# Catalytic Interdisciplinarity: Ecological Restoration in the Architectural Design Studio

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## Speculative Breaks

> *"The real nature of a sudden idea is perhaps less that a solution occurs to us like an answer to a riddle than that a question occurs to us that breaks through into the open and thereby makes an answer possible."* – Hans-Georg Gadamer [1]

While much architectural research is underway to develop more environmentally friendly building materials, advance energy performance and more efficiently "harvest" on site resources, and while flowing landscape-like forms captivate our collective imagination, designers' knowledge of principles of ecology and the site-specific ecological impacts of architectural interventions are limited. *What might more rigorous engagement with the languages of landscape ecology and ecological restoration mean for architects?* In collaborating with restoration ecologists – borrowing and sharing theories, concepts and methods – can we, as Donald Schoen would encourage, "construct a coherent problem worth solving?" [2] Through such "catalytic" interdisciplinarity, might we summon more encompassing portrayals our operations and impacts, descriptions that better enable design professionals and restoration ecologists to address environmental health in our cities, to create projects that not only minimize damage but engage in beneficial, symbiotic relationships with surrounding ecosystems? Can an appropriation of notions such as "peninsular interdigitation," patch/matrix "breaks," "edge/corridor effects" and "core reserves" alter how architects understand problems and thereby encourage shifts in methodological tactics and conventions? [3]

Restoration ecologists, in their efforts to "repair" landscapes, increase habitat quality and connectivity, and encourage conditions where natural systems can approximate former dynamics, endeavor to model pattern-like flows of energy and matter in the physical world. Restorationists operate in less than ideal (pristine) contexts, interpret past conditions in anticipating biologically diverse, place-based futures and impress to their constituents how individual decisions link up at higher levels. The discipline negotiates a difficult passage between the dimensioned quantifications required of science-ecologies and the aesthetic qualifications demanded of design space-making within ecological mediums. Similarities with architectural practice abound, as the following comment by the restoration ecologist Eric Higgs suggests, "The history of the field shows a plural practice, one reflecting the best of scientific perspicuity and creative tinkering." [4] He goes further, "Ecological restoration as a *design discipline* demands attention to tradition and novelty at the same time, searching across the spectrum of the arts and sciences for the best way to respect ecological and cultural integrity." [5]

While restoration projects are undertaken in a multiplicity of ecosystems at many scales,

involving public or private land holdings or both, the discipline finds itself increasingly contending with the Jeffersonian, democratic small scale lot. Joan Iverson Nassauer recognizes the critical importance of this trend,

> "We must work at this democratic scale of ownership, the single lot or the single farm or ranch, to achieve ecological health beyond public lands and beyond the anomalies of privileged and enlightened land development. In the United States, where recent legal decisions have tended to narrowly interpret public interests in limiting private-property rights, and where strong cultural traditions favor the rights of landowners to do what they deem most suitable on their land, overall ecological health depends on the aggregation of innumerable individual landowner's decisions."[6]

In speaking specifically of the restoration of rare native habitats in Oregon's Willamette Valley, Bruce Campbell shares Nassauer's concern

> "Conservation strategies need to focus on restoring and maintaining more natural ecosystem processes and functions within landscapes that are managed primarily for other values."[7]

With restorationists increasingly concerned about environmental quality at the lot scale, even beginning to contemplate the impact of the building "footprint," a growing number of architects seek to more sensitively apprehend larger contextual processes that influence and are influenced by the configuration of buildings. As regimes of thought between these disciplines converge, we see metaphors, "nomadic terms that link disparate discourses," as critical intellectual tools for extending ecological mediums into built form in a transformational and integrated manner.[8] As James Proctor and Brendon Hanson suggest, "By understanding metaphor as a necessary ally and not a threat to ecological knowledge, we may enrich our contextual understanding of (ecological) complexity while continuing to invoke it in useful ways."[9] How might we specifically invoke ecological terms in making architecture?

