2009

Post-Anthropocentric Dwelling Conditions

Peter N. Hendery
University of Massachusetts Amherst

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POST-ANTHROPOCENTRIC DWELLING CONDITIONS

A Thesis Presented

by

Peter Hendery

Submitted to the Graduate School of the University of Massachusetts in partial fulfillment of the requirements for the degree of

MASTER OF ARCHITECTURE

May 2009

Architecture + Design Program
Department of Art, Architecture and Art History
POST-ANTHROPOCENTRIC DWELLING
CONDITIONS

A Thesis Presented

by

Peter Hendery

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ABSTRACT

POST-ANTHROPOCENTRIC DWELLING CONDITIONS

MAY 2009

PETER HENDERY

B.F.A., UNIVERSITY OF MASSACHUSETTS DARTMOUTH

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Directed by: Professors Skender Luarasi

The way we build our environment today is a process of protecting ourselves from the elements of nature. We build walls, roofs, and windows; we create a more predictable and controllable environment to keep out what’s felt to be dangerous, dirty, and destructive. We isolate ourselves from the things we perceive as threats. This is common practice and not illogical. Shelter is about preservation and refuge. We need to feel safe in order to prosper. What is illogical, though, is wasting all those opportunities that come along with living closer and more integrated these natural processes that are being excluded. What would happen if we were to re-integrate our lives with nature?

This examination of a re-integration strategy begins with breaking down the idea of plant and animal into basic “technologies” and learning from them. Through the use of fractal generation these technologies are embedded within the landscape to create a framework that embodies both plant and animal traits or desires of habitation. This new framework becomes the basis for the design; the ground zero for an explosion of life. The final design seeks to re-integrate the human with a whole host of organisms that already exist on site and play vital roles within the ecosystem that the human is participating in. The intention of this process is to imbue the final design with aspects or technologies that are not merely centered on human habitation conditions but are purely post-anthropocentric in that they see to the needs of all inhabitants on a particular site.
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CHAPTER I

PROJECT INTENT / PURPOSE

This examination of a re-integration strategy begins with breaking down the idea of plant and animal into basic “technologies” and learning from them. Through the use of fractal generation these technologies are embedded within the landscape to create a framework that embodies both plant and animal traits or desires of habitation. This new framework becomes the basis for the design; the ground zero for an explosion of life.

The final design seeks to re-integrate the human with a whole host of organisms that already exist on site and play vital roles within the ecosystem that the human is participating in. The intention of this process is to imbue the final design with aspects or technologies that are not merely centered on human habitation conditions but are purely post-anthropocentric in that they see to the needs of all inhabitants on a particular site.

This strategy is done with the intent to reduce waste and reduce consumption by utilizing the “natural” processes that exist in any given environment. By effectively forming a symbiotic relationship with the surroundings and allowing this landscape to actively participate in the shelter and nourishment the structure provides we take care of waste, energy/food production, and water collection at the local site level. This reduces dependency on the society as whole and puts the individual in control of their own needs.
CHAPTER II
BUILDING TO SUPPORT LIFE – PRELIMINARY RESEARCH

“Ecological design reflects new dreams that can be embodied in new kinds of environments. These dreams are not of Armageddon nor Arcadia, but of a world where nature and culture, the living world and the designed world, are truly joined, each celebrated in the image of the other. We can create an Ecological Revolution every bit as profound as the preceding Industrial Revolution. The pieces are well understood, from energy efficiency and sustainable agriculture to ecological waste-water treatment and bioregional design. We possess the collective potential to create environments that nurture both the human spirit and the more-than-human living world.”
--Sim Van der Ryn, Ecological Design (p.171)

The way we build our environment today is a process of protecting ourselves from the elements of nature. We build walls, roofs, and windows; we create a more predictable and controllable environment to keep out what’s felt to be dangerous, dirty, and destructive. We isolate ourselves from the things we perceive as threats. This is common practice and not illogical. Shelter is about preservation and refuge. We need to feel safe in order to prosper. What is illogical, though, is wasting all those opportunities that come along with living closer and more integrated these natural processes that are being excluded. What would happen if we were to re-integrate our lives with nature?

