Strawbales, Sichuan Peppers & Sustainability: an exploration into vernacular architecture and the role of the Living Building Challenge

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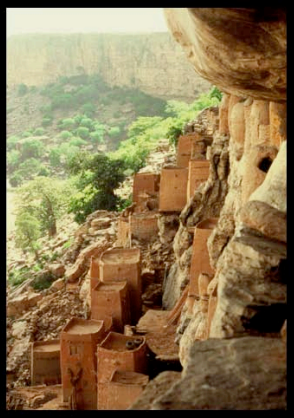
Hello. I'm going to give a fairly quick overview of vernacular architecture, appropriate technology, sustainability and the Living Building Challenge, and straw bale construction and then turn things over to Alli and Kelly to go into the details of their project in China.

Vernacular Architecture

Once upon a time all we had were non-industrial materials and processes. So all buildings reflected local resources, conditions, culture and needs…



Once upon a time… before the industrial revolution began, it's obvious that there were no industrial materials, no industrial processes. Virtually every structure built was based on locally or regionally available resources, gathered or harvested and processed by human and animal labor and adapted over time to local conditions, traditions and needs.

Evolving from Nature and Natural Materials

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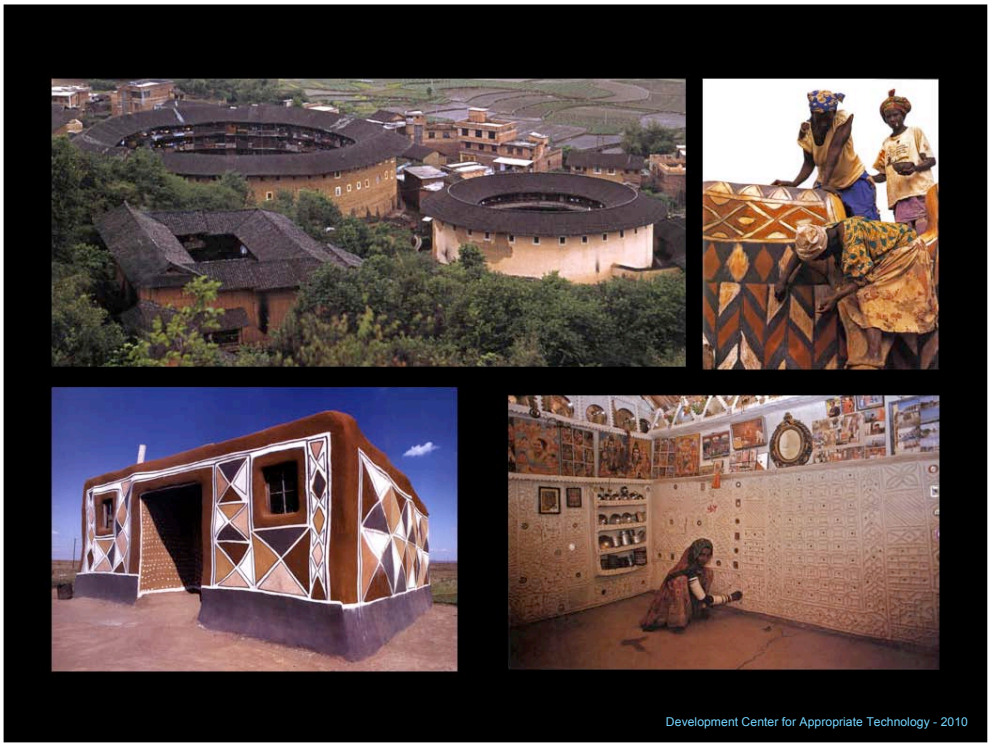
Based on what we can tell, from very early on people were observing the ways other creatures sheltered themselves and using the same materials to begin figuring out how they could create structures and shelters that would serve their needs.

Some of those materials were things that were growing around them - grasses, reeds, canes, bamboo, for example. And, of course, trees, and things like palm fronds and vines and many other plants. Many of those materials have found there way into more modern usage as well.

The diversity of solutions is nearly as great as the range of conditions and opportunities. From tree houses, to entire floating islands of reeds…

Others had to rely more on mineral rather than vegetal resources like stone and earth as well as combining them with wood and grasses and more. And over time the skills in using these materials became well developed in many places.



There is a great variety in the types and scales of vernacular buildings. Social pressures and threats sometimes led to building larger structures as fortifications for collective safety. But all over the world, while people have built for themselves in non-industrial ways, beauty has been a common element incorporated into all kinds of buildings at all scales and levels of sophistication. And even today, it remains more prevalent in buildings built by people for themselves than in professionally designed and built structures.