**Studio Context and Premises**

> *"It is always on the most deterritorialized element that reterritorialization takes place." -Gilles Deleuze and Feliz Guattari* [10]

Accelerating population growth and current development patterns of cities in the Pacific Northwest strain existing infrastructure, deplete finite natural resources and threaten critical habitat. Oregon's Urban Growth Boundaries (UGB's) offer one means for encouraging efficient growth, but as construction of large houses on large lots predominates, cities are pressured to expand UGB's, thereby compromising their usefulness. Compact infill development offers an attractive strategy for accommodating a diverse and growing population resourcefully, as Shim and Chong, the City of Santa Cruz and others have demonstrated, and in principle many prefer this model to low-density sprawl on agricultural land.[11] Yet day-to-day planning and zoning standards seldom provide meaningful incentives for such development, and there is often strong opposition to specific infill development projects within cities out of concern for potential neighborhood quality degradation, loss of open space and consequent decrease in property values.

Over 95% of the land in Oregon's Willamette Valley is privately owned, severely limiting opportunities for public conservation of its remnant native ecosystems. Much of this land, once made up of Oregon white oak communities in the form of oak canopy woodland and open oak savannah, has proven highly suitable for housing, agriculture and other forms of development. As rare oak habitat has dwindled - approximately 80% has disappeared from the Valley since the arrival of settlers of European ancestry - so have the denizens who depend on it, literally hundreds of species endemic to the Pacific Northwest. [12]

Oak habitat ecosystems are particularly susceptible to deterioration when isolated from other, similar habitats. In much the same way that robust, integrated and dependable systems of infrastructure enable humans to conduct their affairs satisfactorily, the spatial location, patterning and connectivity of oak habitat across landscapes directly affects the habitat suitability, resource

(food) availability and overall health of its many species residents. Numerous and diverse linkages between habitats lead to healthy ecosystems.

Students in an experimental, vertically integrated "Triumph of the Commons" architectural design studio were asked to consider increased urban density and improved ecological performance *as one interrelated problem*. The studio specifically explored simultaneous residential alley-access infill development *and* oak woodland habitat restoration on a city block in a post war neighborhood in Eugene, Oregon. A landscape ecologist with extensive experience in oak habitat restoration partnered with an architecture professor from day one, helping students develop proposals for the construction of secondary dwelling units on existing lots *and* the introduction of native vegetative structures – superimposed threads of oak habitat - that extend across lots and connect to urban open space, recreating ecological flows and forming core habitats for threatened species. For architecture students unaccustomed to considering ecological issues as formative, an initial conceptual disorientation led ultimately to thorough consideration of the wider implications of dwelling and lot scale decision making, and to a reformulated notion of design as interconnected patternmaking that acknowledges numerous conditions at multiple scales.

All initial image-based studio design assignments required evocative verbal descriptors, intimations of what a borrowing of ecological terms may mean for making architecture within a particular (infill) context. The metaphorical conflations thus generated - "decelerator water filters," "budding alleys," "deciduous houses," etc. - proved to have meaningful and lasting design influence.

A brief outline of the studio assignment sequence and methodology is as follows:

•Preliminary "*form analog*" investigations involved field trips along existing alleys and to oak woodlands to gather detailed pattern images and verbal descriptors of the two "habitats" under consideration. Oaks were studied as abstract subjects suggestive of architectural qualities of scale, structure,

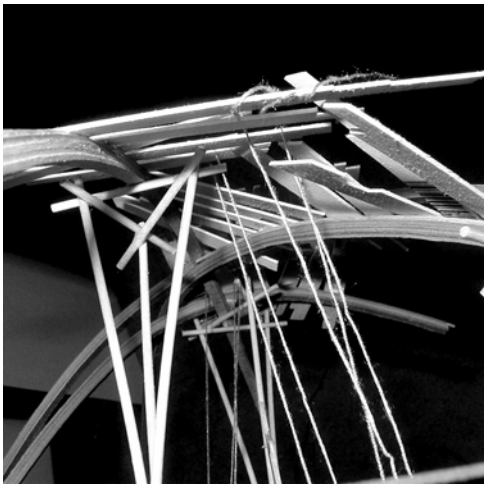

Figure 1: Missa Aloisi's "Lifelines" form analog analog

composition, and dimension. Students next hybridized pattern images and words from the oak and alley settings in order to develop 'place/form' metaphorical artifacts that inspired spatial organizational notions as poetic analogs to the larger context.