In the nature that we keep out there are a lot of great examples of organisms relying on each other for survival; like the lichen. In this case there are two very different organisms, a fungus and a cyanobacterium that co-exist in an elegant balance. The fungus protects and cultivates the algae and the algae provide nourishment. This may seem like an unlikely analogy to human civilization but it’s not. It’s merely a simplification.
Humans typically live in structures composed of dead plants. We also depend on plants and other animals for food and energy. As our societies have expanded and inhabit environments that couldn’t support us we’ve become reliant on what could be produced elsewhere and, through the use of technology, be delivered to us.

We’ve allowed ourselves to become dependent on someone else to deliver what we need for survival. Unlike the lichen we’ve put a barrier between us and the resources we need to survive. So how do we liken ourselves to the fungus of the lichen and harness all the benefits of living entwined with the flora and fauna we need?

The dilemma surrounding an indoor ecosystem begins with two similar words that represent two different ideas: Dependence and Independence. It is certainly true that our lives as humans and animals require varying degrees of these for survival. It seems to me that throughout our history on this planet a vast amount of energy has been put towards the struggle for independence. As citizens of the United States of America, we pride ourselves on our independence and freedom. In reality, however, there is an undeniable dependence we have on our nation and its leaders and citizens, as well as other nations and the environment for survival.

First and foremost we are dependent on our environment. Without food, water, and warmth, we would not last a week on this planet. The current structure of our modern society, however, functions as a middleman for the resources we need to live comfortable and healthful lives. What if we didn’t have to be so dependent on the middleman for survival and could go directly to the source. All the other animals in our environment, with the exception of our domesticated varieties, live in this manner. They live harmoniously in a symbiotic relationship with the earth. We have shunned this
lifestyle in favor of the comfort and safety of the man-made. We have banished “nature” from our homes and implemented man-made, highly inefficient means in substitute.

Secondly, we are dependent on man and his societal structures for provisions. Certainly it can be argued that many, if not most, of our modern privileges come from the use of natural resources like coal, oil, silica, wood, and iron. These come at the expense and in spite of the earth at relatively high cost; be that money, labor, or life. A civilization wholly dependent on these materials is one dependent on those that can provide them. Due to the difficulty and technology involved in their production those few that can provide these products have a vast amount of control.

Within the last 150 years our lives have become even more dependent on electricity and heat due to expanding cities and information technology. People are becoming ever more dependent on those few providers for their survival and that gets increasingly volatile. We are starting to realize that putting the control back in our individual hands holds the key to true Independence through Dependence on the earth and what it delivers to our front doors every single day.

Our society has evolved to become reliant on many public systems like sewers, food, water supply, and electricity. The booms in populations during this industrial age of ours haven’t allowed for the restructuring of our various systems. We still use some of the same methods that been used for the past 4000 years - channeling fresh water into town and piping waste out to the streets and beyond.\(^1\)

All these new “green” solutions to today’s problems help us achieve a certain level of sustainability that IS going to be effective at protecting current ways of living.

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and building. This may be good in the short term at reducing man’s harmful impacts on
the earth but in the long run it doesn’t solve our dependency issues. There are many
systems that have been kicking around that help to mitigate our dependence. Individually
these systems help people save money and resources and have been doing so for many
years but they still exist largely on the periphery.

These systems are more or less household-words in the U.S. today: rainwater
harvesting, grey water, black water, solar panels, wind turbines, hydroelectricity, geo-
thermal heat, artificial wetlands, and composting. Some of these technologies survived
from before society at large used electricity. Others are newer more advanced techniques
based on harnessing the environments latent energy through the use of electronics,
computers, and other high tech infrastructure.

Two very important technologies from this aforementioned group are Water and
Soil. They are referred to here as technologies because their intrinsic qualities lend them
to be very useful and mechanical. They both are adept at cleaning, absorbing heat,
dispersing heat, conditioning air, and supporting life.

In 2000, the Center for Sustainability at Penn State University and Ocean Arks
International became involved in a project that came to be known as The Living
Machine.ii This was in their words, “a series of tanks teeming with live plants, trees,
grasses and algae, koi and goldfish, tiny freshwater shrimp, snails, and a diversity of
microorganisms and bacteria.” Each tank was designed as its own mini-ecosystem that
effectively helped to break down the sewage from 15 faculty and staff as well as 50 to

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ii Penn State University Research, “The Penn State Living Machine, 2000”,
http://www.rps.psu.edu/0009/machine.html
100 visitors a day. As you can see, water and soil have great power, especially when combined with plants and animals.

