
Layered Elements—Reclaiming World-wide, Waste-based and Passive Technologies to Fight Malaria

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In 2012, Architecture for Health In Vulnerable Environments (ARCHIVE) - an organization that “works at the intersection of health and housing, using one basic right, housing, to deliver another basic need, health”; opened an international design challenge themed “Building Malaria Prevention: A Global Design Competition”. The purpose was to retrofit 24 informal housing units in the community of Minkoaméyos in Yaoundé, Cameroon.

As established in the design brief, “the design of the housing units should combine the use of common sense principles and innovative ideas to minimize the transmission of malaria”. The campaign sought a design that truly integrated community-lead architectural construction with health improvements under a \$300 per house budget.

Lead by an Assistant Professor, a multidisciplinary and diverse team that included professionals and students from USA, Costa Rica, Guatemala, England and Chile was formed to work on the project. Early conversations targeted at understanding and defining the problem led the team to a broad, worldwide research on passive technologies based on waste materials and natural elements found in the adjacent context.

This board explores the ideas and technologies that guided the design process and presents the final design proposal – which was chosen as a finalist project by the jury.

The project studied the health profile of the community, the relationship between

housing design and malaria, the existing site conditions, the two housing typologies to be retrofitted and the waste profile as introduced by the competition resources booklet. The project then developed three main ideas explored by the design team: 1) research of worldwide, free available technologies that re-use waste materials or that use natural and accessible resources, 2) empowering the community to be able to build the interventions by themselves and, 3) understand the actual cultural and physical solutions to the problem and include them as part of the new proposal to produce a continuity in the appropriation. Following the presentation of the ideas, a description of each of the technologies is presented and elaborated as parts within a whole, leading to the presentation of the final design as the conclusion. All-in-all the team was able to keep each intervention under \$250 dollars and it was expected to lower malaria transmission in 70% - 90%, a good goal based on how simple the solutions were.

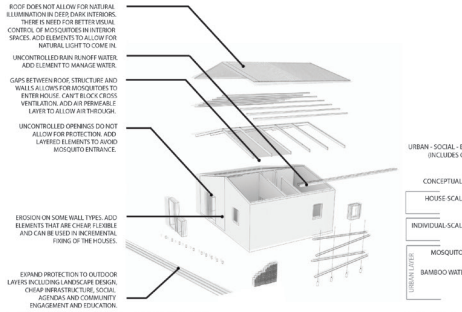
LAYERED ELEMENTS

AN SCALAR, HOLISTIC APPROACH TO MALARIA PREVENTION FROM AROUND THE WORLD

'Layered Elements: An Scalar, Holistic Approach to Malaria Prevention from Around the World' is a multidisciplinary collaboration between professionals from various countries that proposes to attack the problem of malaria transmission through mosquitoes at different scales - from the urban and social, to the individual space. It does so by re-thinking and appropriating technologies found all around the world - reusing materials, re-thinking spatial arrangements and engaging the community in understanding the benefits of the design of the built and natural environments and their interactions. All of this is done while keeping a low budget in mind and giving value to community participation and labor.



EXISTING CONDITIONS



ANALYSIS OF THE PROBLEM

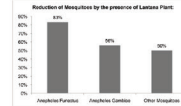
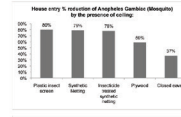
- REUSE PLASTIC BOTTLES AS MOSQUITO TRAP
- RETHINKING ARCHITECTURE WITH BUILT ENVIRONMENT CONSIDERATION TO MOSQUITOES POSITION AT THE HOUSE
- BAMBOO CUTTERS TO COVER WATER CONTAINER
- PAVED WALKING OUTDOOR PLANTS MANAGEMENT
- DOUBLE LAMINATED SCREEN DOORS AND WINDOWS
- SCREENS WITH COLOR AND DIFFERENT DESIGN
- BED NETS WITH COLOR AND DIFFERENT DESIGN
- BAMBOO TRAP FOR BETTER PROTECTION

