Greetings All,

Those of you who are students began learning about biomimicry in SU6003 building ingenious projects and coming to ask, "How would nature dox? Some of you grasped the possibilities and applied biomimicry to your projects in SU6073 integrating nature's wisdom into your site design to save water, energy and .

Two years ago I was fortunate enough to meet a guy named Thomas Knittel. He was a great guy (and we agreed with each other on everything in our group work : }) at a Biomimicry Education Conference. Recently, I began work with the American Institute of Architects on a special project at the request of your colleague, Amanda Robinson, and some old friends on the Board there. They are interested in embracing biomimicry further here in the Mid-South.

While doing some research for my new partners I came across a really elegant example of how Thomas (turns out he's the Seattle VP) is using biomimicry to help orphans in Haiti. You'll appreciate the "stacked tactics" and the brilliance of their efforts. The article is below but there are some great illustrations and a video at the link so, enjoy! http://hoklife.com/2012/01/12/a-model-for-a-new-emergent-approach-to-building-in-haiti/

Be well,

Margo

Margo Farnsworth, TBI Fellow
Screendoor **C**onsulting
Adjunct Faculty, Lipscomb University Institute for Sustainable Practices
615-478-4889

12 January 2012 | Posted inBiomimicry, Blog News & Updates, Featured, Sustainable Design

Posted by Blake

A Model for a New Emergent Approach to Building in Haiti

By Thomas Knittel, AIA, LEED® AP

The New Year always causes one to reflect on the recent past, but especially so today, the two-year anniversary of the catastrophic earthquake in Haiti. I have been fortunate to work with a dedicated group of volunteers at HOK to design a children's center and orphanage in Port-au-Prince. Earlier this week, we presented our latest design to the client, Fondation Enfant Jesus, as well as to the U.S. Green Building Council. The results were very positive.

Our collective goal to create a nurturing and restorative place is taking shape. In many ways, though, this project is more difficult than the large, complex projects we face every day at HOK. We are striving for net zero water and waste and for the building to provide a net positive energy source – all with a design that also celebrates the amazing Haitian arts and crafts culture. Because we do not want to import materials and technologies that create a barrier to replication, we are returning to basic principles of passive design: reducing building demand as much as possible and then using limited solar and wind entrainment to make up the rest.

We have developed the design's core principles around a balance of social, economic and environmental concerns. HOK's design team is using biomimicry to create a locally attuned, responsive building. Biomimicry teaches us that a greater understanding of the commonalities between adaptations in a biome can serve as a guide for place-based design. Selective pressures are a biological term that describes the biotic (living) and abiotic (non-living) forces that drive change in a system. There are few places where non-living forces have wrought so much change as in Haiti.

Because 80 percent of the Haitian population lives below poverty levels, the biotic forces at play here are powerful. Over the past 100 years, forest cover has nearly vanished in Haiti, going from 60 percent to just 2 percent. The associated ecosystem services have been stripped, resulting in systemic problems caused by erosion and loss of nutrient cycling. To help restore this system, this project will leverage cyclical processes and a closed-loop resource strategy.

Biomimicry became more visible in the project after the team developed an understanding of the intended performance of the building (challenge), the strategies found in nature (solution space) and then translated the abstraction into built form.

The local builders mix concrete by hand with a bucket, and in the past have constructed structures that are not strong enough to withstand an earthquake. We are taking cues from nature to improve this process. These structures, for example, heat up in the sun. Some plant leaves create boundary layers to prevent desiccation, and certain barks have low emissivity layers that reject heat. Our goal is to establish a second building layer that keeps the concrete core cool to the touch while promoting the air movement that allows for the skin's evaporative cooling.

Our design inspiration is found in a keystone species, the Kapok tree, which holds a powerful meaning in Haitian culture. It has practical, medicinal uses and spiritual meaning through the connection of earth to sky. The visible translation occurs in the branching support system of the building's balcony system as well as in the low emissivity, heat shedding characteristics of its second skin. Leonardo da Vinci observed the branching system of trees, where the mother limb is twice the area of the daughter limb branched pair. This simple empirical formula guides the design of the diagrid facing the courtyard.

he Kapok is an adapted and emergent tree, meaning that in many areas of the world it rises above the rainforest canopy. Extending the visible and literal tree-like diagrid to the metaphor of the entire building is an important aspect of a passive building that needs tending, as the children will become participants in the life of the building. The below-grade area will serve as the building's "roots," cleaning and storing water and recycling nutrients from waste into biogas for cooking. The first three stories will function as the structure's "trunk." Protecting the building like tree bark, a "boundary layer" will shield exterior walkways and vertical surfaces from direct sunlight while allowing for daylighting and natural ventilation. Rooftop gardens will serve as the "foliage," supporting the solar energy system and providing additional green space.

This large idea is supported by many small elements related to how the people will use this building every day. Mopping floors in the shaded and ventilated surfaces, for example, provides perceived cooling and surface temperature reduction experienced through bare feet. Vertical green walls flanking the main stair have perches for endemic epiphytes (air plants), and we are suggesting that each adopting parent bring a plant to add to the wall. The rooftop garden includes beds for urban farming.

The new children's center is taller than most of the buildings around it, and we hope it will be a model for a new 'emergent' approach to building in Haiti.

Give good people good information and they'll do good things.

(If you've just received this single newsletter, it may be because I thought you'd be interested in this particular subject. You may or may not get others. If you want on my list regularly, e-mail me. If you want off my list, e-mail me. Thanks!)