

Kaf family museum (Dar Muhdhar), and a traditional crafts center (al-Fijr). Al-Mudarrabah and Bir Yimani, two country estates considered beyond repair, have Neo-Classical garden follies in ruinous condition, but if stabilized, they would make excellent backdrops for traditional cultural events, such as poetry readings and musical performances. Al-Riyadh, Dar al-Salam and Hamtut are in close enough proximity to be operated under a single management as boutique hotels catering to Southeast Asian visitors.

However, the question still remains on how to resolve ownership issues, and this can perhaps be done through BOT (build, operate, transfer) agreements, wherein the government and/or private enterprises could take out

Notes

- (1) This paper is written in the memory of two deceased colleagues who worked with me over the years in Yemen: James Conlon (1972-2009), director of Columbia University's Visual Media Center, and Selma al-Radi (1939-2010), Research Fellow at New York University's Institute of Fine Arts.
- (2) It is interesting to note the use of lime plaster as waterproofing for roofs, parapets and ground-floor façades in the Wadi Hadhramaut. Depending on rains, this treatment can provide 10-20 years of water-repellent surfaces (Jerome, 2000, p. 145 and 2006, p. 148).

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EARTHEN ARCHITECTURE: HELPING THE VICTIMS OF THE 2007 FLOOD IN BANDIAGARA, MALI

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Theme 4: Conservation and Development of Human Settlements and Cultural Landscapes  
Keywords: Climatic change, flood, improved traditional techniques, development

Abstract

On 4 July 2007, the river crossing the city of Bandiagara overflowed due to unusually heavy rains. Within few minutes, 194 families (nearly 1,500 people), witnessed the devastation of all or part of their homes and means of subsistence. At that time, the Cultural Mission of Bandiagara and CRAterre were collaborating in the framework of the project “Renforcement des capacités locales pour une meilleure contribution du secteur de la construction au développement durable du pays dogon” (Reinforcement of local capacities for a better contribution of the construction sector to the sustainable development of Dogon country) financed by the European Union; they called upon institutions to enable them to include, as part of their activities, a contribution to the reconstruction of basic housing structures. The German organization “Misereor” and the Abbé Pierre Foundation, based in France, responded positively by funding the reconstruction of 20 houses for sheltering the most affected families.

The project was carried out in collaboration with the local Catholic Parish (Caritas), the municipality, the Flood Victims’ Association, district chiefs, and the prefecture. A Committee was established to carefully select the 20 recipient families, which would commit to collecting materials from their affected properties and participate in the construction-training activities implemented. This reconstruction project benefited from the results of an inventory of the building cultures in Dogon country that included the study of land plots, building typologies and construction techniques. On the basis of these principles, 20 basic houses were designed and built, each with a different plan, defined by the types of materials recovered, the priorities identified by the families and the possibilities for future extensions. The reconstruction process was an opportunity to demonstrate and train workers to master innovative flood-proof building techniques and combine them with traditional practices.

1. INTRODUCTION

Due to perceptible climatic change in the Sahel over the past decade, localized torrential rains have generated a sudden and brutal rise of waters never before seen on the Dogon Plateau (Garnier, Moles, Caimi, Gandreau, and Hofmann, 2011). On 4 July 2007, high waves burst the Yamé riverbed, a tributary of the River Niger, that passes through Bandiagara. In the town of Bandiagara, many families living along the Yamé River lost almost everything (homes, food stocks, materials, etc). In light of the seriousness of this catastrophe, volunteers brought emergency aid to ease the suffering of the victims. Within this framework, the Cultural Mission of Bandiagara and CRAterre launched the idea of a reconstruction program for the most affected families, which would complement efforts by the municipality to provide the affected families with land to build on (Cissé, Joffroy, Garnier, Chamodot, Cloquet and Fecher, 2010). After a pilot study (Léon house) that helped define the technical and financial

references, a project proposal was developed and submitted to Misereor through the Catholic parish, and then to the Abbé Pierre Foundation (Cissé, Dembele, Cornet, and Joffroy, 2011). The project became a reality when funds were obtained for the construction of houses for 20 families affected by the floods, which – together with the pilot study family – brought to 21 the number of beneficiary families.

