The Role of the Nature in the Future Built Environment

Webinar on March 18, 2015
Panelists: Mary Ann Lazarus (HOK), Chris Garvin (Terrapin), Thomas Knittel (HOK)

Summary by Nora Wang, John Goins (PNNL)

1. **Topical summary of presentations**

    1.1. **Resilience (Mary Ann)**

    - **Knowing the conditions and boundaries**

        o Understanding how natural systems survive and thrive is a key strategy for how we build and live in the future. We live within finite conditions. We live within a dynamic state of equilibrium where there is always change to which we must adapt. There are three strategies that can help with living within these finite conditions: biophilia, biomimicry, resilience.

        o Changing conditions happen in two different time period. There are two kinds of change: acute (short-term) and chronic (long-term). We tend to pay attention to the acute changes (like earthquakes) and should pay more attention to the long-term impact such as sea leveling rising.

    - **Meaning and Definitions**

        o Ecosystem resilience is "a measure of how much disturbance and ecosystem can handle without shifting into a qualitatively different state. It is the capacity of a system to both withstand shocks and surprises and to rebuild itself if damaged." (Stockholm Resilience Centre)

        o Building resilience is the capacity to adapt to changing conditions and to maintain or regain functionality and vitality in the face of stress or disturbance." (The Resilient Design Institute) It is not about moving back the old state, but being able to adapt to changes and moving forward.

    - **Four overarching resilient strategies**

        o **Survivability:** Find solutions for during or following acute events and allow minimum impact for survival and recovery through regeneration, redundant systems, and the ability to function without water and energy for a time (For example, we should provide buildings with survivable conditions during or following acute events when there is no access to energy or water).

        o **Protect:** Protect against big shocks with buffers, such as slowing down water flow or protecting during high wind event. (Example: Big U using hard surfaces or green infrastructure surfaces to protect lower Manhattan from sea level rise and storm surge.)

        o **Retreat:** Take seasonal or diurnal refuge such as hibernation and seasonal variations. (Example; Brock Environment Center, Virginia Beach using 2100 year of flood shoreline to plan for the future stage, not the current stage.)

        o **Embrace:** embrace disturbance and recognize the new opportunities from the extreme condition/or changing conditions. (Example: Saint Kjeld's Kvarter, an outdoor park in Copenhagen using rain water to turn into a water park.)

    1.2. **Biophilia (Chris)**

    - **Meaning and Definitions**

        o Biophiia is the science of looking at how humans are impacted by the engagement with nature and understanding how health and productivity changes when people have direct connection with nature.

        o 20 years of academic research in neurosciences and health sciences looking at recovery time in hospitals, attention spans in schools, and productivity in offices. The Building community needs to think about the benefits of biophilia; Productivity gains are much larger than energy savings.

    - **Strategies**

        o Direct connection to natural systems occurs indoors by bringing in plants, water elements, and light and views out toward nature.

- o   Use natural analogues in materials and forms that evoke nature. Create physiological response in our mind although we may not consciously notice that.

- o   Use spatial organization that elicits responses in the mind and body such as prospect (view), refuge, mystery, and risk. The idea is to create diversity of spatial experiences and provoke creativity and support productivity.

- o   Provide ecological functions on site (such as water purification). In a resource-constrained world, there will be a need in the future to connect to the regional ecosystem. Buildings will be tied to the broader cycle of the region, water cycles, the nutrient load, and the limiting factors. These factors will affect our health. We want to see a seamless interaction of the natural system and the built system. Create a citizen feeling of that place.

1.3. Biomimicry (Thom)

- **Meaning and Definitions**

  - o   Biomimicry is using nature as a source for design solutions and technology transfer. Earth is a close-loop system with limited resources. The nature has figured it out long-time ago. How to translate these solutions to the man-made problems.

  - o   Many biomimicry projects were at places where there are a lot of extremes. As we moving forward, these extremes are coming to us and become our future.