The architect Michael Reynolds argues, “We throw away nutrients for our plants in underground sewage systems. We do this in such a way that pollutes underground water tables. Then we buy manufactured “nutrients” for our plants which aren’t as good as what we throw away. This is modern day waste water technology.” iii The idea is that what we discard, our byproducts have the power to nourish our immediate surroundings.

Using this, both as a model and as a supplement to our own survival, is an important one. As a part of our household, plants could participate in this recycling effort through consuming our food wastes, paper products, and any other matter commonly used in composting. But, do people use them for this?

It is not uncommon to find potted plants, domestic pets, and even terrariums or aquariums in people’s homes. People fill their homes sometimes with these often sterilized versions of the world around them. Why do people do this? What is the role that plants and animals play in peoples lives? These are very broad questions but it all comes down to a fairly simple concept. People feel the need to be close to growing living things.

This is known as “biophilia” in current academic circles and refers to human affinities and desired affiliations with natural systems. One could interpret this as a longing for life in closer contact with nature as a result of our increasingly distant relationship. There is an idea that is redeveloping today that strives to employ nature’s “miracles” in modern production, housing, and design which is known as “biomimicry”

or Biophilic design. This method takes advantage of our affinities and applies nature’s methods back into our lives and built / engineered environment.

Biophilic design, a term coined by Stephen Kellert (who is a Yale Professor of Social Ecology), is a process of translating the human affinity for natural systems into the design of our built environment. In an increasingly industrial and inorganic world people seem to be longing for closer contact with what we call “nature” or the non-human environment. We have an innate sense that our environment is what really supports us. This is an important idea when considering our place in the world and how we can better integrate with it.

Kellert says, “People’s dependence on contact with nature reflects the reality of having evolved in a largely natural, not artificial or constructed, world.” In other words we evolved in a symbiotic system much like the lichen and all the other millions of species of life on our planet. We grew into specialized animals that depended on their surroundings, such as light, sound, odor, wind, weather, water, vegetation, animals, and landscapes, for life. As animals needing to survive and reproduce we still depend on all these things. We have just shifted our focus to let others provide for us what has already been given.

The question at the root of this problem is: Can we re-integrate with the natural world around us? The current modes of sustainable design and fuel efficiency are proposing we let nature work for us while we sit back and reap the free rewards. While there is short term benefits to trying to save money and resources this doesn’t seem to be an answer to our long term problem of dependence. Author, microbiologist, and humanist René Dubos suggests a “Wooing of the earth”. This idea evokes a certain scene

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where humanity re-enters the world in a new way, through a way of “respect and love rather than domination.”

Here he says, “The outcome of this wooing can be rich, satisfying, and lastingly successful if both partners are modified by their association so as to become better adapted to each other.”

We have developed panels that do as plants do – turn the sun’s energy into ours. These are specific means for achieving a specific goal. How about a healthful, productive, and mutually beneficial built environment that reciprocates to the surrounding landscape? That is a much more complex problem and can’t be solved by such targeted responses like solar panels or water filters. Bringing the outdoors in can help some of the aforementioned problems by reinstating the natural checks and balances. The problem then becomes creating structures that support life inherently without much artificial input and dependence on fragile economic systems.

People are becoming aware of these dependencies in today’s world and are becoming increasingly wary of them. We know deep down that the earth and its inherent resources are in a much steadier state than any we can provide. There is a trend that is focusing a lot of time and energy at improving building performance and efficiency. One cannot be alive and not be bombarded with “Green Revolution[ary]” information these days. That is not to say it is a bad thing. Increased awareness is leading to increased change in society. Our newest President-Elect won the popular vote with promises of coming change. National policy change is one that has typically been clocked at a snails pace so we’ll see what the future holds.

