

Responsibly Sourced Materials in a Circular Built Environment Project Template

The Sustainable Buildings and Construction Programme (SBC) aims at improving the knowledge of sustainable construction and to support and mainstream sustainable building solutions. Through the programme, all major sustainable construction activities can be brought together under the same umbrella. The work involves sharing good practices, launching implementation projects, creating cooperation networks and committing actors around the world to sustainable construction. The purpose of this template is to capture, report and publish case studies related to circular economy in the built environment for the purpose of knowledge and information sharing including cross collaboration.

Email *

thannalroots@gmail.com

The SBC Programme is one of six programmes under the One Planet Network (UN 10YFP).



One planet
build with care

Please give us more information on the project.

1. Title of project (e.g. Circular Economy Ownership Models: A view from South Africa Industry). *

Community Seed Bank, Karur, Tamil Nadu, for Rangamalai Organic Farms.

2. Region(s) of project *

- Africa
- Asia/Pacific
- Europe and Central Asia
- Latin America
- Middle East
- North America
- Central America
- Caribbean
- Global/All regions

3. Country/countries of project(s). (e.g. South Africa) *

India

4. Your name *

Ar. Biju Bhaskar

5. Your organisation *

Thannal Natural Homes

6. Other than the SBC Programme, is this project related to any of the other 10YFP/One Planet Network Programmes? *

- Sustainable Tourism Programme
- Consumer Information for SCP
- Sustainable Food Systems
- Sustainable Lifestyles and Education
- Sustainable Public Procurement
- Not related

7. If this case study is related to any other program, please list the program. *

Conservation of Native Seeds, Creating awareness about traditional methods of construction

8. Overview/Summary (1000 characters). (e.g. Waste materials are not remanufactured, reused or recycled successfully. This study focuses on the South African industry's view on composite waste. The study found that cost reduction was a major driver and sustainer for recycling of composites). *

'Community Seed Bank' is a project for the community for conserving Native Seeds. The owner of this project is Mr Pradeep, an IT professional with a vision to reverse-migrate to his native in Karur, Tamil Nadu. He wants to inspire the villagers to do farming in methods non-harmful to nature. He founded Rangamalai Organic Farms, which requires a 'Seed Bank' to conserve the native seeds of various vegetables, trees, and food crops. Such seeds are vanishing quickly. By choosing natural building methods for Seed Bank, the intention is to create awareness about sustainable buildings constructed in indigenous ways and use minimal energy and local materials. Through the Thannal workshop, he trained himself, and Ar Biju designed the project. The main walls are in lime stabilised Cob with natural plasters. All the materials and artisans come from the village or nearby places. It uses local palm trees for structural members, old terracotta tiles for the roofing and runs on off-grid solar energy.

9. Keywords *

- Policies promoting circularity
- Construction and demolition waste management
- Design for disassembly, reuse and easy to recycle
- Adaptability, flexibility and refurbishment of buildings and neighbourhoods
- Sharing and multi-use of spaces
- Use of reused or recycled content in new products and buildings
- Circular water
- Circular energy
- Financing circular processes
- Reconstruction

9.1 If the keywords above are not adequate, please specify other keywords. *

Revival of traditional methods, sustainability for everyone.

10. Life Cycle Phase(s) *

- (re-)Manufacturing of building materials
- (re-)Design
- (re-)Build
- (re-)Use
- (re-)Purpose
- Dismantling

11. What do you want other people to know about your project? (e.g. To develop appropriate national models for circular economy, it is important to reduce cost for recycling composites to encourage South African companies to transition towards circular economy). *

The Community Seed Bank gives the following learnings -

1. It is possible to construct modern designs with present day needs using traditional methods.
2. Vernacular methods in construction are sustainable to nature and use less energy.
3. Natural materials can be re-used by future generations as mud and lime are recyclable, even if after decades.
4. It uses the local construction methods that generate jobs for locals, as many are skilled in vernacular building methods.
5. There is no use of manufactured materials from the companies, only local materials from the village, so the money goes into the local economy.
6. It re-uses materials from old buildings - Old wooden beams and terracotta tiles.
7. It revives old methods and supports local artisans - the ancient technique of carved stone columns, palm beams for the roof, bamboo in verandah roofs, cob walls and earthen plasters.
8. It serves as an example of an off-grid lifestyle by meeting all energy requirements using solar energy.

12. What is the aim of the project (50 words/350 characters)?(e.g. To identify the drivers and sustainers for the South African industry to consider reuse and recycling of production waste materials). *

The aim is to use local methods and materials to create community space for seed preservation in traditional construction methods. In addition, the techniques must connect to the culture and history of the place. It must create awareness regarding the feasibility of using such methods to make eco-friendly, modern buildings with all present-day needs.