The practice of decorating and making self-built buildings beautiful is as diverse as it is widespread.

But what exactly is Vernacular?

Vernacular buildings are typically not built by people trained as architects, engineers or builders, following practices shaped and adapted over time by available resources, macro- and micro-climate and conditions, needs and aspirations, influenced by cultural and historical traditions.

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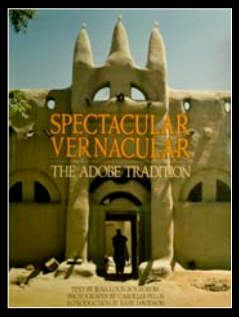
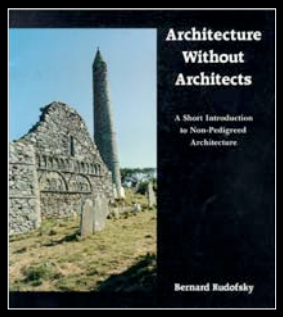
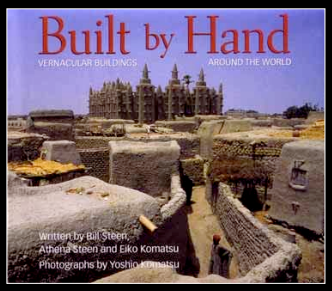
Let's back up for a moment to talk about what we mean by vernacular building or buildings. The term refers to buildings that are not professionally designed or built – not designed by architects or engineers or people who make their living building. Rather, these are buildings and building types or styles that have emerged through local practices shaped and evolved, typically, over many generations. They follow traditions that are suited to the resources available, the climate – including microclimate – and specific conditions, culture, capabilities and aspirations of the local people and communities.

Vernacular Architecture

Books like Architecture Without Architects, Spectacular Vernacular and Built By Hand give a sense of people's capacity to create appropriate solutions to their building needs.







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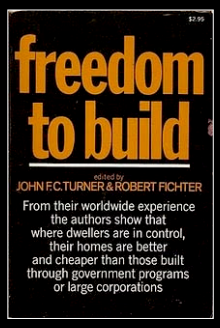
There are numerous beautiful and informative books about vernacular architecture and building, like the classics, Architecture Without Architects and Spectacular Vernacular and more recent books like the magnificent and more recent photo documentation of earthen and other vernacular buildings around the world, Built By Hand.

"Housing as a Verb"

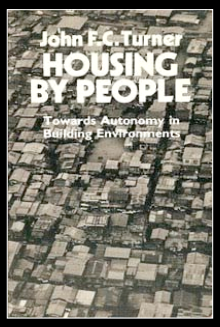


There are other considerations:

"The important thing about a house is what it does in the life of the dwellers rather than what it physically is."

John FC Turner - *Freedom to Build*

Critical in determining what a house is able to do for its occupants is often who controls the process of housing - who makes the decisions.