There are also organizations like the U.S. Green Building Council (USGBC) who have made it a priority to reduce the impact of the built environment on the un-built

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“natural” one. Through their trademarked Leadership in Energy and Environmental Design (LEED) Green Building Rating System\textsuperscript{TM} the USGBC have developed a third party certification program that seeks to raise the bar on environmentally conscious designs. These efforts are biophilic in nature. Through policy we are seeking to align ourselves with natural systems but in terms of rate of return and cost effectiveness. This does nothing to amend our dependence problem as it merely is streamlining the process and implementing energy-saving procedures and equipment to produce a wholly “better” designed building than was designed before. It is a right step forward in making buildings more habitable and comfortable by pandering to our biophilic desires.

As mentioned before, the integrated whole building concept is a vast and complex one. So vast we are finding it necessary for the development of an entire industry to oversee and guide us in a “greener” direction. That brings us back to simplifying our problems rather than making them more complex. We can utilize the environment that exists inches from our front doors and perhaps even invite it in.

In order to truly understand the implications of the re-integration of natural systems in the built environment we have to understand what those systems are. One major player in the game is flora – plants of all types that help form a conduit between the air, sun, and earth. Plants take in energy from the sun and soil to turn it into energy for themselves. They embody that energy as sugars and starches. Inevitably leaves or branches die and fall off. In this process they return their elements to the soil, air, and water that help to nourish themselves as well as the next generation.

In the case of architect Michael Reynolds in New Mexico, he theorizes and implements this process indoors in his “Earthship” designs. An “Earthship” by Reynolds
definition is, “a self-contained vessel capable of sustaining an environment for human
habitation on its own through interfacing with natural phenomena and the nature of the
common person.”vi  He envisions this interface to be in the home where people eat, sleep,
and create a majority of their waste.

Since a normal composting process does not function during the dead of winter
this needs warmth to function properly.  In more temperate and tropical climates it can be
done year round out of doors.  Reynolds employs a greenhouse zone that fully engages
the southern side of the structure.  This long hallway hosts planters and plants that buffer
the greenhouse, its glazing and heat from the living quarters that are adjacent.  All grey
water (water that does not host any bio-hazardous material like bodily wastes) from the
sinks, showers, and laundry flow directly into their individual planter beds.

This process allows the nutrient rich water, which is formed out of food particles,
soaps (bio-degradable obviously), and other organic matter that we wash off of ourselves,
to feed and nourish the plants.  These plants can be specifically designated for their water
and nutrient consumption to match the volume produced in these specific areas.  These
plants in turn produce food for us as well as contribute to a healthy indoor atmosphere as
they produce the O₂ that we breathe and absorb the CO₂ we exhale.

Another interesting place to consider in this plant/animal relationship is an
experimental community called Gaviotasvii deep in the savannah of the eastern
Colombian plains.  In place now for almost 40 years this community has had to overcome
great obstacles in order to survive in such a place.  One such obstacle was commerce.

Being 16 hours by jeep on muddy, and at times, impassable roads from Bogotá they had little to offer in the ways of services.

Being a group of visionaries and technicians they began a quest to survive any way they could. It was soon discovered that a species of Caribbean pine tree grew particularly well in the nutrient poor, heavy metal laden soils in the area. These “barren” soils were once home to rainforest thousands of years ago but had long been drained of fertility by the grasses that cover the area. The pines grew and they harvested a resinous fluid from its bark. This was a marketable commodity in not only Colombia, but the world, and used in high quality paints, cosmetics, and medicines. A secondary byproduct of the resin was clear turpentine, another highly marketable resource.

This may seem like a monoculture nightmare but there is a happy ending. The fast growing pines quickly provided extensive cover of the grassy plains. This not only stabilized the soil but enriched it too. A new fertile environment was developing under this canopy allowing for native species to creep back into the now healthy land. Best of all the pines could not naturally reproduce there and the Gaviotans did not use herbicides to keep the inevitable secondary plants from filling in where it could. Left untouched these plants created a wholly new and native forest in its place.\textsuperscript{viii} The people of Gaviotas are inextricably tied to their crop. It supports them with money, energy, and fertile land as they supported it by nurturing it and harvesting its resin. While this example does not occur indoors on a residential scale it is a beautiful example of a symbiotic relationship between man, society, and plant.

