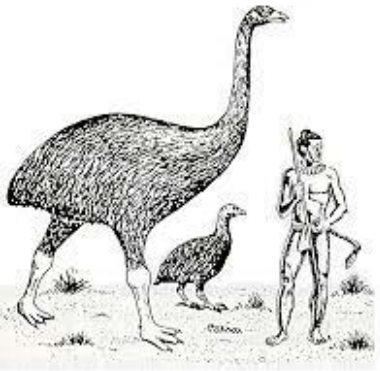

Ecological Degradation and the Evolution of World-Systems

by

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ABSTRACT: This paper describes the role played by anthropogenic ecological degradation in the evolution of world-systems over the past twelve thousand years. We have developed a conceptual apparatus for comparing world-systems in order to better understand how fundamental transformations in systemic logic occur. When properly conceptualized and bounded, we can compare earlier, smaller regional systems with the modern global system. This enables us to comprehend how the size and nature of world-systems have changed. Our model of world-systems evolution incorporates the important work of anthropologists on population pressure and ecological degradation. The expanding scale of world-systems corresponds to the expanding scale of ecological degradation, so that, though institutional developments have temporarily overcome the constraints of demography and ecology, in the long run more complex systems face the same problems that smaller and simpler systems faced. Thus processes of ecological depletion have long been central in the evolution of social structures and are likely to continue to be so in the future.

In this paper we try to do several things. We begin by summarizing part of the conceptual apparatus we have developed for a theoretical research program that compares world-

systems. A more extended treatment is in our *Rise & Demise: Comparing World-Systems* (Chase-Dunn and Hall 1997). We describe our approach to the problem of spatially bounding world-systems, summarizing what we think is one of our more important contributions: conceiving of world-systems as having four, typically nested, networks of interaction. We also outline our approach to core/periphery relations. Then we sketch our explanation for the evolution of small-scale egalitarian world-systems into the single hierarchical global system of today focussing on the roles that population pressure and ecological degradation have played. Then we describe research in progress on cyclical processes of world-systems: the pulsation of interaction networks, the rise and fall of central polities and the role that climate change may have played in these processes. The remainder of the paper proposes some speculative and tentative implications of our comparative study of world-systems for political practice in the present and the near future.

A torrent of research by geo-scientists has focussed on the problem of determining the extent to which changes in climate, soil and biosphere over the last two hundred years may have been caused by human action. A few social scientists have begun doing formal research on the possible causal connections between world-systemic developmental processes and changes in the biosphere (e.g. Grimes and Roberts 1995; Kick *et al* 1996). These important tasks can be facilitated by a theoretical focus that comprehends the role that ecological factors and anthropogenic ecological degradation have played in the evolution of world-systems over the past twelve thousand years.

Our Concepts

Because we wish to study transformations, we maximize the range of possible cases by including all sedentary human groups that have existed on Earth since the beginning of sedentism about twelve thousand years ago.[1] To facilitate broad comparisons we define world-systems as **intersocietal networks in which the interactions (e.g., trade, warfare, intermarriage, information) are important for the reproduction of the internal structures of the composite units and importantly affect changes that occur in these local structures**. Because the boundaries of non-state social groups (e.g., "bands" or "tribes") are often empirically fuzzy, and because the term "society" can too easily imply a clearly bounded social group, we use the term "composite units" in our definition.

World-systems are fundamentally social structures that include different cultural groups and polities within them. As social structures they are based on biological and ecological substrata, but they are analytically separate from, and different from, biological and ecological systems. Social evolution is not reducible to biological evolution, though there may be interesting similarities and analogies. The key difference is due to culture -- the invention by humans of synthesized symbolic systems of representation and communication. Our study of world-systems evolution does not encompass the problem of how culture emerged out of biological evolution with the invention of human language. Rather we begin with an already-formed human institutional process based on linguistically constructed social roles, relationships and normative structures that had

been developed by nomadic foragers over the last two hundred thousand years. World-systems began when people first developed sedentism and so sedentary villages of diversified foragers interacted with their still-nomadic neighbors. This led to the institutional invention of territoriality -- the claim that one group held rights to control and use specific natural resources. This was the beginning of collective property and fixed boundaries between the domains of separate groups. It was an institutional invention for regulating access to natural resources and was motivated by a desire to mitigate the effects of over-exploitation of these resources. **Here we have the factor of human-caused ecological depletion at the very origin of territoriality and hence of world-systems themselves**. The importance of deforestation and other types of ecological depletion as factors in long-term social change have long been recognized by social scientists (e.g. Chew 1995). The theorization of these factors as a central part of world-systems evolution is the present task.

We do not assume a theory of unilinear social evolution, but seek to discover empirically the patterns, possibilities, probabilities of past and future transformations of social structures. We further argue that is possible to use knowledge of past transitions to help humans choose among more desirable future alternatives.

Spatial Boundaries: A Multicriteria Approach

We note that different kinds of interaction often have distinct spatial characteristics and degrees of importance in different sorts of systems. We hold that the question of the nature and degree of systemic interaction between two locales is prior to the question of core/periphery relations. Indeed we make the existence of core/periphery relations an empirical question in each case, rather than an assumed characteristic of all world-systems.

Spatially bounding world-systems necessarily must proceed from a locale-centric beginning rather than from a whole-system focus. This is because all human societies, even nomadic hunter-gatherers, interact importantly with neighboring societies. Thus if we consider **all** indirect interactions to be of systemic importance (even very indirect ones) then there has been a single global world-system since humankind spread to all the continents. But we note that interaction networks, while they were always intersocietal, have not always been global in the sense that actions in one region had major and relatively quick effects on distant regions. When transportation and communications were over short distances the world-systems that affected people were small. Obviously, the spatial range of consequences of all kinds of action increases as transport and communications costs decrease.

Thus we use the notion of "fall-off" of effects over space to bound the networks of interaction that importantly impinge upon any focal locale. The world-system of which any locality is a part includes those peoples whose actions in production, communication, warfare, alliance and trade have a large and interactive impact on that locality. It is also important to distinguish between endogenous systemic interaction processes and exogenous impacts that may importantly change a system but are not part of that system. So maize diffused from Mesoamerica to Eastern North America, but that need not mean that the two areas were part of the same world-system. Or a virulent microparasite might contact a population with no developed immunity and ravage that population. But such an event does not necessarily mean that the region from which the microparasite came and the region it penetrated are parts of a single interactive system. Interactions must be **two-way and regularized** to be systemic. One shot deals do not a system make.

