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Regional resilience: A critical examination of the ecological framework

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BUILDING RESILIENT REGIONS

Regional Resilience: A Critical Examination of the Ecological Framework

Todd Swanstrom
Saint Louis University

Delivered at the Urban Affairs Association
Annual Meeting
Baltimore, MD

April 25, 2008

UNIVERSITY OF CALIFORNIA

Regional Resilience:
A Critical Examination of the Ecological Framework

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The different responses of New York City to the terrorist attacks in 2001 and New Orleans following Hurricane Katrina in 2005 have focused the attention of scholars on the ability of metropolitan areas to recover from disasters (Savitch 2008; Vale and Campanella 2005). In the case of New York City, despite dire warnings that people would flee urban settings that were vulnerable to terrorist attacks, the real estate market in lower Manhattan revived and is now as vibrant as ever. The painful memory remains, but the city has recovered from its wounds (Savitch 2008). New Orleans is another story. The immediate response to the hurricane was often uncoordinated and ineffectual. The long-run recovery has been slow and uneven. The population of the city is still only at about 72 percent of its pre-Katrina level and while the levees have been repaired they have not been built to withstand a category 5 hurricane like Katrina. It is still uncertain as to whether the city will recover enough to sustain the dynamic culture in food, music, and the arts that flourished before Katrina.

The word that is increasingly used to describe successful responses to disasters like these is "resilience." Resilience is an idea that can also be applied to slowly developing challenges as well as sudden disasters (Foster n.d.). Indeed, a good case could be made that in our fast-moving, global economy resilience is quality that all metropolitan areas need to thrive. Every metropolitan area faces challenges, like economic restructuring, high rates of immigration, environmental deterioration, water shortages, and the new geography of poverty. No metropolitan area can rely on its legacy of past successes to succeed in the future. Arguably, what matters most is not how successful a metropolitan area is in the present, but how resilient it will be facing future

challenges. Metropolitan areas that become "locked-in" to one economic trajectory or governing paradigm will soon find themselves left behind.

The purpose of this paper is to explore the value of the resilience framework for thinking about how metropolitan areas respond to challenges.[1] At this point in its applications to regional studies, resilience is more than a metaphor but less than a theory. At best it is a conceptual framework that helps us to think about regions in new ways, i.e., dynamically and holistically. As derived from the field of systems ecology, the resilience framework encourages us to think about regions as interconnected systems with extensive feedback processes that must be understood for successful human intervention. Ecologists have long understood that ecosystems cannot be studied by isolating parts of the system and examining linear relations of cause and effect. Ecosystems function through the interaction of complex processes operating at different scales and time frames. These processes have powerful feedback effects that must be understood to respond effectively to challenges. Take the example of a pest that is devastating crops. Efforts to eliminate the pest may only cause the hosts for the pest to proliferate, making the ecosystem more vulnerable to a future reinfestation of the pest. Isolated interventions based on linear thinking can lead to less resilience, not more. Similarly, scholars on metropolitan areas have increasingly argued that metropolitan policies cannot be treated in isolation from each other. Treating traffic congestion by building more highways, for example, may simply encourage more dispersed development, worsening the problem of traffic congestion in the future.

The resilience framework developed out of ecological studies represents a revolt against the mechanical and linear approach to scientific explanation modeled on

Newtonian physics. A machine can be engineered to achieve equilibrium through human controls and can operate quite independently from its environment. Plants on the other hand cannot be controlled, they must be nurtured and they are highly sensitive to their environment. The resilience framework encourages us to think about regions as complex ecosystems with porous boundaries. Like ecosystems, metropolitan resilience cannot be directly controlled or engineered like a machine. I argue that the resilience framework, by requiring us to think about metropolitan areas as dynamic systems, generates insights that could lead to more sophisticated and holistic ways to nurture resilient regions.

On the other hand, I will argue, the resilience framework, by understanding regional governance through the lens of ecology, fails to understand the power of sovereign political authority in setting the rules and structures within which regional resilience occurs. We cannot overturn the laws of photosynthesis but state governments can shape the rules and institutions that govern metropolitan areas. Power and conflict are present in regional governance in ways they are not present in ecosystems. Politics cannot be subsumed to a natural order of things. Indeed, I will argue, resilience is best served by recognizing and protecting separate spheres of resilience in the public, private and civic sectors, rather than subjecting them to a common ecological structure.

