

Using Biomimicry to Make our Landscapes More Sustainable

originally appeared in a 2015 issue of the Native Plant Society of Texas Magazine

Ever since the Industrial Revolution, the general approach to human civilization has been directed by the question: what can we extract from nature? The results have been static designs that cater to the visual needs of humans and are completely dependent on human input, such as irrigation, raking leaves and mulching, mowing, pesticides and fertilizers, to survive and maintain the domesticated look.

Maintaining these domesticated landscapes is exhausting for us. More importantly, they are exhausting our water supply and polluting our air and water.

So, let's step back and look at nature. Does she have all these problems? No, because Nature's approach focuses on low energy output with maximum output, with forms, functions and systems that changed and evolve over time.

In short, Nature is the perfect model of sustainability. Most of our landscapes have the opposite approach and are not sustainable.

The best way to make our landscapes be sustainable is to look to Nature for guidance. We can observe and learn from her forms, functions and systems. From the knowledge we collect, we can produce ecologically sound landscape designs that not only do not cause pollution or water shortages, but also enhance the quality and quantity of soil, air, water and wildlife habitats, as well as reduce the effects of erosion and flooding. Using nature to guide designs like this is called biomimicry. Examples of biomimicry outside landscape designs can be seen in suspension bridges, velcro, solar panels and even Nikola Tesla's Wardencllyffe Tower.

Now then, I know there is a trend, mostly urban, to plant sparsely and use rocks as mulch to produce a clean look that is the equivalent of a lunar surface. This is

the opposite of biomimicry. Those that favor such designs, claim these landscapes are sustainable because they do not require much irrigation, continued mulching or much plant care since there are so few plants. However, such an approach utterly denies the fact that a natural system does not need these services either. Beyond not needing those services, natural systems give back because they are functional. For instance, a bioswale running alongside an urban street can be used to collect and purify rainwater, to reduce storm drainage volumes and to direct water to street trees and vertical trellises that grow more robustly to mitigate the microclimate and shade buildings.

When biomimicry is applied to landscape design, we find ourselves learning to really see the forms and functions of individual plants, plant combinations, soil microbes, water flows and ecosystems to produce green infrastructure such as green roofs, climate mitigation, and biofiltration. We find ourselves paying close attention to proper plant selections and placements, to protecting soils during construction. Ultimately, we end up producing landscapes designs that function first as ecological systems; designs where human functions and aesthetics come second.

My question is, if biomimicry is about making ecology the priority, can we, as ego based humans, truly allow such designs to be?

I believe the answer is yes, because a sustainable design based on biomimicry can still fulfill the functional needs of humans and be visually satisfying. A design solution that uses biomimicry can be as highly designed as you want. However, the aesthetics will always be dictated by the necessary ecological functions.

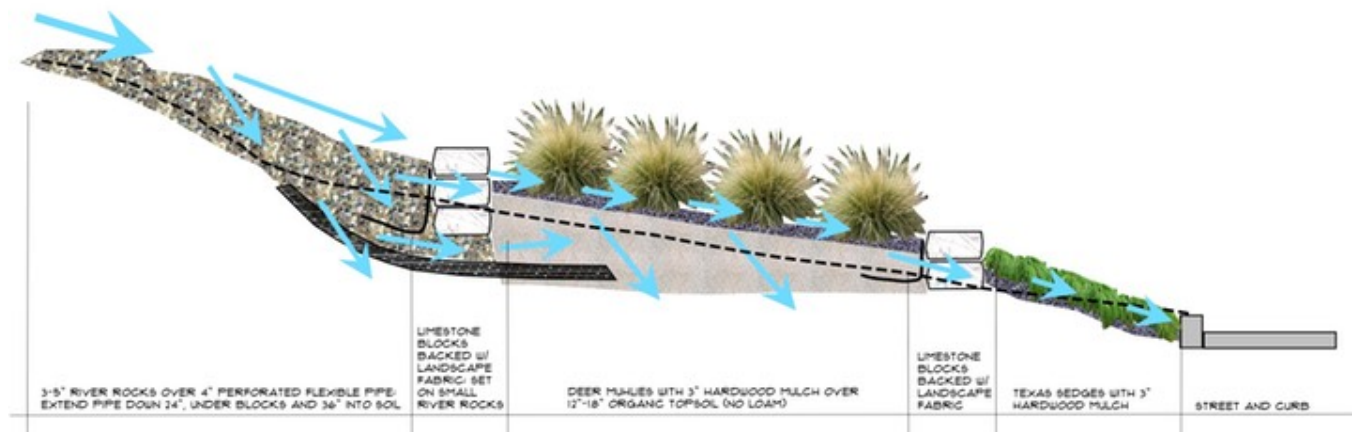
For an example, let's look at a design solution I produced for an Austin gully washer. A development upslope from one of my clients had increased the impervious cover and cleared the slope of its Ashe junipers (cedars). The result was a massive gully washer formed downslope between my client's home and their neighbor's. During a flood, waters would rush down this gully that had eroded down to hardpan caliche, and straight into another neighbor's front door. The typical, engineered solution would have been to pipe the water

under the driveway to the downslope concrete drainage inlet. This would have diverted the problem, but it would not have solved it.

I wanted to design a sustainable system that would solve the problem and utilize biomimicry.

So, I looked at what I already knew. For one, I know that the stair stepped terrain in the Hill Country helps to slow overland water flows from our frequent flash floods. At the smaller scale, I know the dense canopies of trees, such as Ashe junipers and live oaks, break the impact of rain on slopes, and that a dense cover of grasses and matted leaf litter slows overland flows. Looking deeper, I also know a large percent of water captured by the tree canopies flows down the trunks, enters the soil and travels deep along larger tree roots.

I then applied my knowledge to solve the problem. Having only a narrow space between the two homes, I had to go more vertical than horizontal. So, I duplicated the function of tree roots with a downward sloping perforated pipe and I added terraces, deep, organic soil and dense, native muhlies and sedges to slow overland flows and allow for deep infiltration.



Once installed, Austin was hit with the October floods of 2013. I drove to the site a few days later and it was as if no flooding had occurred. Not one piece of mulch...not one rock...nothing...had been washed down. After several severe floods, the design still serves as a functional, sustainable system, growing stronger with time.

This is just one example of using biomimicry to guide a landscape design. I believe it is time to rethink our approach and societal views of what defines a good landscape design. We need to put an end to design that serve as a static stage for plants that serve no other purpose than “icing on the cake.” Instead, I see the potential as a landscape designer to develop designs, installation and maintenance processes that work with and evolve with nature.

SUGGESTED RESOURCES

<https://www.youtube.com/watch?v=NlrodEsRpU>

Biomimicry: Using Nature's Genius for Human Innovation, by Jeff Gonot <http://land8.com/profiles/blogs/biomimicry-using-nature-s-genius-for-human-innovation>

Biomimicry - How Doing It Nature's Way Will Change the Way We live, by Fran Sorin <http://www.gardeninggonewild.com/?p=23890> website article

Biomimicry: Innovation Inspired by Nature, by Janine M. Benyus <http://www.asknature.org/>