Clearly, economic forms of interaction are important in all world-systems. Of these, bulk-goods exchanges are constitutive forms of interconnection (Wallerstein 1974a, 1974b, 1979a). However, we also agree with Jane Schneider (1977) that luxury goods, especially when they are used in a prestige-goods economy (Friedman and Rowlands 1977; Peregrine 1996), are very important for the reproduction of power structures. Since there is considerable ethnographic and archaeological evidence that even nomadic foragers can pass goods over great distances, we expect that the prestige goods net may be several orders of magnitude larger than the other nets.

For political interconnections we use regularized political-military conflict interaction (Wilkinson 1987; Tilly 1984:62). Typically, this network will differ from the bulk-goods or prestige-goods networks. Finally, we note that networks of information in many forms including, but not limited to, ideology, religion, technical information, and culture must also be included as a bounding mechanism. We do not expect the information network to spatially coincide with any of the other networks.

Thus, we propose four sets of bounding criteria:

- bulk goods exchange network (BGN)
- prestige goods exchange network (PGN)
- political/military exchange network (PMN)
- information exchange network (IN)

That is, all regularized material and social exchanges should be included as criteria for bounding systems. Often these networks will define a set of nested boundaries. Generally, bulk goods will compose the smallest regional interaction net. Political/military interaction will compose a larger net which may include more than one bulk-goods net, and prestige-goods exchanges will link even larger regions which may

contain one or more political/military nets. We expect the information net to be of the same order of size as the prestige goods net: sometimes larger, sometimes smaller (see Figure 1).

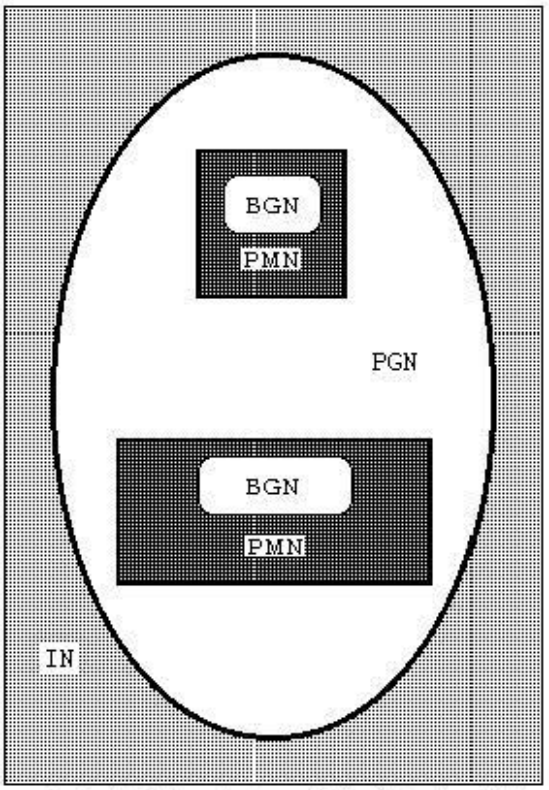

Figure 1: Spatial Boundaries of World-System Networks

At first it may seem counterintuitive to have the information boundary inside the prestige goods exchange, since exchange of goods typically implies s ome exchange of information. There are, however, well known mechanisms by which goods can be exchanged beyond the range of information. When trade goes from partner to partner the physical objects may travel much further than information. Occasionally, when warfare is severe the political/military boundary may cut the flow of information, even while prestige goods may effectively cross the boundary via circuitous down-the-line exchanges.

We do not claim that the networks will always be nested in the fashion described. Occasionally, as in both the modern global world-system and some earlier geographically isolated systems (e.g., the Hawaiian Islands), these four networks converge. Such convergence may be an important characteristic which differentiates some world-systems from others.

Core/Periphery Relations

The first question for any focal locale is about the nature and spatial characteristics of its links with the above four interaction nets. This is prior to any consideration of core/periphery position because one region must be linked to another by systemic interaction in order for consideration of core/periphery relations to be relevant. We divide the conceptualization of core/periphery relations into two analytically separate aspects:

- core/periphery **differentiation,** and
- core/periphery **hierarchy**.

Core/periphery differentiation exists when two societies are in systemic interaction with one another and one of these has higher population density and/or greater complexity than the other. The second aspect, core/periphery hierarchy, exists when one society dominates or exploits another. These two aspects often go together because a society with greater population density/complexity usually has more power than a society with less of these, and so can effectively dominate/exploit the less powerful neighbor. But there are important instances of reversal (e.g. the less dense, less complex Central Asian steppe nomads exploited agrarian China) and so we want to make this analytical separation so that the actual relations can be determined in each case. We also note that the question of core/periphery relations **needs to be asked at each level of interaction** designated above. It is more difficult to project power over long distances and so we should not expect to find strong core/periphery hierarchies at the level of Information or Prestige Goods Networks.

Core/periphery relations can be quite complex. Mitchell Allen (1996: Chapter 1) has developed the concept of a "contested periphery," a peripheral region for which two non-contiguous core regions compete. Based on elaborate case-study of Philistia and its relations to the Neo-Assyrian and Egyptian world-systems he finds that once an area has been incorporated into one world-system it can more easily be moved into another world-system than if it were being incorporated for the first time. Not surprisingly, contested peripheries have more leverage in responding to core demands. Furthermore, what is a periphery in one world-system can become a semiperiphery in another. If such a region provides access to valuable resources or other core regions, it can often leverage this control into semiperipheral relationship.

Allen's analysis is one impetus to rethinking the concept of the semiperiphery. We argue that this concept should include the following meanings:

1. A semiperipheral region may be one that mixes both core and peripheral forms of organization.

2. A semiperipheral region may be spatially located between core and peripheral regions.

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3. A semiperipheral region may be spatially located between two or more competing core regions. [2]

4. Mediating activities between core and peripheral areas may be carried out in semiperipheral regions.

5. A semiperipheral area may be one in which institutional features are in some ways intermediate between those forms found in core and peripheral regions.

