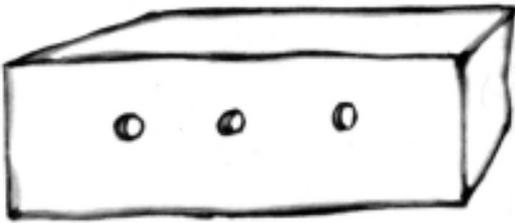


Syn Cities

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Source: Antoine De Saint-Exupéry, *The Little Prince* (New York, Harcourt Brace Jovanovich, 1943, 1961)

DRAW ME A SHEEP

In his incessant demands on the narrator to draw a sheep, the little prince suddenly softens upon seeing the drawn image of a box with three small holes. "The sheep you asked for is inside," exclaims the narrator of this classic tale, to which the prince responds, "This is exactly the way I wanted it!"¹ The narrator has cleverly re-constructed the object – the sheep – into an image of the object – the box – in order to free it from conflicting perceptions.

The subject of this paper – the shrinking, post-industrial city – has experienced similar perceptual inaccuracies that have suppressed its chances for true paradigmatic change. I will begin by tucking this urban typology under the "box" – and what I will later refer to as models of thinking – in order to help re-imagine future growth strategies in which the contracted city can metabolize, not in spite of shrinkage, but because of it. If we can anticipate

shrinkage, we can unfold our preconceptions of urban space.

Furthermore, the paper suspends in the belief that the shrinking city, when seen in this way, can provoke new ways to measure resilience and diversity, in which inputs, throughputs and outputs are the vital components to an architecture of feedback. This system does not assume a constant state of equilibrium, but rather, measures succession and ecosystem change – both spatially and temporally – as states of resilience. The driving principle is that ecological knowledge without the development of social capital will not result in environmental change. Social models need to be developed alongside ecological models in order to implement change, to imagine a human-dominated, human-built, human-designed ecosystem.²

THE MODEL IMPERATIVE

The three models grounding this inquiry are social capital (emerging from the fields of sociology and medicine), patch dynamics (a recent model emerging from the field of landscape ecology) and economic self-organization, and I will elaborate on those momentarily, once I've clarified what I mean by "model." It is imperative to make this word resonate broadly, particularly in the context of this conference's theme and its interest to expand the discourse of architecture and urban design. So, while I do not presume to speak with a scientific tongue, nor do I hold fragile the intellectual spheres of architecture. My use of this word, "model," then, is more like a composite of thinking across disciplines, and specifically, across urban design, ecology and sociology.

Kevin Lynch says of urban design models that they provide a "picture of how the environment ought to be made, a description of form or a process which is a prototype to follow."³ More accurately, he states that the model offers a view into "the way something functions, in which the elements of a system, and the relations between those elements, are clearly specified,"⁴ where ideally, the model can "specify form, creation, and management as one."⁵

Landscape ecologists Mary Cadenasso and Steward Pickett, research partners with our urban design studio at Columbia, have evolved their understanding of a model as integral to a three-part system⁶: the first begins with a "conceptual framework that organizes the components of a system, and illustrates their potential relationships. From the framework, a model template to test the effective relationships among the components can be constructed. Finally, a working model, specific to a particular place, scale and series of questions, must be developed to actually test relationships among framework components."⁷

According to Pickett, his discipline has witnessed a paradigm shift, away from equilibrium models. Previous assumptions that ecological systems are closed, highly deterministic, bounded, and self-regulated have been replaced by a series of assumptions that recognize the opposite: systems are now seen to be open, often regulated from the outside, and probabilistic. More radical still is the position that urban systems are ecological systems, embodying the same behaviors of process and flux, of continuum and adaptation. This paradigm shift in urban ecology no longer assumes discrete patches of vegetation within the urban system, i.e. Olmstead in the city, but instead accepts a complex mosaic of biological, geo-physical, social and built patches as the urban ecological system.

Can we take on Olmstead? It is impressive how he anticipated the growth of his host cities – New York, Boston, Washington. As well as Baltimore, New Haven, Newark. Why have some cities thrived relative to numerous smaller industrial cities on the eastern seaboard?



Today's Megalopolis

Source: Brian McGrath, Coordinator, GSAPP Urban Design Studio Fall 2004

Looking at a shrinking city with the same breadth of vision as Olmstead,⁸ can it trigger the production of an urban ecological imagination? Breaking the prevalent pattern of nature that Olmstead projects reinforce begins by acknowledging that, as landscape architect Victoria Marshall states, "humans are natural, it rains on the street corner and parks are constructed." Our work as architects and urban designers lies in what these relationships afford.