Another aspect of the natural system is the fauna – the animal aspect of the environment. Humans fit, albeit loosely, into this category. The insects, birds, reptiles,
or mammals employ the fauna as either food or home. We process the plants into suitable material for survival and return the waste to the earth much as the plants themselves do.

It is not to say that, in bringing the outdoors in, we should have raccoons, rodents, or reptiles invading our homes. However, it is important to realize the importance of animal life to a healthy ecosystem. Plants can be especially prone to infection from various pests and without proper protection they will not survive. “The idea is to keep pests to a minimum, and simply allow some insects to exist with the plants. To try and create a sterile environment is not healthy for plants or humans, and is a very expensive, time consuming, loosing battle.”

The importance of humans as animals in the system is vital. Without our interaction the indoor ecosystem would fail. Through our maintenance, consumption, and input the natural systems perpetuate us as we perpetuate them. We enter the balance of nature.

Without this balance problems arise. It is those problems that our modern devices and mechanical systems are meant to control. In this case a fungus has found opportunity in a living room. Without its complimentary checks and balances in the exterior environment it overgrows and pollutes.

Just as a loaf of bread in a bag or a jar of leftover peas is prime real estate for molds like Penicillium or Aspergillus, so are our homes targets of opportunistic problems like the overgrowth of molds, bacteria, and viruses. By excluding the systems in place outdoors we exclude the natural checks and balances that have evolved over millions of

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years to keep all these things under control. These problems indoors are nothing short of miraculous outdoors.

A close relationship with plants and animals has health benefits too. Studies, done by B.C. Wolverton (NASA research scientist)\(^x\) and his son JD, have shown that plant-filled rooms have 50 to 60 percent less airborne microbes than similar rooms without plants. Such environments often appear cleaner and fresher than those devoid of life.

Wolverton also did studies for NASA’s "closed ecological life support systems"\(^{xi}\) research program and found plants to be surprisingly effective at cleansing the air by filtering out chemicals and pollutants. There have even been psychological and physiological studies that prove patients in hospital with mere VIEWS of trees lead to less stress in their patients resulting in less meds and less secondary health problems.\(^{xii}\) Many people surround themselves with indoor plants at home. These may look nice and calm us but how can we make them more useful and how can we be useful to them?

I think it is pertinent (re) examine where our dependencies and independencies exist and how they can affect our lives for the better or worse. What we choose to be dependent on says a lot about who we are as people. Just as our homes can protect and nurture us so can they protect and nurture the planet and all its plants and animals. Our homes need not only be a source of comfort and refuge but a source of energy, food, and knowledge that fosters a connection with the planet and ecosystem that are we are

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\(^x\) NASA Spinoff 2007, “Plants Clean Air and Water for Indoor Environments”

\(^{xi}\) B.C. Wolverton, “Foliage Plants for Removing Indoor Air Pollutants from Energy-Efficient Homes”, Economic Botany, Apr – Jun 1984, 224-228

indivisible from. Our homes can protect and more importantly nurture the world as well as ourselves rather than keep it at bay in fear for our lives. Our future isn’t living like we don’t impact the world but recognizing this impact and making beneficial for everything involved.

Current modes of development are built on principles that evolved out of necessity. A paradigm shift is needed to accommodate our needs as players in the ecosystem. Population densities and urban fabrics need to be designed in order to allow for this symbiosis to function properly. Retrofitting existing systems to function at a level that is simply less damaging to our planet will not suffice in the long run. Mitigation of these problems at the home level would free up time, space, and energy to devote to large complexes and developments that need more of such things.

I envision a home that gathers the water that falls around it. It can use this water for daily functions like washing, flushing toilets, even drinking, or it could use the water for storing heat and cooling air. Interior green belts that course through the structure feed off of the water from the kitchen and showers and turn those nutrients into perennial edibles.

The moisture the plants soak up help maintain healthy humidity levels in the home while they filter the air by breathing the air we breathe out. These ecosystem bands reside in earth which, near the periphery of the building is directly connected to the ground to allow native organisms to populate it. Any excess runoff would be recycled and returned through a network of cascades and sand filters as clean grey water to supply showers and toilets.
The structure itself would have retractable façade elements that would allow light, rain, and insects in during the warm months to repopulate and stimulate a healthy ecosystem. There would exist in one of these areas a composting/mulching system that was gravity fed and converted any other decomposable household waste into soil to replenish the ground. Interspersed and interconnected through this network of greenery would be a wetland system that would effectively clean and process all the household sewage that was produced and eventually run into the ground or be recycled into the system.