•Student teams next investigated "micro-urban" organizational strategies at the block scale. These centered on four orders: (1) *oak habitat "structure,"* where students anticipated eventual oak canopy diameters, desired woodland densities and understory communities, etc., (2) *secondary dwelling unit and connected outdoor space configuration*, where students considered relationships of new dwelling units to existing houses, the appropriateness of the 800 s.f. maximum allowable accessory dwelling unit size given existing lot sizes and neighborhood character, etc., (3) *alley character and function*, involving strategies for parking, circulation, infrastructure, etc., and (4) "*ethereal forces"* including sun and shade patterns, prevailing wind, light, etc. Student teams first generated multiple iterations of each "micro-urban" order and next developed hybrid or "symbiotic" proposals for the block including all four order layers.

•Studio members met, deliberated and agreed on a shared set of neighborhood design principles organized around a vision of "dendritic ribbons" of oaks and understory lacing across the site and creating wildlife corridors connecting the Masonic Cemetery

woodland to the northeast of the block with Amazon Creek and associated oak savanna to the west. This organizational structure had the dual benefit of improving the landscape connectivity between oak microhabitats within parcels, while also clarifying an armature for community identity at the block-scale.

•With a shared set of neighborhood scale design principles to work from, each student assumed responsibility for a single parcel within a designated city block study area. Students drew lots to determine the "client" for whom they would design a new infill dwelling, with each client requiring distinct housing needs and with all scenarios combined representing a diversity of life situations ("single parent with teen," "elderly couple moving in next to daughter and family," etc.). For the remainder of the term, students developed an alley-facing accessory dwelling unit and related outdoor space in close collaboration with students working on adjacent parcels and that would meet both community-based and ecology-based criteria.

**Ecotonal Orders and Opportunities**

*"One does not represent, one engenders and traverses."* -Gilles Deleuze and Feliz Guattari [13]

*"Design enables openings for nature and culture, as one being, to go wild."* –Eric Higgs [14]

At the lot scale, studio investigations demonstrate the possibility of dynamic and mutually beneficial relationships between buildings and surroundings. Accessory dwelling unit configurations improve species diversity by allowing for the development of adjacent wildlife corridors and by creating a variety of cool, damp, warm and dry exterior microclimatic pockets for various plant communities to flourish. Walking paths within corridors formalize access, enhance experience, and enrich social ecologies. Habitat rich shrub and ground cover understory provide windbreaks, contain viewsheds and filter runoff, satisfying human needs with great economy. Investigations in section reveal the potential for multiple species to occupy different strata within one vertical band of space, with oaks for example growing alongside, up and over dwellings, providing summer shade for people below and networks of limbs, "lifelines" facilitating movement for the western grey squirrel and