Rise of Resilience

Resilience has gained increasing prominence in the social sciences in the past decade. Figure 1 shows the number of references to the term “resilience” as a topic in the *Social Science Citation Index* for the past ten years.[2] During that period, the annual references to the word “resilience” increased by more than 400 percent. Of the total

references (2,341) the various branches of psychology had by far the most (959). Psychiatry adds another 351 references. (It is worthwhile to note that there were no reported references to resilience in the political science literature.)

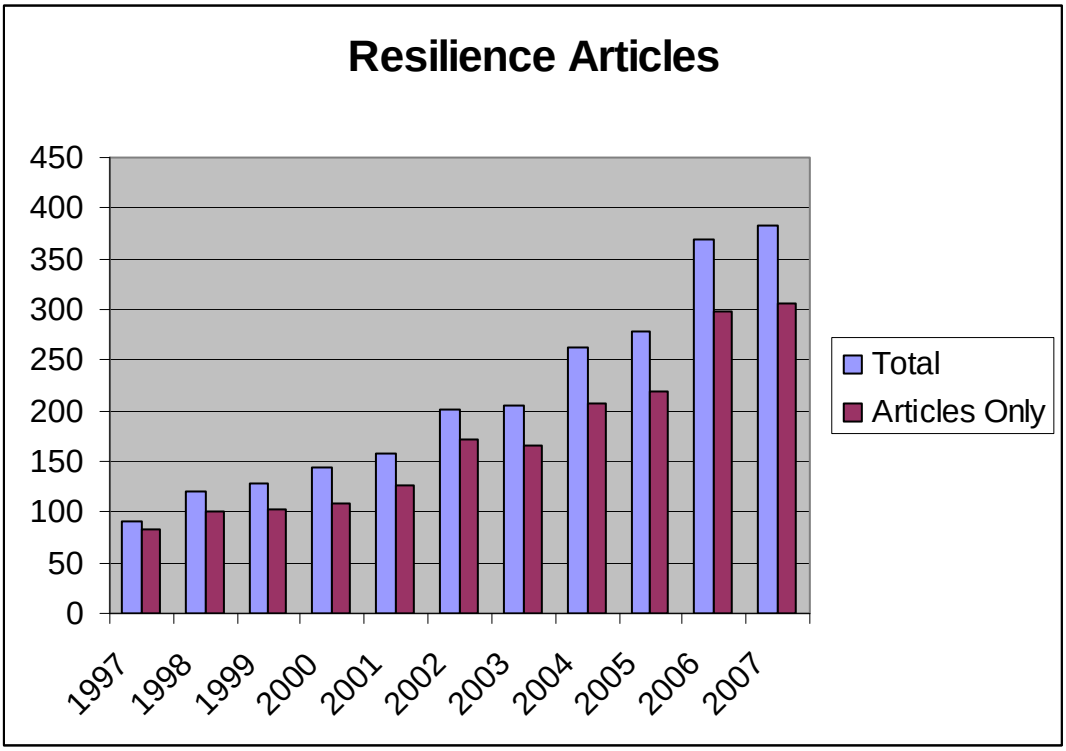

Figure 1. Citations of "Resilience" in the *Social Science Citation Index, 1997-2007.*

Psychology has long been interested in how people resume healthy functioning after suffering from traumatic experiences, such as a wars, accidents, or life-threatening diseases. Psychologists have shown that resilience is not something possessed by a few extraordinary people; ordinary human beings have remarkable abilities to bounce back from traumatic experiences.[3] Resilience can be enhanced by internal processes, such as prayer or exercise, and by external relations, such as enhancing one's social networks (American Psychological Association, n.d.; as reported in Foster n.d.).

I focus here on the concept of resilience developed in the field of ecology. The ecological idea of resilience stretches back twenty-five years to a seminal article by C. S. Holling (1973). Ecological resilience differs from engineering resilience. Engineering resilience is the ability of a system to return to equilibrium after a disturbance, like a thermostat that returns the temperature in a house back to 70 degrees after an ice storm. The ecological concept of resilience is based on multiple equilibria. This means that ecosystems are able to respond to perturbations by changing their structure and functioning to a new system. The idea of multiple equilibria fits metropolitan areas better because regions must reinvent themselves in the face of challenges. When industrial jobs disappear, regions cannot just reinvest in the manufacturing sector in the hope of recreating a prosperous economy based on heavy industry. Instead they must reinvent themselves to find a new profitable niche in the global economy.

