



Nina Katchadourian, Mended Spiderweb #8 (Fish-Shaped Patch) (detail), 1998

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The artist writes:

"The Mended Spider Web series came about during a six-week period in June and July of 1998, which I spent, on Pörtö, a Finnish island in the Baltic Sea. In the forest and around the house where I was living I searched for broken spider webs which I repaired using red sewing thread. All of the patches were made by inserting thread segments directly into the web, one at a time. Sometimes the thread was starched, making it stiffer and easier to work with. The short threads were held in place by the stickiness of the spider web itself; dipping the tips into white glue reinforced longer threads. I fixed the holes until it could no longer bear the weight of the thread. In the process, I often caused further damage when the tweezers got tangled in the web or when my hands brushed up against it by accident. The morning after my first patch job, I discovered a pile of red threads lying on the ground below the web. At first I assumed the wind had blown them out; on closer inspection, it became clear that the spider had repaired the web to perfect condition using its own methods, throwing out the threads in the process. My repairs were always rejected by the spider and discarded, usually at night, even in webs that looked abandoned."

Mending Webs: how to think about ecological / green / sustainable design when we can't even agree on a name for it

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The Mended Spider Web Series by artist Nina Katchadourian contemplates the relationship between the human-made and the rest of the natural world. Her red threads, discarded each morning, ask how we are to act in the world in order to mend rather than tear. At heart, this is the complication of designing ecologically. Without a spider to fix our mistakes so dramatically, how do we evaluate what we've done? How do we know what to do?

### Nature

Turning directly to nature as a source of information and intelligence forms a strong theme in the sustainable literature. Returning to the spider web, scientists are now working on methods of manufacturing fibers based on the silk produced by spiders for their webs. As Janine Benyus writes in *Biomimicry*, "If we could learn to do what the spider does, we could take a soluble raw material that is infinitely renewable and make a super strong water-insoluble fiber with negligible energy inputs and no toxic outputs." By considering nature as a model for processes rather than form, Benyus argues we can find the path to ecological design and invention.

In *Green Architecture*, James Wines (2000) expands on biomimicry in relation to architecture, but is also keen to probe the architectural possibilities in the end of the industrial age and the beginning of the "earth-centric" era. Wines describes nature as "primal, metamorphic, and endlessly ambiguous. The mission ... is to recover those fragile threads of connectedness with nature that have been lost for most of this century." Part of this mission is not only to learn from nature, but to realize once again that people *like* nature and are better off when not separated from it by the built environment.

*The Biophilia Hypothesis*, edited by Kellert and Wilson, argues that "human identity and personal fulfillment somehow depend on our relationship to nature". For architecture to be sustainable, it will also need to reconnect the inhabitants with the natural world outside. Biophilia poses a course of action that architects understand immediately and can choose to follow in pursuit of sustainable design. But re-connecting with the natural world does not guarantee an ecological building or development. How else are we to know what to do?

### Points, Principles, Commandments and Precepts

While Wines critiques the "tendency of the design profession to restrict 'green' to checklists of moral responsibility", he himself includes such a checklist which

reminds us to make smaller buildings, use harvested lumber, situate buildings to make use of solar energy, and so forth. Benyus, as well, includes the “ten commandments of the redwood clan” to assist us in action. In doing so they recognize the long standing history of the architectural treatise and a truth about how we practice.

Statements of principles have played a significant role in architectural theory and history. From the *Ten Books of Architecture* by Vitruvius two thousand years ago, to Albertii's *De Re Aedificatoria* (1450) and Le Corbusier's *Les 5 Points d'une Architecture Nouvelle* of 1926, the treatise guides the designer toward appropriate action by stating a set of principles and, often, backing them up with specific examples. Inherent in the notion of *principle* is a dual meaning that tells us how to act and then grounds that action in a fundamental condition: With principles, the underlying fundamental laws tie specific actions to a larger ethical agency. Inevitably, the authoritative voice borrows from that of the Ten Commandments, indicating a truth that is not to be argued with, but followed to the best of one's ability.

In *Ecological Design* (1996) Sim Van der Ryn and Stuart Cowan recognized that Le Corbusier was on to something in selecting 5 points, resonating with the five orders of classical architecture. William McDonough's *Hanover Principles* (1992) proposes nine principles, which is also the number of precepts described by John and Nancy Todd of Ocean Arks International. John Lyle developed twelve strategies for regenerative design.