A true urban ecology provides feedback mechanisms to safeguard its future and allows for the response of those who want to climb the ladder out of poverty. Shifts in spatial and temporal understanding can alter the way we see the question of architecture allowing us to localize global issues and urbanize local ones. Without the help generated by such remedial institutions, without a complex morphological theory linking urban constructs to ecological flows, design practitioners remain at a disadvantage in creating the new hybrid urbanism.⁹

THERE IS NO SUCH THING AS CRISIS

At the beginning of the last century there were sixteen cities with populations exceeding one million people. Today there are 500. Within a few years the majority of the world's population will be living in urbanized areas.¹⁰ It is imperative that we reframe the question of urban ecology. Marx

theorized the problem as a metabolic rift - a rupture or estrangement between the urban and the rural (the worker and the land), manifest in the depletion of soil nutrients as a direct result of the exportation of food and fiber to expanding cities.¹¹ Today the problem is twofold; defining an urban footprint in a globalized market while negotiating the ecological footprint of urban areas that experience distinct rates of change. Just how much is too much?

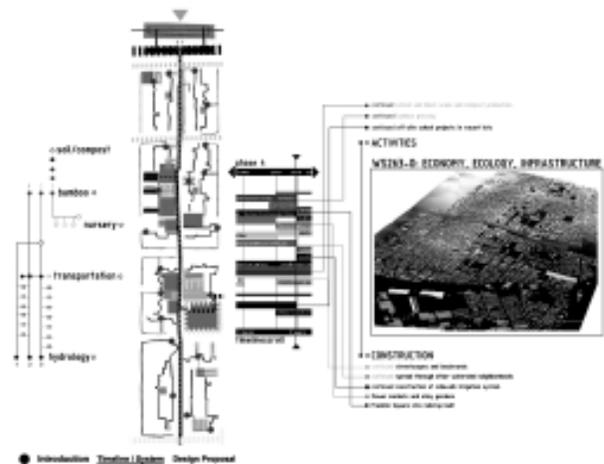
New global processes of capital accumulation, patterns of migration and technologies of communication have unleashed rapid physical changes throughout vast urban regions, outpacing biological and social evolutionary time frames. The earth's biosphere and human societies are complex adaptive systems, yet both natural and social processes lag behind the accelerating spatial reconfigurations, revealing stress points.¹²

It is generally accepted that a system's resilience is perceived to endure numerous assaults. This is true of both urban and biological systems, or what sociologist James McGlade calls socio-natural systems.¹³ Disturbances to a system at once test and alter the behavior and coping mechanisms of its components as it simultaneously negotiates the porosity of boundaries and the degree of diversity among components. These are reliable indicators of a system's resilience.

What is not easily accepted nor easily measurable, however, is the point at which a system, after undergoing stress, can no longer sustain its ability to resume its original condition, the point at which a system's resilience has been met with grave and sometimes, irreparable degradation. This opposite view of system resilience is system vulnerability, or crisis, and suggests what Richard Ingersoll calls an apocalyptic, "ecofascistic" view of the world,¹⁴ where an all or nothing approach breeds further categorization of social and natural systems. Instead, I argue that resilience and crisis are mutually modifying, mutually reinforcing conditions, and may yield an evolved understanding that disturbances on and within a system produce states of resilience.

Standardized ways to measure urban resilience include unemployment rates, real estate values, and income taxes. The danger of relying on these measures alone is that the characteristics that

define the shrinking city also condemn this same urban pattern. Instead we can begin to identify the shrinking city - and precisely that which makes it shrink - as the launching point for an unexpected urban condition beneficial to its inhabitants and the world around it. Adapting our thinking about vacancy in the city, then, might well include wildlife surveys in underutilized and overgrown open spaces, as well as in urban parks, greens, heaths, community gardens and cemeteries. The pleasant surprise is that these places are unexpectedly rich patches of biodiversity, a function that has become increasingly important in the context of creeping urban sprawl.



Watershed of Fortune

Source: Yuan Chen, Tao Li, Richita Misra, and Phanat Sonemangkhal, *GSAPP Urban Design Studio Fall 2004*

THE NEW HYBRID URBANISM

The paradigm shift for urbanism now is one from the centralized industrial city to a city which can be best described as a shifting mosaic of built and vegetated patches which modulate flows of water, energy, matter, information and organisms. Following Kevin Lynch's argument of the need for cognitive city models for urban design, the charge now is to develop an analytical framework from which to design. The following three functional models are presented to help provoke the emergence of a multi-scalar and multi-disciplinary urban design model.¹⁵