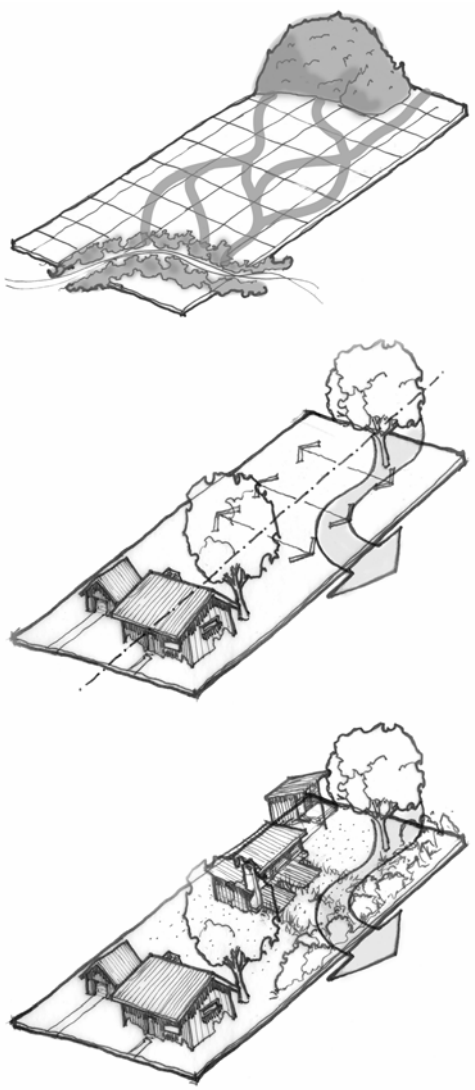

Figure 2A-C: (left) Corridor connectivity at the neighborhood scale; (middle, right) Co-creation of accessory dwelling units and habitat corridors at the lot scale (drawings by Alex Wyndham, MArch candidate)

other creatures, above. With several studio investigations, screen-like architectural structures serve to support vegetation directly, as with Kevin Conley's "Maison du Vignes." Such compression of built and natural orders on constricted urban parcels calls to mind Shigeru Ban's urban residential work, for example the ivy screen of his *House for a Dentist* in Tokyo (1994).

Residents of a neighborhood such as this might initially consider infill development combined with habitat restoration as peripheral to their quality of life expectations

and long-term economic interests. Yet a vision for development that interweaves high quality housing and enhanced open/green space without compromising either, it is hypothesized, has the potential to transform public perception of compact growth, such that this model of development is favored over less efficient ones. If such an approach gained traction, communities would be better able to provide affordable housing options for an increasingly diverse population while developing coherent open space networks including corridors connecting natural features currently fragmented. If block-sized, renaturalized "green development nodes" took root and expanded to include large portions of urban land, cities could contribute significantly to the preservation of threatened ecosystems and to strengthened regional biodiversity.

Relating ecological functioning with architectural design raises compelling questions as to aesthetic commitment and community identity. Working with a restoration ecologist on such a project, students of architecture began to discover advantages of "a project that privileges unpredictable ecological processes," of relinquishing control and inviting wildness in the organization of urban environments.[15] An aesthetic of autonomy gives over to what the environmental philosopher Arnold Berleant would describe as a "participatory aesthetic" involving acknowledgment of the passage of time, the slow and steady maturation of an indigenous landscape, and the measure of comfort and beauty it affords.[16] Designers are alerted to the inherent incompleteness of architectural undertakings, thereby relieving some of the load – psychic, material and thermodynamic – we expect our building projects to carry.

Gilles Deleuze and Felix Guattari, in their poststructuralist masterpiece *A Thousand Plateaus*, favor the "rhizomatic" over the "arborescent" model in describing societies, relationships, movements, etc., directing our understanding of arborescence towards the trunk, a metaphorical pillar of centralized command. In so doing they overlook the bud and the branch, the latter not predetermined in its course of growth and yet reacting to its neighbors in seeking light and continued livelihood. The forest canopy affords a pluralistic, democratic interpretation, and with many student projects, the emergent vision of dendritic ribbons of oaks, a sky-bound community of interwoven limbs, inspired possibilities for open, interconnected and "branching" spatial organizations below. With Brent Sturlaugson's scheme for example, a contiguous canopy overhead corresponds to a contiguous social understory, ribbons of outdoor spaces appearing to emanate from a ribbon-like toplight serving as the scheme's primary organizational element.

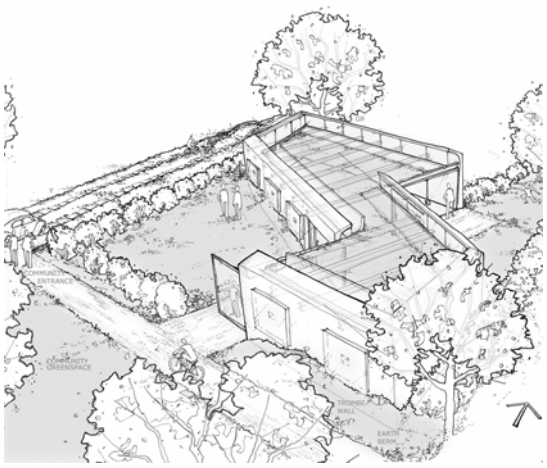

Figure 3: Brent Sturlaugson's "Light Ribbon House"