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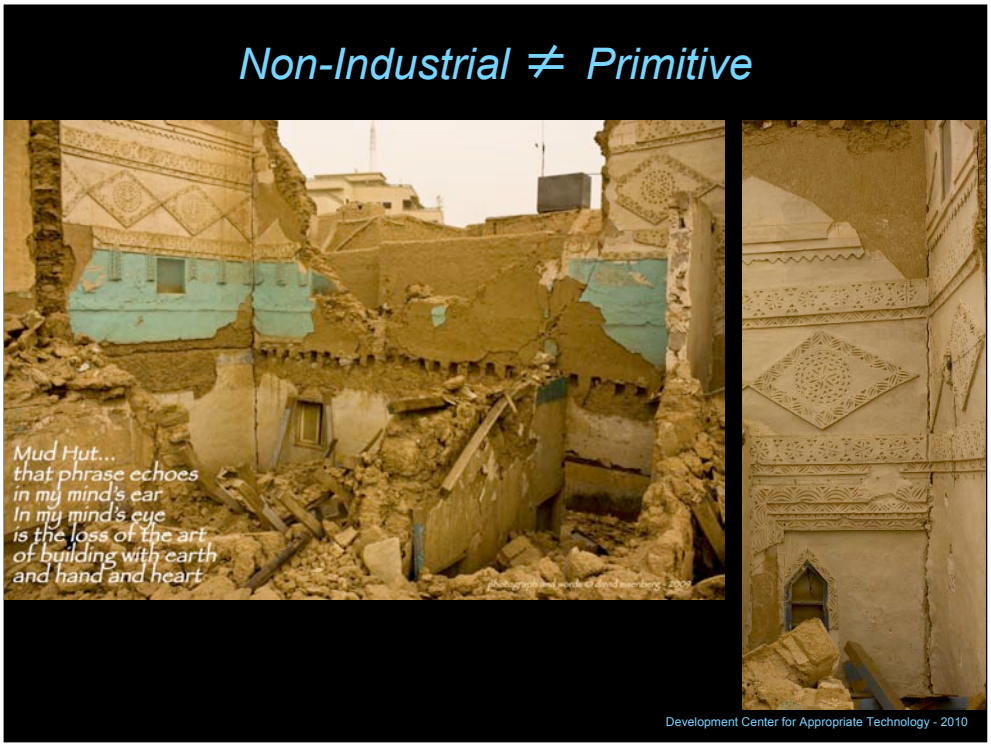
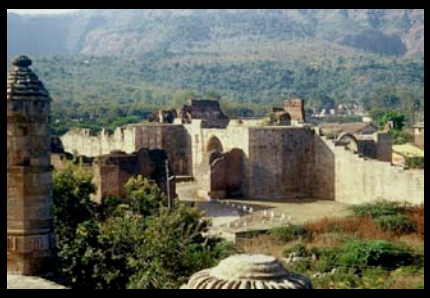
Today we have a strong tendency, when we think about buildings and especially when we think about housing, to focus on the material aspects of the structures - their materiality…what they're made of and how those things are designed and put together. The critical insights of one of my mentors, the British architect John FC Turner, had a profound influence on me and my thinking back in the early to mid 1970s. Initially it was through two books, one of which he co-wrote and edited - *Freedom To Build* - and the other - *Housing By People* - which he wrote, that changed my ideas about buildings, Among many important observations, one was embedded in a phrase he used - "Housing as a verb" - that pointed out that what was most important was not what a house was made of but what it did for its occupants. He noted that when occupants have control over the process of housing, the decision-making, that the short and long-term outcomes were almost always more satisfactory for the dwellers than when those decisions were left entirely in the hands of "professionals" whether in the private sector or public sector. John made many more valuable contributions to the field and those books are still relevant.



I also want to point out that there is a kind of cultural bias against indigenous and vernacular building, actually most forms of non-industrialized building. The tendency is to put buildings which are built from natural, minimally processed or commercialized materials as inferior and primitive. We've all heard the term "mud hut" used derisively to describe all kinds of pre-modern buildings that are hand built from local materials, and obviously, for earthen buildings of adobe or rammed earth and such. The notion that pre-industrial or non-industrial building is primitive is generally inaccurate. There certainly are many primitive buildings constructed of these materials. But there are as many or more that have been hand crafted that are extraordinarily well-built, beautiful and often much more comfortable and appropriately climate-adapted than the modern buildings that usually replace them. This is an earthen building in Old Riyadh, Saudi Arabia last April in the middle of several blocks of historic earthen buildings being torn down to make way for a modern redevelopment project. That's something I wrote to express my concern about the peculiar frame of reference that devalues the beauty, craft, caring and functional benefits of such buildings.

