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Resilience and Ecological Citizenship in Socio-Ecological Systems

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<Abstract>

As the early twenty-first century discussion of an Anthropocene geological epoch suggests, human planning and intentions have had tremendous effects on the earth's ecosystems. One lesson has been that there must be a positive feedback loop for the proper resiliency in terms of system processes. Just as resilience is needed in the interactions across and within species for an ecosystem to persist over time, it is also a human imperative when faced with crises such as the massive perturbations of the Earth System we now call the Anthropocene. Among the variety of human capacities that the crisis will call upon, perhaps the most crucial is spiritual recovery. Resilience and sustainability of ecosystems will be possible only through spiritual enlightenment building on the open-minded attitude of individuals around the globe.

[Keywords]: *ecological citizenship, optimal resilience, cultivating spirituality*

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사회생태계의 레질리언스와 생태시민성

심연수

<국문요약>

21세기 초반의 소위 인류세(Anthropocene) 지질시대에서 인간의 계획과 의도가 전 지구 생태계에 엄청난 영향을 미치고 있다는 논쟁이 계속되고 있다. 이러한 논쟁에서 한 가지 교훈적인 사실이 알려지고 있다. 그것은 체계이론의 전문용어인 체계과정(system process)에서 볼 때, 더욱 적절한 생태계의 회복탄력성(resiliency)을 위해서는 긍정적인 피드백 루프(positive feedback loop)가 반드시 존재해야만 한다는 사실이다. 지구체계(Earth System)내의 광범위한 교란들(perturbations)과 같은 위기들을 극복하기 위한 회복탄력성을 갖기 위해서는 생물학적 종들(species)내에서 뿐만 아니라 종들 간에 있어서 상호작용이 필요하다. 나아가서 인간들은 그런 상호작용을 해야 만 한다. 그리고 지구 위기를 극복하기 위한 인간의 다양한 능력들 중에서 가장 중요한 것은 영적인 회복이다. 회복 탄력적이고 지속가능한 생태계 구축은 전세계차원에서 인간 개개인들의 개방된 열린 마음의 태도를 갖게끔 영적인 계몽을 통해서 가능할 것이다.

[주제어] *생태적 시민성, 최적의 회복탄력성, 영성함양*

I. The Challenge of the Anthropocene

An ecosystem is a system of biota, from the smallest microbes to the largest mammals and the loftiest trees, interacting with one another and with the surrounding non-living environment that affects them and is in its turn reshaped by them.

As human beings are a part of nature, they are also part of a series of ecosystems, but since at least the agricultural revolution, and probably since, as Yuval Harari (2014 [2011], 80) has argued, "*Homo sapiens* drove to extinction about half of the planet's big beasts long before humans invented the wheel, writing or iron tools," their interactions with other life forms and the physical environment have existed on a different plane than the rest of nature.

Over the past two thirds of a century the relationship has grown so tortured and tenuous that one of the big beasts currently under threat from the transgression of planetary boundaries by accelerating anthropogenic pressures on the Earth System is humankind itself (Rockström et al. 2009). The evidence for the role of humans in touching off a series of overlapping revolutions at all levels of our planetary system is so overwhelming that many are now calling our contemporary epoch the Anthropocene (cf. Hamilton, Bonneuil and Gemenne 2015; Purdy 2015; Scranton 2015; Vince 2014).

Both because of the millennia during which humans have consciously or unconsciously reshaped organic and inorganic existence on their planet, and because of their status as an animal species with similar needs and drives to all others, any delineation between social and ecological systems is necessarily artificial and arbitrary. Nevertheless, it makes sense to talk about a series of composite social-ecological systems linking human social systems with the rest of nature (cf. Berkes, Colding, and Folke 2003; Folke 2006; Stokols, Lejano, and Hipp 2013).

As globalization accelerates, the social ecosystem as a whole and in each discrete subsystem will, as a result of the complex interconnections between natural ecosystems and human systems, continue to cause numerous disturbances that will test the resilience of all of its components: among human beings, individuals, families, communities, states, and all universalizing organizations from religions to multinational corporations to the United Nations; in nature, the interaction among all levels of ecosystems up to and including Gaia, the Earth System itself.