SOCIAL CAPITAL

Dr. Morgan Grove, Social ecologist with the US Forest Service, defines Social Meanings as mix of beliefs, myths, identity, and values that motivate social action. Social Capital is shared knowledge, understanding, norms, rules, and expectations about patterns of interactions that groups of individuals bring to a recurrent activity. Social linkages are the way we organize around things that are meaningful to us. For him the key features of social capital are the norms and networks that facilitate collective action, and the forms of common understanding developed over time. Rather than physical structures, social capital is embodied in social relationships, and there are different "types" of social capital that can be explored empirically.¹⁶



Politics of Desire
 Source: Sonal Beri, Melissa Dittmer and Alejandro Guerrero, GSAPP Urban Design Studio Fall 2004

Exposure¹⁷ is the tool epidemiologists use to connect the two toxic legacies of the 20th century city: social segregation (by class race gender age) and industrial and consumer degradation. Epidemiologists look at exposures (including environmental exposures) that "cause" outcomes (or health impacts). This is very basic. Dr. Mary Northridge from Columbia's Mailman School of Public Health prefers to trace pathways whereby social and envi-

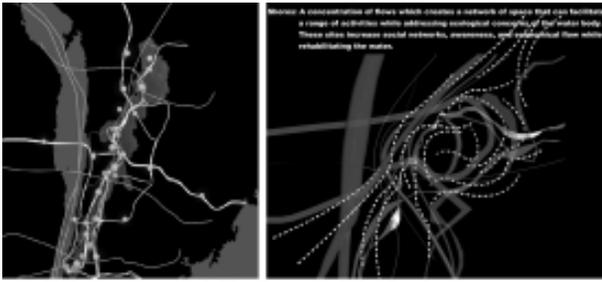
ronmental determinants (e.g., disparate enforcement of regulations and policies, unequal burdens of environmental toxins such as air pollutants and health enhancing resources such as community gardens across communities) influence population health and well-being.

PATCH DYNAMICS

Patch dynamics as an ecological model does not assume equilibrium, but measures succession and ecosystem change both spatially and temporally. Patches are different, heterogeneous areas existing in a different state of change. Patches are spatially indeterminate: 3-d spatial variety can't predict exactly where everything is. Patch dynamics therefore, cannot be represented in 2-d or even conventional 3-d maps. Patches are three-dimensional bodies that change through time, and the explicit spatial configuration has to take that into account. These four dimensions, which account¹⁸ for spatial configuration and change, are the essence of patch dynamics. Patch dynamics presents us with a spatially explicit way to model the world,¹⁹ and then it alerts us to some new functional features of the world such as: fluxes, flows of materials, energy, organisms, and information from patch to patch; and boundaries, three dimensional transitions between patch types that might control the fluxes.

ECONOMIC SELF-ORGANIZATION

Economist Paul Krugman, in his explanation about self-organization and its ability to envisage economic fluctuations and their thresholds, draws similarities between economies whose input-output structure are multilayered, and the morphology of edge cities. He agrees with physicist Per Bak that many physical and social phenomena can be modeled as percolation systems that naturally tend to move to the "edge of criticality."²⁰ This likeness between economic flows and urban systems is key since current economic models have yet to visualize the rates of instability in an economic system. Krugman describes Edge City Dynamics as a ring model: if you start with an even distribution of businesses, the tension between centrifugal and centripetal forces (centripetal force range must be shorter than centrifugal forces) will self organize into multiple clearly separated business centers. The Edge City Model demonstrates the emergence of a polycentric pattern, not a single agglomeration. In today's urban sprawls, office buildings and



Redefining Flows and Shores
 Source: Daniel Windsor, Paul Chu, Sofia Correia, Jason Huan Ting Hsiao, GSAPP Urban Design Studio Fall 2004

single-family homes are different actors caught in the same spatial dynamic. Herbert Simon's Urban Growth Model consists of "lumps and clumps": new units of economic activity almost always form in existing clusters.²¹ Complex Landscapes are landscapes that change over time and retain phase space representations of dynamic systems. Both positive and negative feedback operate in dynamic systems. Interaction generates agglomeration: the centripetal pull of manufacturing, (office buildings) and the centrifugal pull by geographically dispersed agricultural sector (single family houses). The emergence of order under the principles of self-organization is that order emerges from instability/unstable fluctuations: urban morphogenesis, the study of the change of urban form over time shows the development of order from random growth and frequency distributions.



Trans_Urbanism
 Source: Rene Romero, Kleber Salas, Maysho Prashad, GSAPP Urban Design Studio Fall 2004

OUT OF THE BOX

Our students in Columbia's urban design program have been maneuvering this box and its contents for 4 consecutive years. Studio 2 situates urban design within expanded disciplinary and geographic fields, broadening our analyses to consider ecological, social and economic dynamics.

