

A Case Study of Complex Adaptive Systems Theory

Sustainable Global Governance: The Singular Challenge of the Twenty-first Century

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Abstract

The capacity of biological and ecological systems for self-adaptation or self-organization has been a significant theme in the current life-science academic literature. The article is a case study of complex adaptive systems theory, focusing upon the global political system as a part of a biophysical aggregate system in which we are embedded. I explain why self-adaptation does not explain the global political system at this time and postulate what conditions must be met if it did. Self-adaptation, if it were achieved and maintained in some proximate form, would constitute a phase transition.

Our species' cumulative actions on the environment (including those generating global warming, environmental pollution, ozone depletion, and biodiversity loss) are the dominant source of the increasing density of causal connectedness between human and natural systems. Given the dramatic rise in the world's population, technological growth – that affecting industrial practices, life-style behavior, and global trade and investment and military weaponry – is the underlying factor that has driven rising causal interconnectedness. I conjecture that the current density of connectedness constitutes a complexity phase into which humanity has entered. The rapidity with which the banking and economic collapse in the United States proliferated into a global recession contributes to my conjecture. Entering into the complexity phase is a profound non-genetically based evolutionary event with profound consequences.

As a consequence, humanity is perilously close to what theoretical biologist Stuart Kauffman has called a “complexity catastrophe”, sharply limiting the capacity for self-adaptation, and in matters of global governance dramatically increasing the degree of difficulty of effective governance.

I focus on the structural properties of the global political system and argue that its anarchic conditions are maladaptive. The anarchic quality of the strong nation system and the aggressive, self-maximizing behavior of the strong nation it generates serve to diminish the possibility of achieving sustainability. Moreover, the justification for aggressive, self-maximizing behavior within the strong nation system is weakened once in the complexity phase, and such behavior and its justification are no longer viable when a related conflict exists or emerges between global security and national security. The signature characteristic of global governance for global problems is that global security takes precedence over national security when a conflict arises.

I maintain that global governance for global problems is a necessary but not sufficient condition for the achievement of sustainable global governance, and is

not likely to occur without strong nation advocacy. Sustainable global governance requires, among other things, the development and maintenance of resilience within and between our tightly-coupled human-made and natural systems.

1 Complex Adaptive Systems

Complex adaptive systems have the capacity of adapting to changed circumstances, and in so doing, exhibit a level of self-organization. In varying measure, businesses, governments, organizations, individual organisms, ecosystems, the Earth – our biophysical system – are examples of complex adaptive systems (CAS). The Earth has not always been a suitable habitat for our species and despite our best efforts, it will not be so indefinitely in the future. Theoretical ecologist Simon Levin maintains the necessary characteristics of CAS are: “individuality and diversity” of its component members or units, and “localized interactions” which are subject to a selection process which favors some of its products for duplication and reinforcement.¹ Political scientists Robert Axelrod and Robert Cohen state that the objective of human CAS is improvement of performance – the equivalent of adaptation or self-adaptation.² It is sufficient for CAS members to attempt to improve performance; success, thus, is not a prerequisite.³ Nor is it necessary that all members strive for, or that all are committed to improved performance.

CAS are composed of a large number of component members or units, and system-wide behavior is non-linear or synergistic; its system-wide behavior thus can not be inferred from behavior at the level of its component parts. Behavior within complex systems is marked by unpredictability such that slight changes can unleash enormous effects. Consequently, Axelrod and Cohen argue complexity needs to be harnessed or managed.⁴ They note that frequently, it is the “dominant influences” in a human CAS that stand in the way of improved system performance.⁵ As a consequence, Axelrod and Cohen maintain the larger population including, perhaps, those disengaged within the CAS must not only strive to understand the patterns of complex systems but must be proactive striving to effect needed changes.⁶ And those changes, if they occur, might arise from structures that are illustrations of an emergent property, for example, governance networks outside of nation-state governance articulating a new, alternate view which, while it might be anticipated, its specific nature and the strength of its following can not be known in advance.⁷

1 Simon A. Levin, *Fragile Dominion: Complexity and the Commons* (Reading, PA: Helix Books, 1999), 12.

2 Robert Axelrod and Michael D. Cohen, *Harnessing Complexity: Organizing Implications of a Scientific Frontier* (New York: Free Press, 2001), xii.

3 *Ibid*, 7.

4 *Ibid*, 9, xii, xvi.

5 *Ibid*, 18.

6 *Ibid*, 9.

7 *Ibid*, 15.

Civilization and the biophysical system of which it is a part I refer to as the aggregate system. As a system, it is spatially the largest in which we know evolution plays out. The aggregate system constitutes a CAS. The most compelling global injunction at this time is that we live in harmony with ourselves and live in harmony, as much as is possible, within the biophysical system. This is the system performance we seek to improve.

In this article, I explain why the aggregate system at this time is not characterized by self-adaptation or self-organization. The curtain, however, has not come down on the human drama. I present the concept of global governance for global problems⁸ as a necessary condition for achieving a system property approaching or equivalent to self-adaptation. The ability of humanity to live with itself and with the biophysical system with reasonable harmony I define as sustainability. Governance, as intended here, applies to all areas of public policy including the environment, political and socio-economic issues that can adversely affect the survival of civilization. Thus, the objective of sustainable global governance is the prevention – as much as is possible – of adverse system instability. The global political system, in particular, the anarchic strong nation system is resistant to a transition to sustainable governance. Accordingly, the compelling question is whether the current direction of the global political system will be purposively changed before a major cataclysm occurs dwarfing the carnage of the 20th century rendering the biophysical system – in part or as a whole – inhospitable to human life. The achievement and maintenance of sustainable global governance in some proximate form is the evolutionary challenge before our civilization.

8 Only when nation-state internal matters reach the level of a global problem, does it warrant global intervention. Governance that meets the standard of sustainability poses as little adverse system instability as is possible. Truly sustainable governance is perhaps an abstraction much like perfect governance and thus may never be achieved. Thus, I have employed the phrase sustainable governance in some proximate form. One would expect that clear instances of harmful, self-maximizing strong nation behavior would be circumscribed. War between two nations would likely be regarded as a global problem. Nonetheless, one can expect that a strong nation will attempt to engage in activity in instances when it is perceived to be in its self-interest and when its damaging effects are not manifest as a global problem.

2 Complexity

Theoretical biologist Stuart Kauffman posits that complex adaptive systems have three phases. The complex phase – marked by dense interconnectivity – lies between the ordered and chaotic phases with partial over-lap between the ordered and complex phases. It is in the complex phase that self-organization or self-adaptation takes place. In his research within the genetic regulatory framework, Stuart Kauffman discovered a remarkable convergence which parallels the properties of an attractor and its basin of attraction within an ordered complex dynamical system. Without this convergence, cell division during the development of an individual organism would take so much time that it would be biologically untenable. Kauffman hypothesizes that self-organization is a fundamental property of evolution and takes place at a location he calls the edge of chaos.⁹ Self-organization within a CAS, accordingly, avoids system behavior within the chaotic phase. But self-organization is problematic on the ecosystem level as Simon Levin has argued,¹⁰ and it surely does not occur as the natural order of things on the global political system level. If we regard the global political system within the aggregate system as a CAS, self-organization will only take place if we make it happen. Thus, within our domain complexity must be managed.

Complexity – measured by the density of causal connectedness – currently characterizes the linkages between human and natural systems and the linkages within and between human systems. The onset of complexity, I conjecture, began with the opening in the ozone layer above the southern hemisphere. The onset of complexity I assign proximately to 1980, some time before depletion of the ozone layer was first discovered. This onset of complexity I refer to as the complexity threshold. It is a profound non-genetically based evolutionary event with profound evolutionary consequences.

The growth of technology, in particular that affecting industrial practices, global trade and investment, the nature of modern war, life-style behavior, and the dramatic rise in the world's population underlies the onset of complexity. Our species' cumulative actions on the environment (those generating global warming, the melting of land

9 Kauffman, *At Home in the Universe: The Search for Laws of Self-Organization in the Universe* (New York: Oxford University Press, 1995), 27. In his theoretical construction, Kauffman employs a random Boolean network. His hypotheses are based upon empirical research with the genetic regulatory network in cell division in humans and other organisms and in the research of others with earthquakes, extinctions and other phenomena. In such cases, power law distributions emerge as a consequence of micro-agent behavior at the point of self-organized criticality.