The basic insight of behind the ecological concept of resilience is that ecosystems operate according to complex processes of feedback or loops of circular causation.[4] These loops are closed and therefore constitute a system. Order in the system "emerges" out of these interactions; it cannot be understood by understanding the parts but by understanding the properties of the system as a whole. Ecosystems self organize to achieve balance or equilibrium: when one species starts to dominate, the gradual depletion of its food sources blocks further expansion and the system comes back into equilibrium. When ecosystems are disturbed by an outside force, scientists have found, they are capable of restructuring themselves into a new equilibrium. An example would be when a sustained drought causes some species and plants to decline and others to rise, forming a new desert ecosystem with completely different dynamics. This process of

resilience is aided by biodiversity: the more animal and plant species that exist in an ecosystem, the greater the chance that a new equilibrium can be formed out of their interaction.

Increasingly, ecologists have applied the concept of resilience not just to biological systems but to what are called the socioecosystems, or the interaction of human and natural systems.[5] The basic idea is not just that humans need to understand the emergent systems of resilience in nature and make policies that take into account complex feedback effects. Instead, the human system of ecological management is modeled on the same type of processes that bring order in nature. Applying the framework of ecological resilience to human institutions and governance processes generates paths to greater understanding, as well as dead ends.

Resolving the Paradox of Resilience

I often advise my students that they should concentrate on developing broad skills in thinking and writing, instead of narrow technical skills. Increasingly, we have to be lifelong learners, I say, and a broad liberal arts education will help them to adapt and acquire new skills in a rapidly changing economy. On the other hand, as my students often remind me, it is difficult to get that first job with just a liberal arts degree. Employers are looking for marketable skills and for workers who have specialized knowledge, both of which increase worker productivity. In truth, to succeed in the modern economy you need both: technical skills and broad adaptive skills. Technical skills and specialized knowledge makes you a more efficient and productive worker, but it can lock you in to a part of the division of labor that can disappear over night in the

winds of creative destruction that increasingly sweep across the economy. Workers need to be adaptive as well as efficient. Similar paradoxes or contradictions plague ecosystems or regions and the way that the ecological concept of resilience reconciles these contradictions is one of its principal insights.

Across both natural and human systems, processes that increase the efficient production of wealth and stored energy undermine resilience. For example, a forest with one or a few dominant species of trees may prosper and accumulate a rich soil and dense canopy that keeps out competitors. But if that one tree is eradicated by a pest, the lack of biodiversity will hinder the ability of the forest to rejuvenate itself. Similarly, maximizing the accumulation of capital requires regions to concentrate resources on industries where they have a comparative advantage. Taking advantage of economies of scale in production necessitates concentrating capital in one or a few production sites. The result, however, is a regional economy lacking in diverse industries and vulnerable to shifting consumer demand or competition in the dominant industry (Pittsburgh in the 1950s). A successful economy creates tight connections between the industry, society, and the government but these same tight connections can make it difficult to shift public policies and redeploy assets in the face of a crisis (Safford 2004). Similarly, lean companies with just-on-time production and global supply chains, may be highly efficient but they are vulnerable to disruptions (Sheffi 2007).

The ecological model of resilience reconciles this contradiction through the idea of panarchy that captures the "evolutionary nature of adaptive cycles that are nested one within each other across space and time" (Holling 2001, 396). (Figure 2) Systems can be both efficient and innovative, highly connected and free to experiment, if these properties

manifest themselves at different times and at different scales. Four different phases in the cycle are represented in a two dimensional space that maps potential, or accumulated wealth, and connectedness, or tight integration and hierarchical control. Long periods of stasis are punctuated by short bursts of change and innovation. The conservation phase, which corresponds to a mature forest or economy, is the time when the system reaches its highest potential and connectedness. In the face of a challenge or stress, the system enters a phase of release in which connections break down and hierarchical control wanes. The loosening of central controls sets the stage for experiments to flourish. Successful experiments then become the basis of a reorganization of the system. The system then enters a phase of exploitation of the new forms of production in which the new system becomes entrenched, ending in a longer conservative period of little change.

