ECO-RESTORATIVE DESIGN: AN EVOLUTIONARY PROCESS TOWARD CARE FOR THE GREATER COMMUNITY OF LIFE

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And God blessed them, and said unto them, “Be fruitful, and multiply, and replenish Earth, and care for the fish of the sea, and the fowl of the air, and every living thing that moves upon Earth.”

—Genesis. 1:28 (paraphrase).

While pushing wheelbarrows on the community renewal project known as Fifth City on Chicago’s West side, fascination for designing buildings first stirred within me. Working at the former campus of the Institute of Cultural Affairs, I was hauling broken bricks and century-old row house debris during the hottest days of 1963. I remember our talks in the shade of the old seminary dining hall. We brainstormed about how bricks and mortar would help set the stage for reshaping human community for the poor. But while sitting in the cool shade it never occurred to me that using bricks and mortar also changes the natural world, for better or worse.

Ensuing studies at Rice University birthed in me a reverent regard for Ian McHarg’s ideas, who authored his landmark book Design with Nature in 1969. Ian’s ideas sparked our graduate class toward the integration of human activity and care for the natural environment. Such ideas caused me to rethink how best to apply my Master of Urban Design degree through the application of sustainable, ecologically responsible design.

In June 1993 I again found myself back in Chicago. There, while participating in an international architectural convention, we formulated a global “Declaration of Interdependence for a Sustainable Future.” My architectural practice was transformed. Since that time I have sought ways to build the Earth through sustainable design. The seeds of the eco-restorative movement ideas I am offering here germinated in Chicago.

The insights gained in those earlier years blossomed when I read Father Thomas Berry’s The Dream of Earth. His visionary grasp of humanity’s relationship with Earth helped me see how human perception about the natural world is fundamentally shaping our time in history with the passing of each day. He foresaw our rush toward a new era wherein the natural world will seem to have turned the tables against us. He envisioned the natural world regaining the reverent attention once deemed so worthy by our ancestors. He also understood the human community would finally have to come to grips with the visceral prospect of its own extinction.
Eco-Restorative Design and Architecture

Today architectural design professionals are looking beyond the boundaries of their previous notions about green architecture. I am offering eco-restorative design as an evolution of thinking which finds its genesis in “green architecture,” and its progression from “sustainable architecture.” What eco-restorative design adds to sustainable design thinking is attention to the greater community of life. Eco-restorative design aims at restoring Earth to its indigenous level of fecundity. That is to say eco-restorative design helps design and redesign buildings that restore local ecosystems’ ability to flourish, thereby generating more biomass.

Of all the environments to be found on Earth, the most diversified human cultural environments are to be found in cities. Urbanized land is in most dire need of reclamation, soil rejuvenation, and natural ecosystems restoration. Cities comprise man-made environments severely disconnected from natural processes. Eco-restorative design applies appropriate technologies to render our streets, vacant lots, and roof tops as contributors to the restoration of our planet’s ecosystem.

Re-Thinking Technology: Combining Hard and Soft Technologies

Western culture’s great hope is that through technology we can control nature and solve our ecological problems. We think in terms of inventing new technologies that will enable us to produce more food, solve climate change, and other ecological ills. But so far application of new technologies has failed to reverse Earth’s ecological decline.

Let’s take a look at a sampling of our technologies that many people believe will eventually turn the tide on global warming:

- **Thin film and applied photovoltaic coatings** which can transform roofing and building siding into solar energy collectors.
- **“Phase change” adjuncts to traditional wall and ceiling insulation products** which reduce ranges of temperature variations in buildings.
- **Precast concrete foundation cisterns** that are designed to store rainwater, structurally support buildings, and add malleable thermal mass to buildings.
- **Biodegradable packaging materials and related products** which can be used as natural fertilizer inputs.
- **Recycled and reused materials in manufacturing** which eliminate waste streams coming from manufacturing.
- **LED lighting** which uses a fraction of the energy used by fluorescent lamps (fluorescent technology uses mercury and therefore is a waste hazard).
• **Aerophonic crop rooftop production** is being developed in Pacific Rim countries with the objective of creating urban farming industries on top of buildings having flat roofs (presages use of urbanized areas as food resources for people).

• **Renewable fuel resources** intended to serve reciprocating engine technology will move from use of precious food stocks (like corn) to algae propagation which can generate doubled biomass production every 24 hours.

• **Fusion energy production**, a near limitless source of clean energy, but not yet achievable and unlikely to be achieved within the timeframe needed to significantly affect CO$_2$ emission reductions needed to neutralize greenhouse gas propagation.

Another landmark development is the new “high performance” building certification process now being used in the United States. Governmental and educational facilities are adopting the use of a new building design and construction certification process known as Leadership in Energy and Environmental Design (LEED). Architects and people associated with the design services industry are using LEED guidelines to help them develop sustainable buildings and related site improvements. The incorporation of these sustainable design criteria is intended to reduce energy and resource consumption, which in turn helps reduce CO$_2$ emissions. All these are wonderful developments. But they are not enough.