### The Foliage of Architecture

*"The animal world and that of plant life are not utilized merely because they are there, but because they suggest a mode of thought."* –Claude Levi-Strauss [17]

*"Now an increasingly urban population fears any intimacy with uncontrolled nature, especially darkness."* -John Stilgoe [18]

Extending our gaze upward to the tracery of limbs, we can now consider specific architectural/building implications of such oblique scrutiny. Through a design approach Benyus and others describe as *biomimicry*, students translated the characteristics of oaks, oak understory and the life this habitat supports in specifically architectural terms.[19] Missa Aloisi's inspirational insight was that of a bird descending from an oak limb to pluck berries from a shrub below, experiencing a brief moment of exposure in flight. Her dwelling separates eating/living space from sleeping "pods" (reminiscent of oak galls), and the human inhabitant's more long lasting

periods of shelter in these book-ended realms are offset by brief, vulnerable movements within translucent "lifeline" corridor connectors. With several studio projects and in the sprit of Glenn Murcutt, architecture assumes tree-like qualities; as constructed elements extend upwards and outwards, they become progressively more delicate.[20]

That oaks undergo seasonal changes – budding, leafing, shedding – and that these cycles generate dramatically different thermal and luminous microenvironments, had perhaps the greatest impact on perceptions of space making, inspiring dynamic, radically efficient architectures capable of responsive contraction and expansion. With Alex Wyndham's "Deciduous House," insulated wall "leaves" fold upward and serve as south facing trellis-like shade screens in summer. With several projects in the studio, the dwelling in summer mode expands when wall panels slide laterally into recessed niches, maximizing continuity between interior and exterior space. An 800 square foot dwelling suddenly becomes spacious when opened to a reinvigorated network of natural systems, where viewsheds extend through adjacent lots and beyond, thoughtfully and so as to not create conflicts of privacy.

Figure 4: Alex Wyndham's "Deciduous House": insulated wall panel becomes overhead sunshade

In winter mode, architectural elements contract and dwellings become snugly introspective, surrounded by silent matt grey light, gentle rain and black wet limbs of the Pacific Northwest.[21] The January dimness counterbalances the light exuberance of summer; our world becomes closer and more immediate, paralleling the inwardness of our own comportment. With Tanizaki, we recognize darkness not as simple blackness but as consisting of countless gradients, from tangible opacity to endless depth.[22] With Derrida, we harbor suspicion of a society's insistence on unceasing immersion in light:

"The heliological metaphor turns away our glance. For it has always been believed that metaphors exculpate, lift the weight of things and of acts. If there is no history, except through language, and if language is elementally metaphorical, Borges is correct, 'Perhaps universal history is but the history of several metaphors.' Light is only one example of 'several' fundamental 'metaphors,' but what an example! Who will ever dominate it, who will ever pronounce it's meaning without first being pronounced by it?" [23]

## Trajectories

*"Ecosystem deterioration…needs to be addressed by a series of bold experiments to test the success of integrated management"* –Jeremy Jackson et. al. [24]

*"Since man was constituted at a time when language was doomed to dispersion, will he not be dispersed when language regains its unity?"* – Michael Foucault [25]

In our unceasing attempts to narrow the gap between descriptions of the world and shifting sensibilities as to its state, when we seek to render more explicitly the larger context within which our methods are embedded, when we envision and tinker and measure the impact of what we make, when we respond constructively to a world constantly presenting novelty, we realize architects and restoration ecologists occupy complimentary realms. Edward Casey maintains, "By 'strung out between wilderness and site,' I mean that we drastically lack viable and significant intermediate positions between these two extremities." [26] Fellow philosopher Hans-Georg Gadamer suggests "discourse that is intended to reveal something requires that the thing be broken open by the question." [27] Questions originating in the field of ecological restoration break the resolute "thingness' of architecture in compelling ways, and our responses as designers open stimulating paths of inquiry for our newfound collaborators. Together we can more effectively find those intermediate positions Casey believes contemporary culture so desperately needs, discovering new life for our disciplines in the process.