10 Levin, *Fragile Dominion*, 183–186.

and sea glaciers, ozone depletion, biodiversity loss and environmental pollution), in particular, is a driving force of complexity. Accordingly, an unparalleled degree of interconnectivity characterizes daily life at this time particularly for those in the developed world and those in urban settings – whether rich or poor. This interconnectivity is evident in the global economy and in the proliferation of the Internet, voice mail, email, faxes, cell phones, palm pilots, increased air travel, and the ease with which hitherto rare diseases can spread.¹¹ Our global economy is marked by increased trade, services and investment beyond nation-state borders, and as well, the spread of neo-liberal trade policies. Increasing interconnectedness has also led to the emergence of international governance institutions, international and domestic organizations (NGOs), and transnational corporations. Between 1990 and 2000 alone, the number of NGOs has grown from 6,000 to 26,000.¹² NGOs as a political structure illustrate an emergent property about which Axelrod and Cohen referred. They have the potential of providing an instrument for the growth of non-mainstream political views.

Complexity studies focus on the emergence of self-organization in nature and in human organizational and technological constructions as an outcome of disparate elements acting independently. This order – while continuing to be a subject of empirical and theoretical inquiry – is not well understood. Complexity as a term denotes the density of causal interconnectedness within a system. Its essential characteristics are: multiplicity of agents; the emergence of new system-level properties; and their nonlinearity – the difficulty with which new system-level properties, such as feedback effects, their rate of change, onset of threshold effects, and magnitude – can be predicted. An illustration of non-linear behavior is the abrupt change in temperature which can lead to catastrophic effects if such were to occur. For example, 11,500 years ago temperatures increased within 30 years by as much as 12.6 degrees Fahrenheit in North America extending through central Europe.¹³ Climatologists do not understand enough about hydrological cycles to predict such sudden changes in temperature.

The rise of non-linear systems threatens the survival of civilization. Indeed, the United Nations Environmental Programme states the likelihood of increased nonlinearities in the future will generate “accelerating, abrupt, and potentially irreversible changes”.¹⁴ The Millennium Ecosystem Assessment additionally states

11 Thomas Homer-Dixon, *The Ingenuity Gap*, 119.

12 Robert O. Keohane and Joseph S. Nye Jr., “Governance in a globalizing world”. *Power and Governance in a Partially Globalized World* (New York: Routledge, 2002), 213.

13 Homer-Dixon, *The Ingenuity Gap*, 137.

14 United Nations Environmental Programme 2007. *Interlinkages: Governance for Sustainability*. http://www.unep.org/geo/geo4/report/08_Interlinkages: Governance for Sustainability 2007 (accessed on June 25, 2008), 11.

that the failure to understand, predict and to adapt to nonlinearities will generate a host of government failures arising from the inability to mitigate or prevent system stresses and or system failures once thresholds in human and natural systems have been traversed.¹⁵

15 Millennium Ecosystem Assessment, 2005. *Ecosystem and Human Well-Being. Synthesis*. <http://www.millenniumassessment.org/document.356.aspx.pdf> (accessed on June 25, 2008), 15.

3 Managing Complexity

The onset of a marked system-wide increase in the density of causal interconnectedness is neither intrinsically adaptive nor maladaptive. Nonetheless, if not effectively managed, complexity can lead to wide-spread self-destruction. The degree of complexity poses limits for the effectiveness of natural selection. Accordingly, if the complexity is too great, selection can fail to generate fitter variants.¹⁶ Within the genetic regulatory network, theoretical biologist Stuart Kauffman describes this possibility as a “complexity catastrophe”. In organisms, Kauffman maintains, self-organization occurs naturally. In contrast, self-organization within the global political scene, if it does occur, will be the result of human action – the outcome of conscious or largely conscious thought. Analogously, complexity, on the global scene, if not managed, may lead to a “complexity catastrophe”.

Managing complexity is a concern of ecologist C.S. Holling.¹⁷ He states that “rapidly rising connectivity within global systems” – a result of both unsustainable economic and technological growth – “increases the risk of deep collapse”. It is “a collapse that cascades across adaptive cycles – a pancaking implosion of the entire system as higher-level adaptive cycles collapse, which causes progressive collapse at lower levels”.¹⁸ According to Holling, humanity is approaching the conditions in which deep collapse may occur, and should it occur, the possibility of recovery, may be lost.¹⁹ As a consequence, Holling maintains that humanity must have the capacity to adjust to a period of great change, and, in so doing, must engage in “ecosystem management” in which we establish and sustain environmental resilience.²⁰

A by-product of complexity is the unprecedented fragility of the human enterprise to both political and environmental stress, the presence of tightly coupled human and natural

16 Kauffman, *At Home in the Universe*, 194–195; *the Origins of Order: Self-Organization and Selection in Evolution* (New York: Oxford University Press, 1993), 53–55.

17 Ecologist C.S. Holling is the seminal influence in the development of panarchy theory which posits that resilience – an aspect of self-adaptation – is a natural outcome of cyclic change between and among four key phases – growth, collapse, reorganization and renewal – in all ecosystems and in human systems. Panarchy theory is the distillation of decades of empirical work by ecologists analyzing interconnected ecosystems in the biosphere at multiple levels from the microscopic level of bacteria extending to biomes hundreds of square miles. See L.H. Gunderson and C.S. Holling, (Eds.) *Panarchy: Understanding Transformation in Human and Natural Systems* (London: Island Press, 2002).

18 Thomas Homer-Dixon, *Catastrophe, Creativity and the Renewal of Civilization: The Upside of Down* (Washington: Island Press 2006), 206.

19 *Ibid*, 232.

20 C. S. Holling, “Understanding the Complexity, of Economic, Ecological, and Social Systems”, *Ecosystems* (2001), 390–405; 404.

systems, and the possibility of their cascading failure. New and relatively inexpensive weapons of mass destruction – biological and chemical in nature – are capable of exploiting this enhanced vulnerability. Making matters worse, political turmoil and violence, on the one hand, and environmental deterioration, on the other hand, are mutually self-enhancing. Global interconnectivity is also manifest in our increased vulnerability to accidents and sabotage as a result of the emergence and use of high-risk technological and scientific systems, for example, nuclear power, electrical grids, chemical plants, water filtration plants, massive dams, biohazard laboratories, and aircraft in flight. The recent breakdown of electrical grids in early 2004 in the northeast of the United States, south-central Canada and the subsequent “black-out” affecting about 50 million people is an illustration.²¹ Many technological and scientific systems, on the one hand, and ecosystems, on the other, are tightly coupled leaving little or no margin for error especially if political violence breaks out. Not unexpectedly, future wars, in all likelihood, will have a greater number of casualties arising from the compounding effect of environmental damage than past wars.

Localized interactions, one of Levin’s essential CAS characteristics, are generally regarded as more conducive to adaptation because benefits and adverse effects are more obvious than would otherwise be the case. Moreover, linkages with local actors are more likely to be reinforced by repeated contacts which can produce agreement – whether for good or ill. However, in an era of increasing connectivity, spatially non-local and local domains share a greater number of characteristics. In cyberspace of the Internet, empathic linkages can form in non-local and global domains. Increasingly, the actors effecting system behavior are non-local and have a yet undetermined effect on the primacy of local actors. Local domains, accordingly, are in varying degrees losing the discreteness which distinguished them in the past.

Civilization occupies an infinitesimal portion of biological time, only about 6500 years. So too, the nation-state has been with us for the last 350 years – less than one-half of one percent of the time we have had civilization. Largely because of technological growth, given the dramatic rise in population, the pace of political and social change has accelerated during the last two centuries. As a consequence, within the last two decades, the density of causal connectedness has significantly increased such that humanity has crossed a complexity threshold.