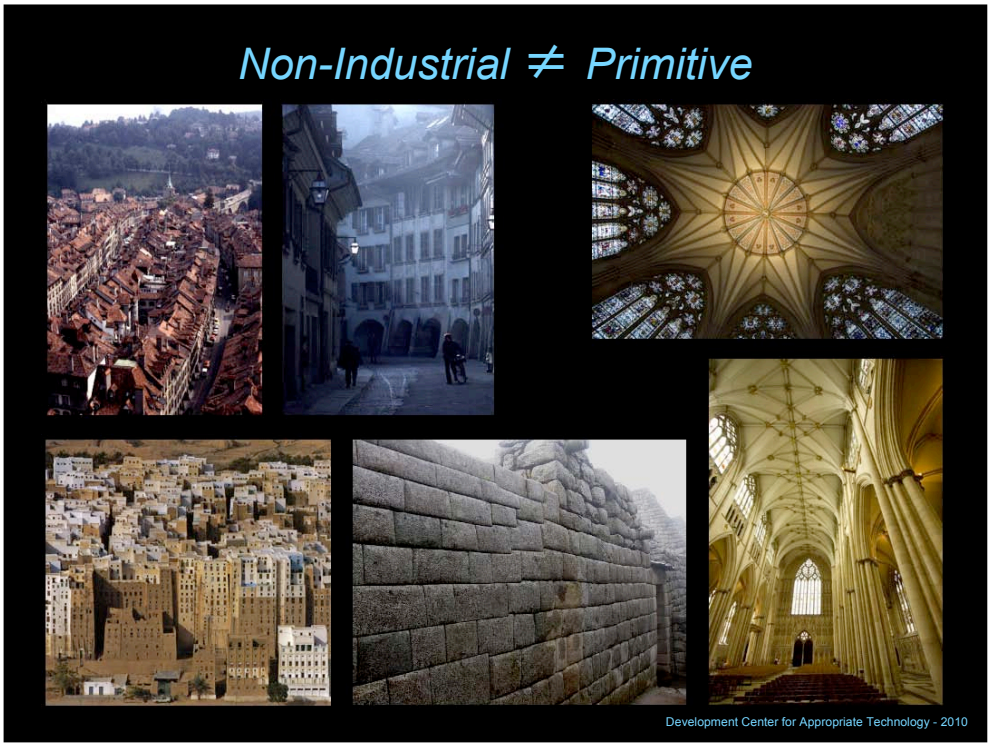
Non-Industrial ≠ Primitive

Champaner-Pavagadh
Archaeological Park
Panchmahal District,
Gujarat, India



Indian Architect Karan Grover, who helped get Champaner-Pavagadh listed as a World Heritage Site, once gave a Greenbuild presentation that showed these ancient buildings could be LEED Platinum.

To the question of whether pre-industrial is primitive, I would point to the thousands of ancient buildings that are both breathtakingly beautiful, durable, and functional, but also far more sustainable than most modern buildings. My friend, the Indian architect Karan Grover once gave a presentation at Greenbuild in which he showed how a 500 year old building in India could achieve a LEED Platinum rating. Karan was responsible for initiating the process to establish the Champaner-Pavagadh Archeological Park and get it listed as a World Heritiage Site. The picture on the left is a stone sculpture in the ceiling of one of the buildings there - approximately six and a half feet square with hundreds of spirals of life incorporated into the design.

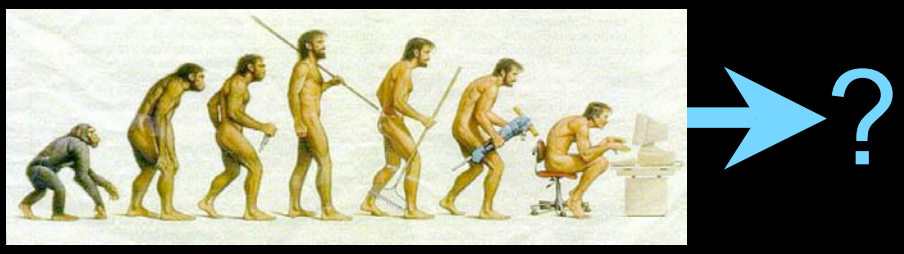


Whether cities like Berne Switzerland in the upper left - where all those pre-industrial buildings have been continually occupied for the past 800 years, or the two right-hand pictures of the Yorkshire Cathedral in England of the same vintage, or the Incan city of Machu Picchu in Peru, with it's extraordinary stone work from 600 years ago, or the five, six and seven story earthen and stone structures in Yemen many of which are several hundred years old, there is ample evidence that non-industrial materials can be used to create high quality buildings.

'Post-Industrial Evolution?'…

The Industrial Revolution *has been* about increasing human productivity by replacing labor with resources and technology. With more people and fewer resources to go around why is this still a priority?

Human labor, intelligence and skill are renewable and abundant resources. They can begin to replace energy, resource and technology intensity…



One of the little understood aspects of the industrial revolution is that it has really been about increasing human productivity by replacing labor (originally both human and animal labor) with technology and resources. That process persists today though many claim that we are no longer in the industrial age. The reality is that we are still striving for the same goal with greater and greater impacts as a result of our technology. In the meantime, we have more and more people, fewer resources to go around and we're ignoring that human labor, intelligence and skill are abundant and highly renewable resources.

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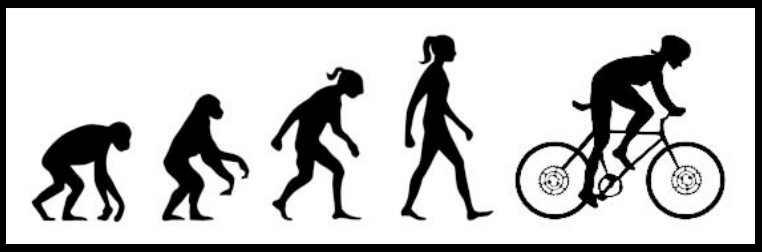

We now know what we're doing to the planet, to the base of non-renewable and finite resources available and we're in a position to move toward a much more appropriate response to what we actually need, want balanced with what we have.