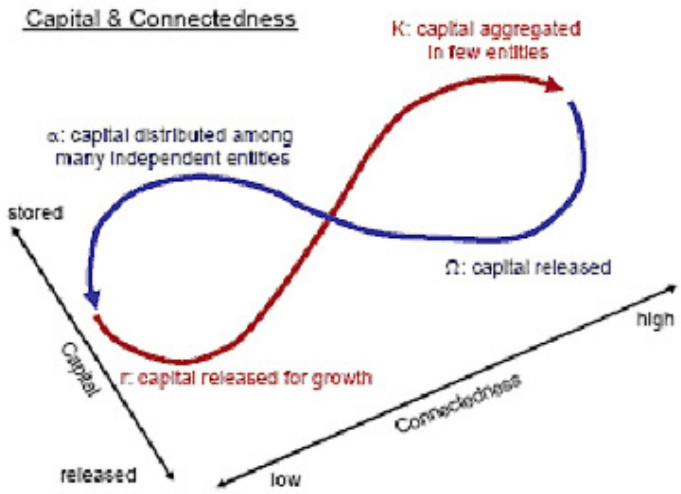

Figure 2. The adaptive cycle - in two dimensions, capital and connectedness, depicted as a figure 8 pattern of dynamics. Source: http://www.resalliance.org/564.php (accessed April 22, 2008).

In ecology a good example is a mature forest whose dense canopy discourages competitors and whose accumulated dry kindling is "an accident waiting to happen." A

bolt of lightening sets off a forest fire which sweeps through the forest breaking down connections and opening up the space for a great diversity of new trees and plants to thrive. A period of creative experimentation ends with a new equilibrium, different from the prior one. As exploitation gives way to a conservative stage the new system creates the seeds of its own destruction or at least vulnerability to outside disturbances as certain large species of plants and animals begin to dominate. The basic idea is that ecosystems maintain their resilience by going through these cycles. If they get stuck at the conservation stage, often from human interventions, such as fire suppression, they can become locked in and even more vulnerable over time to outside disturbances that can disrupt the whole system (forest fires that are widespread and highly destructive).

The tension between efficiency and innovation, tight connections and freedom to experiment, is also reconciled by being situated at different scales. Basically, the slower, longer term processes operate at larger scales and the faster, short-term processes operate at smaller scales. Usually, the larger scales processes dominate and shape the outcomes of the smaller processes. Thus, for example, climate, geomorphology, and large plants and species dominate over finer grained biochemical processes. But at times that require rapid innovation and change, the lower levels can exercise a “revolt” function, reacting back on the higher levels and changing their structure and function. A resilient system is one where these smaller scale processes are able to deal with the stressor without having to reorganize the larger scale structures.

In the case of regions, markets correspond to the faster, more localized parts of the system that are constantly adjusting to change. Local governments represent an intermediate level while the central government and larger culture represent the larger

structures that adapt more slowly. A resilient region would be one in which markets and local political structures continually adapt to changing environmental conditions and only when these processes fail, often due to misguided intervention by higher level authorities which stifle their ability to innovate, is the system forced to alter the big structures. A good example would be federal urban renewal policies that generated perverse incentives for localities to favor commercial development over housing, resulting in the disruption of the social fabric in many cities, fueling urban riots. This resulted in the change of federal policies from categorical grants to block grants, such as the passage of the Community Development Block Grant in 1974, which freed up local governments to experiment and develop more balanced urban policies.

Understanding Regional Resilience as a Dynamic, Multi-Tiered System

The foregoing discussion raises the question: can models generated by empirical research on ecosystem resilience be applied to human systems such as metropolitan areas? Can (and should) human systems operate under the same as principles as natural systems? In this section I explore the positive contributions that ecological thinking about resilience can contribute to understanding the resilience of metropolitan areas. In the following section I examine the flaws in applying ecological thinking to human systems.

First, it is important to reiterate that the ecological resilience when applied to human systems functions more as a conceptual framework than as a theory or a set of testable hypotheses. In their essay linking social and ecological systems, Berkes and

Folke (1998, 15) defend the value of conceptual frameworks by quoting Rappoport (1985, 256):

> Conceptual frameworks are neither models nor theories. Models describe how things work, whereas theories explain phenomena. Conceptual frameworks do neither; rather they help to think about phenomena, to order material, revealing patterns – and pattern recognition typically leads to models and theories.

Ultimately, the value of the ecological concept of resilience will rest on its ability to suggest new hypotheses about regional resilience that can be tested by social scientists.

1. **The Systems Approach to Regions**

Why regions? This is the first question asked of studies of regional resilience. The ecological literature suggests a way to think about the importance of the regional scale. An eco*system* is a habitat characterized by extensive feedback loops among plants and animals that create a complex but orderly system. The systems approach takes an endogenous point of view: you can understand metropolitan areas in terms of their internal relations. External forces are treated as exogenous variables that generate stresses or challenges that the system must adapt to.