13. Explain what is special/unique about this case? (1000 characters) (e.g. This case study focuses solely on composites. Apart from the general reuses of recycled composites in a circular economy, it is also a good strategy to avoid or reduce high energy demand linked with the production of raw materials). *

Unique factors -

1. It facilitates the participation of the community in making low energy, eco-friendly building.
2. It uses no cement, concrete, steel or any other high energy-embodied materials in construction.
3. How to make spaces multipurpose - office space and display area of seeds, verandah space for various value addition work post-harvest and interaction between farmers from the community, dark room for storage of grains and loft as living quarters.
4. It creates an opportunity for upskilling of masons to adapt the ancient methods to present-day needs - like stabilising mud with lime, admixtures from plants and animals.
5. Through this project, young masons learn about the methods used by the elders. Hence, the project acts as a venue for knowledge transfer in architecture.
6. The money is invested in the village economy and serves as an example for rural projects to be sustainable.
7. It inspires others to build in sustainable methods being a community building.

14. Year of delivery or ongoing?(e.g. 2018 or ongoing). *

2020

15. What did the project achieve (1000 characters)? Please give an example.(e.g. The study identified that a large number of companies in the South African industry experience a small percentage of composite production scrap material and that quality assurance of recycle and product certification for the composites was a major barrier.With these key identifications, the SA industry can conduct future research on how to overcome this barrier and would ensure the use of materials more efficiently to reduce production costs). *

1. The building is creating awareness at the rural level regarding nature-friendly and vernacular methods of construction.
2. The project proves sustainable methods of construction can be economical and affordable. Sustainability doesn't need to come at a premium investment.
3. It is an example of traditional methods of construction that are reliable and nature friendly.
4. It proves that building a sustainable mud home can contribute to the local economy.
5. It shows how to re-use materials from old structures.
6. Using local materials can reduce waste due to construction. Indigenous methods optimise material consumption and use of any by-product created in the best possible way.
7. The building actively plays a role in promoting traditional building methods in the community.
8. Adaptation and improvisation on vernacular construction methods and materials like lime as a stabiliser bamboo as a structural member inspire people to use natural materials for modern designs.

16. Who was involved/who were your stakeholders, and what was their contribution?Please list the entire supply chain of stakeholders/actors.(e.g. Directors and senior managers in South African composite material users sector). *

The stakeholders are -

1. Host of the hands-on workshop Ar. Biju Bhaskar and Sindhu Bhaskar provided education and awareness to the owner.
2. Mr Pradeep, the owner, put in the effort, time, money to learn through the workshop and execute the construction efficiently.
3. Designer Ar. Biju Bhaskar in providing a suitable design for local construction methods.
4. Project coordinator Ar. Sundar Rajganesh from Thannal spending time on-site ensuring the quality of materials procurement, training to masons and volunteers to adapt the construction methods and documentation.
5. The masons and carpenters are enthusiastic about traditional methods, which involves more physical efforts and patience than the new conventional methods.
6. Head volunteer and civil engineer Karuppaswamy Pandi and other volunteers played the role of essential aids to the workers.
7. The family members of Mr Pradeep - his grandmother and his aunt took care of accommodation and food of project coordinator and volunteers.

17. What were the output(s)/outcome(s)? Please list examples of any outcomes achieved.(e.g. A purely theoretical study, but outcomes are: 1. Identification of cost reduction as the biggest driver. 2. Sustainers for a circular economy cannot be assumed from a global perspective but have to consider the local environment. 3. The different ownership models could be assessed though detailed knowledge of the supply chain and composite volumes.4. The need for quality assurance of recycle and to certify products incorporating recycle composites. 5. A large number of companies experience a relatively small percentage of composite production scrap material). *

1. The project identifies the importance of proper awareness and education of all stakeholders to mitigate the challenges involved in construction.
2. It shows the importance of proper project management with a sufficient workforce and raw materials in executing the project timely.
3. A community seed bank is a place of utmost importance to people who believe in farming without causing many problems to nature. Now, they can experience a way to build shelters without causing many problems to nature also now.
4. It is an example in Tamil Nadu which has overcome the stigma of associating mud homes with poverty.
5. It is evidence that shelter making is possible using local materials within two kilometres of the site without cement or steel.
6. Successful in the revival of traditional methods, which are ignored or forgotten by all in shelter making.
7. It is an inspiration for young professionals - architects and civil engineers, to take alternate materials and methods in their practice.

18. Is the project replicable? If yes, how? (1000 characters)(e.g. Yes, with the application of similar cost reduction methods in different countries). *

The features of natural buildings vary from place to place, adapting efficiently to the available materials and local methods. Hence, a study of vernacular buildings in the site's surroundings is essential before the start of the project. The construction principles like using local materials, adapting the design to the materials and method to optimise on cost, and the presence of trained individuals on-site to check on the quality of work must remain the same. Other things like material, suitable climate for construction, method, people, working hours, speed of construction and challenges can be different. Solutions for each site can vary and take decisions keeping in mind the context of each project. Replicating the same method using the same set of artisans is an easy process. Still, it may be not economical due to several site conditions changing in a particular site. Adapting ourselves and learning from the vernacular knowledge of shelter making is the key to natural building.