Rethinking Long-Standing Assumptions

Traditional, non-industrial materials & systems were abandoned mostly because of their labor intensity, not because they're inherently inferior.

Labor-intensity = *jobs*.

Lack of support for testing, research, and standards development for traditional materials and systems has made it more difficult to gain approval for their use.

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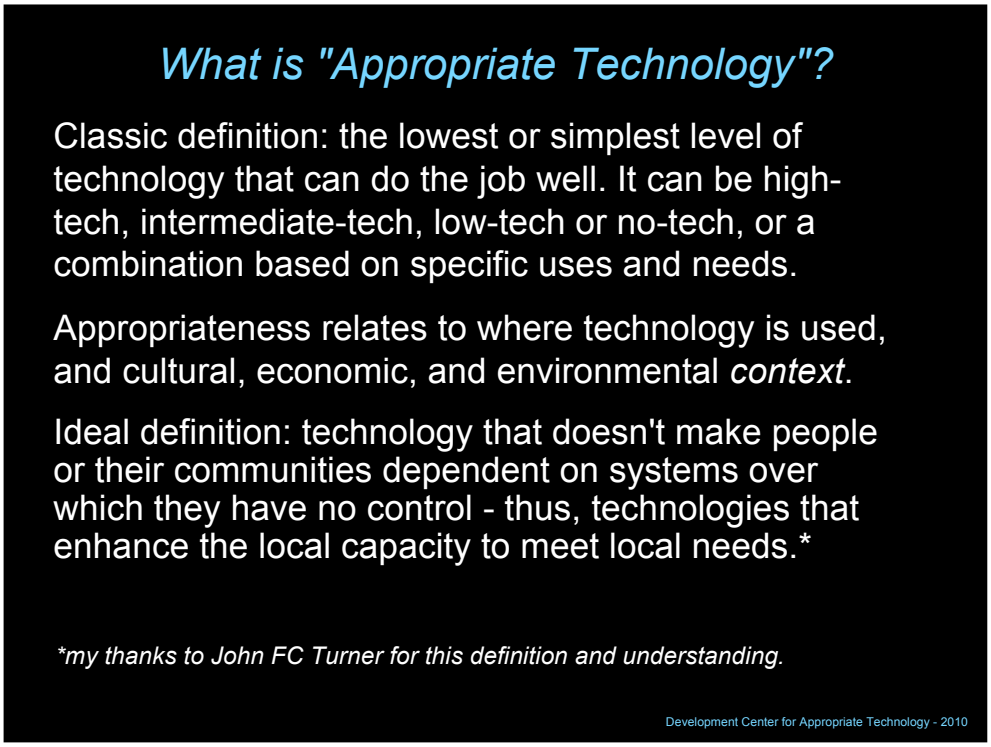
One of the important things to realize about traditional and non-industrial materials and building systems is that they have mostly been rejected not because they are inherently inferior but because they are labor-intensive. Because we have viewed labor as expensive and resources and technology as relatively cheap (mostly due to the abundance of seemingly cheap energy) we've abandoned traditional building materials and systems. This shift was in full swing as modern codes and standards were developed so they aren't included. And they don't have a big industry like cement or steel to support the research and testing and development needed to bring them into codes, so it's been hard to use them.

Rethinking Long-Standing Assumptions

Entering the Post-Carbon Era, in terms of technology transfer, we have much to learn from vernacular building as we seek ways to build smaller-footprint, more appropriate, affordable, and beautiful structures.

We've always been doing the best we could with what we had and knew…

We're at a very different moment in time now - entering the Post-Carbon, Post-Petroleum era. We will increasingly need to rely on integrating what we've learned in terms of science and engineering and design, as we find ways to use the resources we have more locally available using less energy and resource intensive processes. Smaller footprint, more appropriate, more affordable buildings are possible and we'll find a way to integrate these materials and processes into our buildings.