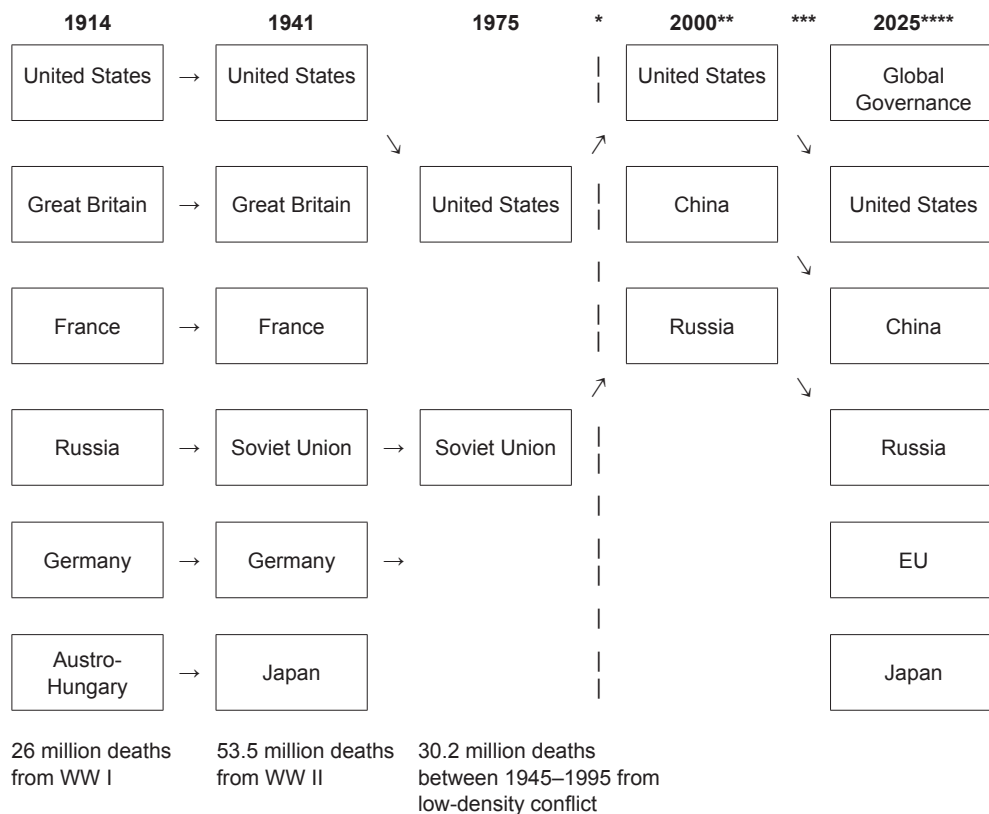
Passage beyond the complexity threshold is a profound non-genetically based evolutionary event with profound consequences. I argue that aggressive, self-maximizing behavior of strong nation behavior detracts from the achievement of sustainable global governance. Moreover, I argue the justification of aggressive, strong nation behavior is weakened in the complexity stage, and such behavior and its justification are no longer viable within the complexity phase, once a related conflict arises between global security and national security.

21 Editorial, “Lessons from a Blackout”. *New York Times*, April 12, 2004, A18.

4 A Framework of the Global Political System

Strong nations are the key actors in the global political system framework for the years 1914, 1940, 1975, 2000, and for a heuristic scenario in the year 2025. The key constituents of strong nation power are represented by an arrow between time-periods of a given nation. The constituents of power include: 1) GNP: an indicator of economic power; 2) population; 3) military manpower; and 4) weapons technology and during the nuclear age, the number of nuclear weapons with advanced delivery systems.

A Framework of the Global Political System



The onset of complexity I assign proximately to 1980, several years before depletion of the ozone layer was first discovered.

** The United States is the lone superpower and China and Russia are regional strong nations.

*** The danger of failure of multiple human-made systems is an omnipresent danger throughout the complexity phase if not properly managed.

**** The rise of global governance and its timing in the year 2025 are for heuristic purposes. The configuration of political entities includes a list of potentially strong nations.

The singular logic of the strong nation system is its arrested or truncated development marked by significant political, socio-economic and environmental deficits and the

absence of movement toward self-adaptation. The strong nation system replicates itself after both WW I and WW II and after the dissolution of the Soviet Union. I have designated for heuristic purposes the year 2025 for the achievement of a transition to global governance for global problems. The transition, if it occurs, represents a fundamental shift in priorities within and among strong nations from the world of *Realpolitik*. It is the realization of the institutionalist school of thought of political scientist Robert Keohane. Unlike institutionalists, realist and neo-realist political-thinkers, generally believe that humanity will likely always be consigned in some measure to an anarchic international world.

The strong nation system is one in which no governance capacity exists to impose an international rule of law. In the absence of an international rule of law, nations that can engage in aggressive self-maximizing behavior often do. This is the *Realpolitik* world of statecraft. Nonetheless, the pursuit of power does not exist within a vacuum. Thus, religious, ideological, economic and geographical factors come into play and affect whether a nation regards another nation a potential adversary, an ally or neither.

The strong nation system is a violent, dysfunctional world. Germany was defeated in 1918, and in 1945. In the space of about seventy years, France was defeated in 1871, in 1917 and in 1940.

Imperial Russia underwent a violent revolution in 1917 and the Soviet Union into which it was transformed dissolved in 1991. Hapsburg Austria was defeated in 1866 by Germany and in 1917 by the Allied powers and was annexed by Germany in 1938. In large part because of the military challenges posed by the English Channel, Britain was spared conquest in both world wars. WW II ravaged France and Germany and weakened Great Britain, such that their empires de-colonized and each fell from the ranks of strong nations. The absence of global war, post-World War II, reflects awareness by the two superpowers that in nuclear war no antagonist can escape devastation. It does not entail, however, that other governments (including subsequent U.S. and Russian administrations) with a military nuclear capacity will exhibit the same restraint. Nor does it mitigate the threats posed by other sources of potential global conflagrations.

5 The Anarchic Strong Nation System and Post-Cold War United States Foreign Policy

The twentieth century was the most perilous century for which we have records. However, the degree of difficulty of effective governance is and will be significantly greater this century than it was in the previous century. The absence of an effective governance system dealing with global problems, the prospect of diminishing nation-state governance capacity, metastasizing within and beyond the third world, and weakened ecosystems in their ability to sustain humanity pose critical problems for the future of civilization.

Strong nations are the chief actors in a global system that is fundamentally anarchic. If our species has an equilibrating mechanism, it is reasonable to assume it would arise from our species' unique ideational and cognitive endowment-empathy and intelligence. To the extent this discerning capacity exists, it would reside in the decision-making structure of the nation which at least since the Treaty of Westphalia in 1648 has been the significant actor in the international scene.

However, this system is inherently dysfunctional. Our species' unique capacities often serve the mutually conflicting interests of these nations, interests which often are antithetical to the global interest, and hence antithetical to the survivability of our species. As a consequence, the strong nation decision-making process does not serve as the analogue of symbiosis and symbiogenesis in the evolution and co-evolution of organisms.

In the strong nation system, nations which can engage in aggressive, self-maximizing behavior generally do. This behavior is likely a consequence of a mix of both insecurity and a desire for self-aggrandizing expansionism. They are both mutually reinforcing threads of political culture, fanned by military and industrial interests. A dynamic emerges among strong nations as an outcome in which distrust and antagonism abound. The result is a drive for power that in large measure determines the behavior of the strong nation. Even when strong nations strive to create global peace, John Mearsheimer writes:

...great powers do not work together to promote world order for its own sake, Instead each seeks to maximize its own share of world power, which is likely to clash with the goal of creating and sustaining stable international order. This is not to say that great powers never aim to prevent wars and keep the peace. On the contrary, they work hard to deter wars in which they would be the likely victim. In such cases, state behavior is driven largely by narrow calculations about relative power, not a commitment to build a world order independent of a state's own interest.²²

22 John Mearsheimer, *The Tragedy of Great Power Politics* (New York, W.W. Norton & Company, 2001), 42.

An adaptive global system would be characterized by sustainable global governance in which strong nations do not engage in destructive self-maximizing behavior. An adaptive system would provide an international rule of law based upon democratic principles in some proximate form and would strive to prevent war and genocide.²³ Moreover, an adaptive global system would establish and enforce ecological policies, which would regulate human actions affecting the environment. Such policies would have as their objective the establishment and maintenance of the rule of law and protection of the capacity of ecosystems to sustain our species.

To the extent that deaths arising from war during the last 350 years have been significant, looking at the chart below, the global political system has been dysfunctional. Indeed with regard to fatalities arising from war, the world has become progressively more violent. The twentieth century in absolute and per capita terms was considerably more violent than the preceding century. (See chart “War-Related Deaths” below.) When one takes into account genocides and war, the total number of deaths from 1900 through 1987 is 169 million.²⁴

War-Related Deaths²⁵

Years	War -Related Deaths (millions) Per Century	War Deaths per 1000 People
0–1499	3.7	n.a.
1500–1599	1.6	3.2
1600–1699	6.1	11.2
1700–1799	7.0	9.7
1800–1899	19.4	16.2
1900–1995	109.7	44.2

While strong nations may be reasonably self-adaptive within their borders, strong nations beyond their borders often have not been. Thus, if a nation is sufficiently

23 It may well be that the commitment of individual societies to democratic principles is contingent upon the society’s level of development. Thus, a society at a given level of development may prefer other priorities for their internal governance. Optimal global governance, on the other hand, requires that it be democratic in some proximate form, or, at very least, more democratic than it currently is. One can imagine a wide range of possible world orders that politically are less than proximately democratic. While such world orders may not be politically sustainable, it is conceivable that some could generate ecological benefits at least in the short-term. On the other hand, an entirely ruthless global hegemony could lead to a secular Armageddon and a sixth extinction.