II. Defining Socio-Ecological Resilience

Resilience is the ability to absorb disturbances and to change in reaction to them, yet to re-organize in such a way as to retain the same basic structure and ways of functioning. As resilience declines, the magnitude of a shock from which it cannot recover gets smaller and smaller. Applied to a social ecosystem, the definition implies a self-organizing ability to osmose any disturbance by adapting to change and stress in such a way that the original identity of the social ecosystem can still be discerned. Resilience is a highly desirable attribute due to the extent, scale, and duration of the changes any social ecosystem may confront, although occasionally the identities may be changed in such an extreme fashion (for example, in social terms, a dictatorship, or in ecological, a highly saline landscape) that we may wonder whether the resilience was worth it (cf. Gunderson, Holling, and Allen 2010, 435-436).

The application of resilience to ecosystems can be traced back to a classic paper of C. S. Holling on “Resilience and Stability of Ecological Systems” (1973) that, when it was first published more than four decades ago, helped bring the relationship between ecology and systems theory to a new level of sophistication. Holling pointed out that the understanding of ecology simply in terms of the stability or degree of fluctuation of species populations within the classic equilibrium models then dominant in ecological and conservationist discourse could, especially in the open systems of the real world, often have a negative effect on the long-term persistence of some of the species in an ecosystem. A more useful metric would be their resilience, which would often exist in obverse relationship to their stability (Holling 1973). As Holling's thesis has been summarized in what has become an often-cited ecological definition of resilience (e.g., Young et al. 2006, 305), the term refers to “the capacity of a system to absorb and utilize or even benefit from perturbations and changes that attain it, and so to persist without a qualitative change in the system's structure.”[1)]

1) The significance of this definition of resilience for ecology and other fields influenced by systems theory is shown in the variety of other sources that cite Holling 1973 for this definition, including Paton, Kelly, and Doherty 2006, 191; Marshall and McGrath 2007, 52; van der Leeuw 2007, 214; Bentley 2009, 3; Helfert and Duncan 2010, 230; Bentley 2011, 249; and Cusicanqui 2016, 13. It is therefore surprising to discover that the quoted definition is in fact not used in Holling 1973. However, the phrasing can be said to meet Holling's interpretation of resilience, as it has certainly demonstrated its persistence.

Holling was disappointed that for a number of years his original paper of 1973 was largely ignored or opposed by practitioners in the central body of ecology (Holling 2010, 426). Their reluctance may have stemmed in part from Holling's choice of words, for *resilience*, deriving from Latin for leaping or leaping back to the starting point, had, since its induction into the English scientific lexicon by Sir Francis Bacon, connoted rebounding without major discernible change (Alexander 2013). In other words, implicated in the term Holling had chosen was the very equilibrium model that he was attempting to overthrow. Acknowledging the problem, Holling tried to distinguish an engineering conception of resilience, marked by an emphasis on “efficiency, constancy, and predictability,” from what should be an ecologist's sense of the word, which would highlight “persistence, change, and unpredictability” (Holling 2010 [1996], 53). However, despite the initial confusion, over the decades Holling's redefinition would come to prevail, until by the second decade of the new millennium it seemed clear that, in the sense associated with Holling's formulation, “Ecological resilience is an idea that has come of age” (Gunderson, Holling, and Craig 2010, 439).

Its triumph may be attributed in part to the perception that “Resilience thinking is *systems thinking”* (Walker and Salt 2006, 31, emphasis in text), and a growing recognition that Holling's definition offered a better fit with the direction that broader systems theory was taking over the same period, from “hard” to “soft” (Checkland 1999 [1994]), from “arrogant” to “humble” (Ogilvy 2015), as the study of systems increasingly eschewed closed feedback loops and embraced the qualities of persistence, change, and unpredictability championed by Holling (cf. Gunderson and Pritchard 2002). It could also be argued that an equilibrium-based model could never do justice to any system affected by time's unidirectional arrow, for life-forms and the relationships in which they are implicated cannot rebound back in time to their original form before change intervened. They will be transformed, or they will perish; if the transformation nevertheless allows us to continue to identify the changed entity with its predecessor form, it may be said to be resilient.

In this sense of persistent identity amid change, resilience became a buzzword in analyses of human development and social interactions from 2000 onward – indeed, one might date the moment even more precisely, from September 11, 2001 – as the alternative to post-traumatic stress (Bonanno et al 2006, Layne et al 2007, Bonanno, Westphal, and Mancini 2011, Walker and Westley 2011, Masten and Narayan