Are metropolitan areas usefully viewed as systems? Clearly, larger-scale forces, like globalization and national policies, impact regions, and conventional wisdom would argue that new telecommunication technologies are rendering places less important. At the same time, there is considerable evidence that important processes interact with each other in systematic ways within regions. Pastor, Lester, and Scoggins (2007) provide objective evidence that "regions matter." According to their data analysis, regional economies are not converging toward a national mean; increasingly, regions vary in their

economic performance, suggesting that factors internal to the region are driving growth. Manuel Castells (2000) argues that the space of places has been replaced with the "space of flows". Under the space of flows metropolitan areas are changing their functions but they have not been rendered obsolete. In many ways metropolitan agglomerations are more important than ever as centers of innovation and planning in the modern economy.

The Census Bureau defines metropolitan areas in terms of commuter sheds, which can be thought of as analogous to watersheds. Labor markets and housing markets operate at the regional scale. Regions can be viewed as "high reverberation" systems where activity in one area or sector impacts processes in another. According to linear models of cause and effect rooted in Newtonian mechanics, the effect is always proportional to the cause. One of the insights of systems theory is that small interventions can cause large effects (the butterfly effect) and large interventions can have very small effects. A good example of this at the regional level is that massive busing programs designed to increase interaction among racial groups in schools can have very little impact if it results in whites fleeing central city schools for suburban white districts.

Policy interventions must understand these complex feedback loops in order to be effective. Consider the example of CDCs building new affordable housing in central cities. In metropolitan areas where household formation lags growth in the regional housing supply, the effect may be only to cause housing in other parts of the city to be abandoned, undermining revitalization efforts. Policy silos need to talk to one another because the region is an integrated system. Job training for inner city residents makes little sense if the workers have no transportation to the available jobs in the suburbs. Job

training needs to be coordinated with transportation and housing policy. And in the classic case of feedback effects, massive expenditures on expanding highway capacity may only have a tiny effect on traffic congestion. According to Anthony Downs's "triple convergence," in response to the added capacity travelers will change the times, the mode of travel, and their route generating more traffic and cancelling out any reduction in congestion (Downs 2004). A systems approach to metropolitan resilience makes sense.

2. Resilience as a Dynamic Process

The concept of resilience forces attention on change. In contrast to the engineering concept of resilience, ecological resilience, with its notion of multiple equilibria, points to the need of metropolitan areas to constantly reinvent themselves in the face of challenges. Given the porous boundaries of metropolitan areas, the constant flow of goods and people in and out, and the turbulence of national and international markets, it is not enough for metropolitan areas to simply maintain the status quo. Metropolitan areas must constantly reinvent themselves or they will fall further and further behind.

A key issue for resilience studies is understanding how metropolitan areas move from path dependence to path divergence. Ecological studies provides some insight into this issue by emphasizing that diversity of animals and plants helps ecosystems to adapt by providing them with more alternatives. Regional economists have long advocated the need for diverse economies that will be less vulnerable to shake-ups on one industry. Similarly, companies with diverse and redundant suppliers will be less vulnerable to an interruption in the supply chain (Sheffi 2005). Chapple and Lester have begun to operationalize the concepts of path dependency and divergence. They compare the

performance of metropolitan areas in the 1980s and 1990s, arguing that if a metropolitan area declined in the 1980s and then turns that around in the 1990s, it is "transformative," i.e., it has reversed path dependency. After empirically identifying regions that were able to turn the corner on important outcomes, it may be possible to study particular cases in more depth to document how the region was able to be resilient. It is precisely these kinds of in-depth studies of the sources of regional resilience that are lacking.