24 Rudolph Rummel, Table 1.3, *Death by Government* (New Brunswick, N.J.: Transaction Books, 1994), 7.

25 Michael Renner, “Ending Violent Conflict”, *State of the World*, 1999 (Washington, D.C.: Worldwatch Institute), 60–73; 153.

strong, it will likely seek to maximize its interests and will likely relinquish power only if it believes it is compelled to. Major nations are often islands of self-serving morality which historically have engaged in intimidation and systematic violence beyond their borders with few constraints.

Territorial expansion through merger or conquest and subsequent consolidation has played a key role in the historic development of governance from spatially small units of authority – band, tribe, kingdom – to larger units. The anarchic strong nation system, thus, is the cumulative, historical by-product of political consolidation of innumerable smaller governance units and their integration within the rule of law of the nation-state. During the last three and a half centuries of the post-Westphalian period, no consolidation has taken place on the global level, much less one in which the narrow self-interested behavior of the strong nation has been replaced by global governance. Currently, it is at our collective peril that this anarchic behavior exists unbridled in the international arena.

Given the anarchic environment, it is predicable that nations that possess the necessary resources would seek to enhance their power by seeking valuable resources abroad, markets for their mercantilist policies, and/or by the conquest of societies of strategic value. The last five centuries are replete with illustrations of self-aggrandizing policies in the form of mercantilism, colonialism and imperialism. Accordingly, it is reasonable to assume, that had the U.S. had not taken the Philippines after the Spanish-American War, the likelihood is that France or England, at some point, would have or would, at very least, have tried. If the English had not established control over India, the French or another strong nation, in all likelihood, would have. Had not United States President Monroe, in 1823, proclaimed a doctrine which later bore his name that the western hemisphere was off limits to European powers, no doubt Britain or perhaps France at some time might have sought to establish colonies as they had done earlier.

It is also predictable that empires would rely largely upon coercion to maintain their satellite systems. Rarely has there been a natural identity of interests between client nations and the strong nation. The exigencies of the strong nation system are such that coercion was the most practicable means of achieving control. Indeed strong nations dealt mercilessly with governments that did not satisfy their expectations. Satellite nations were not free to enter into alliances with other nations. The populations of satellite nations were not regarded as equals with citizens of strong nation. Even in British North America, colonists were not accorded the same status as citizens living in England.

The manner in which empires characterize their foreign policy is generally not consistent with the reality of their behavior. Ideological systems often emerge which not only justify strong nation behavior but also glorify it as serving a higher good. The Spanish conquistadors believed the indigenous peoples of the Americas were their inferiors. Their forced labor and virtual enslavement played a vital role in the Spanish *encomienda* system of governance. Spanish King Ferdinand believed it was the sacred responsibility of conquistadors to propagate Christianity among the indigenous peoples.

During the nineteenth and twentieth centuries, many in the United States and in Europe believed that Western civilization had the responsibility to bring the blessings of their civilization to the indigenous peoples of the world, and that, if in the process of doing so, subjugation was necessary, it was justified. Belief in Anglo-Saxon superiority and their mission in civilizing others is reflected in the statement of late 19th century Protestant cleric, Josiah Strong: “[t]he Anglo-Saxon is the representative of two great ideas...civil liberty...[and] a pure spiritual Christianity... the Anglo-Saxon is divinely commissioned to be...his brother’s keeper”.²⁶ A sense of cultural superiority and noblesse oblige also played a significant role in the French and Dutch colonial governments in Africa and Asia, which they referred to as “civilizing missions”.²⁷

We would not expect that the U.S. government during the last century has been exempt from inaccurate characterizations of its foreign policy. The public steeped in a culture embracing democracy and human rights would no doubt find strong nation behavior objectionable. The U.S. government typically describes its foreign policy as one that advances democracy and human rights. Blatant strong nation behavior is concealed from the public purview and in large measure from Congressional oversight at least at the time it has occurred. The process of concealment has been aided by agencies that operate clandestinely, such as the CIA and Defense Intelligence.²⁸

The United States emerged from the Cold War the dominant military nation in the world. The United States, instead of seeking multilateral solutions to global problems, has sought to pursue its own course, consistent with traditional strong nation behavior. The United States has withdrawn from the Anti-Ballistic Missile

26 James Kirby Martin, Randy Roberts, et al, *America and its Peoples From 1865*, Vol. II, Second Edition (New York: Harper Collins, 1993), 658.

27 William J. Duiker and Jackson J., Spielvogel, *World History Vol.11: Since 1500* (New York, West Publishing Co, 1994), 585–586.

28 See Chapter 3, “Stealth Imperialism” 65–94 in Chalmers Johnson, *Blowback: The Costs and Consequences of American Empire* (New York, Henry Holt and Company, 2000.)

Treaty, undone the Clinton's Administration's signatory status of the International Criminal Court and failed to sign the Bio-diversity Treaty.²⁹ The Nuclear Test Ban Treaty is in jeopardy because of a change of policy after the terrorist attacks of September 11, 2001, that the United States would not rule out a "first [nuclear] strike" in response to threats. The United States has not signed on to the Kyoto Protocol restricting carbon dioxide emission, a chief source of greenhouse gasses and has otherwise taken a tepid position regarding global warming. Also, the Open Space Treaty of 1967, in which the signatories agreed not to place weapons in space, is also in jeopardy because of the on-going development of Space Command, a program of the Air Force.

Strobe Talbott, former US Deputy Secretary of State criticizes this unilateralist posture. In an essay entitled "Memo to America: Rejoin the World", he states: "[a]fter September 11th, American foreign policy took a turn down a dangerous and solitary road, leaving its international partners in the dust. To get back on the right track [he states] it's time to return to internationalism".³⁰ Our government's unilateralism is also the subject of the comments below of Stanley Hoffman, chair of Harvard's Center for European Studies. He avers:

In the realm of interstate problems, American behavior will determine whether the nonsuperpowers and weak states will continue to look at the United States as a friendly Power (...) or whether they are provoked by Washington's hubris into coalescing against American preponderance. America may be a hegemon, but combining rhetorical overkill and ill-defined designs is full of risks. Washington has yet to understand that nothing is more dangerous for a "hyperpower" than the temptation of unilateralism.³¹

Similarly, Princeton University scholar, John Ikenberry argues that our government's "neo-imperial policy" as he refers to it, "steps into the oldest trap of powerful imperial states: self-encirclement [self-induced isolation]".³² He further maintains, "when the most powerful state in the world throws its weight around, unconstrained by rules or norms of legitimacy, it risks a backlash". Indeed, he adds that "... history [has] show[n] that powerful states tend to trigger self-encirclement by their own

29 Richard DuBoff, "The U.S.: Rogue Nation" Center for Research on Globalization, December 22, 2001, <<http://www.zmag.org/roguenation.htm>> (25 April 2004). See Peter Beaumont, "Bush set to flout test ban treaty", *The Observer*, July 28, 2002, 1. <<http://www.guardian.co.uk/bush/story>> (25 April 2004).

30 Strobe Talbott "Memo to America" <<http://www.unausa.org/site/pp.aspx?>> (27 July 2007).

31 Stanley Hoffmann, "Clash of Globalizations". *Foreign Affairs*, Vol. 81 Issue 4, July/Aug (2002), 104–116, (6). American Search Premier. EBSCOhost. Galileo. Agnes Scott College, Decatur, GA. <<http://www.galileo.usg.edu>> (29 October 2002).

32 John Ikenberry, "America's Imperial Ambition". *Foreign Affairs*, Vol. 81 Issue 5, Sep./Oct. (2002), 44–62, (8). American Search Premier. EBSCOhost. Galileo. Agnes Scott College, Decatur, GA. <<http://www.galileo.usg.edu>> (30 October 2002).

overestimation of their power. ...Their imperial orders were all brought down when other countries decided they were not prepared to live in a world dominated by an overweening coercive state”.³³

In a recent book aptly called *The Choice*, National Security Advisor to President Carter, Zbigniew Brzezinski states that the United States has two choices. The first is whether to continue on its current path, the cost of which he argues will be devastating and which would lead to “an accelerating plunge into global chaos”.³⁴ The second choice is whether the United States should adopt a leadership role among nations moving in the direction of building a “global community of shared interest” and “...weav[ing] together [with the European Union and other nations] a broader fabric of binding and institutionalized international cooperation”.³⁵ It is obvious that in Brzezinski’s judgment it is only the second path which is viable.