I want to take a minute to talk about appropriate technology. The name of my organization is the Development Center for Appropriate Technology so people ask what makes technology appropriate? A standard definition of appropriate technology is that it is the simplest or lowest level of technology that you can use to do well what needs to be done. I contrast that with our cultural bias that tells us that higher technology is always better, that there is an obligation to always use the highest level of available technology one can afford, and that when new technology is introduced the old technology becomes obsolete and is no longer useful. The reason we care about the level of technology is that higher levels of technology come with higher levels of unintended consequences and at some point the consequences are not merely unknown, they're unknowable, especially in the time frame in which we must make our choices. Appropriate technology isn't necessarily low tech. It is the right level of technology for what must be done, based on the specific use and real needs, circumstances, and to the degree that they are knowable, the consequences flowing from its use. It can be high-tech or no-tech or anything in between. My favorite definition of appropriate technology comes from John Turner, who I mentioned earlier: it's technology that doesn't make people or their communities dependent on systems over which they have no control. If we think about this seriously, it means technologies that enhance the local capacity to meet local needs - which is the true foundation for sustainability and for real security.

Awareness of Consequences

Being aware of unintended consequences can shift preferences toward *local*, *simple, less*.

A crucial benefit of doing things locally is that the feedback loops are shorter and higher quality: it's harder to miss or ignore the unintended consequences of what you're doing.

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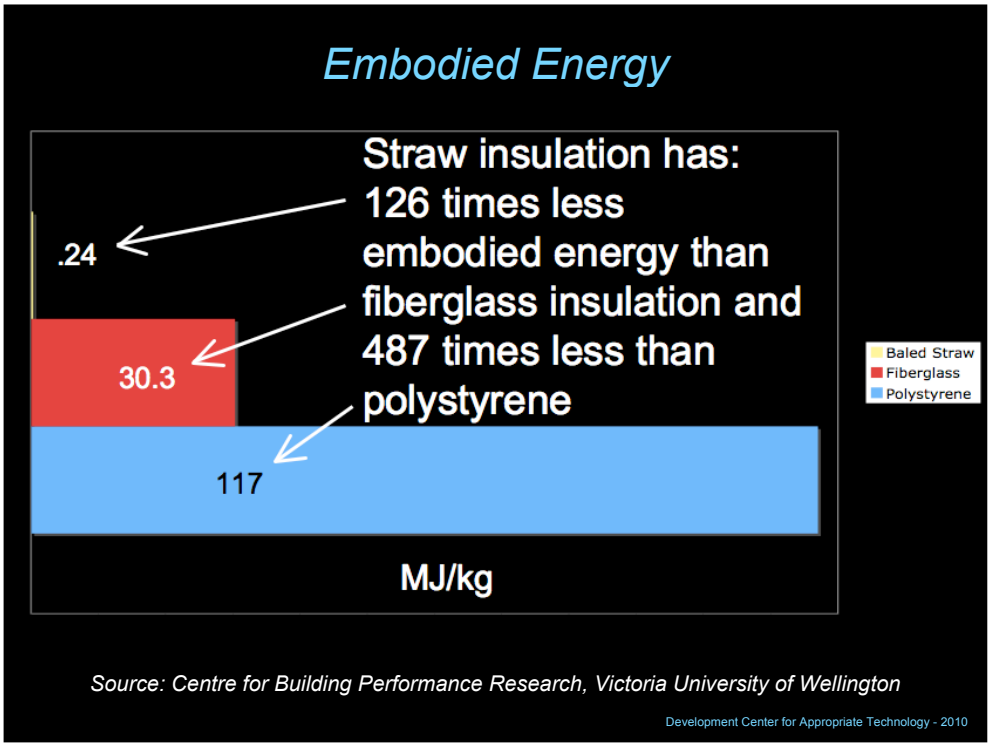
When we become aware of the fact that most of the consequences of what we do are actually unintended - all the upstream and downstream impacts associated with our choices and actions, we see that the ecological footprint of our buildings are also much larger and different from what we had in mind. That can lead to a process of asking what we do and don't know, what the nature of the impacts are likely to be, where and when they are likely to occur and so forth. That process of questioning leads to an entirely different, and far more conservative and sustainable set of criteria for our decision-making. If we care about coping with unintended consequences, we discover a natural preference for doing things as simply as possible, as locally as possible, and doing as little as possible of those things about which we know there are serious risks, or about which our knowledge is limited. There is no more rational approach to managing risk than one based on acknowledging the known and unknown and the degree of risk associated with it. The biggest benefit of doing things locally is that the feedback loops are shorter and higher quaility and you're much more likely to run into the unintended consequences of what you're doing than if you do it somewhere else.