Without more detailed empirical studies, it is premature to define the semiperiphery more narrowly. Indeed, we should not assume a priori that all world-systems have semiperipheries.[3]

Finally, we see historical social change as open-ended and path dependent. That is, it occurs in any existing social structure within the context of a specific historical legacy and specific current conditions. Important bifurcations and discontinuities of development, rapid transformations, and instances of devolution are normal characteristics of social change (see Sanderson 1990, 1995). Our argument that world-systems are the primary unit of analysis for understanding these processes does not vitiate the importance of processes that operate within societies or other social groups. A world-system is composed not only of intersocietal interactions, but of the totality of interactions that constitute the whole social, economic, and political system. Good world-systems analysis--in modern or precapitalist settings--always attends to the complex dialectic between social change within any of its composite units and the entire system.

Semiperipheral Development

World-systems tend to grow. They have gotten larger in terms of population size, population density, territorial extent, absolute and relative productivity. Growth necessarily entails absorption of formerly external areas, the incorporation of new peoples and territories and/or the merger of formerly autonomous world-systems. Throughout these processes no core area remains a core area indefinitely. Development is uneven. Old cores are replaced, often by formerly semiperipheral societies.

We argue (1997: Ch. 5) that the semiperiphery is fertile ground for social, organizational, and technical innovation and has an advantageous location for the establishment of new centers of power. In particular, secondary state-formation on the marches of empires has frequently been recognized as a semiperipheral phenomenon that is related to the rise and fall of empires and the shift of hegemony within interstate systems (e.g. Mann 1986). A

broadly similar phenomenon occurs among chiefdoms(e.g. Kirch 1984:204). Semiperipheral capitalist city states in the tributary world-systems and some semiperipheral national states in the modern world-system have been upwardly mobile and played transformative roles.

The earliest historically known semiperipheral conqueror was Sargon of Agade, the first unifier of the Mesopotamian core of city states. Igor Diakonov (1991) contends that Sargon's success hinged on his combination of core and peripheral features into a superior military capability and the support he was able to get from the oppressed classes of the old core states. Sargon combined elements of a peripheral kin-based mode of production with those of the core tributary mode to conquer the Sumerian core and then he established a more centralized, more exploitative, purer form of the tributary mode of production than had ever existed before.[4]

The ability to generate new and effective institutional forms also occurred very often in capitalist city-states which typically existed in the semiperipheral interstices of empires dominated by the tributary mode of accumulation. The city-states of antiquity were semiperipheral because they were on the edges of, or the boundaries between, large territorial empires. Spatially they were often located such that they could easily mediate trade between the core empires and peripheral regions. They could sometimes manipulate this position to maintain a considerable degree of political and economic autonomy, although they were not infrequently swallowed up by imperial expansion (Frankenstein 1979). The important cases were formally sovereign: e.g. Dilmun, Byblos, Tyre, Sidon, Carthage, Malacca, Venice, Florence, Genoa, Antwerp, and the cities of the Hanseatic League.

Most of these cities were specialized in maritime trade. Coastal or island locations made them defensible with naval forces from would-be conquerors leading armies. Also, as is well known, easy access to water lowers transport costs. These cities often engaged in manufacturing of goods that facilitated their trade-based strategy of accumulation. They were powerful agents of commodification and commercialization in the still predominantly tributary world-systems. We also argue that the "rise of the West" is best understood as another instance of semiperipheral development -- an upwardly mobile semiperipheral region within the larger Afroeurasian system that eventually succeeded in dominating the entire globe.

World-Systems Evolution

Our explanation of world-systems evolution is composed of three elements:

1. semiperipheral development,

2. an "iteration" model that involves demographic and ecological variables as causes of hierarchy formation and economic intensification, and

3. transformations of modes of accumulation.

We have already outlined the phenomenon of semiperipheral development above. The iteration model is a synthesis of the approaches developed by anthropologists Marvin Harris (1977,1979), Robert Cohen (1977) and Robert Carneiro (1970). This model is a world-systems model because it necessarily involves processes that occur among societies as well as within them. The main moving forces in the model are population growth, ecological degradation and population pressure. **Population growth**, other things equal, causes the decline of natural resources -- **ecological degradation**. The type and scale of ecological degradation varies with the nature of production technology and the scale of the exploitation of natural resources. **Population pressure** results when resource scarcities cause people to have to increase the amount of effort necessary to meet their needs.

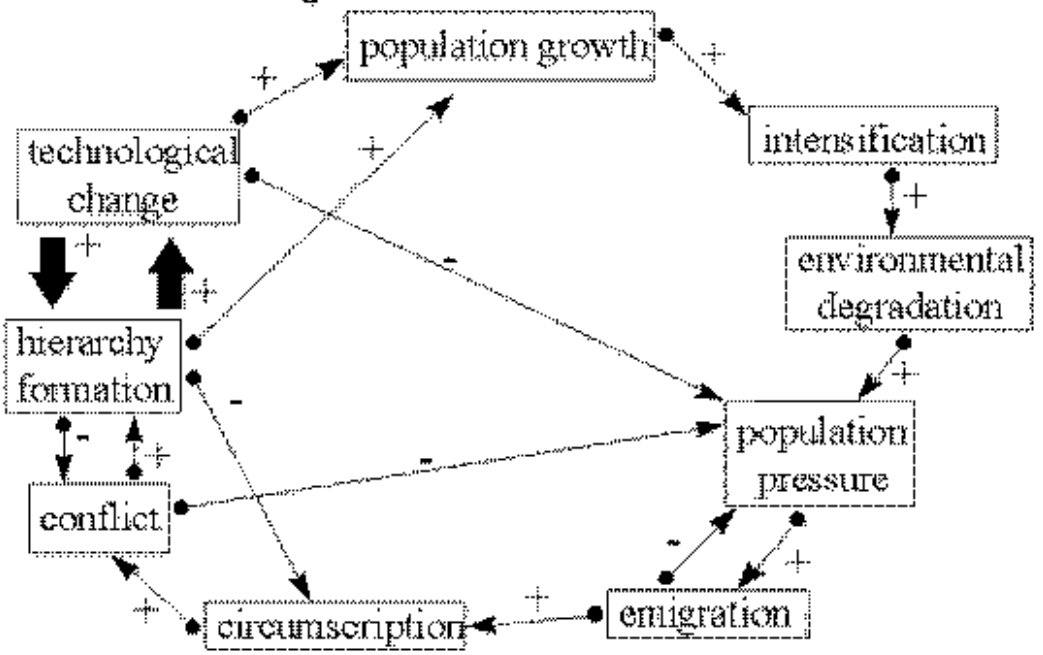
Population pressure explains much about nomadism and shifting agriculture. People eat up nature and then must move on. It is not necessary for nature to be completely destroyed, however. Well before this happens the amount of effort needed to obtain the same return will have increased substantially. This is a fine incentive to move, or to do something differently. However, people usually prefer to continue in the way that they know as long as this does not require substantially greater effort. George Zipf's (1949) **principle of least effort** is a force that operates in all human societies.