Within the next ten to twenty years, “LEED – New Construction” buildings will affect roughly 2% of America’s building stock. But what about all the existing structures whose thermal performance pales in comparison to these high performance buildings? And what about the economics involved in retrofitting the new technologies listed above? Using LEED guidelines will take more time than is left for us to transform our inventory of extractive-use buildings into net energy-exporting buildings. In the face of this situation, what can be done to bring America in line with average worldwide energy use patterns?

Photovoltaic electrical generation, solar water heating arrays, wind generated electricity, and associated renewable energy technologies are promising a better tomorrow in the minds of most people. Such technological applications are very important to our future. They are indeed part of the solution to global warming. They have, however, a very significant drawback. These sophisticated delivery systems require a high degree of specialization, centralized distribution patterns, and highly skilled labor resources to produce, install, and maintain them. Access to such technologies tends to be limited in many parts of the world because they are “hard” technologies. They can be viewed as such because they are difficult to acquire and bring on-line in most underdeveloped locations around the world—including inner city America. What is needed to counterbalance the relative unavailability of these hard technologies are sustainable scientifically based globally applicable processes which can be referred to as “soft” technologies.

Soft technologies are about using locally available human and physical resources as we find them. Soft technologies combine ancient agrarian sciences of indigenous peoples with contemporary Agrarian Earth Science, such as that popularized by Bill Mollison in the 1980s. He and his partner in Australia developed nature-based ways for people to interact with surrounding ecosystems. Mollison saw it was possible for humans to live in harmony with
nature. He coined the word “permaculture” to identify this contemporary cultural form of living lightly on the land. Today one can find examples of whole communities whose interactions with nature are based on permaculture, “natueco,” and related agrarian Earth sciences throughout the world.

Soft technologies involve processes that are decentralized and available to people everywhere in the world. They are needed to complement the use of hard technologies. In contrast to hard technologies, which are costly and inaccessible to many people in the world, application of permaculture-based sustainable crop production can be universally adopted. Even in developed countries these soft technologies are needed to complement hard technologies.
Universal human participation is key to meaningful global ecological transformation. Combinations of hard and soft technologies can be used in cities and human habitations throughout the world to address climate change. This combination of hard and soft technologies provides the means for every person to be involved.

**Visions of an Eco-Restorative World**

Here are some visions of how an eco-restorative world might look.

**Local Economic Flows**

This process begins with people and the decentralized economic activity patterns they can generate. The key barometer for local exchange and flow of commerce is money distributed within local neighborhoods and communities. When compared to the energy-intensive centralized corporate world, such economies are less energy consumptive and, therefore, healthier for the planet. The energy needed to produce and transport locally grown produce is significantly less than needed for agribusiness-produced imports sourced from remote locations.

Localized economies offer social benefits as well. Human accountability is one of these. Local producers often have direct contact with their end-use customers, so the incentive to produce higher quality is more immediate. In the world of localized thinking, economics is just one factor. Locally derived recycled water and energy flows, urban farming, individually owned corner grocery stores, local-exchange currencies, and mixed-use zoning are all associated with localized economies.

**Retrofitting and Adaptive Reuse**

In most cities about 80% of the building stock that exists today will likely be occupied by successor generations of people. Even if progressive policies are followed for new construction, like the LEED program, this will not address the even greater need of retrofitting sustainable technologies into existing buildings, streets, and parking lots. The retrofitting of insulation, weather stripping, and rainwater distribution systems can be applied to most buildings.

Another concept is adaptive reuse, excellent examples of which can be found in Durham, North Carolina. The downtown area of this city is dominated by brick warehouses and manufacturing facilities built by the tobacco industry over a century ago. Today these fine buildings have been adapted for condominiums, apartments, and offices which are in high demand.
Within the urbanized world we have the opportunity to transform how human populations will retrofit soft technologies into streets, buildings, and open spaces everywhere. Opportunities for creation of community gardens and green spaces abound. We are envisioning an evolutionary green revolution leading us towards humankind’s regained synergistic relationship with the natural world in cities. This transformative vision forms the heartbeat of the future eco-restorative green movement.

**Green Collar Jobs**

In the 1930s the Civilian Conservation Corps provided meaningful work to people across America. Now is the time for a new Clean Energy Corps. The Clean Energy Corps’ mission would be to put thousands of Americans to work installing renewable energy and retrofitting urban buildings and public spaces. The broad application of agrarian Earth science is a labor intensive, site-specific process requiring large concentrations of participating people living in cities.