3. Resilience is Not an Asset

Ecological resilience also requires us to think of resilience not as a resource or an asset but as a process of change. The success of regions is often viewed by scholars as based on their accumulated capital – whether that be financial capital, physical capital (built environment), or social capital. Thus, Robert Putnam (1993) argued that the success of regional governments in Northern Italy was based on the accumulation of social capital going back centuries. By contrast, in her study of eight metropolitan areas, Kate Foster (2000) found an intriguing disjunction between deep stores of regional capital and success on regional outcomes such as economic performance or social equity. Just as a forest must loosen tight connections in order to permit reorganization into a new better adapted ecosystem, metropolitan areas that fail to loosen tight connections that bound them to the earlier structures will remain brittle and lack resilience. From the viewpoint of resilience, social capital can just as easily be the problem as the solution. In his study of successful adaptation to deindustrialization in Allentown versus failure to adapt in Youngstown, Sean Safford (2004) argues that what mattered was not the accumulation of social capital but its configuration. In Allentown, the structure of civic relations facilitated action across social, political, and economic divisions, thus,

promoting a resilient response to the traumatic loss of industry. In Youngstown the social networks were ingrown and tied to sunset industries, supporting continuing commitments to policies supporting shrinking industries.

Limits of the Ecological Approach to Resilience

The basic insight of the ecological concept of resilience is that human institutions should mimic the resilient processes of nature. Resilience in nature arises from nested sets of adaptive cycles that operate at different scales and different time frames. The ecological concept of resilience stresses self-organization among decentralized structures over intentional hierarchical controls. Indeed, the term panarchy, which is used to describe the structure of ecological resilience, was chosen to avoid the term hierarchy which is "so burdened by the rigid, top-down nature of its common meaning (Holling, Gunderson & Peterson 2002, 74). In a panarchy, there are different scales at which adaptation occurs but the higher and larger scales are not privileged; indeed, panarchy celebrates the fast-moving decentralized structures that are the source of system adaptability. Human governance should mimic the disorganized, emergent order of nature. "When the scales of human affairs become decoupled from those of nature, signals of change are eliminated and the learning that such signals can generate begins to whither" (Gunderson & Holling 2002, xxii).

Ecological resilience is fundamentally anti-statist. Ecological resilience validates forms of governance that are fundamentally anti-political in the sense of rejecting the power of the sovereign state to manage resilience. At the same time, ecological thinkers are often critical of economists who think that environmental sustainability can be

achieved if we just "get the prices right" (Gunderson & Holling 2002, xxi) Rejecting both the state and the market, ecological thinkers embrace social processes of consensual decision making and network governance. I argue that the diminishment of the role of the state and political conflict in favor of consensual social networks ends up being profoundly conservative, reinforcing the status quo. A diminished role for the state does indeed promote rapid innovation, but far from leading to resilience this can cause profound disorganization and social stress. I illustrate my argument with examples from the foreclosure crisis.

From Natural Laws to Human Laws

Ecologists are deferential to the emergent order of nature. Over and over again, they caution against the hubris of scientific resource management trying to control nature. The result of partial interventions, such as managing the sustainable yield of one crop, is to reduce biodiversity and undermine resilience. Scientific management violates the emergent order of nature. However, the laws that govern human affairs are not natural, they are man-made. To defer to them is to defer to the status quo. The ecological literature on human systems of resilience almost never analyzes the background conditions that shape regional governance and resilience. We do not start from a state of nature but from a civil society in which resilience is shaped by laws, policies, and very human institutions. Suspicious of any central authority, ecological models of resilience ignore the ways that the central government shapes markets, local governments, and even cultural values. When applied to human systems, ecological resilience overlooks the crucial role of sovereign authorities in both nurturing and undermining resilience.

The current foreclosure crisis illustrates the crucial role of central authority. The main cause of the rash of foreclosures was a 1980 federal law that repealed the usury, or interest-rate, limits on first-lien mortgages and thus set in motion the rash of subprime lending (Gramlich 2007). The opening in the forest canopy of federal regulation ushered in a wave of innovation in the mortgage industry, introducing new instruments, such as ARMS, balloon payments, teaser rates, liar loans, piggyback loans, etc. From the viewpoint of ecological theory this proliferation of new mortgage instruments apparently increased biodiversity and thus resilience. But in fact these new instruments were used to dupe consumers into loans that were against their interest. Wall Street investment firms were also highly innovative, inventing complex forms of mortgage-backed securities that enabled predatory lenders to off load their fraudulent mortgages and acquire new funds to spread the problem further. Resilience in the mortgage industry undermined resilience among households. Ecological thinkers cannot be blamed for the foreclosure crisis, of course, but there is almost nothing in their thinking that would suggest that a decline in central regulations could lead to such disastrous results.