Population pressure often results in emigration to new regions where resources are less pressed, if such be available. **Circumscription** occurs when suitable new locations are not available either because they do not geographically exist in contiguous areas or because existing regions are already filled with other populations who resist immigration. Thus population pressure causes competition among societies for land and other resources and this is necessarily an intersocietal phenomenon. One possible outcome is increased **conflict**, especially warfare, as groups contend for scarce resources. In some systems endemic warfare functions as a demographic regulator by reducing the population density and alleviating (temporarily) population pressure. But in other cases new hierarchies or larger polities emerge (**hierarchy formation**) to regulate the use of resources, and/or new technologies of production develop that allow larger numbers of people to live within a given area.[5] This explanation of hierarchy-formation and technological change is "iterative" because population growth continues so that the same problems reemerge on a larger scale, and so similar problems need to be solved once again.

Besides involving intersocietal competition, the institutional inventions and implementations that make the iteration model work are usually tied to core/periphery relations. This is because semiperipheral actors are most often the agents of political expansion and technological development. Intersocietal competition and conflict as well as semiperipheral development are world-systemic processes, not societal ones.

This model, illustrated in Figure 2, involves complex feedback loops, and by no means is meant to imply that bigger hierarchies or technological development inevitably occur in each region. On the contrary, development is usually uneven, as we have discussed above. But unevenness occurs within a world-system context. States most often emerge in interaction with other states. When we look at those regions in which the first primary (or pristine) states emerged, virtually all of them occurred in a context that had already experienced the formation of complex chiefdoms. States do not spring directly from egalitarian societies, unless these come under the influence of existing states. The so-called pristine states all emerged in regions where their had already been considerable previous hierarchy-formation.

Figure 2: Basic Interation Model



Ecology structures the economies of least effort because it limits available resources and potential alternative resources. As world-systems become more complex and hierarchical these ecological limits and potentials change their spatial scale because of changes in social organization and technology. Our perspective here differs from that of Lenski et al. (1995). They contend that technological development of societies reduces the importance of ecological determinants of social structure. They argue that the social structures of foraging societies are much more determined by the features of the local ecology than are the social structures of industrial societies. We agree with this if the focus is only on local ecological features.

However, a world-systems perspective allows us to see that the scale of ecological constraints grows with the expanding scale of intersocietal networks and intensification. Thus, local ecological features are less important for a continental world-system than for a much smaller regional world-system. Local ecological features are also not very important forces in a global world-system. But continental and global ecological constraints become more important as world-systems increase in size. So as local features of the natural environment decrease in importance, ecological features and processes that are larger in scale rise in importance as constraints on resources and sustainability. Environmental degradation in the form of deforestation on one island or soil depletion in one valley is replaced by threats to global features such as depletion of the ozone layer. As the scale of ecological constraints expands, their importance as constraints on social structure does not diminish overall.

The principle of least effort applies most purely and forcefully to the economic behavior of households. When these are autonomous and able to obtain access to necessary resources, the principle of least effort is the major determinant of subsistence behavior. This changes considerably if and when households become culturally, politically, and economically controlled by hierarchical or stratified social orders. In such societal contexts the principle of least effort continues to operate, but it is masked by institutional mechanisms that extract much greater amounts of labor from households by means of coercion, exchange, or ideological mystification.

Technological innovations act back on population growth by increasing the number of people who can be fed and sheltered within a given amount of land. This stimulates population to rise, or rather it reduces the incentives to maintain the (costly) cultural and social regulations on population expansion. So population density tends to increase to the point where resources are again pressed. Then the whole cycle goes around again. As systems become larger, and especially as they become more diversified, regulation or maintenance of the overall system becomes more complex. Those systems that develop hierarchical structures are generally better able to manage these complexities.[6]

But how and when does a high level of conflict created by population pressure and ecological degradation in a circumscribed setting result in the emergence of a new level of hierarchy? First, increased conflict may not lead to hierarchy formation. A period of violent warfare can itself "solve the problem" because people are killed and population density decreases. In Figure 2 this is illustrated by the negative arrow from conflict to population pressure. Kirch (1991) describes the case of the Marquesan chiefdoms caught in a vicious cycle of warfare and population growth in which a new level of political hierarchy never emerged. In other cases one group successfully conquers other groups and puts together a larger polity that brings peace to the region. This is the scenario that Carneiro paints.

To this we would add that hierarchy-formation by conquest occurred most frequently when a semiperipheral polity conquered an old core. Our modification of the model brings together the elements of core/periphery hierarchy with considerations of "internal" stratification and class struggle. Semiperipheral polities in precapitalist world-systems generally had less internal stratification than older core polities. Older core regions developed greater internal inequalities and greater divisions among different factions in the ruling groups. Semiperipheral marcher states (and semiperipheral marcher chiefdoms) usually had less class inequality and more solidarity among elites. This gave them an important military advantage over older core regions and allowed them to conquer whole core regions and construct larger polities.

Patrick Kirch's (1984) model of semiperipheral hierarchy formation in Polynesian interchiefdom systems points to the important feature that semiperipheral polities generally occupied regions that were less ecologically desirable than those occupied by older core regions. In these marginal regions the application of core techniques of production reached their ecological limitations more quickly. This sometimes caused new forms of productive technology to emerge in these semiperipheral regions and it motivated polities from these stressed regions to be willing to take the risks associated with attempts to conquer the older core chiefdoms. The stress approach formulated by Brian Hayden (1981) to explain technological intensification contends that ecologically marginal regions experience population pressure more strongly and were more likely to implement technological changes. This parallels our formulation of the semiperiphery as the locus of transformation.

The iteration model proposed in Figure 2 does not operate within single societies. It is a model that requires intersocietal interaction as the context of social change. Social circumscription is generally produced by competition among culturally different or politically autonomous groups. Some world-system anthropologists reject this model because they associate it with the ecological-evolutionary approach developed by Julian Steward (1955) which emphasized the relevance for social structures of local ecological features. Steward's approach was partly a reaction to the long-distance diffusionism of V. Gordon Childe (1951). Diffusionism and the importance of long-distance trade have become important new foci of attention with the rise of the world-systems perspective and we think rightly so. But we also insist that understanding world-systems evolution requires attention to **whole** systems, including local, regional, and inter-regional interactions. From this point of view the Harris-Carneiro-Cohen model is an important contribution that should be taken seriously as a basis for devising a world-systems theory of social evolution.