Mary Kaldor, the Director of the Center for the Study of Global Governance at the London School of Economics and Political Science, widens the purview of Brzezinski, making additional recommendations for global political sustainability. She writes:

[f]irst of all, international humanitarian law needs to be strengthened. Moreover international law needs to be applied impartially... And the United States cannot exempt itself from the rules.... Secondly, a substantial multilateral capacity for international law enforcement needs to be constructed... Thirdly, there must be intensified efforts to resolve local “wars on terror... Fourthly, in cases where leaders are illegitimate or criminal which is often the case in conflict zones, as for [example] Saddam Hussein or the Taliban, it is important to find ways to bring about change through support for local political constituencies... Fifthly there has to be a commitment to global social justice.... Essentially, these five issues could represent the possible content of a global social contract....³⁶

Kaldor echoes Brzezinski’s thoughts regarding the precarious nature of the current juncture in global politics:

I am not sanguine that anything resembling this answer [her five reforms] will be adopted, although I hope it will be debated. At the time of writing, the prospects are grim. This is probably the most dangerous moment in the lifetimes of those born in the lifetimes of those born after the Second World War, or perhaps after the Cuban Missile Crisis.³⁷

33 *Ibid.*

34 Zbigniew Brzezinski, *The Choice: Global Domination or Global Leadership* (New York: Basic Books, 2004), 218.

35 *Ibid.*, 219.

36 Mary Kaldor, *Global Civil Society: An Answer to War* (Cambridge: Polity Press, 2003), 156–157.

37 *Ibid.*, 159.

6 Economic Globalization within the Strong Nation System: The Need for Effective Management

Economic globalization, which has extended the effects of complexity, is very much a function of growing interconnectedness both within and between societies and nations. Like complexity, economic globalization can be destructive, if not managed correctly. The current failure of financial institutions: Bear Stearns, Lehman Brothers, Fannie and Freddie Mack, AIG, Citigroup, and the weakened state of J.P. Morgan Chase and the Bank of America, and the imminent collapse of the automotive industry reflect the worst financial crisis in the U.S. since the great Depression. It has led to banking failures in the United Kingdom, Germany, France, Russia, China, and Iceland, and to plummeting global stock markets. The global economy is in recession, and according to the Organization for Economic Cooperation and Development (O.E.C.D.), it will be a protracted one for developed countries.³⁸ The International Monetary Fund anticipates a global loss of \$4.1 trillion of which \$2.7 trillion had its place of origin within the United States.³⁹ The rapid cascading of global bank failures and falling stock markets contributes to my conjecture that we are in the complexity phase of a complex adaptive system.

Management of the global economy in accordance with the Washington Consensus and its neo-liberal trade policy with its emphasis upon market fundamentalism has had significant destabilizing effects reflecting the distribution of power in the strong nation system. Historically, the director of the World Bank is a United States citizen and the director of the IMF historically is from a European nation, and their selection is not characterized by transparency.⁴⁰ Indeed the United States today is the only nation that has a virtual veto in the decision-making process at the IMF.⁴¹ Moreover, in the World Trade Organization decision-making between unelected trade representatives takes place in secrecy, and without accountability.⁴²

Because of significant economic and social disparities and the absence of governance institutions to ameliorate such disparities, the stability of our global political system has been compromised. An anarchic world comprised of a superpower, regional strong nations, terrorists and a world in which about forty percent world's

38 David Jolly, "First World Said to Face Protracted Downturn", *NYT*, November 26, 2008, B3.

39 Mark Landler, "I.M.F. Puts Bank Losses From Global Financial Crisis at \$4.1 Trillion", *NYT*, April 23, 2009, A6.

40 Joseph Stiglitz, *Globalization and Its Discontents* (New York: W.W. Norton & Company, 2003, 2002), 19.

41 Stiglitz, *Making Globalization Works* (New York: W.W. Norton & Company, 2007), 282–283.

42 *Ibid*, 45.

population live on \$2 per day or less is a vulnerable world.⁴³ Parts of the world are already severely stressed, and in the event of ecosystem failure of sufficient magnitude, it could serve as a trigger mechanism leading to chaos and a total breakdown of governance and societal institutions.

The economic record during the two decades, the 1960–1980, known as the Bretton Woods period, relative to the years 1980–2000, which is referred to as the neo-liberal period and is characterized by the free trade philosophy of the Washington Consensus, is not a good one. The data indicate a drop in per capita Gross Domestic Product during the neo-liberal period for each of five groups of nations arranged by wealth. The growth rate in the 1960–1980 Bretton Woods period is at least twice of the rate during the 1980–2000 neo-liberal period in all but the wealthiest group.⁴⁴ Moreover, since 1990, income inequality has increased in the United States. Indeed, family income inequality in 1998 is higher than any year for the period beginning in 1947.⁴⁵ The data for both periods also include socio-economic indicators: the growth of income per person, life expectancy, mortality among infants, children, and adults, literacy, and education. The authors of this report note, “[f]or economic growth and almost all of the other indicators, the last 20 years have shown a very clear decline in progress as compared with the previous two decades.”⁴⁶

Economic indices in 2001 relative to 1981 exhibit a global picture of increasing and widespread poverty. About 40 percent of the world’s people subsist on \$2 per day or less – the standard of global poverty – an increase of 36 percent from 1981. 876 million (one-sixth of the world’s population) currently live on \$1 per day, an increase of 3 per cent from 1981. The data in Africa is worse. Those living on \$1 per day or less rose from 41.6 percent in 1981 to 46.9 percent in 2001 which given high population growth means those in extreme poverty jumped from 164 million to 316 million.⁴⁷

Where positive results have been achieved – China – with regard to those in extreme poverty – success has not been a measure neo-liberal trade policy. China resisted pressures from global economic institutions to open its market to global

43 Jeff Madrick, “Economic Scene,” *NYT*, August 7, 2003, C2.

44 Mark Weisbrot and Dean Baker, *et al.*, “The Scorecard on Globalization 1980–2000: Twenty Years of Diminished Progress.” July 11, 2001, *Center for Economics and Policy Research*, 16, <<http://www.cepr.net>> (19 April 2004).

45 Arthur E. Jones, Jr. and Daniel H. Weinberg, “The Changing Shape of the Nation’s Income Distribution, 1947–1998,” *Current Population Reports*, June 2000, 2.

46 Weisbrot and Baker, “The Scorecard on Globalization,” 2.

47 Stiglitz, *Making Globalization Work*, 11.

capital investment and delayed exposing its markets to imports.⁴⁸ The neo-liberal global economic institutions – the World Trade Organization, the International Monetary Fund and the World Bank – embrace a “free trade” philosophy backed by the United States and the advanced industrial countries. The “free trade” policy which has characterized trade policy since 1980 includes: removal of constraints to the flow of global capital between nations; privatization; reduction of restraints to foreign ownership and investment; doing away with regulation of business; reduced public expenditures for health, education and social services; and acceptance of an export-led economy with “free trade” practices as the exclusive model for incorporation into the world economy.

Joseph Stiglitz, Nobel Prize laureate in economics, former chair of the Council of Economic Advisors and former chief economist of the World Bank, has criticized the Washington Consensus for its “market fundamentalism”⁴⁹ – an excessive faith in markets based upon assumptions of “perfect information, perfect competition and perfect risk-taken markets... which is of little relevance to developing countries in particular.”⁵⁰ Also taking issue with “free trade” policy, Lance Taylor, an economist specializing in comparative economic development, maintains, “in the long run there are no laissez-faire transitions to modern growth. The state has always intervened on behalf of [powerful corporate interests]....”⁵¹ According to political economist, Alicia Amsden, of the twenty or so nations which have achieved “high economic development, only two did not employ protectionism in the form of tariffs or in the promotion of exports. The exceptions are Switzerland and Hong Kong, both of which “enjoyed extraordinary assets by neighboring country standards.”⁵²

Speaking about the globalized economy, former Secretary of State Henry Kissinger, in Davos, Switzerland, posits that if it is not “fundamentally reformed to change the incompatibility” between the wealth it generates, and its widespread adverse social effects, it would lead to political destabilization and crises.⁵³

Also at Davos, Switzerland, former UN Secretary Kofi Anan expressed similar concerns:

Globalization is a fact of life. But I believe we have underestimated its fragility. The problem is this: The spread of markets far outpaces the ability of societies and their political system to

48 Dani Rodrick, “After Liberalism, What?” *Taipei Times*, October 3, 2002, 1; Stiglitz. *Making Globalization Work*, 10.

49 Stiglitz, *Making Globalization Work*, 27.

50 *Ibid*, 28.

51 Lance Taylor, editor, *The Rocky Road to Reform* (Cambridge, MIT Press, 1993), 104.

52 Alice Amsden, *The Rise of the Rest: Challenges to the West from Late-Industrializing Economies* (New York: Oxford University Press, 2001), 49.