Situated somewhere between guidelines and commandments, such lists feel potent with good ethics and design possibilities, but are hard to translate into specific action. Most are phrased in the vocative: make nature visible, rely on natural energy flows, match technology to need, and similar. To put these into practice relies on a different type of architectural text: the guidebook or handbook. Mendler and Odell's *HOK Guidebook to Sustainable Design* in the United States and *A Green Vitruvius* address the gap between intention and action, general principle and on-the-ground job organization and design process. Leaving the why and what to previous texts, these guidebooks assist with organizing the minutia of the how.

Which still leaves evaluation. To have some measure of our successes and failures, in lieu of the spider judging our webs overnight, we can turn in two directions: the accounting methods and the checklists.

### Evaluating Sustainability

In many codes, much like California's Title 24, there is a choice between the performance path that asks the building overall to meet a performance goal and the prescriptive path that checks on the compliance of the component parts of

the building. We can find the same characteristic division in sustainability evaluation.

The performance path delves into the complex arena of whole system performance – accounting for the entire ecological impact of a building, conceptually based in large part on the ecosystem work of Odum and Odum in the 1950s. To date these systems of sustainable evaluation tend to inform the larger conversation rather than find use in practice in the U.S. *Our Ecological Footprint* by Wackernagel and Rees is a method for calculating the amount of land and resources required to support a given development or community. Life Cycle Assessment methods (LCA) and the accounting for green house gas emissions (GHG) are gaining currency outside the U.S. Much of Europe, as signatories to the Kyoto Protocol, evaluate building performance in terms of carbon emissions or GHG emissions, a metric ignored or bypassed in the United States.

The prescriptive path, in the form of checklists, tells us how to achieve each component of sustainable design and rewards us for each individually. The more parts, the more “sustainable” the design. LEED (Leadership in Energy and Environmental Design), developed and managed by the US Green Building Council, is the most broadly used metric for sustainable building in the United States. To the same extent that LEED has enticed building owners in the public and private sectors to ask for sustainable design, it has attempted to streamline and simplify the knowledge and expertise required to use the checklist. A highly flawed system, often without respect for technical accuracy, LEED has nevertheless achieved the market transformation for inclusion of sustainable concerns in the United States building industry that previous efforts have not.

LEED is joined in use by local evaluation systems, such as BUILT GREEN, the Colorado Residential Rating System and Certified Green for Eco-Hotels. LEED is also being challenged by alternatives such as Green Globes, a web-based building performance tool from Canada reworked for U.S. application. Similarly, a number of evaluation and assessment systems have been developed outside the U.S., such as BREEAM (Building Research Establishment Environmental Assessment Method) in Great Britain.

Ironically, the prescriptive assessment systems such as LEED downplay the rigor and expertise necessary to achieve a sustainable building and simultaneously distance ecological concerns from design. When daylighting becomes a spreadsheet calculation, when energy flow is disengaged from thermal comfort, when the sustainable aspects of a building and site become invisible and un-experienced, bad design can be, and is now, certified as sustainable.

Wilderness Gets a Perfect Score

In 1969, Malcolm Wells published *Gentle Architecture*, in which he proposed that we could measure our buildings against wilderness because we know that wilderness is sustainable. In his “Wilderness Based Checklist for Design and Construction” positive points or negative points are awarded on fifteen measures of performance, including “creates pure air”, “creates pure water”, “stores solar energy”, “maintains itself”, “matches nature’s pace” and “is beautiful”. Wilderness receives the maximum possible of 1500 points.

In 1969, well before the OPEC embargo, Chernobyl, evidence of global warming and the science of the last thirty five years, Wells seemed far on the margins of architectural thought and practice. How could one ask a building to grow food for the inhabitants? Or store rainwater? Or provide habitat for wildlife? And better yet, why? From the vantage point of 2005, Wells’ checklist seems almost mainstream, nearly a blueprint for LEED or Green Globes.

But our comfort with the Wilderness Based Checklist is misleading. Wells is challenging us to engage in sustainable issues as a set of ends, not means; as a set of ethics not tradeoffs; as a means of being responsible rather than marketable. As such, his ‘checklist’ reaches toward the “ecological sustainability” defined by David Orr in *Ecological Literacy* (1992), rather than settling for “technological sustainability”. Wells gathers the advantages of biomimicry and biophilia and tells us we can, indeed, assess what we are doing, both pragmatically and ethically. Above all, Wells reminds us that being beautiful is just as important as any other performance metric.

Williamson, Radford and Bennetts make this case eloquently in their highly intelligent *Understanding Sustainable Design*: “Sustainable designing means taking responsibility to anticipate the wide consequences of a building proposal ... rather than prescribe a limited range of sustainable building solutions we should support an increased richness and diversity of solutions crafted in joy and care. “ The most convincing sustainable design is that which we value enough to maintain, re-use, re-inhabit and pass on to future generations. The most sustainable design must start as good design.