This model does not explain the exact kind of social change that takes place. Nor does it explain where or exactly when social change takes place. But it does provide a processual

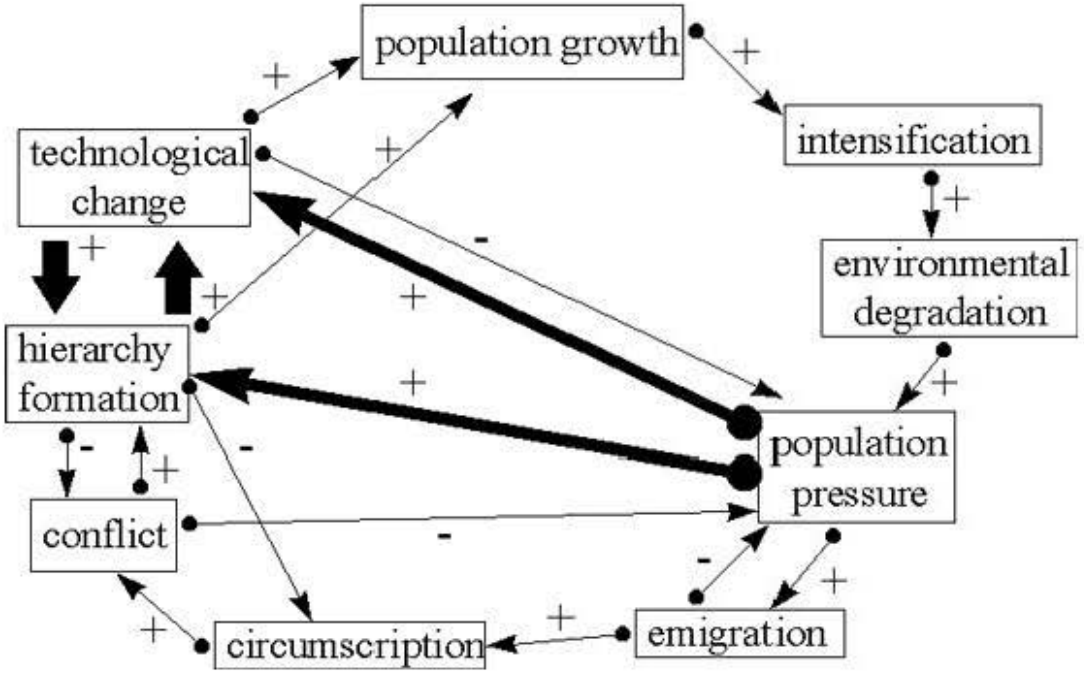
backdrop for explaining the most general features of human social change -- increasing population density, scale, and hierarchy of social organization.

Stephen Sanderson(1995) agrees with us that the iteration model accounts for the emergence of mesolithic sedentary societies, neolithic horticulture and primary states but he argues that this model does not account for the subsequent growth of empires nor the transition to capitalism. We contend that the iteration model, suitably adjusted, does explain continuing expansion, hierarchy-formation and technological development. It also explains the growing commercialization of the tributary empires and the larger interaction systems of which they were parts, and it explains the eventual emergence of predominant capitalism. Indeed, just as earlier hierarchies and technological changes were responses to the problems created by ecological degradation, population pressure and intensified conflict, larger empires, greater long-distance economic integration and the development of commodified goods, labor, land and wealth were also responses to these same problems.

The difference is that the institutional inventions -- larger empires, larger markets and capitalism -- temporarily altered the way in which the iteration model worked. This was especially true during periods of expansion. The development of these institutional structures allowed population pressure to temporarily affect hierarchy formation and technological development directly rather than through the path of circumscription and intensified conflict. The demographic and ecological constraints reappear in periods of contraction, and especially in those extreme contractions that Tainter (1988) calls collapse.

This modifies the model in Figure 2 by adding positive arrows directly from population pressure to both hierarchy formation and technological change (see Figure 3). When market mechanisms articulate growing scarcities (e.g. deforestation in England) these provide incentives for new kinds of production (e.g. the coal industry). These institutional inventions are responses to the constraints and opportunities created by ecological degradation and population pressure. They allow for greater population growth and density by temporarily bypassing the conflictive path in the iteration model. We say this is temporary because eventually population pressures emerge that create problems on a scale that the new institutional structures cannot handle. This leads to a return to the conflictive path of the iteration model.

Figure 3: Temporary Institutional Shortcuts in the Iteration Model



Sanderson(1995) also contends that population pressure and circumscription were not important causal factors in the transition to capitalism. He notes that European capitalist transformation occurred following the demographic disaster due to the Black Death which reduced population pressure in Europe. He argues that rapid population growth in both Europe and Japan facilitated capitalist development rather than stimulating a crisis of population pressure. He presents supportive statements to this effect from one of the main proponents of population pressure theory, Ester Boserup (1981). Again we note that the dynamics of the institutional superstructure transform the ways in which the demographic and ecological constraints work during periods of expansion. Thus, population density and growth sometimes directly facilitated capitalist accumulation rather than provoking it by means of its effects on ecological degradation and conflict. The later expansion and colonization by Europeans of Africa, Asia and the Americas was partly driven by population pressure in Europe.

Similarly, in some cases ecological degradation operated directly on technological intensification rather than by means of increasing conflict. Richard Wilkinson (1973) shows evidence that deforestation in England was an important stimulus to the development of coal production. Once the market mechanism is working, resource scarcities may provoke substitutions without having to go through the much more disruptive processes of conflict and violent competition.

But rapid population growth also does cause disruption in modern societies. Jack Goldstone (1991) demonstrates that both reform movements and revolutions are caused by the effects of rapid population growth in expanding state expenditures beyond state revenues. Goldstone seeks to explain why revolutions came in waves throughout Eurasia during the early modern period (1500-1850). His primary cases are the English revolution in 1640, the French revolution in 1789, the transition from Ming to Qing rule in China in 1644, and the seizure of power by the Köpru"lu" viziers in the Ottoman empire in the mid-to-late seventeenth century. These revolutions began with state breakdown, followed by elite competition over control of the state and its reconstruction, and ended with renewed stability. State breakdown, Goldstone's major concern, is a result of the complex interaction of population growth with social structure.