53 Alan Cowell, “Annan Fears Backlash Over Global Crisis,” *NYT*, February 1, 1999, A10.

adjust to them, let alone guide the course they take. History teaches us that such an imbalance can not be sustained for too long.⁵⁴

Joseph Stiglitz argues that political development has not matched economic development, and as a result of which a “democratic deficit” has emerged in which global economic institutions favor powerful corporate interests of the United States over the interests of the developing countries. Stiglitz maintains:

I have argued... that we have to learn how to cope better with globalization... We also have to learn how to manage it better, with a greater concern both for the poor countries and the poor in rich countries and for values that go beyond profits and GDP. The problem is that there is a democratic deficit in the way that globalization has been managed. The international institutions [IMF, World Bank, WTO] ...reflect the interests of the advanced industrial countries – or, more particularly, special interests (like agriculture and oil) within these countries. The imbalance is in some cases the result of distorted voting rights; at other times it comes from the sheer economic power of the countries and interests involved. The imbalance is seen both in the agenda and in the outcomes in every arena of globalization, from trade to the environment to finance.⁵⁵

Stiglitz maintains that responsibility for the currency and banking crises in Thailand, Indonesia, Malaysia and South Korea in 1997–1998,⁵⁶ the loan defaults and economic decline of Argentina in 2001 and 2002,⁵⁷ the dramatic exodus of capital out of Russia and its precipitous economic fall during its transition to capitalism,⁵⁸ and the absence of growth in Africa,⁵⁹ rests in significant way with either the policies of capital market liberalization, quick privatization and or the debt payment austerity programs of the Washington Consensus.⁶⁰ Where economic progress has been made, for example, China, India, Vietnam, and East Asian nations after 1997–1998, he posits it has been because countries pursued policies other than the Washington Consensus.⁶¹ Reinforcing at least one aspect of Stiglitz’ view, the IMF acknowledged in 2003 that opening capital markets in many Third World nations contributed to further destabilization rather than economic growth.⁶²

But culpability for these economic crises extends beyond global economic institutions. In Stiglitz’ judgment, the government in which neo-liberal trade policy was formulated – the United States – bears principal responsibility:

54 *Ibid.*

55 Stiglitz, *Making Globalization Work*, 276.

56 Stiglitz, *Globalization*, Chapter 4 “The East Asia Crisis,” 89–132.

57 Stiglitz, *Making Globalization Work*, 220–225.

58 *Ibid.*, Chapter 5, “Who Lost Russia,” 133–165.

59 *Ibid.*, 40–42.

60 *Ibid.*, 277.

61 Stiglitz, *Globalization*, 91.

62 Stiglitz, *Making Globalization Work*, 16.

The end of the Cold War gave the United States, the one remaining superpower, the opportunity to shape the global economic and political system based on principles of fairness and concern for the poor; but the absence of competition from communist ideology also gave the United States the opportunity to reshape the global system based on its own self-interest and that of its multinational corporations. Regrettably, in the economic sphere, it chose the latter course.⁶³

Third World nations regard both neo-liberal global trade policy and their under-representation within global institutions unfair. Indeed, Joseph Stiglitz has written, this perception is largely correct:

The critics of globalization accuse Western countries of hypocrisy and the critics are right. The Western countries have pushed poor countries to eliminate barriers but kept up their own barriers, preventing developing countries from exporting their agricultural products, and so depriving them of desperately needed export income. The U.S. was...one of the prime culprits...

...[E]ven when not guilty of hypocrisy, the West [G8 nations] has driven the globalization agenda ensuring that it garners a disproportionate share of the benefits at the expense of developing world.⁶⁴

Echoing parallel views, Jonathan Cahn in the *Harvard Human Rights Journal* maintains that [the World Bank] functions as a “governance institution exercising power through its financial leverage to legislate entire legal regimens and even to alter the constitutional structure of borrowing nations”.⁶⁵ Writing about the International Monetary Fund, Columbia University economist, Jeffrey Sachs writes, “not unlike the days when the British Empire placed senior officials directly into the Egyptian and Ottoman ministries, the IMF is insinuated into the inner sanctum of nearly 75 developing country governments around the world – countries with a combined population of some 1.4 billion”.⁶⁶

Indeed, political scientist Mark Neuffield maintains that economic globalization has led to the “[d]emise of the [n]ation-[s]tate of the South [developing nations]”. More than twenty nations, most of them poor, have experienced prolonged intra-nation discord during the last decade. In large part, these nations can no longer assure human safety, protect property rights and provide public services, such as education and health.⁶⁷ This is the especially the case in sub-Saharan Africa, in six

63 *Ibid.*

64 Stiglitz, *Globalization*, 6–7.

65 Donald Korten, *When Corporations Rule the World* (San Francisco: Berrett-Kohler Publishers, 1995), 165.

66 Chalmers Johnson, *Blowback* (New York: Henry Holt and Co., 2000), 210.

67 Mark Neuffield, “Internal Conflict: Adaptation and Reaction to Globalization”, *The Corner House* (January 1999), Briefing 12, 2, <<http://www.thecornerhouse.org.uk/briefing/index>> (28 April, 2004).

nations of which, more than forty percent of children suffer from malnourishment. Fatalities from intra-nation discord during the 1990s have mushroomed to 3.6 million, more than 16 times the number of deaths between nations for the same period. The discord has produced twelve million displaced refugees, an increase of 50 percent from the 1980s. UN peacekeeping operations during the decade of the 1990s have burgeoned from slightly more than four on average for the period from 1946 to 1989, to 36 in the 1990s.⁶⁸

Reflecting the distribution of power within the strong nation system, the neoliberal management of the global economy with its embrace of market fundamentalism has had destabilizing global effects, especially upon third world nations. Our imperative within the complexity phase is to develop and sustain more effective global economic institutions. We may infer that its policies will not reflect market fundamentalism and otherwise will not reflect neo-liberal policies. Such institutions will be more transparent and more democratic than exist now and developing nations will fare better than they have under current institutions.⁶⁹ The costs of failure in designing adaptive institutions may be irreversible. Indeed, Robert Keohane, former president of the American Political Science Association, speaking about our precarious juncture in history, states:

The stakes in this mission are high. If global institutions are designed well, they will promote welfare. But if we bungle the job, the results could be disastrous. Either oppression or ineptitude would likely lead to conflict and a renewed fragmentation of global politics. Effective and humane global governance arrangements are not inevitable. They will depend on human effort and on deep thinking about politics.⁷⁰

68 *The United Nations Development Program Human Development Report 2002* (New York: Oxford University Press, 2002), 11. *The United Nations Implementation of the Millennium Declaration*, 17.

69 Read Joseph Stiglitz' *Making Globalization Work* for development of what effective management of the global economy might be.

70 Robert O. Keohane and Joseph S. Nye, Jr., "Governance in a partially globalized world", *Power and Governance in a Partially Globalized World* (New York: Rutledge, 2002), 266–267.

7 Our Aggregate System: Cumulative Ecological Stress & the Danger of Multiple Human System Failure

Agenda 21, the report of the 1992 Earth Summit, expressed the theme that the world is at a critical juncture in its history, not experienced before.⁷¹ The singularity and gravity of this historical juncture is also expressed in “The Warning to Humanity”, a report of 1600 scientists and 104 Nobel Prize Laureates.⁷² Our current extinction rate of species is between 1000 and 10,000 times greater than it was during the Paleolithic and Neolithic periods.⁷³ It is a result of persistent habitat destruction, the introduction of alien species, pollution, population growth, over-grazing, and over-harvesting. Harvard entomologist, E.O. Wilson predicts that at our current rate of species extinction, by 2030, 20 per cent of species will become extinct and by 2100, 50 per cent will become extinct.⁷⁴ While scientists do not understand well the synergies of global warming, loss of bio-diversity and resource depletion, scientists believe their confluence will exacerbate, rather than mitigate their adverse effects. In 2004, the American Geophysical Union stated there was no “substantive disagreement in the scientific community” as to the anthropogenic origins of global warning.

The National Academy of Science together with science academies of Japan, Britain, Germany, and China jointly stated, “[t]here is now strong evidence that significant global warming is occurring”.⁷⁵

The Intergovernmental Panel on Climate Control’s (IPCC) Fourth Assessment Report Draft Copy (FAR) of November 2007 issued perhaps the most alarming of IPCC reports to date. IPCC lead scientist, Rajenda Pachauri, speaking about the FAR, notes, “What we do in the next two or three years, will define our future”.⁷⁶

Hardly more sanguine, James Hansen, Director of NASA’s Goddard Institute for Space Studies, James Hanson, stated that we have fewer than ten years to correct our energy policies.⁷⁷ Our current “business as usual” practices, if unchanged, will

71 Daniel Sitars, editor, *Agenda 21: The Earth Summit: Strategies for Saving the Planet* (Boulder, Colorado: Earth Press, 1993), 1.

