



HAL
open science

Building vernacular, building sustainable. Case studies of contemporary architecture

Nuria Sanchez Munoz, Sébastien Moriset

► **To cite this version:**

Nuria Sanchez Munoz, Sébastien Moriset. Building vernacular, building sustainable. Case studies of contemporary architecture. SOSTierra2017, UPV, Sep 2017, Valencia, Spain. <hal-01880783>

HAL Id: hal-01880783

<https://hal.science/hal-01880783v1>

Submitted on 25 Sep 2018

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



HAL Authorization

Building vernacular, building sustainable. Case studies of contemporary architecture

N. Sanchez Muñoz & S. Moriset
CRAterre, Grenoble, France

ABSTRACT: Over the last few years the number of architects engaged in the search for solutions to address our planet's critical situation, has been happily increasing. While most of the research has taken the path of innovative technology, CRAterre and other teams have turned towards the knowledge that each culture has developed over the centuries to extract the intelligence it can provide in terms of sustainability.

This paper presents two buildings that have drawn inspiration from local heritage, one in Albreda, The Gambia, and the second in Kilwa, Tanzania. Both buildings are tourist information centres connected to World Heritage Sites. They aim to demonstrate how vernacular architecture contributes to socio-economic development while protecting cultural landscapes. The direct involvement of local communities promotes greater collective awareness of the cultural and natural values. This idea applies not only to the construction process, but also to the design stage as well. In both cases CRAterre organised a participatory design workshop with local craftspeople and tourist guides, who went round the respective villages in search of clever architectural features before deciding which materials and spaces they would like to have in their new buildings.

1 INTRODUCTION

This article analyses the sustainability of two recently built information centres in Africa. The first one is located in Kilwa, Tanzania, and the second one in Albreda, The Gambia (Fig.1). Both structures are connected to World Heritage sites where massive old stone structures dating several centuries back, blend with humble vernacular earthen architectures of today. In the two communities, skills to handle these two architectural typologies are still alive and well mastered. The Tanzanian and Gambian craftspeople are equally comfortable either building new houses with local resources or conserving old stone monuments.

These projects not only have a visitors reception role, they also strive for a better recognition of the local building genius. They seek to showcase African construction talents by producing quality buildings with well-executed construction details using simple local resources that contribute to the sustainable development of their area.

Vernacular architecture is restricted to available resources, which leads to more thoughtful design. It takes full advantage of each individual's potential and promotes his connection to the community, spreading best solutions and opening to further evo-

lutions. Results are greatly adapted to particular means, needs or desires. Analysing the vernacular culture of a place to reinterpret it in the contemporary context has proven to be a solid method to create more sustainable buildings.



Figure 1. Location of Albreda and Kilwa information centres.

2 DESIGN

2.1 Sustainable local architecture

One of the goals of both projects was to come out with designs that do not simply mimic old buildings. The architects wanted to achieve something distinctly contemporary and appealing for visitors, yet familiar for the local population. It was important to pay tribute to the genius of the local architecture and to demonstrate the value of this heritage in terms of sustainability.

2.2 Participatory inventory

The first step was to inventory the existing architectural typologies, techniques and materials available. To do so, field trips were organised with the participation of key stakeholders, not by the architects alone. In Albreda-Juffureh for example, a two-days participatory workshop gathering 40 people including masons, carpenters, guides and civil servants was organised. Participants were introduced to sustainable architecture principles and then split into 3 groups to hunt for clever details still available in the village (Figs. 2 and 3). One group was focussing on walls, another on roofs and the third on details and comfortable atmospheres. They spent a whole afternoon observing details and taking pictures on the field, and on the second day each group presented a selection of images and ideas that could be integrated in the information centre. Thanks to intensive group discussions, by the end of the workshop solid foundations for the architectural concept were compiled, and the architects involved had enough material to finalise the drawings.



Figures 2 and 3. Albreda: Walk in the village to hunt for clever architectural and landscape features.

