 10 public building have been locally funded since the beginning of the project. This is showing a cultural acceptance of technologies proposed.

Environmental

- Use of fired bricks is reduced from 52% to 85 % compared to a pure fired brick building. For each school where the use of proposed technologies will be preferred to conventional one, this is 13m3 of wood that will be saved.

TEACHER HOUSE
constructed in 2003 by RPWRD team

TWO CLASSROOM BLOCK
constructed in 2003 in Kagari, bushenyi district

DÉMONSTRATION BUILDING
constructed in 2002 in Kagari, bushenyi district

RESULTS HABITAT

SOCIAL IMPACT

- Alls masons trained during the project (30 persons) organised themselves as a cooperative to be able to build their own houses using the proposed technologies. They already achieved three houses. Some particular that have been exposed to these technologies are actually constructing with them. This is showing a perfect cultural appropriation of proposed solution
- Improvements proposed are increasing the quality of life in the house, particularly in term of inside moisture contents. This will reduce health problems.
- When the only dream for people was a fired brick houses (unaffordable if we are talking on quality), proposed solution bring real affordable solutions to help every single Ugandan to get access to decent houses.

ECONOMICAL IMPACT

- At the short term, proposed technologies are more expensive than existing one's. Proposed improvement will increase the required cash to achieve the building by 1 000 UgSh (0.5 Euro) per square meter of living space. A standard rural house in Bushenyi district is 60 m2. Investment required to afford proposed improvement is around 60 000 Ugsh (30 Euro).
- At the long term, improved building life expectation will be about five times longer than what is the actual existing. This will definitely make profitable the initial investment.

ENVIRONMENTAL IMPACT

- Adobe houses are using a very negligible quantity of wood (about 100 fired bricks) while improved pole and mud houses will help such building to last five years more than the similar existing one and so reduce the global wood consumption by five.

RESULTS
TRAINING CAPACITIES

TO ANSWER SHORT TERM NEEDS

Training capacities was built within RPWRD team. As a grass root NGO, this institution is able to get direct access to professional (masons, carpenters, etc.) that are already in the field. Through on site training, RPWRD, in a very short time and at a really efficient cost, is able to give all necessary skills to these persons. To reinforce this strategy, training of trainers capacities have also been built within this NGO.

TO ANSWER MEDIUM TERMS NEEDS AND TO BE MORE EFFICIENT

To introduce technologies promoted into the curriculum of technical school will be the cheapest and most secure way to be sure that all Ugandan will benefit from this knowledge. Two technical school, KTI and UTC, Bushenyi, build their own related training capacities during the project. But teaching themselves these topics to their students, they developed enough experience to help to determinate how to use existing curricula to train on local material building technologies..

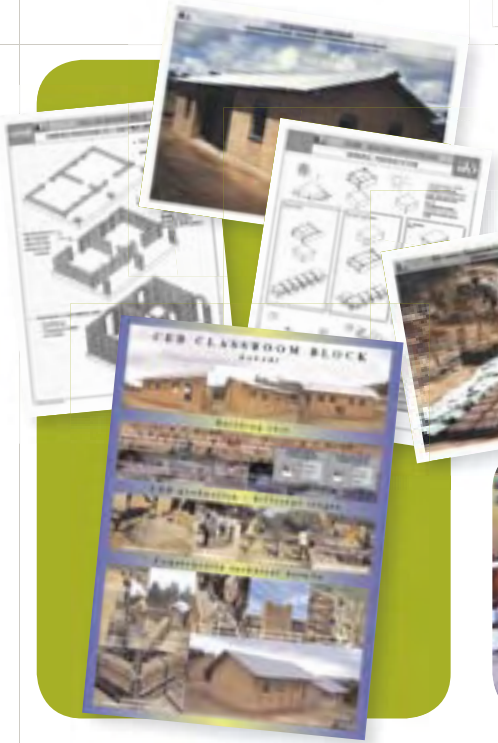
TO ANSWER LONG TERMS NEEDS

Because human needs are continuously evolving, good answers today could be useless tomorrow. To answer these future needs, it appeared necessary to build capacities within tomorrow architect and decision makers. The department of Architecture at Makerere University introduce in its curricula the science of building with local material, taking care of local skills and culture. Social, economical and environmental approach is entirely part of the courses contain.