2012; cf. APA 2016). A shelfful of self-help books soon appeared with resilience in their titles, among them probably the only title on the Cambridge University Press backlist with a blurb by the former basketball star Earvin “Magic” Johnson (Southwick and Charney 2012; cf. Reivich and Shatt 2002, Rodin 2014; Braden 2015 [2014], Greiten 2015). But beneath the occasional froth a real revolution has occurred over the past decade and a half in bringing humans in their individual and social capacities within sophisticated resilience models. Although some social scientists have balked at letting resilience, especially in its Holling-flavored social-ecological sense, enter their domain (e.g., Kirchhoff et al. 2010, Walker and Cooper 2011, Welsh 2014, Olsson et al. 2015), others have rejoiced at the maturation of a concept that seemed to offer a holistic, interdisciplinary approach to crucial contemporary problems (e.g., Adger 2000, Luthar and Zelazo 2003, Almedom 2008, Wright, Masten, and Narayan 2013, Southwick et al 2014, Panter-Brick 2014, Masten 2014). Indeed, at this point resilience has become scarcely less central to an overarching approach encompassing a broad spectrum of animate activities than systems theory itself (e.g., Walker and Salt 2006, Walker and Salt 2012, Zolli and Healy 2012, Beichler et al 2014).

III. Socio-Ecological Citizenship and the Challenge of Resilience

The concept had arrived just in time, for globalization added urgency to the dialogue about social-ecological resilience by broadening the ecosystems at stake to the entire earth system and by adding socio-economic concerns about sustainable development, a convergence that became obvious in the United Nations report *Resilient People, Resilient Planet* (UN Secretary-General's High-Level Panel on Global Sustainability 2012) prepared for the Rio +20 conference on sustainable development held in Rio de Janeiro in 2012. Globalization interlocked the human and the natural spheres in ways that rapidly became more complex and pervasive (Young et al. 2006, 308), while it at the same time immensely complicated the relationships between human society and natural ecological systems by simultaneously increasing the scope and scale of disturbances as well as the strengths of the connections throughout the social ecosystem. These changes, which have not been the product of planned changes, have a tendency to increase the vulnerability of the social ecosystem by reducing its overall robustness and resilience (Young et al. 2006, 309). Because the social ecosystem is a hierarchical entity consisting of various sub-systems, with established institutional relations visible

at each of the levels (Young 2002), the changes triggered by globalization necessarily echo throughout its interconnected biophysical elements in terms of their resilience, vulnerability, and adaptability (Young et al. 2006, 311).

But if the extent of the challenges facing socio-ecological resilience is daunting, recent work by psychologists and other social scientists on human resilience at the individual level offers hope. When confronted with adversity, often of the most dire nature, most individuals have displayed a capacity to respond with a personal resilience shaped by the complex interaction of genetic inheritance (e.g., Feder, Nestler, and Charney 2009), social support systems (e.g., Nettles, Mucherah, and Jones 2000), and the mysteries of individual personality (e.g., Werner 1995, Belsky 2013; for excellent recent overviews of the literature on resilience in psychology, see Masten 2014 and Bonanno, Romero, and Klein 2015). At the individual level, several researchers have found one of the most significant corollaries of resilience to consist of a "steeling factor," in which exposure to severe risk in one form can help humans and other primates meet future crises of the same or even different type (Suomi 2011; Rutter 2012, 337-338). This "steeling factor" of resilience, if validated by further research, will in all likelihood assume crucial importance for the human species throughout the Anthropocene's building crescendo of escalating crises.

Of even greater significance for meeting future crises is likely to be a significant intersection within socio-ecological systems for researchers who accept that "human resilience is closely linked to ecosystem resilience" – that persistence through change of an identifiable entity, whether an ecosystem or an individual psyche, can be reframed as "maintaining normal function without fundamental loss of *identity"* (Almedom and Tumwine 2008, pages S2, S1, emphasis added). As explained by Walker and Salt (2012, 3), "as a concept identity emerged independently in ecological and psychosocial studies, and it is both important and useful because it imparts the idea that people, societies, ecosystems, and social-ecological systems can all exhibit quite a lot of variation, be subject to disturbance and cope, without changing their 'identity' – without becoming something else." Resilience has therefore become intertwined with one of the most protean ideas within the psychological and social sciences, for identity is simultaneously the unique blend of experiences and memories swishing and swirling within each individual, like the ebb and flow of amniotic fluid within the womb that delineates a different set of fingerprints for every human being (Greenfield 2016 [2011], 4-5), and the bonds that tie different individuals

together as humans define themselves within groups (Erikson 1968; Bauman 2004; Brewer and Hewstone 2004; Burke and Stets 2009; Lawyer 2014 [2008]; Greenfield 2016 [2011]). Unfortunately, as testified by the tectonic geopolitical shifts of 2016 culminating in the election of Donald Trump to the United States presidency, actions to prolong individual and group identity may not coincide with the steps necessary to sustain earth's ecosystems. Rather the reverse, in fact, for as Erik Erikson noted nearly half a century ago, humans typically shape the deepest affinities within our identities around "pseudospecies" – tribes, nations, races, religions – rather than the human species as a whole (Erikson 1968, 41-42), let alone the larger web of life within which *Homo sapiens* interacts. And yet we must also remember that no group identity in modern culture is stable or automatic, that they are always being created and imprinted in our life experiences, and that "our resilience is rooted not only in our beliefs and values, in our character, experiences, values, and genes, but critically in our *habits of mind* – habits we can cultivate and change" (Zolli and Healy 2012, 14, emphasis in original).