2.3 Learning from local craftspeople

In Kilwa, the process was similar but the group smaller. For one week, the architect worked on the design through work sessions with tour guides and craftsmen. Details were discussed and local references tracked on site, and so his first sketch evolved gradually integrating ideas coming from all stakeholders (Figs. 4 and 5). A 3D modelling software facilitated the immediate inclusion of every new sug-

gestion, as if the contributors were drawing themselves (Fig. 5). The final design showcases the collective intelligence of 15 people.



Figures 4 and 5. Kilwa: Discussing details on site with future users and using a 3D software to design with craftsmen.

Architects also tried to provide room for further creativity. For instance, the roof of Kilwa Information Centre was built by a skilled and creative thatcher. During the construction, he was able to suggest several details that were not on the original drawings. He together with the architect, were able to improve the roof during the construction process. Another design innovation of this building was the use of locally woven mats as ceiling boards. This was not in the original plan neither; the idea came out while looking at women weaving these mats in the village (Fig. 10).

2.4 Architectural design

For both projects, designs were deliberately kept simple. Every construction element can be technically understood when looking at the building; there are no hidden details apart from the underground foundation. This is to ensure that builders can easily duplicate what they see (Figs. 6 and 7).

These participatory design processes have ensured ownership of the structures by the local population. No one actually claims paternity of the design, not even the architects, because many people can recognise themselves in the whole layout or in specific details. The architect's role was to turn people's ideas into drawings, not to dictate his ideas as an untouchable creator.

3 CONSTRUCTION PROCESS

3.1 Building in phases

The construction of Albreda Information Centre was deliberately developed in two phases. This allowed to improve logistics organisation of the second construction phase, as well as to reinforce several construction details after the rainy season, which brought unexpected strong winds that even blew off a tree and the roof of a nearby building.

The information centre withstood the test of storms, but a few details had to be modified, taking advantage of best practice examples.

Also the finishing and furnishing of Kilwa Information Centre was done a few months after completing the structural works. This allowed users to more clearly define their needs and so the building enjoyed a more accurate completion.



Figure 6: Kilwa Information Centre under construction.



Figure 7: Albreda Information Centre under construction.

3.2 *Everybody is aware*

From the very first day of the construction, some information panels were installed at the construction sites to inform locals and visitors about the nature and architectural features of the building. This allowed everyone to understand the purpose of the projects and helped exchange opinions (Fig. 8). It is also remarkable to mention that in Albreda, fishermen and women who work near the building as well as some tourist guides, who actually form part of the principal future users of the building, participated in its construction on a voluntary basis.



Figure 8: Information panel in Swahili installed in front of Kilwa Information Centre during construction. The site was open to visitors.

4 ENVIRONMENTAL IMPACTS

4.1 *Respecting nature*

Significant green gas emissions arise from the transportation of building materials from the production plants to the construction sites. To avoid CO₂ emissions, materials were sourced as much as possible in the villages, where much of the transportation was done with donkey carts (Albreda) or sailing boats (Kilwa and Albreda). In order to decrease embodied energy rates, the use of imported industrial materials was deliberately reduced to a minimum, and mainly where no equivalent materials were available in the village, such as electricity or plumbing fittings. In Albreda, for example, the soil lacks clay. Instead of replacing the adobes with cement blocks, the earth plastering was reinforced with fishing nets to increase its tensile strength (Fig. 9), and with lime to improve its resistance against rainwater. The use of cement was limited to slabs. The same occurred in Kilwa, with the exception of cement that was also used for foundations because time was a limiting factor and cement blocks were available. However, in this case transport was not much increased as cement is directly produced in Kilwa.



Figure 9: Fishing net to reinforce lack of clay in the soil

4.2 Taking care of inhabitants

The use of iron sheets to cover the Albreda Information Centre is justified considering that they have been recycled from the old warehouse building, which had to be demolished because it was incongruous and was under serious risk of collapse. In addition, the low insulating capacity of metal roofs was improved by installing a traditional ceiling system consisting of one layer of raffia sticks covered with a cotton cloth and a thick earth layer (Fig. 11). Some ventilation holes located below the ceiling help release the excess of hot air. Many more ventilation holes were inserted in the adobe walls, already well known for their good hydrothermal behaviour. Both elements, earth blocks and ventilation holes, are features of the traditional architecture and work well to preserve users' health. Vernacular houses also have a veranda to protect people and the building itself from weather severity, either against excessive sun radiation or strong rains. Finally, both buildings left no construction waste behind because all materials were used in one way or another.



