

What is Bioconstruction?

By IAPC

Bioconstruction is a construction method with low environmental impact that promotes harmony between the natural and built environments, uses natural and/or less-processed materials, and considers local climate conditions, management of available resources, renewable energy and waste treatment. Although this concept is relatively new for the civil construction sector, the method has always been used by populations that have not adopted mechanization and industrialization of processes, as is the case with native peoples, who use a lot of wood and vegetable straw.

The bioconstruction method emerged together with the concept of permaculture, an abbreviated expression of the English term “permanent agriculture”, created by the Australians Bill Mollison and David Holmgren in the 1970s, when the focus was more on understanding ecology, always associating it with social issues. Nowadays, permaculture involves not only the agroecological dimension, but also expands to the planning processes of self-sustainable settlements and promotes scientific knowledge allied to popular knowledge. [1]

Building environments that use the bioconstruction method prioritize the use of local and/or easily accessible materials, in order to reduce the damage caused by extraction, transport and industrialization, in addition to fostering the local economy and promoting social autonomy arising from a self-organized workforce and the management of natural resources and waste. Generally, the choice of materials will depend on what is found in the place, but the most comprehensive ones are: earth, stone, straw and wood.

The techniques used are thought of in closed cycles, in which nothing should be discarded. Therefore, the waste generated during construction is transformed to be reused or recycled. This process is considered not only

during construction but also throughout the use of spaces, such as sanitary waste that can be treated to turn into fertilizer. Below some of the constructive techniques: [2]

- Superadobe: raffia bags complete with compacted soil pylon, for building walls and roofs.
- Adobe: Adobe bricks are a mixture of clay and straw, which undergo natural drying, without the use of ovens and without burning other materials and/or substances.
- COB: a homogeneous and plastic mixture made with clay, sand, straw and water.
- Hand Taipa or wattle and daub: a wooden plot, usually bamboo, fixed in the ground and covered with clay.
- Rammed earth: earth compressed by a pylon into wooden molds.



Construction in superadobe.

Photo: <https://ecovillage.org/event/training-superadobe-earth-bag/>



Adobe bricks in the process of drying, made in the open air.

Photo: https://live.staticflickr.com/42/122919012_22af94e121_b.jpg



House and some furniture built in COB.

Photo:

<https://mindfultravelexperiences.com/wp-content/uploads/2013/03/cob-sykourio-greece>
1.jpg



Detail of wall built with rammed earth by hando (bambboo-to-daub).

Photo:

https://3.bp.blogspot.com/-kGIJqaGZLow/Tf1FxTbsGtI/AAAAAAAAA6M/Z_qQ2ZPAVhQ/s1600/TAIPA_%257E1.JPG



Rammed earth walls.

Photo:

<http://4.bp.blogspot.com/-coYeMlrVYhg/TxqkOSKMzII/AAAAAAAKS4/r8U8E9ihnik/s1600/DSC05696.JPG>

Bioconstruction is a method that is less harmful to the environment than conventional constructions, as environmental impacts are considered in all stages of the life cycle of constructions. These stages range from the extraction of resources in nature, transport, industrialization, commercialization, construction sites, use and disuse of buildings, until the end of their useful life, when the materials return to nature in waste form. The environmental damage caused in this cycle, however, is not considered in conventional construction processes, leading the civil construction sector to be one of the most relevant actors in the climate crisis.

On a global scale, conventional buildings generate almost 39% of carbon dioxide (CO₂) emissions and are responsible for 33% of energy consumption. [3] Despite the relevant environmental impact, little is considered when building and this also crosses a cultural issue. Materials such as cement, for example, which is one of the most used materials worldwide, emits large amounts of CO₂ and produces a lot of waste, and is an essential product for construction, combined with good prices and availability, where its consumption is proportional to its production. Other products relevant to construction are made from cement, such as mortar and concrete. [4] The cement industry manufactures other products relevant to construction, such as mortar and concrete, and is responsible for almost 8% of global carbon emissions, generating 0.6 tons of CO₂ for each ton of cement, three times more polluting than cement. aviation sector. [9,10]

In Brazil, there is prejudice against wattle and daub buildings, as they were associated with poverty, which was aggravated by the health crisis and the proliferation of Chagas disease, caused by a bedbug that lodges in dark and dry crevices, very common in clay constructions. This image of cracked clay constructions, however, should not be associated with the material, but with a lack of knowledge of material handling techniques, since clay

naturally expands or retracts as it absorbs or loses moisture, and the use of plaster as part of the finishes prevents the exposure of these cracks.

Compared to conventional methods, bioconstruction is less harmful to the environment. The execution time, however, may be longer due to natural processes and the need for team training and this may result in high labor costs. [5] Due to the ease of handling natural resources, the method is more used in rural areas and/or in areas with little or no access to public policies (including water and energy).

Even in urban areas, where natural resources are not easily available, the use of the method still suggests a lower environmental impact, despite the need for transportation, since less processed materials are less harmful to the environment. Even with a still timid participation, the techniques have been explored in the scope of housing that are part of the public programs of the Brazilian government, both for constructions and for subdivisions. Construction standards and laws need to encourage the use of the method to facilitate the scaling of its use.

In addition, the techniques can help create jobs, because despite not needing an experienced workforce, it is necessary to test the materials found on site and train the team so that the methods are taught. Even if the constructive process is developed in a solidary way, the self-organization of groups leads to an enriching experience for communities, as the techniques require a mutual and collective effort.

Regardless of the means to be built, bioconstruction offers advantages both for the environment and for society, as it reduces energy consumption and the amount of emissions during the life cycle, rescues, re-signifies and values traditional knowledge, empowers communities, correctly manages natural resources and develops healthier environments for the population. It is necessary, however, that it be socially widespread, have access to technical assistance and that the taboo involved that this type of method is

underdeveloped, marginalized and not modernized is broken, so that people's "dream house" does not put the planet at risk. [7]

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