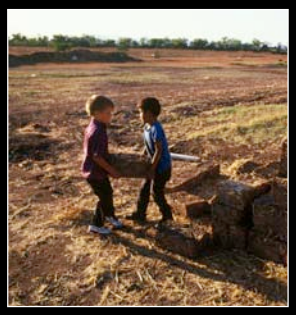


An example that ties to what Kelly and Alli will be talking about in a few minutes is to take a look at the embodied energy of different kinds of insulation. One of the reasons that using straw makes sense where it's available and appropriate to use is that it provides excellent insulation but has a tiny amount of embodied energy compared to foam or fiberglass. It's also an annually renewable agricultural by-product—the dried, dead stems of cereal grains such as (wheat, oats, barley, rice) after the seed heads have been harvested. We had to add the arrows so that people would notice the straw in this graph.

Rethinking Long-Standing Assumptions

We have to begin to develop the transitional strategies that can bridge to a future that works for our great-grandchildren.

For that future to emerge, our technology must become rooted in the rediscovery of the virtues of *reverence* and *justice.**



**my heartfelt thanks to Paul Woodruff, Barry Lopez and Bill Moyers for this bit of clarity.*

What is clear to anyone who is paying attention to climate change, peak oil, peak gas, peak water, etc. is that we have to fundamentally change all our human systems and do so relatively quickly. What we need are transitional strategies to get us from where we are to where we need to be if our children and grandchildren are to have any hope of having a healthy and decent existence. We need to shift toward technology that is rooted in the virtues of reverence and justice. Reverence for the past and future of all life and justice for those here and all those coming.

For the Good of All for the Long Haul

So this focus of the LBC on creating built projects that *belong* where they are and *work for the good of all for the long haul* has old, deep roots. It also grows out of a new awareness about unintended consequences.

PETALS

SITE
- Limits to Growth
- Urban Agriculture
- Habitat Exchange
- Car Free Living

WATER
- Net Zero Water
- Ecological Water Flow

ENERGY
- Net Zero Energy

HEALTH
- Civilized Environment
- Healthy Air
- Biophilia

MATERIALS
- Red List
- Embodied Carbon Footprint
- Responsible Industry
- Appropriate Sourcing
- Conservation + Reuse

EQUITY
- Human Scale + Humane Places
- Democracy + Social Justice
- Rights to Nature

BEAUTY
- Beauty + Spirit
- Inspiration + Education

The Living Building Challenge is actually a pretty good start at creating a process to create a built environment that belongs where it is built, and that works for the good of all for the long haul. It is one of those transitional tools that we need.

The Living Building Challenge 2.0

The Living Building Challenge is an evolving standard acknowledging the importance of and embodying deep recognition of connectedness, a reverence for life and living systems, for place, for health, for beauty, and for inter-generational and social justice in our goals for the built environment.

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I don't have time to describe the LBC in depth but the new version - 2.0 - moves further in the right direction of incorporating the larger set of impacts into a design and building and ongoing operational process embodying the reverence for life, place, beauty, health function and current and intergenerational justice.

The Living Building Challenge 2.0

The LBC starts by focusing on building where and what is appropriate to build.

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Place is crucial and this is where the LBC starts - only building where it is appropriate to build and only building what is approriate to build there.

The Living Building Challenge 2.0

There are historic precedents for nearly every Petal in the LBC, though in many cases we would find some of our modern expectations or demands for comfort and convenience unmet.

But we've been closer to meeting many of these ideals in the past than we are now.

The focus of today's journey is on both materials and the process of finding appropriate solutions after disaster…

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The LBC has an integrated set of areas that must be addressed and there are good historical precedents in many of them going back to what makes many of the best examples of vernacular building so good. So it isn't going back, it's going forward in a more holistic and informed way.

We've lost our faith in natural materials…

Because we know that they can fail catastrophically…

We know that there are issues with many forms of older materials and building systems. We no longer trust earthen materials in earthquakes because they can and frequently do fail catastrophically.

But we trust industrial materials…

…though we know they fail catastrophically too,
AND can kill in a thousand slow ways as well…

As do many of the industrial materials we have come to rely on and trust. And those materials, with their huge ecological and resource footprints jeopardize public health, safety and welfare as well, in more hidden and often much larger ways.

and we have old and new examples…

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What we know is that with proper design and construction care, we can build buildings using these materials and systems that can last as longer than their industrial counterparts.

We also know that we can build these lower-impact buildings and make them beautiful.

That can include extremely low-cost shelter in the developing world, as in these houses in Mexico built by women and their families and friends for about $500 USD with the assistance of Bill and Athena Steen and their non-profit organization The Canelo Project.