Brian McGrath, the studio's coordinator, states that "the intent of this expansive framework is to approach an understanding of the relations between macro trends and micro behaviors accompanying the global shift in advanced urban economies, from center of industrial production towards networks of symbolic processing"²² – a shift that Manuel Castells has called "the emergence of an urban society without cities."²³

Our chosen geographic field is now the megalopolis, and the urban watersheds within it. Watersheds are a unit of study that attract different disciplines and practices, and hence provide an opportunity to link different perspectives, concerns, and expertise.²⁴ Because the boundaries of a watershed are regulated by both biological and human processes, and therefore shift in the temporal and spatial dimensions, they also prompt new ways to draw the fields in which the students choose to work. By adopting the watershed as our localizing field, it has lifted the burden of preconception and moves them forward.

Ecolopolis
 Source: Andre-Jacques Bodin, Uri Mazor, Jennifer Swee, Rex Wong, GSAPP Urban Design Studio Fall 2004

By making shrinkage productive to cities, we can initiate cycles of development that may happen within nested time scales, and within nested geographic fields. Derelict land is not wasted land. The shrinking city can be a source of cultural innovation, precisely because it is shrinking. The conditions of vacancy allow for an experimentation of new ways of living, developing, and making money not possible in the high-rise, high-rent capitals of today. Shrinkage can be the new currency of social capital, and the field subjects of new spatial and temporal cartographies.

8. Victoria Marshall, landscape architect, as stated

1. Antoine De Saint-Exupéry, *The Little Prince* (New York, Harcourt Brace Jovanovich, 1943, 1961), 12.

2. Matthew A. Wilson, Morgan Grove, Roelof Boumans, William Burch and Amanda Walker. "Exploring the Spatial and Ecological Dimensions of Social Capital: A Case Study of the Baltimore Urban Ecosystem" from Proceedings of first Annual meeting of the International Society for Ecosystem Health, 2002.

3. Kevin Lynch, *Good City Form* (Cambridge, MA: MIT Press, 1996), 277.

4. *Ibid.*

5. *Ibid.*

6. Mary Cadenasso, Steward T.A. Pickett, Kathleen C. Weathers, and Clive G. Jones. "A Framework for a Theory of Ecological Boundaries" in *BioScience*, August 2003/Vol. 53 No. 8: 750.

7. *Ibid.*

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9. Grahame Shane. "The Emergence of Landscape Urbanism" in *Harvard Design Magazine*, Fall 2003/Winter 2004, Number 19.

10. David Harvey. *Justice, Nature and the Geography of Difference* (Blackwell Publishers Ltd., Oxford, UK. 1996), 403.

11. J.B. Foster. "Capitalism and Ecology: The Nature of the Contradiction" in *Monthly Review*, Vol. 54, No. 4, September 2002.

12. <http://www.arch.columbia.edu/gsap/41373>

13. James J. McGlade, "Archaeology And The Ecodynamics Of Human-Modified Landscapes" in *Antiquity*, 69(262), 1995, 113-132.

14. Richard Ingersoll, "A Post-Apocalyptic View of Ecology and Design" in *Harvard Design Magazine*, Spring/Summer 2003, Number 18.

15. Explanations of the three models and concepts are excerpts from course material of GSAPP's Urban Design Studio Two, Fall 2003 and Fall 2004

16. J. M. Grove, and W. R. Burch. "A Social Ecology Approach and Application of Urban Ecosystem and Landscape Analyses: A Case Study of Baltimore, Maryland" in *Urban Ecosystems*, 1997 No. 1, 259-275.

17. GSAPP Debate: "Disturbance and Exposure: The New Urban Ecology?"; held October 11, 2004, Wood Auditorium, Avery Hall, Columbia University

18. S.T.A. Pickett and P.S. White, Eds. *The Ecology of Natural Disturbance and Patch Dynamics* (Academic Press, Orlando, FL, 1986), 4-16.

19. *Ibid.*

20. Paul Krugman. *The Self-Organizing Economy* (Blackwell Publishers Ltd., Oxford, UK. 1996), 44.

21. *Ibid.*, 44.

22. <http://www.arch.columbia.edu/gsap/41373>

23. http://www.arch.columbia.edu/Buell/mmarchive/s_2001/castells/castells_fs.html

24. Steward T.A. Pickett, William R. Burch, Jr., Shawn E. Dalton, Timothy W. Foresman, J. Morgan Grove and Rowan Rowntree. "A Conceptual Framework For The Study Of Human Ecosystems In Urban Areas" in *Urban Ecosystems*, 1997, No. 1, 185-199.