POLITECNICO DI TORINO
FIRST SCHOOL OF ARCHITECTURE
Master of Science in Architecture (Construction)
***Honors theses***

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**Re-start from straw: rice straw between Italy and Haiti**
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The project designed for the master thesis originates from the collaboration with the italian ONLUS "Architettura senza Frontiere Piemonte" which works in undeveloped countries. In according to the organization, we decided to focus the thesis on the design of an orphanage in St. Marc, close to the epicenter of the 2010 earthquake in Haiti. At the same time, we investigated a new constructive technique that could be used to build other buildings in the Country.
Haiti is a difficult country where to build, mainly because of two reasons: the high cost of building materials and the poorness in specialized workers, which leads to a bad quality of constructions. All the building materials within the island have high costs: cement is the most common material but it is never used reinforced with steel bares, for this reason 85% of buildings collapsed during the earthquake. The project aimed at finding a low-tech and low cost system that uses local materials.
After a first step of intense research done in Italy we traveled for 30 days visiting 12 building site in the biggest cities of Haiti to understand better the dynamics that control the construction environment.
During this trip rice straw was identified as one of the best building materials widely available in the Nation, indeed Haiti's economy is mainly based on agriculture and rice cultivation is especially developed in its internal valleys. The Straw, besides being much more economical than bricks and cement, it is excellent to build, especially in rural area where there is a large availability of this material.
Furthermore, straw is a biodegradable material, renewable on an annual basis, easy to handle and its cost in terms of combustible energy for the harvesting, the baling and the transport to the site (“grey” energy) is far lower than any other material employed in the building trade.
Once in Italy we started the design of the orphanage that had to resist to tropical storms, hurricanes and earthquakes.

**Render of the internal courtyard of the orphanage designed in Haiti**

For this reason we referred to all the test made from different American and Australian College to investigate the structural behavior of straw bale construction. Some parts of the building are composed by other local materials as car tyres and bamboo. In order to test the quality of this project we decided to build a part of the building in scale 1:1 to verify the capability of the new structure to host children and adults. The prototype built in Italy, made by load bearing straw bale walls, represents a model that could be standardize to build different kind of constructions.

http://www.youtube.com/watch?v=JsepGrtdc60

**Prototipe scale 1:1 built with straw bale load-bearing  realised in Poirino, Torino**

The further development of the thesis work led to the creation of a link between Haiti and Italy, where rice straw is the constructive element in common between the two countries. This choice was the result of a collaboration with the design firm n.o.v.a. civitas of Biella to build a pavilion in rice straw, which could illustrate the proper use of this constructive technology in Western countries. The building realised in Biella has an educational function and it was designed to show the cycle of the rice and the use of straw in architecture to children, which can access to the roof accessible equipped with games.

**Educative pavillon realized at the “Fondazione Pistoletto” for the project “Ri-partire dalla paglia”**

The realization of this project and the Haitian prototype was made possible thanks an allocation of funding from the Politecnico di Torino, which combined with funds provided by the "Fondazione Pistoletto" has served to promote the purchase of materials used in the construction .
The thesis promotes a return to rice farming and to the use of straw as a building material, setting up a virtuous process from a social, economical, environmental and architectural point of view.

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