The complementary activity for training workers on the building sites was financed by the European Union within the framework of the project “Reinforcement of local capacities for a better contribution of the construction sector to the sustainable development of Dogon Country”, which had been running since 2007. On the ground, the project brought together the skills of the Catholic parish through Caritas/APH, the Cultural Mission of Bandiagara, CRAterre and the architectural firm Audex. In order to follow-up the implementation of the project, Misereor



Fig.1 The house built for the Adama Dramé family – AP4 (credits: CRAterre, Joffroy Thierry, 2010)

also engaged two technicians from the Bafoussam Professional Centre in Cameroon, which enabled a South-South exchange.

2. APPROACH AND STRATEGY FOR PROJECT IMPLEMENTATION

The underlying idea of the project was to use the reconstruction effort to demonstrate that the use of local materials, especially earth, can be compatible with resistance to adverse weather, and that this type of sustainable construction could be affordable and accessible to more people. In fact, with a budget of 3,000 euros per family, it is indeed possible to achieve quality construction and to have enough space to re-settle families in decent conditions. The costs of construction to such a standard would also ensure favourable conditions for the extension of future homes, as well as duplication of these methods by the masons trained in improved construction techniques.

The project was also able to show how such reconstruction projects could be carried out in a sympathetic manner, while adapting to:

- The priority needs of the families in the construction program;
- The specificities of the land and the distinct constraints of common ownership;
- The real possibilities that each beneficiary had something to contribute.

This contribution would allow to propose of certain additions to each family's construction plan (extra rooms, fencing, covered balconies, etc). Each family could choose from among:

- Participation through volunteer labor; in this case, a work-day is estimated at the same price as a laborer or mason hired for the project, and the overall is taken into account;
- Contribution of materials (reuse of recovered materials, production and supply of earthen bricks, contributions in sand, stone or other local resources, etc.);
- Financial contribution.

In this way, each family receives an identical 'base' financial package, but can have a variety of proposed construction plans, adapted to each layout, instead of replicating any single model.

Concerning the strategy for the dissemination of knowledge, it was envisaged that the project would have three main phases; at each stage, masons would be trained to independently take charge of a site at the next phase.

- **Phase 1:** Pilot sites for two families. These site projects would support training, i.e. Be a 'training project'. Each of the two site projects would be executed by a team of three trainee masons, each of whom would become trainers on the next site project, with the support of technicians hired for the project.
- **Phase 2:** The idea was that the head masons of six projects would be those who were trained in Phase 1; a newly recruited mason would have to help them in their work and thus benefit from their experience to learn and in turn become the head mason in the last phase.
- **Phase 3:** This last phase of the project involved the last 12 families, and at this stage a dozen masons who, theoretically, were autonomous enough to lead the process.

This phase also allowed to put in place a training strategy that resulted in 12 masons and 24 laborers (each mason being accompanied on the site by two laborers).

3. SELECTION OF BENEFICIARIES

Since the available funds would not be able to assist all of the victims, the organizations in charge of the implementation of the project established 12 criteria that would enable the most vulnerable families to access the resources of the reconstruction-assistance project. A call for applications was launched on 28 September 2009 through posters at relevant buildings and services, such as the Town Hall, the Prefecture, *Conseil de Cercle* (District chiefs), APH, etc., as well as through announcements on local radio stations. Finally, a meeting took place with the area chiefs and the Flood Victims' Association. An application dossier was developed to facilitate the evaluation of candidates based on the established criteria.

In order to select the beneficiaries from the 44 applicants, a selection committee was established, comprising technical-services representatives from Urbanism and Settlement, Decontamination and the Fight against Noise and Pollution, the Municipality of Bandiagara, Caritas/OPAH Bandiagara, the Flood Victims Association, the Cultural Mission of Bandiagara, and the architectural firm Audex.