Yet perhaps we can never fully comprehend the implications of our characterizations, to craft "word games" so as to correspond to our undertakings, as Foucault intimates,

"Changes in the mode of being of language, swift as they are, are never clearly grasped by those who are speaking and whose language is nevertheless spreading these mutations; they are noticed only indirectly, for brief moments; and then the decision is indicated only in the negative mode – by the radical and immediately perceptible obsoleteness of the language one has been using." [28]

Perhaps in our efforts to envision and express more symbiotic relationships between nature and culture, humans and other organisms, and architecture and ecological restoration, we are compelled to speak in reductivist binaries, thereby confronting the limits of a language that necessarily presupposes the nature/culture duality we seek to circumvent. Yet if we consider the connections between architectural and ecological systems as manifold, and our charge as not the portrayal of parallels but the rendering of entanglements through associative thinking, we may affect a redistribution of categories, a traversal and interdigitization of nature/culture binaries that increases the frequency of their oscillation. We may engage in positive, pro-active language games and with Richard Rorty "replace the world of pictures constructed with the aid of Greek oppositions with a picture of a flux of continually changing relations." [29]

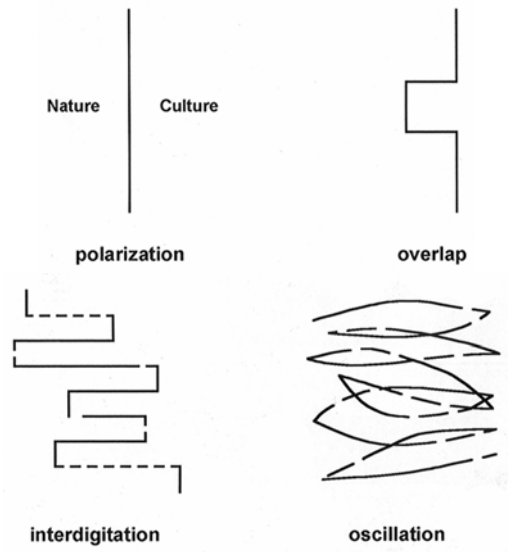


Figure 5: Evolving relationships of nature/culture, ecology/architecture, and our descriptions thereof)

For students in the "Triumph of the Commons" studio, a playful, tenacious engagement of the language of ecological restoration generated an outward and upward reverberation of thought, inspiring not only notions of ecological symbioses between buildings and sites but also dramatic material and energy efficiencies, the possibility of more profound engagement of humans and the natural world, and openings to deeply poetic sustainable architectures. With the acknowledgment that ecological structures can help us conceptualize our own relationships and artifacts, we might break through with sharper questions, alerting us to new encounters with urban wilderness and community revitalization, to depictions of cross flows not yet appreciated, architectural ecologies both selectively porous and biologically complex.

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## Endnotes

[1] Hans-Georg Gadamer, *Truth and Method*, Joel Weinsheimer and Donald G. Marshall, transl. (London: Continuum Publishing Group, 2004 edition), p. 360.

[2] Donald Schoen, *Educating the Reflective Practitioner* (San Francisco: Jossey-Bass Publishers, 1987), p. 6.

[3] See Richard T.T. Forman & Michel Godron. *Landscape Ecology*. New York: John Wiley & Sons. 1986.

[4] Eric Higgs, *Nature By Design: People, Natural Process and Ecological Restoration*, p. 82.

[5] Eric Higgs, p. 279.

[6] Joan Iverson Nassuaer, "Cultural Sustainability: Aligning Aesthetics and Ecology" in *Placing Nature: Culture and Landscape Ecology*, Joan Iverson Nassuaer, ed. (Washington, D.C.: Island Press, 1997), p. 71.