A network of hard-scapes, or living areas would be integrated into this plan. Ideally these are closeable or at least indirectly accessible from the soft-scapes, or green spaces. The superstructure would exist as a shell that could provide both refuge and support for the animals and plants that live within year round.

By envisioning the home as an organism that embodies all the processes of the non-human environment, a structure that lives and breathes for its occupants (just as we would live and breathe for it) we can free ourselves from dependence on others and shift it onto ourselves and the planet.

I imagine a new suburbia full of homes where the forest and native plants flow in and out of the structures instead of merely around them. During the warmer parts of the year these indoor ecosystems would directly interface with the native outdoor environment. During the cold parts of the year the building and its inhabitants would support the ecosystem as well as participate in it by consuming the food it produces and using its natural ability to cleanse the air, the water, and the waste.
The theory is that by taking care of most of all the waste, living in a self-sufficient manner, and utilizing all the free energy that is available the demand on the system at large would be greatly reduced. Through a process of integration and not efficiency we would be freeing ourselves from dependence on what we consistently complain about being inconsistent: other people.

“A human being is part of a whole, called by us “the Universe”, a part limited in time and space. He experiences himself, his thoughts and feelings, as something separated from the rest -- a kind of optical delusion of his consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons nearest us. Our task must be to free ourselves from this prison by widening our circles of compassion to embrace all living creatures and the whole of nature in its beauty.”

---Albert Einstein
CHAPTER III
PRECEDENTS

Project: Harmonia_57

Designer(s) / Architects(s): Triptyque
Location: São Paulo, Brazil

This project utilizes a façade structure that can be labeled as a “green wall” (see ref. 1). This green wall system absorbs rainwater for sustenance and reduces runoff to the city streets below. Any additional runoff that is not absorbed is directed to cisterns in the garden areas where it is filtered, ozonated, and redistributed for the buildings non-potable needs and further irrigation which is spray on as a mist (see ref. 2).

This idea of the building sustaining life beyond the human is central to this thesis. While the plants in this project are not edible it is easy to imagine how this idea might be translated to a home environment where food crops could be produced in such a system.

This building begins this re-integration process by allowing plants to reclaim an area that traditionally might have been kept free of such growth to absorb runoff and utilize it. The same could be said for any “green roofs” which use plantings on a perpendicular surface to achieve the same end result.

In an urban setting this also achieves an interesting aesthetic effect were greenery was once non-existent. This is a psychological and subjective benefit but has been proven to enhance and improve living conditions to some degree and is definitely worth pursing as a beneficial architectural element.xiii

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Project: Vancouver Land Bridge

Designer(s) / Architects(s): Jones + Jones
Location: Vancouver, British Columbia

This interesting project takes two disconnected areas (see ref. 3-4) along Rte. 14, Vancouver’s Columbia River Waterfront and the Fort Vancouver area, and “helps restore the natural landscape continuum from upland prairie to river edge”. This idea of using architecture or landscaping to create a framework for nature is another core concept of this thesis.

In this instance the architects use a bridge to span a highway in order to let plants and animals (humans included) that once travelled unimpeded between the two areas to reconnect and restore their once seamless transition. This is not habitat reconstruction but habitat stimulation. The idea that man made artifice can stimulate growth and repopulation is a refreshing one in light of all the bad press we humans get concerning the environment and our negative impact upon it.

In this design project a similar stimulus is proposed. The very construction of such a project would wipe out an existing local microcosm but replace it with a fertile framework to stimulate the remaining landscape to repopulate the structure and perhaps flourish to an unprecedented degree.

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xiv Jones & Jones. Vancouver Land Bridge
http://www.jonesandjones.com/work/natural.html#
Project: Multi-Tiered Vine Park

Designer(s) / Architects(s): R. Landschaftsarchitekten AG + Burckhardt & Partner AG
Location: MFo Park, Zurich, Switzerland

This project was influential in the development of the inhabitable structural elements that comprise this project's façade. In this case vines are given purchase on many steel cables that stretch from the ground plane upwards (see ref. 5).