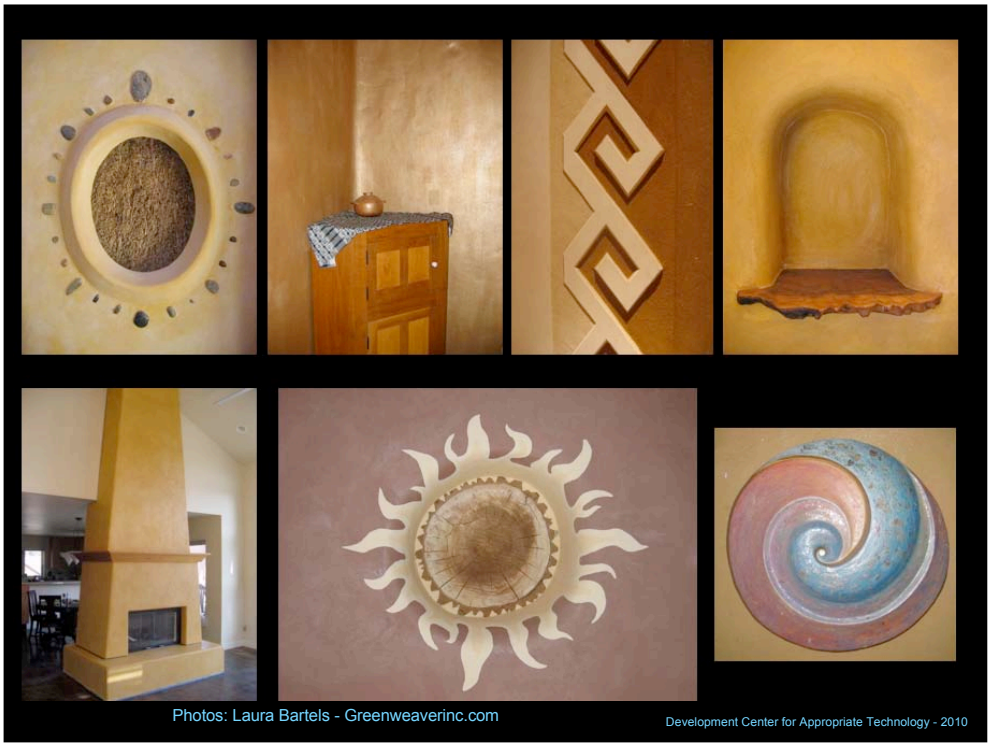
to High-end Residential and Commercial

Entering this time of enormous change, these ways of building will likely play an increasingly important role in the near future.

Photos: Laura Bartels - Greenweaverinc.com

And it can also include upscale homes, schools and commercial buildings like these.

I like to point out that there is no reason not to mix these materials where it makes sense to do so. Use the industrial materials carefully and well and especially where they can enhance the performance and durability of the natural or alternative materials. Likewise, use the low-tech, low-impact materials where they shine, where they add performance, beauty, health by their lack of toxic chemicals and so forth. There is a big pallette to choose from and we need to learn to choose wisely as we go forward and this is an opportunity to integrate this more sustainable set of materials and approaches into mainstream practice.



These materials reintroduce craft and beauty and soul to our buildings. This is something that most modern materials and building systems simply can't accomplish. And these are the characteristics of buildings that lead people to care for them for the long haul - people don't take care of what they don't love.

Rethinking Long-Standing Assumptions

As for process, my colleagues Alli and Kelly will go into detail, but I want to offer a few thoughts about going to another place to 'help.'

It's worth remembering—you're likely dangerous when in 'help mode.'

And, pay attention to what locals know. Ask what, why, how, who, when and more. Balance whatever 'expertise' you might be bringing with the crucial 'inpertise' of the locals…

Finally, a few thoughts about things that I think are important to remember if you're heading off somewhere to "help." I think when we're in "help mode" we tend to be dangerous. I say that because we tend to make some assumptions - like that what you know and have to offer is going to be helpful, needed, appropriate, wanted, needed. It may well be, but the most important thing you can take with you are questions - to find out if any of those possibilities are actually true. And it's also crucial to remember that when you come from outside with your expertise, that needs to be used in harmony and balance with the deeper, longer, place-based "inpertise" of the locals.

Lastly, this is another of those buildings in Riyadh that were being torn down last year and something I wrote about one of the things that people have done in such buildings for millennia - sleep on the roof under the stars…something we rarely design for, and my own reverence for what that does for us. Thank you, and now for Alli and Kelly and Act Two.

David Eisenberg, Director

Development Center for Appropriate Technology
www.dcat.net

Credit to Lisa Marie Lanz, Laura Bartels, and Bill Steen for some photos in this presentation.