72 Paul R. Ehrlich, *Betrayal of Science and Reason* (Washington D.C.: Island Press, 1992), 242.

73 E.O. Wilson, *The Future of Life* (New York: Alfred A. Knopf, 2002), 100.

74 *Ibid*, 55–56.

75 Greg Easterbrook, “Finally Feeling the Heat”, *NYT*, <<http://www.nytimes.com/2006/05/24/opinion/24easterbrook.html?>> (7 August 2007).

76 Editorial “The Scientists Speak”, *NYT*, November 17, 2007. See “Summary for Policymakers of the Synthesis Report of the IPCC Fourth Assessment Report”, *Draft Copy*, 16 November 2007, 4 <http://www.ipcc.ch/pdf/assessment-report/ar4/syr/a...> (4, December 2007).

77 James Hansen, “The Threat to the Planet”, *The New York Review*, July 13, 2006, 12–16.

generate a five degree Fahrenheit increase⁷⁸ which by 2015 will be a 35 percent increase over carbon emissions.⁷⁹ Hansen predicts that anything in excess of a two degree F increase will be “dangerous” during the next ten years because of the carbon including methane and black soot already in the atmosphere and elsewhere in the biosphere. Indeed, a ten degree F. increase, ten million years ago precipitated mass extinctions because of the release “frozen methane”.⁸⁰ Hansen prescribes a global warming increase of no more than two degrees F. this century which will provide time for the development of technologies.⁸¹ A five degree F. global warming increase will yield, he anticipates a rise in sea level of 80 feet which would ultimately inundate major U.S. eastern cities such as Miami, New York, Philadelphia, Boston and Washington and would have disastrous effects on China, Bangladesh and India, displacing more than 500 million people.⁸² Hansen’s somber predictions are based upon increased melting of glacial ice in Greenland in excess of fifty percent during the last twenty-five years, a comparable melting of ice in 2005 in West Antarctica, and three million year old geological data which indicate that sea level rose eighty feet after a temperature increase of five degrees F.⁸³

Management of our world’s natural resources will require the establishment of a global authority to monitor negative externalities, such as greenhouse gas emissions, deforestation, biodiversity loss, and water and air pollution, and that such monitoring inform global policy-making. Negative externalities detract from the accuracy of traditional measures of national wealth such as GNP and GDP because they do not reflect realistic environmental assessments. Measures of national and global wealth need to be calculated to account for diminishing environmental capital. In addition to human capital, (general education, competence and skills of citizenry), physical capital (highways, bridges, tunnels, air ports) a measure of environmental capital (e.g., fisheries, biodiversity, forests, wetlands, air, water and soil quality) needs to be calculated. Sustainable development entails that physical, human and environmental capital “remains constant or rises over time”.⁸⁴ Sustainable NNP is the extent to which capital stock can be used without our endangerment. In addition, measures of dense causal interconnectivity need to be designed and calculated for the aggregate system and such measures should assist both in the formulation of the complexity threshold and in efforts to avoid catastrophic scenarios.

78 *Ibid.*, 13.

79 *Ibid.*, 14.

80 *Ibid.*

81 *Ibid.*, 13.

82 *Ibid.*

83 *Ibid.*

84 Michael Todaro, *Economic Development*, Seventh Edition (New York: Addison-Wesley, 2000), 411.

Jared Diamond describes the multiple, interconnected challenges of the first half-century. He writes: “The single most important problem is our misguided focus on identifying the single most important problem [of unsustainability] ... any of the dozen problems if unsolved would do us great harm, and because they all interact with each other”.⁸⁵ With the onset of political and/or economic crises and environmental disasters, the prospect of multiple human system failure,⁸⁶ compounding each other, generating large scale, adverse effects is a real possibility in this century if our current course remains uncorrected. Political scientist, Thomas Homer-Dixon, Director of the Trudeau Centre for Peace and Conflict Studies at the University of Toronto, refers to this possibility as synchronous failure.⁸⁷ Thomas Homer-Dixon defines synchronous failure as “an event caused by multiple, simultaneous, and synchronous stresses that together generate multiple, simultaneous and synergistic failures”⁸⁸ and posits “[it] is the convergence of [these] stresses that’s especially treacherous and makes synchronous failure a possibility as never before.”⁸⁹ Indeed, the adaptability of our human and natural systems may be so compromised by the failure of a few systems that human system failure(s) may result from seemingly benign events, or events not especially ominous in isolation.

An abundance of incipient crises exist in the aggregate system which could ignite the serial failure of multiple human systems. Acute tense relations, i.e., flashpoints, already exist between a number of countries including India and Pakistan, Iran and Israel, and between China and Taiwan; fragile circumstances also exist in the autocratic regimes of Saudi Arabia, Egypt and Pakistan. If sustained violence or war erupts in any one of these contexts, it could lead to a cascade of events, and in the worst case scenario, multiple system failure. Environmental conditions which could set off flashpoints include: dramatic shortages of water in Asia and Africa and elsewhere, flooding of low level lands, for example, in coastal China, Bangladesh

85 Jared Diamond, *Collapse: How Societies Choose to Fail or Succeed* (New York: Penguin Group, 2005), 498.

86 Human systems (and subsystems) include essential infrastructure components: transportation (airports, bridges, tunnels and highways); energy (nuclear power plants, dams, hydroelectric plants, electric grids); water (reservoirs, water filtration plants); chemical storage facilities; governmental offices and operations.

87 While stresses from fragile human-made and natural systems are likely to be cumulative and continuous and, perhaps, can be said to be simultaneous and synchronous, failures in human-made systems are not. They are more likely to occur serially whether synchronous or not. While some catastrophic events in fragile human systems may follow in rapid sequence, such as the outbreak of violence and a declaration of war, others will not. Events such as mass migrations, the spread of disease and pandemics, expanding, deep poverty and nation-state collapse, if and when they do occur, are likely to be delayed, cumulative breakdowns.

88 Homer-Dixon, *Catastrophe*, 127.

89 *Ibid*, 16.

and India, food riots and widespread non-arable farm land. But each could by itself generate a trajectory leading to serial failure of multiple systems. Additionally, the need for new sources of affordable energy, or widespread income inequality and/or world-wide recession/depression could either set off sustained violence or war and/or be its consequence.

Adequate sources of affordable energy are a *sine qua non* of the mechanistic world in which we live. The military prowess of strong nations is largely dependant upon adequate energy reserves. If oil reserves become fewer and fewer, increasingly inaccessible and, accordingly, prohibitive in cost, and if alternate energy sources are insufficient, this could lead to changed power relationships between strong nations and to self-aggrandizing or defensive war, and wars of domination over weaker nations with greater energy reserves. A widespread insufficiency of energy resources could lead to a disruption of industrial practices and life style patterns which is likely to be globally destabilizing.⁹⁰

The adaptability of our human and natural systems may be so weakened that events not especially ominous in isolation could generate the failure of multiple systems. Such behavior parallels the phenomena Edward Lorenz discovered in his study of meteorological patterns in the 1960s. Circumstances seemingly benign, taken in isolation, may lead to catastrophic trajectories and human system failures. This is the characteristic of chaotic behavior and is metaphorically described as the “butterfly effect”, in which the fluttering of a butterfly’s wings on one side of a continent can produce a devastating tornado on the other side of the continent. Under chaotic conditions, the path or trajectory starting from two very similar events or two adjacent points, diverge sharply and are dramatically different. Accordingly, one can not approximate or predict the timing of a breakdown, its location and its magnitude from a specific event. Within Stuart Kauffman’s CAS theoretical structure, this would be an unmistakable illustration of the failure of self-adaptation.

In an already anarchic world, the tight-coupling of our natural and human-made systems are a recipe for bedlam. The prospect of mass migrations crossing nation-state boundaries for any one of a number of reasons sustained drought, to escape war, to seek higher ground after being displaced by rising sea level, for arable land – is real. Desperate actions taken by desperate nations, extending to war are realistic scenarios. Those nations with the military capacity to prevail will likely seek to maintain their power if not to expand it.

90 For the likelihood within the next two decades of sharply diminishing sources of affordable, accessible oil reserves, see Homer-Dixon’s *Catastrophe*, chapter four, 77–100.