**Transforming Buildings into Non-Extractive Ecological Contributors**

The idea of transforming buildings from extractive resource and energy components into benign ecological contributors is now being well received in the architectural design community. It is now feasible, given a long enough period of time to render a return on capital investment, to build and retrofit buildings that produce at least as much energy as they consume. This concept has been popularized as “net zero” energy exchange between buildings and the electrical supply grid to which they are connected. In most cases, use of photovoltaic technology can achieve this objective in combination with a myriad number of devices designed to most efficiently generate, consume, and deliver electrical power. Further, the use of LED lighting is far superior to today’s fluorescent technology.

But using such hard technologies in buildings is not enough. We need to go beyond thinking about how reduce the negative impact of buildings on Earth to thinking about what they can positively give back to surrounding ecosystems. Eco-restorative sees buildings as one would see coral reefs in the ocean. Coral reefs provide habitat for myriad biota. In a similar way buildings can be seen as opportunities to enrich the fecundity of Earth. The time has come to envision buildings as biomass-enhancing ecological contributors to the planet.

Rendering both existing and new buildings into ecological contributors to the planet is very achievable. For example, rainwater flows can benefit nearby vegetative and microbial life forms that always occur around buildings. If we harvest rainwater and store it in ways that optimize building thermal-mass dynamics, and then use it to maintain controlled moisture levels in soil by means of irrigation, we can achieve the following:

- **increase macrobiotic populations in soil** through the interaction of building systems with surrounding landscaped areas (enhance fertility).
- **increase density of life populations** per square meter of ground by enhancing soil quality, soil moisture levels, and therefore biomass production.
• **enhance biodiversity** through the application of permaculture and related agrarian Earth science principles.

• **lower the sine wave of building thermal variations** making it easier to maintain comfortable indoor air temperatures through the use of water stored in foundations.

• **eliminate use of precious treated water resources for landscape irrigation applications** through adoption of water conservation and on-site rainwater harvesting and reuse patterns.

• **decrease rainwater flow velocity and volume over time** by temporarily storing storm water concentrations and runoff in building foundations (this helps protect downstream riparian ecosystems).

**Creating Micro-Edens**

“Micro-Eden” is a term which can be applied to urban localities where nature is given a chance to reestablish herself on rooftops, vacant lots, streets, and anywhere open areas are exposed to sunlight. Most urban space is covered over with buildings, parking lots, streets and other impermeable surfaces. Innovative ways to transform such life-compromising places are available thanks to the application of soft tech science based on “depaving” (removal of impervious surfaces). The application of permaculture tools, such as “bio-intensive” gardening, edible landscaping, and rainwater conservation techniques, can be retrofitted into cityscapes to make micro-Eden urban havens for people, plants, and animals where concrete formerly was in place.

**Eco-Awareness—The Heart of the Eco-Restorative Design Movement**

Even beyond the hard and soft technologies and the visions described above, there is something deeper that is the heart of the eco-restorative design movement. It is what shapes and guides how humans first perceive, and subsequently how they are then destined to interact with, nature. The outcome of this human/Earth relationship will primarily be guided by human perceptions about what matters most. The looming question before us is will we continue to treat humans as important in isolation from the larger community of life or whether we will recognize that humans and the larger community of life are a single sacred community.

One can see how it is possible to commit ourselves to establishing eco-restorative beachheads in each city throughout the world. But the transformation of the human cityscape to net ecological contributors to the planet, cannot hope for success without first sourcing from the depths of the human spirit a renewed sense of the sacred nature of all life. What underpins, what inspires, what sets us upon a course of action with deep caring, comes from our very depths as human beings.

For our global venture to work out, what inspires and drives us to commit to the “Great Work,” as Father Thomas Berry would put it, must be exposed to the light of day. The best of who we are is found in compassionate, humane regard for all of creation. The ground on which we walk is holy. We are in and of Earth—intimately connected to one another and the cosmos.
Profoundly, eco-restorative thinking reaffirms the spiritual connection that exists between humans and the natural world.

In human endeavor, be it the arts, healing a child, or climbing Mount Everest, it is what we yearn to witness in ourselves and experience in life that drives and motivates us to climb any mountain, however daunting that mountain might seem. It is for us to educate our students, our neighbors, and one another in ways that will see us present to the profundity of life that surrounds every building, every garden, and every tree.

**Conclusion**

We have considered the combination of hard and soft technologies whereby the restoration of the planetary ecosystem can be undertaken by everyone, everywhere. We have looked at how buildings can be reconceived to help restore the land areas surrounding them. We have set forth a challenge to rethink our existing building stock in ways that render the built environment net exporters of energy flows rather than continue with the extractive pattern of present day building science.

Nature herself is coming to be viewed by increasing numbers of people as central to the human world agenda. Let us respond to this new agenda in a humane, purposeful and dedicated way. Our relationship and attitude toward the natural world significantly defines who we are. What lives within our hearts will shape our destiny with this planet. Above all else, our thoughts, attitudes, and perceptions about our innate relationship with the natural world are the keys to our future failure or success.

Like our forebears, let us take up a reverent dance with the natural world in celebration of the sacredness of creation.