Population growth causes state expenditures to outstrip state revenues. As the revenue gap increases the state must either raise new taxes or curtail expenditures. The growth of elite population heightens competition for resources and positions. Rising grain prices create new wealth holders who, if blocked by traditional or new barriers, become a marginal elite. Population growth increases the proportion of young persons, who due to un- or under-employment become an impoverished group with high potential for mass action. The increase in poverty further strains state resources.

As conditions deteriorate, elites and commoners lose confidence in the state and elites struggle for control and promote reform. If a formerly marginal elite seizes power and if the prevailing culture has an eschatological tradition, reform radicalizes into revolution. If any of these components is absent or very weak, reform or fall of a regime are typical results. Goldstone bases his explanation on controlled comparisons among his cases. He presents evidence to support the argument that trade, and therefore world-systemic processes, do little to shape these revolutions. He further claims generality for his explanation, at least for the early modern period, throughout Eurasia.

Goldstone's demographic analysis of revolutions fits nicely with our explanation of world-system evolution. Indeed, his explanation can be interpreted as a special case of the same processes analyzed in closer detail. We disagree, however, with his claim that world-system processes do not have effects on state crises. To be fair, he is addressing conventional world-system theory, not comparative world-systems theory. Still, his demurrer is unwarranted and stems from a lack of appreciation of how demographic changes--both declines and increases--are not exogenous to the social system, but are, in fact, consequences of large scale world-system interactions.

Eurasia was linked by long-distance trade into a single PGN as early as 400 BCE (see Chase-Dunn and Hall 1997:Chapter 8). In the first few centuries of the common era this linkage became sufficiently strong to transmit pathogens from China to Rome, unleashing epidemics in both. This recurred in the century after the Mongols temporarily merged Afroeurasia into a single PMN when the Black Death swept through Europe and epidemics occurred in China. Goldstone acknowledges that the severe population losses brought by the Black Death set the conditions for a rather spectacular population increase a couple of centuries later when European populations had built up immunities and

climate changes favored increased agricultural production. He also recognizes that the Black Death was spread by the Mongols, who had spread the disease, probably via rats in their baggage, which they had picked up in earlier steppe wars.

What Goldstone does not acknowledge is that the pathways along which the pathogens spread were precisely those by which the Eurasian PGN was linked. That is, the occurrence of epidemics was not an exogenous, or randomly induced, change, but one that worked along predictable world-systemic pathways. Now when we add to this the linkages implied by the correlation of urban and empire growth/decline phases in the Mediterranean/West Asian and East Asian PMNs (see below), the synchronicity of the revolutions Goldstone examined is readily explained.

As we have mentioned above, semiperipheral states often play a special role in systemic transformation. Such states often have the "advantages of backwardness" (Gerschenkron 1966): they have access to latest technologies, including what Michael Mann (1986) calls "techniques of power," but have not yet become burdened with the costs of empire, or in Tainter's (1988) terms, have not reached a point of declining marginal returns. If, additionally, a semiperipheral state is located on the edge of a system, so that it is not vulnerable to attack from two directions, it can eliminate core competitors one at a time and come to dominate the system. And semiperipheral capitalist city states were the most important agents of the expansion of commercialization in the tributary world-systems. Thus, semiperipheral actors were the most important transformational actors that account for the rise of larger and larger empires and the eventual emergence of predominant capitalism. It is this aspect of our version of the iteration model that explains these important transitions in the systemic logic of accumulation.

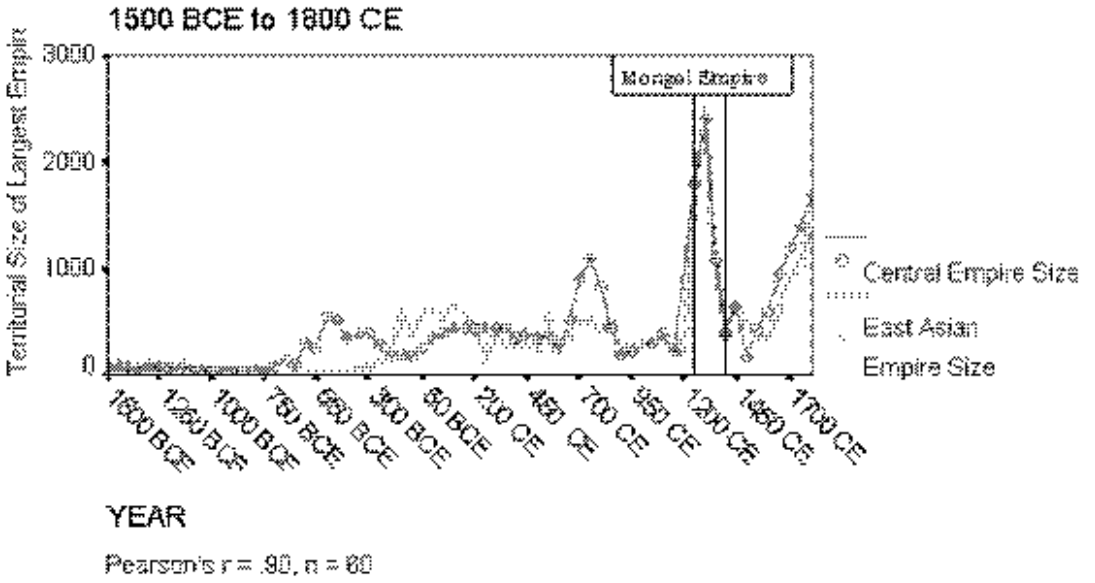
Rather than abandoning the basic iteration model for completely different explanations of how transformations take place in complex and hierarchical systems, we explain why the iteration model moves back stage to geopolitical and capitalist dynamics only to come forth again during periods of collapse and crisis. The basic demographic, economic, and ecological constraints posited in the iteration model do not become irrelevant. Rather what happens is that institutional superstructures such as states and capitalist accumulation temporarily overcome these constraints by raising the pace of spatial expansion and technological development. But eventually even these institutional mechanisms run into limitations posed by the material substratum of demographic, economic, and ecological factors. Our world-systems approach to social evolution combines the focus on semiperipheral development and an analysis of the changing dynamics that occur within geopolitical and economic processes to explain the major systemic transformations. These operate somewhat differently in the different transformations, but they do not ever completely transcend the basic iteration model. We agree with Sanderson that the iteration model explains Mesolithic sedentism, Neolithic

chiefdom formation, and early state formation in a direct manner. The only thing we would add is that chiefdom formation and state formation were importantly influenced by semiperipheral development. The causal elements in the iteration model affect older core regions and semiperipheral regions differently and this constitutes an important world-system modification of the Harris-Carneiro-Cohen model. To recapitulate, population pressure affects hierarchy formation and technological change directly once states and commodities have come into existence rather than through the mechanisms of conflict and circumscription. But the path of causality that goes through conflict and circumscription is yet again important even in the presence of states and commodities during periods of institutional breakdown and systemic collapse. In this sense there is a single underlying model of transformations, though it works somewhat differently once states and markets have become widespread social forms. The world-system unit of analysis is important at every level because of the phenomenon of semiperipheral development and because circumscription does not happen within societies but only in intersocietal systems.