The establishment of the final list of beneficiaries was made in the course of three meetings and site visits facilitated by the City Council. The results were announced through posters and on local radio, following which the 20 beneficiaries were invited to the Cultural Mission to be briefed in more detail on:

- The voting and selection process;
- The overall principles for the works, ie:
- A fixed financial package for each family and the possibility to enhance the construction plans depending on each family's own contribution;



Fig.2 Left: Analysis of urban fabric in Bandiagara and traditional organization of a house plot. Right: Description of the house building parts (credits: CRAterre, Mathilde Chamodot, Basile Cloquet, 2008)

- The possibility for each family to define the plan that best suits it according to their specific needs within a range of proposed features (bedrooms, living rooms, covered balconies, verandas, latrines, fencing, etc.);
- The availability of local materials (especially earth), etc.
- The division of the reconstruction program into several phases and the impending construction works at the first two projects/building sites.
- The meeting also had a question-and-answer session.

4. PERSONALIZED DESIGNS

This work was carried out on the basis of an inventory of building cultures in Dogon Country, previously carried out by the Cultural Mission, NGO Radev-Mali and CRAterre within the framework of the EC-funded project "Reinforcement of local capacities for a better contribution of the construction sector to the sustainable development of Dogon Country". This enabled us to focus on the bigger elements, at the level of contemporary local practices for land (plots) use, as well as on construction typologies, included in Bandiagara (Chamodot, and Cloquet, 2008; Cissé and Joffroy, 2006).

Using the results of this work, base models were conceived: one-bedroom, two or three rooms, balcony, covered veranda, bathroom unit, and kitchen. Aside from these models, numerous combinations could be offered. Concurrently, each model was cost-estimated, which also made it possible to make quick calculations on the price of planning proposals that would come out of the discussions with the beneficiary families. A table of costs was developed, allowing us to make variations based on different parameters: the amount of each component selected for the construction (e.g. one, two or three rooms, one kitchen or none, one bathroom unit), as well as the type of finishes (sealant, screed, etc.). Despite the amount of time it

took to put this tool in place at the beginning of the project, it was indispensable for customizing the plans.

The specificities of each beneficiary family – and also of the environment and the urban framework within which the constructions will happen – have, since the formulation of the project, caused us to think about developing a participatory effort that would allow us to take into consideration:

- The priority needs of each family;
- Their capacity to contribute (financially or in kind);
- The necessity to protect against strong winds (and rain) from the east;
- The orientation, nature (rocky or not), slope and characteristics of common land ownership (water outlets, buildings on the edge of plots, etc.).

To this end, the representatives of the relevant technical organizations (Cultural Mission, CRAterre and the architectural firm Audex) organized a series of individual meetings and site visits with the beneficiaries so that they could express their needs and priorities, and also give their opinions on the proposed plans and the actual implementation strategy.

4.1 Description of the process for designing plots distribution

The implementation strategy was as follows:

- A first meeting made it possible to list the particular needs of each family, to identify the priorities, to take note of some technical or aesthetic preferences (rendering, types of windows), optional additions of other details (e.g. ventilation duct) and to be conscious of potential recommendations. It was also an opportunity to confirm the commitment that each family pledged in their application, so as to better assess the amount needed and the additional funding possibilities.
- Working time (without the family) was then set aside to develop the proposals to be submitted to the families, keeping





Fig.3 Work sessions with the beneficiaries (credits: CRAterre, Laure Cornet, 2009)

in mind their demonstrated needs and the financial package available to the family based on their own contribution.

- A second meeting took place, whereby each family was presented with the various proposals that fit within the given budget (at least two different choices, and sometimes as many as five, given the possible combinations). The decision was then made with the help of a prepared model, allowing the families to get a better idea of their construction project and how it would fit into their plot.
- The approval of one proposal was then made by the family, either on the same day, or after consultation with other family members.
- The family was invited one last time to the Cultural Mission to sign a contract.