UTC AND KTI TRAINING
Teachers fromKTI and UTC already introduced earthen architecture within their actual curricula

ON SITE TRAINING
RPWRD trained already more than 90 local artisans from Bushenyi district

MaK ARCHITECTURE TRAINING
"earthen architecture" as well as "affordable housing for sustainable development" are already part of architecture students at MaK University



RESULTS
PEDAGOGICAL MATERIAL

Pedagogical material was designed in partnership with teachers from technical institution. Particularly care has been done to take into account institutions means and teaching methods.
These pedagogical materials have been tested and improved during the project implementation. This material is now available to partner's institutions.

AWARENESS

In order to sensitize as many institutions as possible, numerous awareness activities were developed all along the project. An electronic presentation is locally available within each Ugandan partner. This may be use for conference during lectures or training.
A poster for mass awareness was produced and widely distributed in Uganda.
This present project brochure is to help more person and institutions to understand the projects goals and to support similar project elsewhere in Uganda.

CONCLUSIONS

➜ HUMAN INVESTMENT

The idea of bringing together different local actors (MaK Department of Architecture, RPWRD, KTI, UTC) in order to take charge of monitoring the project and thus acquire sufficient experience to be capable of developing similar projects in other districts of the country resulted in 2004 in the signature of a Memorandum of Understanding by all the partners involved in the project as well as by the Ugandan Ministry of Education. This agreement will permit better control by local actors of the activities to be organised in the phases following the current project.

➜ TECHNIQUES

The quality of the materials provided by local production units is acceptable. Production supervised independently by locally trained resource persons shows that the construction techniques promoted by the project are now mastered locally.

➜ TRAINING

RPWRD has shown its competencies in on-the-job training of rural craftsmen (40 craftsmen trained from 2003 to 2004).
MaK has effectively introduced the teaching of earth architecture in its training curricula.
In addition, the two partner technical schools of the project (UC and KTI) are currently incorporating the teaching of earth architecture in their curricula.

COMPARATIVE STUDY FOR AN INITIAL INVESTMENT OF 2 BILLIONS UGSH (1 MILLION EURO)			
COMPARISON FOR 2 CLASSROOMS BLOCK	CONVENTIONAL FIRED BRICKS	COMPRESSED EARTH BLOCKS	ADOBE
Nbre of blocks that can be built	**152** units	**180** units	**192** units
Money invested in labour	**160 000 000** UgSh (80 000 Euro)	**410 000 000** UgSh (205 100 Euro)	**507 000 000** UgSh (253 700 Euro)
Money directly invested into the locality	**221 600 000** UgSh (110 800 Euro)	**526 200 000** UgSh (263 100 Euro)	**707 400 000** UgSh (353 700 Euro)
Fired wood used	**4 864** m^3	**730** m^3	**2 334** m^3

➜ RURAL HOUSING
➜ URBAN HOUSING

Regarding the housing improvement section of the project, the prototypes built in 2003 are of good quality and are technically and financially accessible to the population.

➜ PUBLIC BUILDINGS

Private orders (10 orders in 2004) for the construction of "public buildings" are much encouraging and seem to confirm the emergence of a market for the technologies promoted by the project.

PERSPECTIVES

Based on actual results, new proposal was designed. The proposed action will help previously involved partners to build and improve capacities in technology transfer in related sister organisations in charge of training in Mbale district, so as to enable these organisations to implement the technologies towards their target groups (rural poor, students, trainers, publics building beneficiaries). The action includes also a cycle of seminars on related topics (Awareness, Building regulations, Syllabus development, Loan access, and National implementation), that will be organised to build the logical framework aiming to help the Ugandan population to benefit from the promoted activities.