Synchronization of PMNs within the same PGN

While examining the relationships within PMNs of urban and empire growth/decline we discovered that city growth and empire growth seem to occur synchronously in the Central (West Asian and Mediterranean) and the East Asian PMNs (Chase–Dunn and Willard 1993). Some relevant evidence is contained in Figure 4 which shows the territorial sizes of the largest empires in the Central and East Asian PMNs from 1500 BCE to 1750 CE.

Figure 4: Central and East Asian Empire Sizes



Pearson's r = .90, n = 60

Figure 4 presents strong evidence that growth and decline phases are synchronized in PMNs that are linked within a larger PGN. However, we also found that the intermediate Indic PMN did not experience a similar sequence of growth and decline phases (Chase – Dunn and Hall 1997: Fig. 10.11).

What are the causes of this synchronization? The synchronicity of the growth of cities and empires in the Central and East Asian PMNs remains a puzzle begging for an explanation. One possibility is northern Eurasian-wide climatic fluctuations. India, at a more equatorial latitude across the Himalayas, may have experienced very different climatic fluctuations. Climate change can affect urban growth and empire–formation through its affects on agricultural productivity (Nix 1985). Periods of flooding may disrupt irrigation systems, and periods of drought also may negatively affect agriculture. Recent evidence indicates that the collapse of Mayan states may have been caused by climatic changes. Weiss et.al. (1993) contend that both the expansion and collapse of the Akkadian empire were spurred by climate changes.

Gong and Hameed (1991) have used historical documents from counties to code floods and droughts in China over the past 2000 years. Their index of variation in moisture does not seem by inspection (eye-balling) to correspond with changes in the territorial sizes of Far Eastern empires over this period, but a more rigorous quantitative analysis should be done. Gong and Hameed report an approximate correspondence between the data for China and fluctuations in the height of the Caspian Sea, though the number of data points for the Caspian are small. More thorough comparisons of the Chinese data with climate change in West Asia are needed.

If we found significant relationships between indicators of climate change and the urban and empire growth/decline sequences we would want to examine **the direction of causality**. Does climate change cause urban change, or does the expansion of agriculture

associated with urban growth cause climate change? It is possible that expanded agricultural activity, and/or deforestation due to human exploitation, may have affected local and regional rainfall patterns and ground water levels. Thus, population density, mediated by intense agriculture and forest exploitation, and thus urbanization, may have affected climactic fluctuations. We have already mentioned studies of recent anthropogenic causes of climate change. It is well–known that the intensification of productive activities causes environmental degradation. This, in turn, has affected the development of human societies for millennia. If urban growth episodes precede climate change or changes in water levels then causality in the direction of human effects on climate will be supported. But as it stands research on climate change in the relevant areas has not been combined with measures of urban and empire growth to see if these are empirically related.

We must note, however, that microparasites could also be an underlying cause, mediated through trade networks. As trade increased in density and volume, formerly isolated disease pools came into contact, unleashing epidemics—what Alfred Crosby and others label virgin soil epidemics (Crosby 1972, 1986). These epidemics produced massive disruptions, and following Goldstone's (1991) argument, can unleash all sorts of social, economic, and political changes. As pathogens and hosts adapt to each other, these diseases become less lethal, and populations recover. Trade then resumes, and the cycle can repeat as other, formerly isolated disease pools come into contact, or as new diseases spread along trade networks. This might account for some of regularity in the cycles of growth and decline.

Another possible explanation that directly involves world–systemic processes is Frank's (1992) hypothesis of the "centrality of Central Asia" as a peripheral region linking both ends of the Eurasian continent. The Mongol Empire briefly linked the Western Asia and China into a single polity in the thirteenth century CE (See Figure 4). Thomas Barfield (1989) built on Owen Lattimore's (1940) observations to trace the long–term linkage of the rise and fall of steppe empires with the rise and fall of agrarian empires in China. Citing this and other evidence Frank (1992) contends that processes of peripheral migration and steppe–empire formation and their affects on the long distance trade carried along the Silk Roads of Central Asia are the explanation of the linkages between Rome and China first reported by Teggart (1939). Figure 4 (and others in Chase–Dunn and Hall 1997: Ch. 10) show similar synchronization.

Perhaps it is Frank's Central Asian linkage that accounts for this. But in order accept his explanation we need to rule out the climatic fluctuations hypothesis and to explain why India was not affected in the same way. The same caveat holds for disease linkages (McNeill 1976). One explanation for the South Asian exception—but a none too satisfactory one—might be that the tropical and semi–tropical climates there were subject

to a different disease regime. It is also conceivable, given the Himalayan barrier, that climatic cycles in South Asia differed significantly from northern Eurasia. The monsoons certainly follow a different rhythm from the weather in the northern regions.

The ways in which South Asia was connected into Afroeurasian trading patterns may account for the South Asian exception. India had multiple connections into Afroeurasian trading networks. Overland, either via Hindu Kush passes of the Silk Roads, via Yunnan and Assam, and by sea. Even the latter are quite old, going back at least two millennia. At first they consisted of coastal trade. Later, as sailors mastered the monsoons, they crossed Arabian Sea and the Bay of Bengal (see maps in Chaudhuri 1985 and Abu–Lughod 1989:172–173, 202, 252). Thus, at any given time, South Asian states had multiple routes of access into trade, so disruption of any one route—for whatever reason—could be compensated for by means of alternate routes.

