Nubian Vaults and Earth Blocks

Submitted By: Chiwarà Project Srl



Organization Profile

Organization Name: Chiwarà Project

Organization Type: Private sector

Website: www.chiwaraproject.com

Practice Details

Country(ies): Senegal, Mali

City(ies): Dougourakoro, Tiele, Galle, Namala, Nangola, Sandama, Godel, Keur Songho, Kassack Nord

Start Year: 2022

Ongoing: Yes

End Year: N/A

Main Adequate Housing Components:



Housing Thematic Areas:

- Social Housing
- Communal & Self-Build Housing
- Housing & Climate Mitigation

Relevant SDGs:



UN-HABITAT

Problem & Context

In West African and Sahelian regions, cement and steel dominate housing, despite being thermally inadequate, high in emissions, and economically extractive. These materials raise costs and exclude local labor, limiting income generation. The Nubian Vault (NV) technique offers a climate-resilient alternative using only raw earth, without cement, timber, or sheet metal. Revitalized by AVN, NV buildings are cooler, low-carbon, and adapted to seasonal rains. Yet, national housing policies still promote imported models, neglecting vernacular solutions like NV and Compressed Earth Blocks (CEB). This perpetuates skill loss, climate vulnerability, and dependency. A policy shift is needed to recognize and scale NV and CEB as viable models for inclusive, affordable, and sustainable housing—creating local jobs, preserving know-how, and supporting circular economies rooted in place-based solutions.

Solution Developed

This housing practice combines the Nubian Vault (NV) technique with Compressed Earth Blocks (CEB) to deliver thermally comfortable, low-carbon housing using 100% local materials. It targets vulnerable peri-urban and rural communities facing inadequate shelter, economic exclusion, and harsh climatic conditions. Homes are built through participatory processes that engage and train local masons, ensuring ownership, skill transfer, and job creation.

Objectives include reducing construction costs, improving thermal comfort without cooling systems, lowering emissions, and boosting local resilience through decentralized material production and skilled labor. Each project enhances eco-construction skills, enabling long-term impact.

Innovation lies in merging vernacular knowledge with modular, replicable designs, modernizing NV with waterproofing, ventilation layers, and LCA-informed choices. Socially, it reframes housing as a community-driven process; institutionally, it offers a scalable model that bridges informal methods with sustainable housing policies.

Implementation

The implementation follows a community-centered and multi-actor model. Key actions include: site selection and climate analysis; co-design workshops with communities; soil testing and production of Compressed Earth Blocks (CEB) or Adobe; training of local masons in CEB or Nubian Vault (NV) construction; phased construction with on-site supervision; and post-occupancy monitoring for thermal performance and community feedback.

Actors involved:

- Community groups engage in planning, construction, and building use.
- NGOs (e.g. Helf Mali, Rainbow for Africa, AVN, Geres) lead facilitation and training.

- Chiwarà Project oversees project management, sustainable design, Life Cycle Analysis, and site supervision.
- Construction firms and artisans execute the works.
- Donors and municipalities (e.g. EU, Egis Foundation) support funding and policy alignment.

Timeline:

- Planning & analysis: 2–3 months
- Design & mobilization: 1–3 months
- Training & materials: 1–2 months
- Construction: 2–6 months
- Post-construction monitoring: 1–2 months

Resources: Funded via international cooperation, with budgets from €50,000 to €400,000. Local contributions included land, labor, and mobilization. Technical schools and youth programs reinforced replication and skills transfer.

Enablers & Obstacles

Key enablers included strong community engagement, ensuring local ownership throughout all phases. The availability of local materials, paired with traditional knowledge of earth construction, offered a solid foundation for training and scalability. NGOs and international donors supported technical assistance, capacity building, and funding. Alignment with SDG targets and growing interest in low-carbon housing created momentum among development actors.

Obstacles included skepticism toward earthen techniques, often seen as “poor man’s solutions.” This was addressed through demo buildings and workshops showcasing thermal comfort and durability. Logistical issues, like transporting materials during rainy seasons, were mitigated by site-level planning and storage. Lack of formal policy recognition was countered by engaging local authorities and using performance data to advocate for institutional support.

Results & Impact

To date, the practice has delivered over 3,500 m² of sustainable buildings in Mali and Senegal. Performance assessments show indoor temperatures 6–7°C cooler, with over 2,200 tons of CO_2 saved compared to concrete-based models. Construction costs were reduced by up to 40%, enabling access for low-income groups.

A significant scale-up is underway: through the Chiwarà Project, a regional training-based model is expanding to Côte d’Ivoire, Burkina Faso, and Benin. Chiwarà focuses on community buildings (schools, health centers) as demonstrators, coupled with on-site apprenticeship programs that form local labor and promote peer-to-peer knowledge transfer.

This “formazione-cantiere” approach turns each construction site into a learning hub. Once built, these public buildings become replicable models for nearby households, catalyzing housing adoption. In Mali and Senegal, over 130 masons and 40 technicians trained through this system are now active in autonomous housing projects, accelerating grassroots replication.

The broader impact includes new green jobs, revived vernacular techniques, women’s participation in block production, and a shift toward community-led housing ecosystems that combine climate resilience, cultural identity, and local ownership.

Replication & Scale Up

Replication has occurred in rural and peri-urban communities in Mali and Senegal. Key enablers include hands-on training, use of local materials, and strong community ownership. Public buildings constructed with Chiwarà’s method served as demonstration hubs, inspiring local households to adopt the techniques for their own homes, supported by trained local masons. Partnerships with NGOs and local authorities further accelerated adoption and trust.

Scaling up relies on a hub-and-spoke model: public buildings act as local hubs for training and demonstration, enabling nearby households to replicate the technique. Expansion is supported through regional partnerships, standardized technical guides, and integration into vocational training programs. With minimal equipment needs and strong community ownership, the model is adaptable across diverse climates and social contexts in West Africa.

Policy Uptake

This housing practice has informed or been partially integrated into policy discussions, strategies, or pilot-level policy instruments.

The practice is promoted through ongoing policy dialogue at local, national, and international levels. Through partners like AVN, the technique is integrated into cooperation sector strategies, pilot programs, and institutional forums. Simultaneously, Chiwarà fosters community-level advocacy, ensuring a bottom-up dynamic rooted in local ownership. This dual approach—linking grassroots adoption with institutional engagement—creates the conditions for both scaling and policy alignment, bridging informal know-how with formal housing agendas.

Lessons & Takeaways

In hindsight, earlier involvement of local authorities would have eased replication and policy alignment. More structured monitoring tools could improve data collection and impact tracking. Enhancing gender inclusion in training and decision-making remains a priority. Stronger community feedback loops would help refine design and increase ownership.