The Levels of Analysis Problem

As much as ecologists have tried to make it a scientific concept, resilience has strong ideological overtones. As applied to individuals, resilience, with its connotations of self-reliance, is a quintessentially American concept (Pendall, Foster & Cowell 2007, 4). Resilience is often understood as the ability of an individual, or in our case a region, to pull itself up by its bootstraps and reinvent itself in the face of external challenges. By failing to recognize how different levels of analysis interact, this understanding of

resilience is ideological. Resilience tends to treat stressors as generated by basically unpredictable forces in nature, such as storms, climate change, or forest fires. A forest cannot prevent fires or stop climate change. Humans can.

As we saw above, the rise in subprime lending was not an act of nature, but the result of federal deregulation of lenders. Moreover, research has shown that banks that signed lending agreements with communities were much less likely to issue subprime or predatory loans (Casey 2007). Bank lending agreements were promoted by the Community Reinvestment Act of 1977 that made it possible for community-based organizations to file legal challenges against lenders for failing to meet the credit needs of their communities. In other words, central government regulations empowered community-based organizations to innovate new ways of meeting the credit needs of the community outside of predatory lending. Resilience in human systems has as much to do with shaping the challenges as responding to them.

With regard to the regional response to mortgage foreclosures, clearly localities lack the resources to respond adequately to the crisis. Federal and state action is needed to empower localities to respond adequately, partly because the problem is most severe in low-income and minority communities. Moreover, state laws control the legal process of foreclosure, setting the time frame in which borrowers must act to restructure the mortgage to prevent foreclosure. Localities need both resources and a supportive legal framework from higher levels of government in order to be resilient in the face of the foreclosure crisis. They can not do it themselves.

Resilience is an Inherently Normative Concept

Resilience always has an object. Resilience can only be understood with reference to some desirable outcome. Resilience toward what? For whom? The ecological concept of resilience essentially finesses the normative question. The norm or goal of resilience in the ecological literature is sustainability, which is rarely debated or questioned. The definition of sustainability is the ability to meet the needs of the present generation without compromising the ability of future generations to meet their needs. The emphasis in the literature is not on the "needs" of the present generation but on processes of production that use renewable resources and close the loop of production so that all waste is recycled. What is important is the proper functioning of the whole, not the well being of the parts or the just distribution of the burdens and rewards of resilience.

Westley et al (2002, 103) begin one chapter by quoting an anonymous source: "There are in nature no rewards or punishments, just consequences." In human systems there definitely are rewards and punishments. Some people win and other people lose. The distributive consequences of resilience cannot be ignored. In the study of resilience in human systems we are from agreement on goals. Researchers are forced to choose among desirable outcomes and defend their choices. Resilience in human systems is inherently conflictual, or political.

The ecological framework of resilience tends to supported consensual, network forms of regional governance. In an article cited by ecologists (Alberti, et al 2003), Innes and Booher (1999, 152) put it this way: "Experience has shown that many consensus-building processes have properties similar to complex systems – self-organization,

decentralization, and inventiveness…. Because consensus building maps so effectively onto these complex systems, it can be a particularly powerful planning method." Consensus building may work in the case of watershed planning, where the costs of inaction often weigh heavily on all stakeholders, but in the case of the foreclosure crisis relying on consensus may undermine resilience rather than foster it. If the goal is to keep as many households as possible in their homes, then resources will need to be distributed from taxpayers to at-risk homeowners or bankruptcy laws will have to be revised to force lenders to renegotiate loans. Either way, some people will win and others will lose and if we wait for consensus inaction will most likely be the outcome.

Conclusion: A Three-Sector Model of Regional Resilience

The conceptual framework of resilience as developed by ecologists has strengths and weaknesses for the study of resilience in metropolitan areas. Clearly, metropolitan areas are complex systems with powerful feedback loops that must be understood by policymakers and resilience requires adaptive cycles that periodically break the hold of tight connections that stifle innovation. But the conceptual framework of resilience ignores the role of sovereign authorities in setting the rules for resilience, the need for researchers to make tough normative choices about desired end states, and the inevitability of political conflicts in resilience processes. Instead of summarizing the arguments made in the paper, I will end with a conjecture about a three-tiered model of regional resilience.

Resilience can be understood as a process that takes place in three sectors: private, public, and civic (or nonprofit). Each of these has a characteristic mode for

promoting adaptation to challenges, as well as characteristic failures or rigidities. Regional resilience is most effective when each sector operates according to its own principals and is not contaminated by the processes of the other sector. In other words, resilient regional governance is not a holistic process or system, as is suggested by ecological theory, but requires maintaining borders between spheres of resilience.