→ OVERALL OBJECTIVES

The project aims at improving the living conditions of the population (especially the rural poor who are the majority) through provision of appropriate, affordable and better buildings and shelter, and enhancing their economic activities (including sustainable capacity building) in an improved environment.

→ SPECIFIC OBJECTIVES

The specific objectives will be, through the development of an adequate environment (building capacities, regulation and education system) for a relevant use of local material in the building industry (public and private buildings):

a) To support environmental activities through reduction of deforestation.

b) To contribute to relevant legislation related to earth construction technology in building.

c) To enhance and improve on earth construction technology training in established institutions and on demand basis.

d) To improve earth construction technology in the country.

e) To expand earth construction technology to the rest of the country.

f) To build capacity for sustainability of earth construction technology.

To strengthen and expand existing national network on earth construction technology

→ PARTNERS

Rukararwe Partnership Workshop for Rural Development (NGO)
Salem Brotherhood Uganda Ltd (NGO)
Uganda Gatsby Trust (NGO)
Department of Architecture Faculty of Technology Makerere University, Kampala
Uganda Technical College, Bushenyi
Kyamuhunga Technical Institute
CRATerre – EAG

→ TARGET GROUP

Direct beneficiaries: Students, lecturers, artisans (100)
Indirect beneficiaries: Low-income people from the Bushenyi and Mbale districts (total population: 81 600)

→ EXPECTED RESULTS

Availability of an experimented team of local resource people able to implement relevant building technologies in Uganda
Conditions available for a national implementation of local building material technologies in the national technical curriculum of Ugandan training institutions
Conditions available for standardization of local building material technologies in Uganda
Assessment of local opportunities to help the poorest to get access to small grants
100 artisans and trainers trained during the action

→ ACTIVITIES

BUILDING CAPACITIES

1) Identification of relevant techniques to be developed in Mbale -to help them to acquire methodological approach skills;
2) Technical documentation of demonstration building to be erected -to put into practice theory learnt;
3) Training of artisans and technical trainers from various institutions (theory and on site practical during demonstration building construction) – to acquire skills in technology transfer;
4) Development of adapted pedagogical material;
5) Training of trainers – to ensure multiplier effect.

DESIGN OF NATIONAL STRATEGY

Five seminars will be held during the project duration:
1) Global awareness
2) Buildings regulation
3) Technical syllabus for training institutions
4) Loan access for housing
5) National implementation of project activities

Awareness and lobbying will be organized all along the project to sensitize as many people as possible, including decision makers and development agencies, of the relevance of the project aims.

A CRATERRE PUBLICATION
PREPARED WITHIN THE PILOT PROJECT IN BUSHENYI
«projet de promotion de modèles architecturaux respectueux de l'environnement et accessibles aux populations défavorisées en Ouganda»
EUROPEAN UNION, FRENCH MINISTRY OF FOREIGN AFFAIRS, BINGO LOTTERY, CRATERRE-EAG

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"IN THE PAST THE HORIZONS OF ARCHITECTURE education have often been limited to principles of construction and the aesthetics of design and decoration. (...) Students must be able to emphasise with the cultural base of Uganda's 'and Africa's civilisation and bridge the vast gap between it and the predominantly western idioms and technology which have become the talk in trade of so called "International Architects". The vast majority of Ugandans are dwellers and are poor. The architect can have a valuable role in third-world rural development by being the professional who both enables development to take place and raises its standard, by assisting villages to build more effectively for themselves. In most African countries formal architectural education is a relatively recent phenomenon. Current programs of architectural de sign on too narrow a range of problems in a society, unresponsive to poverty, emergency, and the tropical climate of Uganda, and unused to dealing with the clienteles in greatest needs. And technology, as taught in architectural curricula, is not persuasively linked to materials and techniques that are available and appropriate in many regions of Africa; instead it is often linked, at least implicitly to architectural forms found in western countries and the technologies that support those forms."

Dr NAWANGWE

Head of the Department of Architecture
of the University of Makarere

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