In the warmer months the many different plantings gives a definition to the project and form a new structure that previously did not exist (see ref. 6). This idea of allow plants to help shape and define a structure is a third core element to this design project. While the plantings add aesthetic qualities they are also the formal elements that create the “building” in the summer months. They exist because the building allows them to as well as exist to allow the building to exist.

This reciprocal relationship between the non-human organism and the building help to decentralize people from being the sole benefactors of architecture. As part of a collection of projects entitled “Living Systems” xv this project explores that relationship between non-human participants and their importance to architecture. This theme is an essential element in understanding the design project to be described later.

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CHAPTER IV
SITE SELECTION AND ANALYSIS

The particular site (see fig. xx) that was chosen is a plot of 16 acres in Chester, MA. There are two free standing structures that exist on the property as it exists but it is to be assumed that the lot would be subdivided into 2 – 8 acre lots. (fig. 1)

An analysis of movement patterns was investigated (fig. 2). This revealed certain patterns that were exhibited by plants, animals, and the elements alike. These patterns are to be used later on in the design process (see Chapter IV).
CHAPTER V

PROGRAM AND USE

The intended use for this design is as a live / work residence that is primarily “off-the-grid” and deals locally with food, waste, and energy production. The main components of the layout are typical to a residence. Beyond that are growing spaces that are interspersed throughout the plan to give all areas access to the benefits of living closer to vegetation.
CHAPTER VI
DESIGN PROCESS AND DIAGRAMS

The following is an excerpt from Abstract “Using fractal analysis to assess how species perceive landscape structure” by Kimberly A. With.

“To develop a species-centered definition of 'landscapes,' I suggest using a fractal analysis of movement patterns to identify the scales at which organisms are interacting with the patch structure of the landscape. Significant differences in the fractal dimensions of movement patterns of two species indicate that the species may be interacting with the patch structure at different scales. Fractal analysis therefore permits comparisons of 'landscape perceptions' of different species within the same environment.’”

“Fractal analysis can be used to identify the perceptive resolution of a species; that is, the spatial grain and extent at which they are able to perceive and respond to heterogeneity. Analysis of movement patterns across a range of spatial scale may reveal shifts in fractal dimension that reflect transitions in how species respond to the patch structure of the landscape at different scales.”

The preceding excerpt was the foundation for the design process. This process describes using fractals to understand how different species interact within a landscape. In the case of this design, the plant and the animal were distilled to the basic “technologies” or structures that they embody and those were applied using fractal

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patterns to the inhabit the landscape (see fig. 3) with those technologies. This resulting framework is used as the basis for design and the existing site is warped and stretched to fit over this framework. The resulting planes then become the basis for the building levels. The final result of this process yields a structure that is embedded with the inherent “technology” of both plant and animal lending itself to better supporting both types of organisms (see fig. 4).

From this point the resulting planes were re-analyzed and re-interpreted as part of the topography of the site (see fig. 5). This involved combining the resulting planes with the existing topography of the site. This process allowed for the planes that had been developed to integrate seamlessly with the existing landscape (see fig. 6). Further refinement produced the end design (see fig. 7-19) which is a living environment that fully interacts and integrates itself with its surroundings.
fig. 4 - Resulting Planes
in-process sections

1

2

3

4

5

fig. 5 - Design Development

topographic analysis

water pathways

indigenous pathways

occupiable pathways

green = plant life
red   = animal life
fig. 6 – A New Topography
CHAPTER VII

DESIGN PROJECT AND IMAGES

Project Description

The final design is a three tiered living space that is interspersed with growing spaces and light wells to allow for maximum life support. This building is fully integrated into the landscape. The structure allows for parking below on the ground level (see Ground Floor Plan). The interior space on the second level can be accessed via a stair to the rear of the parking area. The second level (see Second Floor Plan) consists of a living area, cooking area, and growing areas. This second floor plane then splits (see Third Floor Plan) above to a study area and below to a sleeping and bathing area.