  - o   Find resources to help, e.g. Wyss Foundation, www.asknature.org

- **Strategies (Case Studies)**

  - o   Look to traditional wisdom — how people make it livable in that place, how desert animals live in that place, etc. Can buildings match the ecological performance of the place that it's in (such as water collection, national ventilation)? How can that ecological performance move towards a kind of local stability?

  - o   Legislator requirements (e.g. 100% green ratio, natural ventilation in Singapore, 2 hours of sun exposure in China) integrated into green strategies drive the green performance.

  - o   New technologies (like 3D printing) may allow us very well create biomimetic parts.

2.   Panel Discussions

2.1. Can these case studies become a "norm" practice?

- Building industry moves very slowly because (1) it is in a legislated environment, (2) there is little room to do experimentation and it is hard to find people who are willing to do that, (3) codependency, such as on automobiles.

- There have been changes. Many drivers are out there: market-place driven competitions and recognitions, federal government's leadership and demonstration of feasibility and importance, changing expectations of younger generations.

- Resource scarcity associated with urbanization will force to behavior change. More activities will drive down the cost.

2.2. Are there conflicts between using natural approaches versus high tech ones?

- The challenge is integrating wisdom of the past with technology, and doing it well. We don't know what the future will be. So, putting your hope in tech only is the wrong way to go. What happens when today's tech solutions no longer work? Technologies for today's environment may not work in the future climates. Technologies need to be more adaptable, rather than being disposed when outdated.

- Integrated solutions that allow for dynamic changes. Human technologies like iPhone update themselves. In contrast, we are stuck with lots of old building technologies. We need technologies that work with human behavior to optimize outcomes.

- We should get as much technology out as we can. Very few clients today are willing to look at the bigger picture. On the other hand, many technologies today are short lives, high cost, and difficult to maintain.

2.3. We want buildings that last longer but that can accommodate the increased pace of change. How do you do this?

- The building industry moves slowly, so the pace of change may not have as much of an effect. The market will force some change though. So what can be done is thinking about how to modify and improve existing buildings while planning for future buildings.

- The current economy doesn't encourage a holistic view. Nothing should be wasted so that everything remains usable in some way. We should reuse the old buildings as resources.

- Enlightened city authorities can bring major changes and push for good changes.

- The market will ask for more changes beyond what buildings are offering today.

2.4. How will building use, types, function and ownership change? How will climate change affect buildings?

- Building ownership is driven by the economy; I don't seem major changes occurring in the future. In the past, dramatic changes to use and type happened in NYC driven by the demand associated with urbanization. This will continue to occur as more cities increase density.

- There's a shift happening towards more sharing. There will still be large landowners, but people may shift to temporary housing and less groundedness. There is a richness of experience in sharing. You can 'have' a lot but at a lower cost. The new generation is viewing things differently. Greater sense of community but with less stuff.

- Human resilience is as important as building resilience. Where there is strong community, the survival rates and ability to recover after disasters is higher. We want buildings to be able to foster stronger community.

2.5. Does cost-effective need to be redefined?

- We know that the real costs of building surpass the first costs. People are beginning to understand that it's the operational costs and people costs that add up. We see recognitions of the longer-term values.

- From an ecosystem service perspective, we need to understand the role of nature and what buildings can do to positively impact ecosystem services

- This long-term perspective is developing that focuses on occupant health and wellness since building owners and managers understand the economic impacts of the built environment on productivity and reduced absenteeism. The tech companies understand the added value because they have interests in attracting and retaining talent. We will continue to see this attitude spread throughout the building sector.

2.6. What can individuals or legislators do now?

- Become aware of these issues. Be more informed of how we can change the future collectively.

- Teach children about the nature. Engage public community.

- Ask your clients about their interests in sustainability. Personal responsibilities are important. Just ask.

- Engage local politicians. Zoning laws and energy codes can help shape the community and make better buildings and places. Cities are the right level. Friends, families, elected officials are all important.