PROPOSED MASTER PLAN / LAYERING OF STRATEGIES



RESEARCH AND FINAL BUDGET

| Item | Description | Quantity | Unit | Material Unit Cost | Quantity | Unit Cost | Total | |
|------|---------------------------------|----------|----------------|--------------------|----------|-----------|--|-----------------|
| 1 | Bamboo Cutters | 16 | meters | Free - forest | \$0.00 | \$0.00 | \$0.00 | |
| 2 | Net Ceilings | 56 | m ² | \$1.00 | \$67.00 | \$67.00 | \$67.00 | |
| 3 | Bamboo canals | 1300 | meters | Free - forest | \$0.00 | \$0.00 | \$0.00 | |
| 4 | Plastic bottle planters | 40 | bottles | Free - recycle | \$0.00 | \$0.00 | \$0.00 | |
| 5 | Plastic bottle wall improvement | 200 | bottles | Free - recycle | \$0.00 | \$0.00 | \$0.00 | |
| 6 | Solar bottle bulb | 6 | bottles | Free - recycle | \$0.00 | \$0.00 | \$0.00 | |
| 7 | Opening screen boxes | 0.54 | m ² | \$1.00 | \$0.54 | \$0.54 | \$0.54 | |
| 8 | Bed nets | 28 | m ² | \$1.60 | \$44.80 | \$44.80 | \$44.80 | |
| 9 | Mosquito bottle trap | 30 | bottles | Free - recycle | \$0.00 | \$0.00 | \$0.00 | |
| 10 | Bottle beds | 112 | bottles | Free - recycle | \$0.00 | \$0.00 | \$0.00 | |
| 11 | Landscaping | 1 | gh | Local forest | \$0.00 | \$0.00 | \$0.00 | |
| 12 | Education | 1 | gh | Free | \$0.00 | \$0.00 | \$0.00 | |
| | | | | | | | Free - Contributed by the same community | |
| | | | | | | | Total | \$138.42 |



BAMBOO CUTTERS

(Indonesia, Philippines, Southem Asia)

As an attempt to control, manage and protect their own, millions of households around the world have been managing water through bamboo cutters. This has been a common practice in rural areas to prevent mosquito breeding in water containers. The bamboo cutters are made from bamboo and are used to cover the water containers. This is a simple and effective way to prevent mosquito breeding in water containers.

NET CEILING

(Sri Lanka)

It has been proven that adding ceiling in interior rooms reduces the mosquito in Malaria cases by as much as 50% (see also by U. S. Kumar, A. Chinn, and T. Sankar, 2000). The net ceiling is made from bamboo and is used to cover the interior rooms. This is a simple and effective way to prevent mosquito breeding in interior rooms.

PLASTIC BOTTLE WALLS

(New York, USA, Mexico, Venezuela, India, Nigeria, Taiwan, Argentina, India, Uganda, others)

Since the existing houses are an already-made investment, not allowing to modify the house, bamboo walls were built to improve the ventilation and the house. The bamboo walls were built to improve the ventilation and the house. The bamboo walls were built to improve the ventilation and the house.

SOLAR BOTTLE BULB

(USA, India, others)

This device also part of the '1' layer of light inside in urban areas and that was designed and developed with students from the Massachusetts Institute of Technology (MIT) based on the concept of 'light traps'. The solar bottle bulb is made from a plastic bottle and a solar panel. The solar panel is used to power the light bulb, which is used to attract and kill mosquitoes.

MOSQUITO BOTTLE TRAP

(Japan)

Made by cutting the top off a 1-liter bottle, leaving the cone, placing inside the sugar and water and adding one teaspoon of yeast and a cup of sugar to attract mosquitoes. The bottle is used to attract and kill mosquitoes. The bottle is used to attract and kill mosquitoes.

BOTTLE BEDS

(Japan)

Eliminating the bed by using recycled plastic bottles and the mattress on top. The bottle beds are made from plastic bottles and are used to attract and kill mosquitoes. The bottle beds are made from plastic bottles and are used to attract and kill mosquitoes.

LANDSCAPE

(Japan)

Integrating mosquito-resistant plants to one of our main goals. This will be done at various scales. The landscape is made from mosquito-resistant plants and is used to attract and kill mosquitoes. The landscape is made from mosquito-resistant plants and is used to attract and kill mosquitoes.

EDUCATION

(Japan)

The students are encouraged to be more active in their own communities. They are encouraged to be more active in their own communities. They are encouraged to be more active in their own communities.



PROPOSED