Each “dossier family” was finally established with the following documentation:

- Application;
- Needs/recommendations and specific choices;
- Proposal of options;
- Approval/selection of one of the proposed options;
- Estimated budget according to the options selected by the family;
- Technical file (plans) – building permit;
- Model and photo;
- Contract between the family and the partners (and, eventually, receipt for the funds);
- Construction follow-up forms;
- Eventually, the family’s budgetary participation, kept at the Cultural Mission of Bandiagara.

The dossier remains available for consultation at all times by the beneficiary family; particularly the model, to which everyone can easily refer.

5. DESCRIPTION OF THE MAJOR BUILDING PHASES

The works were initially planned in such a way as to have three phases, which would allow for the training of masons and transmission of expertise during the different building stages. The order of the construction was not left to chance, and a strategic choice was made. The first two site projects and plots were selected because of their proximity to the Cultural

Mission of Bandiagara and their proximity to each other, to facilitate movement by the technicians between the projects and follow-up.

Another criterion was added to this: the first two families to benefit from the program were also among the most needy; as such, it was decided to prioritize widowed women with no resources. The second group (six projects) was established in the same way, with plots located in a restricted area and families in the most difficulty. The third phase, which in theory would require fewer follow-ups, involved the remaining 12 families.

It is important to note that the training strategy was not able to completely fulfill its objectives. The masons trained in the first and second phases of the works exhibited varying levels and apprenticeship ability. As such, at the end of the second phase, those masons who were sufficiently independent and competent were allocated site projects, whereas the others stayed in their role of assistant.

5.1 First phase

The procedure with the first two families was launched at the beginning of November 2009 and the two (2) site projects (on plots O/6 and R/1) were started soon thereafter, on 19 November. The training element was also primarily made possible through support of a technician from Audex and the Cameroonian foreman made available by Misereor. The technician from Audex, having worked closely with CRAterre since the end of 2007 within the framework of the EC-funded program, already participated in several projects of this nature (in terms of local material, especially earth), and was thus able to become a trainer at this stage.

Through some sessions on theory by the CRAterre expert at the beginning of the work, the masons and the supervisory staff were reminded of some basic principles. In fact, the work should have begun with the professionals who had already benefited from training sessions within the framework of the EC-funded program, and who were already skilled in improved earthen-construction techniques. It was important to count on competent masons, who were able to transmit their skills.



Fig.4 Construction of cupolas (credits: CRAterre, Laure Cornet, 2010)

5.2 Second phase

The second phase of six building projects was initiated on 22 December 2009. At this stage, six extra masons joined the main team, bringing the team to a total of 12 masons, each builder working with two laborers. Therefore, about 36 professionals were working simultaneously, which explains the speed of the works. Midway through the project, a session of technical review was carried out, so as to emphasize some details that were still not being observed and, perhaps, misunderstood. This short training, which was both theoretical and practical, was organized by leaning heavily on the technicians on site, so as to reaffirm their role as trainers of the builders, and as the ones who would ensure the proper execution of the work.

A supplementary training session was organized during this phase, in February 2010, for the construction of kitchens that were built without wood, and whose roofs were domed, made from unfired-earthen bricks (adobe). The transmission of skills having been accomplished, the local team carried out the next cupola projects independently.

5.3 Third phase

This last phase of execution was launched on 8 February 2010, simultaneously with the second round of works on the first eight contracts. The work plan was developed with the aim of finishing the construction and handing over the keys to the beneficiaries before the onset of the rainy season. In order to allow enough time for the houses to dry before plastering, the project advanced slowly. It was first of all preceded by the execution of the main work of the last houses, then the complete execution of the finishes (plasterwork, interiors and exteriors, floors, balconies, placing of doors and windows) of the first eight houses, and then for all of the remaining houses.