The surface or roof of the building is mostly covered by earth and the plant life that slowly takes over this new terrain. The earthen roof (see Roof Detail) is perforated by glazing at key areas to allow maximum light penetration. These glazing surfaces are then covered at varying degrees by the living structural system that allows for plant life to inhabit it (see Skin Detail). This living structure allows for shading in the summer months when foliage is at its peak and for maximum solar gain in the winter months when the perennial foliage dies back.

The intent is for the building to eventually blend with its surroundings as the plant life reclaims this new terrain and envelopes the site. The plant life is only interrupted by the intermittent perforations of glazing panels and living structure.
fig. 7 - Ground Floor Plan
1/4" = 1'0"
fig. 8 - Second Floor Plan
1/4"=1’0"
fig. 9 - Third Floor Plan
1/4"=1'0"
fig. 11 - East Elevation
1/4" = 1'-0"
fig. 12 - South Elevation
1/4"=1'-0"
fig. 13 - **North Elevation**

1/4"=1'-0"
fig. 14 - Section A
1/4"=1'-0"
fig. 15 - **Section B**

\[
\frac{1}{4}" = 1'\cdot0"
\]
1 - green roof
2 - skylights
3 - structural beams
4 - ceiling substructure
5 - 2nd plane
6 - 3rd plane
7 - ground/growing space
8 - glazing / growth scaffolding system

fig. 16 - Exploded Axonometric
fig. 17 - Northeast Perspective
n.t.s.
fig. 18 - Roof Detail
n.t.s.
The frame may consist of differing materials. In this case it is proposed to be constructed from pre-fabricated PVC components that provide lateral support for the facade. Other configurations beyond the diamond pattern are encouraged based upon building requirements. The spacing and frequency of the pattern may serve the needs of varying spaces due to differing programmatic needs (i.e, sun, shade, protection, exposure, and access to potential food crops). Depending on the application the framwork could incorporate glazing or it could be superficial to the actual facade that creates the building envelope.

Seen here the configuration adopts an arched form that encourages drainage and allows for differing plants to utilize the structure in with a tiered effect.
CHAPTER VIII
CONCLUSION

As a whole this investigation has proven to be an interesting one. Perhaps further development of the systems described in this thesis would inspire a new generation of living, breathing, consuming buildings that benefit all life, not just humans. The idea that our homes can be an interface with all nature and take advantage of those powerful and efficient systems that have been in development for millennia is a provocative one.

Just because a home is a protective place does not mean that it should exclude nature. We are an integral part of nature and it is pertinent that we act like it. It would clearly be to our benefit.

It is true that further investigation into the mitigation of moisture and insects could strengthen this thesis. Common building materials at this point in time do not lend themselves to a close relationship with the elements. They, in fact, are the enemy. As we push our knowledge of materials and building construction to a more integrated path this type of existence could become that much more common and practical.

However, in this day and age, to envision and hope for a life where we can depend not on our fickle and unstable societies for sustenance but our time-tested and efficient environment helps us to move in that direction. As the planet changes so will we. Instead of relying on the city infrastructure we should be relying on our property’s infrastructure. The embedded technology that exists all around us is surely enough to sustain us at an individual level. This is very much a ground up approach rather than a trickle down one that puts the power of life back in our own hands, where it should be.
It is essential that we can support ourselves and relieve that pressure on society at large or the bigger and bigger society gets the more demand is put on the individual to support it all. That is definitely not efficient nor does it make sense to make an increasingly dependent population with decreasing space and resources foot the bill for the ever-growing and consuming nation.

Architecture that fosters growth on a local level will rehabilitate neighborhoods and communities. It will allow them to produce food and energy as well as strengthen the local relationships as people begin to trade and do business with a local crowd. This type of lifestyle seems not only necessary but is hopefully inevitable because the other alternative is a densely packed society with no means of surviving beyond what is supplied to them through second and third party means. That kind of dependence can only lead to being taken advantage of.

This design project seeks to establish a precedent for a new kind of pioneer, a pioneering architecture that takes into consideration all inhabitants of a particular site. This type of consideration can only lead to a stronger, healthier, and more connected and peaceful world. At least it would re-integrate us with the natural world that we have been moving away from for so long.


**Websites**

Friends of Gaviotas.
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