19. Is the project scalable? If so, please explain (1000 characters)?(e.g. Yes, it has not been implemented in South Africa yet as this is a purely theoretical study). *

Yes, the project is scalable, but one must take care of few factors. If the span is huge, the use of bamboo will be economical than wood. The specific technical knowledge to scale up the spans using bamboo needs to be attained by making mock-up samples and load testing. Civil engineers and artisans experienced in bamboo or mud must work together to achieve this. Using Civil engineering labs to test the strength and durability of the specific building units made from the local material is essential. Dedicate time to these studies to minimise chances of error in scaling up. Another way to deal with this is to tackle the problem with thoughtful design. Limit the spans and heights, but increase the number of building units to reduce the complexity. The unit cost of the project can go up as the scale goes up. There are impressive ten storey mud structures in Shibam, Yemen, which are still inhabited by people. Hence, it is possible but with considerable input from experts in the field.

20. What are the 3 main challenges (1000 characters) you encountered? And why?(e.g. Quality assurance of recyclate and to certify products incorporating recyclate composites,no consensus in the survey of composite manufacturing companies, government, local authority, product retailers/distributors, end users or third parties, should take responsibility for managing end-of-life product waste. Lack of QA for recyclate and product certification incorporating recyclate composites was a hindrance). *

1. The initial challenge is to find local masons and carpenters willing to work on traditional methods. As it is different from conventional methods, many are unwilling to work. However, giving proper awareness to them can motivate them to pursue such works in future.

2. The preparation of estimates of costs at the project's starting was complex due to unique context on-site like available materials, per-unit cost and labour charges. Contractors are not willing to take such work due to a lack of prior experience. The project was executed on daily wage labour without any contract. However, in the end, the mason is trained and is open to working on a contract basis in future.

3. There were delays due to a shortage of funds, as the project cost was more than expected due to –

- Manual works in carpentry, as electricity was not available initially.
- Reworks due to damage to building in a cyclone.
- Expansion of carpet area and addition of few aesthetic details like columns and doors.

21. What are the 3 main successes (1000 characters) of this study? And why?(e.g. 1. Circularity can be progressed in SA. 2. Identification of cost reduction as a driver and sustainer for CE. 3. Quality assurance for recyclate and product certification). *

1. Making a structure of modern design with traditional methods caught the attention of many villagers and natural farmers. It can spread awareness about sustainable, eco-friendly practices in shelter making and promote sustainable development in rural areas. It is a cultural landmark.

2. Training masons and many volunteers in earth construction methods was possible through this project. They can take forward the learning into their practices in future. It creates an opportunity for the revival of different traditional methods in construction.

3. Using local materials, old reclaimed materials from buildings reduces the cost of construction. The employment of local masons and workers proves that traditional methods can be one way to keep money in the local economy. Since the structure is entirely free from cement or steel, it makes the soil easily re-usable. It serves as an example for many sustainable projects not using high embodied energy materials and nourishing the local economy.

22. Please indicate the cost of the project in USD. *

27000

23. Would you like to add any other relevant information (1120 characters)?(e.g. While this study is purely theoretical, it mainly identified the drivers and sustainers in CE for composite material users and also elements that would encourage the adoption of CE in South Africa). *

The Community Seed Bank inspires the people who visit it to think about the possibility of building with earthen materials the next time if they build anything. Due to climate change and pandemic situations, there are many movements to get back to sustainable living methods, dependent on the local economy by many people. People are inspired to reverse migrate to villages from cities to take up a living close to nature. The use of low embodied energy materials from the surroundings for making shelters will align perfectly with the idea of sustainable living. Many practices from the vernacular building practices have been sustainable for nature. The significant doubts in the mind of an owner thinking about natural buildings are durability and maintenance. There are many traditional buildings in our country which have been existing for more than 100 years. Learning about construction methods of traditional buildings in the locality can help build natural, sustainable homes and not use cement or steel. In the long run, maintenance is easy and affordable than modern materials like concrete.

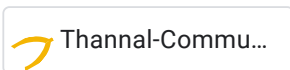
24. Are there any additional sources or websites for this project? If yes, please state. *

Kindly refer to this the website links - <https://thannal.com/native-seed-bank/> Community Seed Bank in local media – DT Next <https://www.dtnext.in/News/City/2019/02/04003625/1105285/When-engineering-helps-a-farmer-run-a-self-sustainable-.vpf> The Hindu - <https://www.thehindu.com/news/national/tamil-nadu/the-indian-young-farmers-forum-a-collective-where-successful-farmers-mentor-those-new-to-farming/article35121740.ece/photo/1/>

25. Has this project been verified? If yes, please state. If verification is ongoing, please indicate how long this may take.(e.g. Journal paper through RMIT University online library resources. Verified by one of the authors, namely Al Amin Mohamed Sultan). *

No verification of the project by academic personnel have been done yet.

26. Please upload any relevant images for the project. Please acknowledge credits for the photographer or source of images.



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