Unfortunately, at this stage, the pond from which the



Fig.5 Construction of cupolas (credits: CRAterre, Laure Cornet, 2010)

water was drawn ran dry. To overcome this obstacle, it was necessary to transport water from a source about 5 km from the town of Bandiagara. This was made possible thanks to the support of the Catholic Mission that provided a mobile tanker, with the pick-up truck of the Cultural Mission. This exemplified the importance of planning the projects well from the beginning, when faced with this type of climate. In this way the construction work, which used a lot of water, were carried out before embarking on the finishing touches. This was also what was done from the beginning of the project with the estimate of the number of bricks that would be required for all the building sites and the anticipated mass production of adobe just after the rainy season, so as to take advantage of the natural reserves of rainwater.

6. CONCLUSION

Despite some difficulties during the implementation, and a slight delay in the anticipated delivery date, all the social partners of Bandiagara deemed the execution of this project as a success. The handing over of the keys occurred right at the beginning of the rainy season (early July 2010), which also provided shelter for the beneficiaries during that time.

On the whole, the follow-up and training program was fruitful. It is now clear that the strategy to have the builders become progressively more responsible should have been revised based of the different levels expertise they gained; we are nonetheless aware that an investment in training allowed



us to strengthen and eventually multiply the skills for the execution of a building project by young builders.

Through the promotion of local materials and practices, the project created a lot of employment for builders, laborers, transporters, etc., which resulted in increased economic benefits for the population of Bandiagara. In addition, the construction of the buildings allowed the masons, laborers and brick builders to learn new techniques. The project thus introduced ideas and skills that are today being built upon to improve the availability of basic housing.

After the rainy season, most of the project homes were the subject of new works, executed by the families to expand their basic housing (addition of extra rooms), or to finish the funds provided (equipping the kitchen, boundary wall, etc.). The evolutionary aspect of the homes, through the integration of lintels in the masonry, allowed the placement of doors in the walls. As such, the beneficiaries could easily add rooms, economizing on wall space and overall space on plots that are often home to many families.

As flood victims, their first instinct would have been to build new houses out of concrete blocks and sheet metal – which would have been smaller. Based on the experience in the improvement of traditional homes (foundations, method of execution of the basement, capillary barriers, quality of bricks, etc.), the local technicians and the families are now convinced about the potential of high-quality earthen construction, suited to their own means.

It is worth noting that this acceptance was especially demonstrated by some people on projects outside this program, who adopted technical details or proposed construction typologies. The technicians have also had some initiatives and started to apply, when they deemed fit, certain construction principles learnt in the course of the reconstruction project. This was notably the case in the construction of the boarding facility for students at the Protestant parish.

In addition, the project was visited by representatives of Delegation of the European Union in Bamako, as well as the Governor of the Mopti region, and His Excellency Mohamed El Moctar, the Minister of Culture. This visit took place on 7 May 2010, with the political and administrative authorities of the District of Bandiagara. This was good publicity to show the authorities the



Fig.6 Adobes ready for the recovery (credits: CRAterre, Thierry Joffroy, 2011)

possibilities offered by the effective use of local materials. As a result of its success, the reconstruction program came to the attention of the national television station's programming editors. A news-reporting team was sent to Bandiagara by the directors of the station; this resulted in a 10-minute program broadcast in a widely-listened-to one-hour slot during the course of March 2011, and several more times in the same year.

With regard to the results and benefits, it can be stated that the project fulfilled the expectations of both the partners and the participants. For the beneficiaries, the flood of 2007 is now but a bad memory for them. Thanks to this humanitarian action, communities were able to be housed and, above all, to have a home of their own for their children and their parents.

This resettling was undertaken with a view to establishing a procedure for sustainable development, while strengthening the capacities of the building workers and technicians. It also provided a better understanding for the local and national authorities of the solutions offered by local materials (Manifesto, nd). For the local population, this project increased their resilience by decreasing dependence on foreign construction techniques and materials.