Figure 10: Use of locally woven mats as ceiling boards in the guides' office in Kilwa Information Centre.



Figure 11: Wood-raffia-earth ceiling blocking the radiating heat of the roof in Albreda Information Centre. Ventilation holes were left in the adobe wall below and above the ceiling.

5 SOCIO-ECONOMIC IMPACTS

5.1 Heritage and its economical potential

The construction of these buildings was only one of several activities programmed as part of wider Ac-

tion Plans. The main objective of both projects was to develop a "sustainable tourism product" encouraging more visitors to stay longer and therefore increase benefits to the population. For that, the Action Plans focused on the inventory and promotion of all heritage resources available aside from those inscribed on the World Heritage List. As avowed in the Ngorongoro Declaration, the idea is that when local populations are directly employed for the promotion of their natural and cultural heritage, they would be the first ones willing to protect and preserve it (Fig. 12).



Figure 12: Kilwa tour guides promoting their heritage resources to visitors in the information centre.

5.2 Raising local economy

Another pillar of both projects was the development of a sustainable economy for the people of Kilwa and Albreda, to have positive socio-economic impact on their territories. The premise of relying on local techniques is basic if we want local labour to benefit from the construction. In the case of Kilwa, 82% of the money injected ended up in local pockets, 57% as labour and 25% as materials production (Fig. 13).

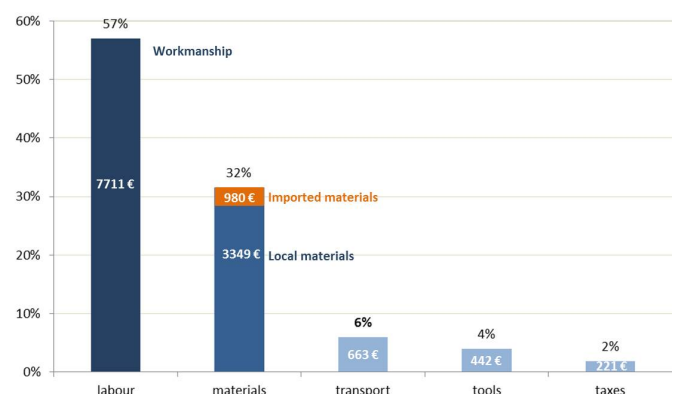


Figure 13: Distribution of expenses for the construction of Kilwa Information Centre.

If we look at Albreda statistics the percentage is reduced to 49% (half of it as labour and half as materials production) because of an excessive dependence on timber that needs to be brought from Banjul. On the other hand, we can say that in Albreda women received up to 25% of the budget spent in labour.

The production of construction materials was intentionally diversified in order to fairly split the benefits derived from the construction. This idea also helps increase the potential availability of local craftspeople whenever repair or periodical maintenance works are needed.

In addition, both projects integrate spaces dedicated to the sale of local craft products that ensure fair trade and avoid the exploitation of endangered natural resources (Fig. 14).



Figure 14: Selling of local Arts and craft products in Albreda Information Centre.

6 SOCIO-CULTURAL IMPACTS

6.1 Ancient building traditions

Both projects benefit from the skills developed many centuries ago and still in use. For instance, the stones of the foundation and basement of Albreda Information Centre are bonded with the lime that is manufactured by burning shells on the South shore of the Gambia River. The same occurred in Kilwa, where lime is produced after burning dead coral stones on Songo Mnara Island, as they did for the construction of outstanding heritage buildings such as the Great Mosque dating back to the 10th century.