Altering our current course of increased habitat destruction, loss of biodiversity, carbon dioxide emissions and exhaustion of Earth's resources, and redirecting humanity to a sustainable course will be a Herculean undertaking. Ehrlich and Wilson wrote in 1991:

The social, political, economic and scientific barriers to achieving the goal are so formidable that nothing less than the kind of commitment so recently invested in the Cold War could possibly suffice to accomplish it. And we are 45 years late in starting.⁹¹

Without significant correction of our current course, C. S. Holling has said the possibility of recovery may be lost. E.O. Wilson, in his book *The Future of Life* published in the year 2000, is no more optimistic than he was in the above cited 1991 article. He maintains we do not have the ability to reconstruct ecosystems, once destroyed. He states: “[t]o synthesize ecosystems ... is no more practicable than the reanimation of deep-frozen corpses. And to redesign the genotype better to fit a ruined biosphere is the stuff of science fiction.”⁹²

Political scientist Gilberto Gallopin states the compelling question is not whether our collective survival is imperiled by civilization's current trajectory, but whether it will be decided by “enlightened management” or “catastrophe.”⁹³ There is little to suggest that “enlightened management” characterizes the decision-making process upon which our collective survival currently rests. But change to a more hopeful direction could occur quickly if as Brzezinski explains in his book, *The Choice*, the United States government elects a path of global leadership, striving for international consensus in the direction of shared global governance.

91 Paul Ehrlich and E.O. Wilson, “Bio-diversity Studies: Science and Policy”, *Science*, Vol. 253, August 16, 1991, 758–763; 761.

92 Wilson, *Future*, 130.

93 Gilberto Gallopin, “Planning for Resilience: Scenarios, Surprises, and Branch Points”, L.H. Gunderson, and C.S. Holling, (Eds.) *Panarchy: Understanding Transformation in Human and Nature Systems* (London: Island Press, 2002), 363–364; 361–392.

8 Harnessing Complexity: The Quest for Sustainable Global Governance

The passing of our aggregate system into the complexity phase is a profound evolutionary event with profound consequences. Complexity has generated the likelihood that if current practices continue, multiple failures of our tightly coupled political, economic, social systems could take place in this century.⁹⁴

Our aggregate human and biophysical system is a high risk system. High risk technological and scientific systems are managed by building redundancy, reducing tight coupling within the system which serves to lesson vulnerability from breakdowns and sabotage. Comparable measures should be applied to our aggregate system at this time.

Little likelihood of meeting our evolutionary challenge exists without an expanded realm of cooperative governance that extends beyond nation-state borders. Having passed beyond the complexity threshold, we must effect a transition from an anarchic strong nation system to a system of cooperative global governance. Harnessing complexity, the term Axelrod and Cohen use, means achieving some proximate form of sustainable global governance. Its institutionalization in our aggregate system within the context of complex adaptive system theory would be comparable to a phase transition.

The prospect of nation-state war in a densely connected world, exacerbating fragile, tightly – coupled systems or precipitating their collapse poses frightening, unacceptable risks. Accordingly, if a transition comes to pass in the foreseeable future, the likelihood is, that while strong nations will continue to exist, the anarchic nature of the strong nation system will not. It is in the interests of the strong nation to confront the critical nature of the problems we face. One might say with justification, that a voluntary cession of a key measure of strong nation autonomy to global governance entails the end of the nation-state as we know it. Notwithstanding, whatever we label the modified nation-state, there can be no national security without global security; nor can there be global security without the availability of the nation-state military apparatus when needed to serve global interests.

Rising density of casual interconnectedness may generate a heightened concern for global problems creating, in turn, an unprecedented commonality of interests among nations and their respective citizens. Should global “localization” occur, it would produce a veritable compression of ideational space characterized by

94 *Ibid*, 212–213.

fewer differences in policy prescriptions between (and within) nations. Such a compression might parallel the characteristics of the *small world* network: a high degree of ideational connectedness of a relatively small number of powerful actors (nations), key supporting actors together with the vast majority of remaining actors, all in short ideational proximity of each other permitting rapid, effective communication.

An international governance system possessing shared interests provides a unique opportunity to design a world better suited for our mutual survival. Indeed, frequently it is only in crisis that significant reforms are made, e.g., the New Deal during the Great Depression of the 1930s in United States history. (Albeit there have been grave crises for which there has been no adaptive response, e.g., World Wars I and II.) About the *small world*, Duncan Watts so eloquently said:

It doesn't matter if you know about [its effects], and it doesn't matter if you care, they will have their effect anyway. To misunderstand this is to misunderstand the first great lesson of the connected age: we may all have our burdens, but like it or not, we must bear each other's burden as well.⁹⁵

If the process of "localization" ensues, we would expect the emergence of vocal interest groups and revitalized, if not new constituencies, sympathetic to an ethos that extends beyond the narrow self-interest of the strong nation system. A growing activist awareness on the part of global citizenry accompanied by a rapid increase in the density of networks in the political sphere (comprised of international governance institutions, international and domestic organizations and in the private sector, transnational corporations, which collectively I refer to as network governance) may well be integral to the transition. Indeed since 1972, 302 regional environmental agreements were established.⁹⁶

But network expansion can manifest itself for good or ill and gradients in between. It is predictable that expanding networks will become, if they have not already, a locus of a struggle for power. The contentious issue underlying this struggle may well be the degree of autonomy from the self-maximizing nation-state. The struggle for power between those advocating narrow self-interest within the strong nation system and those favoring a wider and global interest will undoubtedly play out, and no one can predict in advance its outcome. One may hope that the preponderance of power will rest with the dynamic of "localization" and identification with, and support for global interests and global governance.

⁹⁵ Duncan J. Watts, *Six Degrees of Separation: The Science of a Connected Age* (New York: W.W. Norton, 2003), 301.

⁹⁶ *United Nations Environmental Programme*, 379.

Nonetheless, a global governance network can lead to an extension of traditional strong nation, self-maximizing policies as Joseph Stiglitz has argued in this article with regard to the global economic institutions: WTO, the IMF and the World Bank. Together, they constitute a global governance [economic] network that has generated a global capital market that dwarfs in size the capital market in any one nation or in any group of nations, and are beyond their control. While the autonomy of nations, especially within the third world, has diminished as a result of the globalized economy, the economic resources of powerful interests in the U.S. and the G8 nations that benefit from the globalized economy have increased. If anything, their interests may have been better served by current global governance institutions. Notwithstanding, if the transition is made to global governance, network expansion is likely to have a salutary effect.

Global governance, if it is effective, will need the capacity to marshal preponderant military power in order to contain an errant, self-maximizing, strong nation, or a group of errant non-state actors. It will need the technological and economic resources to deal with and contain catastrophic ecological disasters and their accompanying human and political devastation. A wholly decentralized network of global governance without the capacity for necessary concerted action among its multiple actors will not have the resources to cope with the horrific possibilities that may well be part of our future.

Global governance, by itself, is not a guarantor of the rule of law. Nor is it a guarantor of a sustainable planetary course of action. The quest for power will not end with the establishment of global governance – whatever the design of these structures. Indeed the locus for political self-aggrandizement will shift to these decision-making structures. Nonetheless, inasmuch as explicit responsibility for sustainability would rest within global governance institutions, and no such responsibility currently lies within strong nations, global governance has the potential of being a more effective evolutionary adaptation than the strong nation system.

Humanity would do well to reflect upon the myriad self-adaptive networks in our CAS. This is a biological legacy to which we are heir but in which we have played no deliberative role in creating. These self-adaptive networks are a model for humans to emulate in its governance systems. It would be the height of ignorance and misdirected hubris if the human enterprise – as ideationally and cognitively talented as our species is – ends in a coup de grace in which we not only destroy civilization but ravage the biosphere, in which recovery along unknown evolutionary paths will take millions of years, if, in fact, it occurs at all.

If our global society collapses, it will not be the first society to do so. The Anasazi who lived in what is today New Mexico, the Classical Lowland Mayans and the people of Tenochitalin – both of Meso-America – and those living in Easter Island situated 220 miles west of Chile in the Pacific Ocean, each engaged in excessive use of their natural environment, clear-cutting of forests, over-harvesting and over-grazing.⁹⁷ These societies exceeded the human carrying capacity of the eco-systems they inhabited, contributing significantly to a precipitous decline in the population and ultimately to a non-viable society.

Whether the creation and maintenance of sustainable global governance takes place in this century, arresting environmental, political and socio-economic deterioration and whether an enduring global civil society arises with shared values affirming sustainability could well decide the destiny of the human enterprise.

⁹⁷ Paul R. Ehrlich, *Human Natures: Genes, Cultures and the Human Prospect* (New York: Penguin Books, 2000), 243–244; 321.