[7] Bruce H. Campbell, Restoring Rare Native Habitats in the Willamette Valley: A Landowner's Guide for Restoring Oak Woodlands, Wetlands, Prairies, and Bottomland Hardwood and Riparian Forests (Washington, D.C.: Defenders of Wildlife), p. 3.

[8] James D. Proctor and Brendon M. H. Larson, "Ecology, Complexity, and Metaphor," in *Bioscience* Volume 55, No.12 (December, 2005), p. 1066.

[9] James D. Proctor and Brendon M. H. Larson, "Ecology, Complexity, and Metaphor," p. 1065.

[10] Gilles Deleuze and Feliz Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia,* Brian Massumi, trans. (Minneapolis: University of Minnesota Press, 1987), p. 221.

[11] See Shim and Chong's *Laneway Architecture* (Toronto: University of Toronto Faculty of Architecture, Landscape and Design, 2004) and the City of Santa Cruz' *Accessory Dwelling Unit Planning Manual: Growing Santa Cruz' Neighborhoods from the Inside* (2003).

[12] Bruce H. Campbell, *Restoring Rare Native Habitats in the Willamette Valley: A Landowner's Guide for Restoring Oak Woodlands, Wetlands, Prairies, and Bottomland Hardwood and Riparian Forests,* p. 5.

[13] Gilles Deleuze and Feliz Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia,* p. 364.

[14] Eric Higgs, *Nature By Design: People, Natural Process and Ecological Restoration* (Cambridge, MA: MIT Press, 2003), p. 285.

[15] Eric Higgs, *Nature By Design: People, Natural Process and Ecological Restoration*, p. 74.

[16] See Arnold Berleant, *Art and Engagement* (Philadelphia: Temple University Press, 1991), *The Aesthetics of Environment* (Philadelphia: Temple University Press, 1992), and *Living in the Landscape: Toward an Aesthetic of Environment* (Lawrence, KA: University Press of Kansas, 1997).

[17] Claude Levi-Strauss, *Totemism*, Rodney Needham, trans. (Boston: Beacon Press, 1962), p. 13.

[18] John Stilgoe, "Land Fear: Wildness and the Bewilderment of the City Dweller," in *Architecture Boston*. March/April (2003). pp. 20.

[19] See Janine M. Benyus, *Biomimicry: Innovation Inspired by Nature* (New York: Harper Collins, 1997).

[20] See Philip Drew, *Touch This Earth Gently: Glenn Murcutt in His Own Words* (Sydney: Duffy and Snellgrove, 1999). As for treelike architecture we are thinking in particular of the roof and column support of the Simpson-Lee House in Mount Wilson, p. 153.

[21] The Kalapuya who originally inhabited the Willamette Valley practiced seasonal occupation, living in inward-focused, efficient plank houses in the foothills during rainy winter months and then descending to open, minimal shelters along riverbanks in summer. Several students attempted to affect this "migration" in the design of one transformable dwelling.

[22] See Jun'ichiro Tanizaki, *In Praise of Shadows,* Thomas J. Harper and Edward G. Seidensticker, trans. (New Haven, CT: Leete's Island Books, 1977).

[23] Jacques Derrida, "Violence and Metaphysics," in *Writing and Difference,* Alan Bass, trans. (Chicago: University of Chicago Press, 1978), p. 92.

[24] Jeremy B.B. Jackson, et. al., "Historical Overfishing and the Recent Collapse of Coastal Ecosystems," *Science*, Volume 293 No. 5530 (July 27, 2001), pp. 629-638.

[25] Michael Foucault, *The Order of Things: An Archaeology of the Human Sciences* (New York: Vintage Books, 1994 edition), p. 386.

[26] Edward S. Casey, *Getting Back Into Place: Toward a New Understanding of the Place World* (Bloomington, IN: University of Indiana Press, 1993), p. 259.

[27] Hans-Georg Gadamer, *Truth and Method*, p. 357.

[28] Michael Foucault, *The Order of Things: An Archaeology of the Human Sciences*, pp. 281-282.

[29] Richard Rorty, "A World Without Substances or Essences," in *Philosophy of Social Hope* (New York: Penguin Books, 1999), p. 46.