6.2 Intercultural debate

Although no local research teams such as technical schools or universities were involved, which would have been a good opportunity to help develop the ideas of sustainable architecture and further employment, the link between conservation and contemporary construction through trained craftsmen was evident. They demonstrate the genius of today's

local craftspeople as much as the old ones. The use of ancient techniques mixed with vernacular ones, such as the roof of Kilwa Info Centre, motivated an interesting debate on contemporary vernacular architecture and its so rich and diverse expressions. But instead of academic environments, this debate was produced in the very heart of the building. Whether we sit in the long veranda of Albreda centre or in the Swahili front *baraza* in Kilwa, these information centres are deliberately porous to let people come in, sit and discuss about heritage issues. From the design stage to the construction process, the layout of these buildings encourages intercultural exchanges. Guides are proud to explain “their” building to anyone coming to visit. As a result, both projects present a strong cultural identity.

These information centres were thus naturally adopted by the entire population, without forcing them to come, without any kind of advertisement. Specifically Kilwa Information Centre has indeed become a cultural centre dedicated to heritage and tourism.

A document entitled *Sustainable Architecture in Kilwa* was published after the project (Figs 15 and 16). It describes the construction process of the information centre, and presents information sheets on the fourteen local materials available in town, their uses and advantages. It aims to raise awareness on sustainable development and inspire other builders, either from the private or the public sector.



Figures 15 and 16: Kilwa Sustainable architecture publication.

6.3 Involving authorities

Albreda project was entirely funded by the Government of The Gambia; therefore finances were managed by two government institutions, tourism and culture, working in collaboration. Authorities have taken ownership of the building and feel so satisfied about it that they have expressed their desire

to build their own houses in the capital city Banjul with the same materials. They have presented the information centre as a living museum within the Roots Festival (Fig. 17), and published two articles where the Ministry describes some features and advantages of building this way.



Figure 17: Ministers and Directors visiting Albreda Information Centre during the 2016 Roots festival.

7 CONCLUSION

These buildings serve various purposes at various times, including functions that came naturally, without being planned. All kinds of public were invited during the design and the construction processes: fishermen, villagers, tourists, kids and craftspeople. The possibility of permitting people entering and discussing at any stage of these projects, together with a deliberate permeable layout of the buildings, allowed for taking into account many people's ideas, and made these buildings become a rewarding result of a collective effort.

These projects have changed the minds of local authorities about local materials and vernacular architecture, including local urban planners. If the wealthiest layer of a society approves this architecture as a good option, others are likely to follow. The approach of these two projects favours the expansion of a more sustainable development and helps dignify local architecture as the best departing point of inspiration to regain balance between humankind and nature.

8 REFERENCES

Guillaud, H. Moriset, S. Sanchez Muñoz, N. Sevillano Gutierrez, E. 2014. *Versus: lessons from vernacular heritage to sustainable architecture*. Grenoble: CRAterre-ENSAG. (available on Internet).

Brown, J. Hay-Edie, T. 2014. *Engaging Local Communities in Stewardship of World Heritage*, UNESCO World Heritage Papers Series, n°40 - (available on Internet).

Barillet, C. Joffroy, T. Longuet I et al. 2006. *Cultural Heritage and Local Development, A guide for African Local Governments*, Paris, CRAterre/Convention France-UNESCO, (available on Internet).

Battle, S. Moriset, S. Sánchez Muñoz, N. Magina, T. 2016. *Kilwa, Tanzania: Partnership between the World Heritage site and other assets in the District*. Arusha, UNESCO Conference.

Ceesay, B. 2016. *Albreda-Juffureh: Revamping a heritage tourism destination for more sustainable growth*. Arusha, UNESCO Conference.

Moriset, S. 2015. *Karibu Kilwa, Kilwa District Heritage Resources. Tanzania*, Grenoble, CRAterre-ENSAG.

Moriset, S. 2016. *Kilwa final report*. Grenoble, CRAterre-ENSAG (available on Internet).

Sanchez Muñoz, N. Moriset, S. 2016. *Kilwa Sustainable architecture*, Grenoble, CRAterre-ENSAG (available on Internet).

2016. *The Ngorongoro Declaration*. Arusha International Conference: Safeguarding African World Heritage as a Driver of Sustainable Development, Tanzania.