In this way the concept of resilience offers hope – no guarantee, but at least hope – that we can begin constructing new identities for the future by merging the responsibilities of global citizen and ecological citizen. Unlike environmental citizenship, which tends to focus on obligations at the public and national levels, ecological citizenship is a concept that now must emphasize the responsibility of citizens of the world within global society to exercise their rights and obligations on behalf of the single ecosystem called Earth. Ecological citizenship is called upon to discuss cooperation and international obligations in place and time across generations, and to inculcate the feelings of care and compassion that can reduce consumption, and thus ecological footprints, in the interests both of others on the earth today and their descendants living there in the future. The creation of global ecological citizenship will in turn depend on the inculcation of "habits of mind" that must include spirituality and open-mindedness.

IV. Promoting Spirituality in Living Systems

Psychologists and social scientists have pointed to religion as one of the principal bulwarks for the resilience of human beings in the face of emergencies and dire circumstances (cf. Cook 2000; Crawford, Wright, and Masten 2006; Kasen et al. 2012; Smith, Webber, and DeFrain 2013). This

relationship has proved beneficial for both individuals and the institution of religion, for “religious belief persists and thrives, in part, not because it necessarily guarantees persistence of one's soul in the next life, but precisely because it confers a measure of psychological resilience upon its possessors” (Zolli and Healy 2012, 129). And yet at this level religion acts no differently than any other cultural “pseudospecies,” for any deeply felt bond with other people can provide the emotional support systems to sustain hope and build resilience, even at the same time that it “also can function to undermine and harm individual development” (Masten 2014, 252-258, quotation on 258).

The persistence of religion despite the many sins committed in its name cannot be explained by the need to keep society together or to preserve morality, because these needs do not create institutions (Boyer 2002, 27). The pioneer anthropologist E. B. Tylor defined religion as, in its essential nature, "the belief in spiritual beings" (Tylor 1871:I, 424). But what does “spiritual” actually connote? According to contemporary spirituality theorists, spirituality is said to develop inner peace and form a foundation for happiness through meditation and similar practices that practitioners employ to cultivate their inner life and character (Wilkinson 2007). Outside the boundaries usually assigned to religion and spirituality, global citizenship can be fostered through the expansion of spiritualty in individuals' lives.

Living systems can be thought of as comprising four major components: matter, energy, information, and consciousness. A human being has body, soul, and spirit. Body is the external physical layer of matter. Matter, though, can be changed into energy. “Soul” can be thought of as the form that the energy takes as mind, will, and emotions. Energy can also be turned into information received by mind. Information can in turn be transformed into consciousness conceived as spirit. Spirit is the inner core of being sensitive to the belief in a spiritual being's innate conscience. Mental power or conscious force suffuse and are integrated with the human body.

As we have learned from the discussion of the embodied consciousness in Maurice Merleau-Ponty (1968), the human body is “thinking.” We find the figure of the "thinking body" everywhere. When you eat a delicious meal, ride a bike, swim, or lose yourself in playing a musical instrument, you are not reflecting but acting through your consciousness. The body moves in accordance with the requirements of any given situation. As Merleau-Ponty understood, this dissolution of Cartesian dualism has profound implications for the related boundaries between the individual and the

surrounding nature. As he wrote in March 1961, less than two months before his death, “Nature as the other side of humanity (as flesh, nowise as 'matter')” (Merleau-Ponty 1968, 274). We need to cultivate the desirable embodied consciousness to see the world of the Anthropocene in its complete reality of creation and destruction, and to react to it with the necessary level of engagement. Both natural and human affairs continue to dissolve and fuse in their co-evolution.