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THE MANAGEMENT PLANNING PROCESS, A CONSERVATION AND DEVELOPMENT TOOL FOR KSAR AIT BEN HADDOU, MOROCCO

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Theme 4: Conservation and Development of Human Settlements and Cultural Landscapes  
Keywords: Participatory management planning, revitalization of abandoned sites, earthen World Heritage, conservation of architectural values

Abstract

The first management plan for Ait Ben Haddou was produced in 2006, 19 years after the inscription of the Ksar on the World Heritage List. Despite the high number of visitors attracted to this emblematic site, the Ksar had lost its soul and was quickly deteriorating; its function had become purely commercial, and served the business interests of tour operators and souvenir dealers from outside. The anarchic movement of visitors in the ruins reflected the poor management of this prestigious place, which generated no benefits for the local population.

The management plan was developed over a period of one year with the active participation of the population, all the government agencies active in the region, and the heritage technicians based in Ouarzazate. This paper describes the various steps of this participatory process that involved 67 people, and brought this World Heritage jewel back into the framework of municipal development strategy. All the activities integrated in the document were suggested by the stakeholders, who slowly formulated the plan through a series of workshops, with the support of CERKAS professionals and a CRAterre expert. The full transparency in the discussions and the wide dissemination of the plan in both French and Arabic languages led to the prompt implementation of many activities, and brought positive changes into the life of the local population (water supply, cleanliness and safety, and street paving, to name a few).

Five years after the preparation of the plan, we can assess its impact on private and public initiatives, and list all of the activities, which were made possible because of the better distribution of roles and responsibilities. The site has been revitalized thanks to the increased number of actors who, rather than fight for selfish interests, have a common vision for the place.

1. PRESENTATION OF THE SITE

Like many historic villages in southern Morocco, Ksar Ait Ben Haddou has lost its function as a dwelling place, and was abandoned in favor of a new village built on the other side of the Wadi (1), more comfortable, better served and closer to services. The Ksar has, however, kept its splendor and annually attracts hundreds of thousands of visitors fascinated by the natural beauty of this site perched on the mountain. The site was listed on the World Heritage List since 1987 (UNESCO-WHC, nd).

This status has not prevented the continuous deterioration of the structures and the gradual population decline. In 2006, only nine houses were occupied and two-thirds of the village had collapsed. Anarchic movement of visitors within the ruins and the proliferation of souvenir shops reflected the poor management of this prestigious property, which brought no benefits to the local population. The site presented extraordinary strengths that many other sites would dream of having to revitalize the

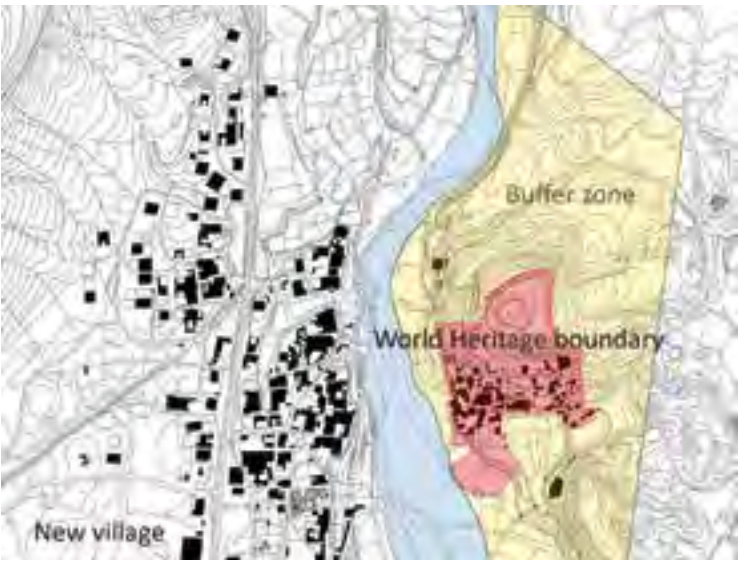


Fig.1 Site Map of the Ksar Ait Ben Haddou (credits: Sébastien Moriset, 2009)