1. Civic (Nonprofit) Sector: Critical of both markets and governments, ecological theory places civic networks and consensus decision making at the center of resilience. The basic idea is that a diversity of stakeholders can devise innovative solutions that transcend the limits of self-interest. Innovative win-win solutions are possible if stakeholders collaborate. There is no doubt that many innovative ideas do emerge out of diverse networks in civil society. Pressed by CRA requirements, for example, banks have met with CBOs and other neighborhood interests to devise creative lending products that meet the needs of low and moderate-income lenders without compromising bank profits.

On the other hand, civil society can become unresilient or locked when infected with "cronyism": networks become ingrown, self-replicating, and develop a "group-think" that precludes creative and resilient solutions. When these civic networks take over the functions of government, they empower the already connected and distribute benefits based on particularistic criteria. Salamon (1995) calls this philanthropic particularism. Similarly, if nonprofits operate according to the principles of the private market, they lose their ability to innovate. Randy Stoecker (1997) argues that CDCs often succumb to the pressure of the marketplace and give up their advocacy function in pursuit of real estate development.

2. Private Markets: If civil society represents an intermediate level in speed and flexibility, then private markets are clearly the fastest and most rapidly innovative level of resilience. Properly functioning private markets are highly resilient because they motivate decision makers to respond quickly to changing technology and consumer preferences. Mobile investors shift investments quickly out of dying industries into sunrise industries. Markets aid individual resilience by giving consumers more choice. For example, the ability of private lenders to put foreclosed properties back on the market as quickly as possible so they can be occupied and pay taxes is an important part of resilience in the face of the foreclosure crisis.

On the other hand, markets can also get "locked in" to patterns that undermine resilience. In the parlance of welfare economics, these are called market failures. When market actors behave like civic actors, achieving consensus to advance their interests through collaboration, they undermine resilience. Competition and individual self-interest clearly have an important place in regional resilience but they can undermine resilience if infected by the principals of the other sectors. Policymakers must be aware of the levels of analysis problem. Market resilience or rapid innovation can undermine household resilience. Unregulated or weakly regulated mortgage brokers, for example, seduced lenders into loan products that did not make households more resilient, by building equity through homeownership, but instead made them vulnerable to economic insecurity or job losses.

3. Public Sector: The public sector represents the broadest scale and the slowest moving parts of resilient systems. Competitive party processes enable democracies to innovate in the face of challenges. When control over the government changes parties,

the opportunity exists to transform the rules that govern resilience. The job of government policies is to provide a framework within which market and civic actors can do their jobs, each within their own sphere, to adapt to challenges. Government builds the infrastructure of resilience. Government action must be guided by public interest considerations, governing for the entire society, not for any partial interests. The set of policies that emerged from the New Deal, such as FHA loan guarantees, and from the 1970s, such as the CRA Act, empowered private lenders and civic actors to better of adapt to challenges.

When government operates according to private interests or requires consensual decision making to legislate, it loses its ability to promote resilience. Government policy can be captured by policy monopolies or subgovernments that insulate policy from the reach of the competitive party system (Baumgartner & Jones 1993). When governments rely upon collaboration among networks to make policy instead of legitimate authority that legislates for the entire society, then the powerful become entrenched and resilience wanes (Lowi 1979). This is essentially what happened when federal regulators became captive of the financial services industry and failed to grasp the effects of deregulation on households, communities, and even the economy as a whole.

In conclusion, each of the three sectors is needed to maximize resilience. The private sector maximizes the resilience of individuals, the civic sector of communities, and the public sector of the society as a whole. Without a balance between the three sectors, controlled ultimately by a central authority, society will either become rigid or innovation at one level will undermine resilience at other levels. In short, resilience does

not require merging human systems with nature in one integrated system but requires maintaining spheres of resilience with carefully guarded borders.

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[2] The Social Science Citation Index describes a topic search as: "Searches for topic terms in the following fields within a record: Title, Abstract, Author Keyword, Keywords Plus®."

[3] Likewise, cities have also shown remarkable ability throughout history to recover from disasters. See Vale and Campanella 2005.

[4] For an introduction to feedback thinking in the social sciences, see Richardson 1999.

[5] The effort to create an integrated theory of natural and human systems was let by a 5-year collaboration among social scientists funded by the MacArthur Foundation called the Resilience Project. The results are published in Gunderson and Holling 2002 and on the website: http://www.resalliance.org/reports.

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