Since the dismantling of medieval society, faith in human reason has informed the creation of modern civilized society in all areas, yet throughout world history, humans have repeatedly displayed the limits of reason. Living systems, whether in the guise of European history, amoebas, bodies, auditoriums, mountains, cities, or anything in between, create boundaries in order to establish their identity. However, in this process, all things (not just living things) must use their matter-energy and information in such a way as to increase the level of entropy within their systems according to the second law of thermodynamics. The second law of thermodynamics states that in every natural thermodynamic process the sum of the entropies of all participating bodies is increased. And all things must die due to the increase in entropy, if there are no other variables. Therefore, we need more variables to interconnect with other systems and environments for acquiring energy and information and decreasing entropy. That is, within their systems, they continue to get the energy for the dissipation of entropy maximization.

Also, living systems are cognitive systems, and living as a process is a process of cognition (Maturana and Varela 1980, 13). Living systems involve autopoiesis and cognition as well to open and shut epistemological framework in order to establish identity from the environment. In living systems, any autopoietic cell actively relates to its environment, and its sensory responses trigger motor behavior governed by autopoiesis as a self-referential system (“Sensorimotor subjectivity" in Thompson 2007, 243ff).

Human beings as a living system seek to establish epistemological identity. Also even in a closed state, identity is constantly evolving. If humans have closed minds to block information from the outside, they evolve into closed, dogmatic, superstitious, and fearful individuals. If they combine with one another, they can generate a common myth, sometimes metastasized into an ideology. to strengthen a collective identity through the closure of other environments. This natural tendency within humans is perhaps the greatest threat to the social ecosystem.

V. Cultivating Open Mindedness

While much of the attention in environmental circles has gone to sustaining resilience specific to a small set of threats and desired mixes of species, in some ways this approach, for the reasons that Holling specified back in 1973, is likely to prove counterproductive, because it does not deal with the most likely source of threat: the unpredictable. One of the most important lessons to be drawn from research into socio-ecological resilience is the importance of optimal diversity, openness, and modularity in allowing perseverance through change (Loreau 2000; Walker and Salt 2006, 120-122, 145-148; Walker and Salt 2012, 90-98). In recent years some social scientists, especially anthropologists, have emphasized the importance of traditional folkways and belief systems for the sustaining the resilience of indigenous peoples around the globe (e.g., LaFromboise et al. 2006; Fleming and Ledogar 2008; Rotarangi and Stephenson 2014). The threats and anxieties confronting individuals in these cultures demand a response that can foster their resilience. However, just as specific resilience in an ecosystem can diminish the likelihood of general resilience, too exclusive a focus on their immediate needs within a traditional culture can boomerang by leaving them potential victims to the probably inevitable onslaught of modernizing globalization. To deal with the unpredictable surprises of modern life, the best approach to achieve resilience remains the embrace of diversity and open-mindedness in global citizenship.

The human brain naturally hates ambiguity. Basically, the brain operates as a nonlinear complex system that has a "search and destroy" relationship with ambiguity, which is why evidence contradictory to people's current beliefs tends to make them uncomfortable (DiSalvo 2011). The closed mind leads to intolerance or impatience in the face of a cognitive mismatch. The open-minded person, on the other hand, comes to believe that others should also be free to express their views, and recognizes the possible and potential value of their knowledge. The open mind can negotiate a political agreement. It refers to an agreement through specific psychological technologies rather than reliance on the era's hegemonic ideology and mindset (Hunt and Miller 1968).

A human consciousness operating with an open mind can also develop a self-reflection mechanism that contributes in a practical way to his spiritual growth. Through strengthening their own feelings and trying to take care of others around them, humans can cultivate an attitude of raising other people's interests to the level of their own interests, or even

above them. All religions emphasize love, compassion and forgiveness. Those who do not believe in a religion also appreciate the value of such basic human virtues. Humans also can learn to distinguish between negative pride and conceit on the one hand, and on the other positive self-esteem and confidence, by training their minds toward spirituality.

Generally, closed minds are closely associated with dogmatism and ideology in authoritarian systems (Inzlicht et al. 2009). The factors that enable people to solve problems more easily and to integrate new ideas more quickly start with open minds, not any specific information. Hence, when truly resilient persons are faced with difficult challenges, they prove willing to accept and overcome then with open minds. People with closed minds, on the other hand, tend to show aggressive attitudes or to atrophy in similar situations (cf. Cohen-Cole 2014).

Open minds are a prerequisite for human beings to develop the resilience needed to overcome the vulnerability of both social systems and ecosystems, and to improve the adaptability of the social ecosystem developing through their co-evolution. Open mindedness can be achieved through a spiritual recovery in the embodied consciousness that controls both through reason and emotion. Only in this way can we begin to feel confident about the resilience of the Earth's socio-ecological systems, and of the individual human beings within them.

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