Since warfare affects both urban growth and the territorial size of empires, steppe empire formation and the attendant fighting and migration of pastoral nomads may well be the cause of the simultaneous rise and fall of empires at both ends of the Eurasian land mass. If so, warfare between steppe nomads and agrarian states in both Western Asia and East Asia should be correlated. Thomas Barfield's (1989) *Perilous Frontier* provides information for the East Asian region. For Western Asian, data on warfare obtained by the LORANOW project (Cioffi–Revilla 1991; 1994) could be used. More research needs to be done to sort out this puzzle.

The Modern System and Transformations

Our comparative world-systems approach suggests some tentative conclusions about the nature of transformations of modes of accumulation and possibilities for the future. It also provides new way of seeing the contemporary global system. This last section outlines our conclusions and our best guesses about the implications for the future.

The tributary modes of accumulation spread by conquest, by reactive (secondary) state-formation, and by the diffusion of productive technologies to distant regions. The analogy to ecological succession, in which more complex forms of life establish themselves over the tops of earlier levels of biotic energy accumulation, suggests itself.

Social and ecological circumscription were important features of the evolutionary changes that took place in the tributary modes. The concept of circumscription emphasizes regional **contextual factors** that facilitated or constrained state formation and the intensification of production activities. The logistical factors involved in long-distance transportation and communications constrained the emergence of larger empires. Easy transportation and communication along the quite-navigable Nile led to early

empire formation in Egypt, while the more difficult Tigris and Euphrates prolonged the existence of an interstate system in Mesopotamia.

The development of adjacent agricultural regions and states were also important conditions facilitating or constraining the emergence of large empires. There is little point in conquering a territory if little surplus is produced there (unless it is a strategic link to a richer zone or an important trade node). Also, it is far easier to extract surplus from a region that already has an existing tributary structure. Thus, both the growth of surplus production and the spread of institutional structures of exploitation facilitated the construction of larger and larger state structures. As agriculture and states spread they made possible the erection of larger political structures. On the other hand, one state's possibilities for expansion by conquest were constrained by the existence of already large and powerful states in adjacent regions if those neighboring states were powerful enough to prevent conquest. So contextual features could both constrain and facilitate expansion. Too little development in adjacent regions made expansion unprofitable, while too much development prevented it.

The costs of escape by means of emigration from large states increased as people became more dependent upon states for the protection of trade routes and the maintenance of productive infrastructure. Social circumscription is a question of the relative costs of staying versus leaving. The tendency for peoples to try to escape hierarchies became counter-balanced by both coercive force and the infrastructural and trade-based surpluses that the tributary empires were able to muster. Some tributary states (e.g. neo-Assyrians, Inkas) utilized forced migration as a technique of control and surplus extraction, thus intervening directly to alter the relationship between populations and the land.

Contextual factors were also involved in the emergence of capitalist institutions and their spread. Production for exchange was much easier once more land-efficient technologies of production were widely spread. So the growth of markets was facilitated by the spread of agricultural techniques. One reason why the Greeks erected such a commodified system was that their articulated agricultural practices (olives, grapes, wheat) were well-suited to the efficient production of surpluses in the Mediterranean littoral (Rostovtzeff 1941). Contextual factors also facilitated the rise of semiperipheral capitalist city states. The development of commercial trade inside the tributary empires expanded markets and supplies for the trading city states. The supplies they brought to the empires from far-off regions helped dissuade the empires from conquering them (Frankenstein 1979). As the older capitalist city states succeeded in spreading commodity production they created the basis for new specialized trading states and so the number of these grew and they moved into new regions.

Contextual factors also made possible the eventual concentration of many capitalist city states in a single region -- the European "dorsal spine." One was the absence in Europe of a tributary state sufficiently powerful to extract tribute or taxes or to threaten the operations of the city states. Another important contextual factor was the existence of the much larger Asian commodified empires. The institutional heritage of contract law, money, and market institutions from the Roman empire and the immediate economic opportunities for trading with the larger Afroeurasian system strongly stimulated the European cities despite their proximity to each other. Local and regional markets were too small to stimulate such growth by themselves. Their dense concentration in one region spurred the development of markets, commodity producers, and an interstate system that was congruent with capitalism.

Whereas the tributary modes emerged and developed over the tops of the kin-based modes, the capitalist mode (commodification) emerged within spaces inside and between the tributary states. The capitalist mode did not, however, become predominant in any region until capitalist states emerged in the core region of the European subregion. Though there had been many semiperipheral capitalist city states, the first capitalist core state was the Dutch Republic of the seventeenth century. The common feature here is that, even though transformational institutions tended to arise first in the semiperiphery, it was necessary for core polities to become agents of a mode of accumulation before it could become the predominant mode.

Semiperipheral upward mobility usually has developmental consequences, but they may be of two analytically different sorts. The rise of a semiperipheral polity sometimes contributes to the further development of an existing predominant mode of accumulation. At other times it makes a more direct contribution to transforming the old mode into a new mode. It is sometimes the case that the further development of an existing predominant mode also creates the basis for transcending that mode. New modes are not simply the opposite of old ones. Rather they develop from efforts to solve the problems created by the contradictions within the current mode. This is neither automatic nor unidirectional. Historical struggles and agencies are involved. Things rarely turn out as the protagonists intend. But transformations occur as a result of efforts to fix the problems created by the current mode. This is not a nice smooth Darwinian learning model. Nor does it imply that change in the direction of a general trend, often erroneously labeled "progress," is inevitable. Yet there is a general trend to the process of change that has occurred by both long-term accretionary and more evenemiental cataclysmic processes.

A further point is that not all change is in the direction of the general trend. Sometimes there is no change. Other times change may go opposite to the general trend. We also want to re-emphasize the problem of teleological reasoning and our critique of the notion of "progress." There is no necessary direction to these changes. Rather, there is an historical trend. Indeed, if stability is the prime desire, then the Marquesans are the most successful of all peoples for having controlled change. To sum up, transformations involve circumscription, systemic contradictions, uneven development, and core/periphery relations. Agents of transformation most often come from semiperipheral

regions. Regarding the uniquenesses of the modern system and its similarities with earlier world-systems our comparative approach suggests the following. While some tributary states (such as Rome) needed to expand in order to survive, capitalism intensifies this systemic feature to a new level. The realization problem is the necessity to expand markets in order to realize the profits of more and more commodity production. Capitalism handles this by geographical expansion, by commodifying more and more aspects of life, and by paying some workers more so that they can purchase additional products. Geographical expansion of the capitalist system has reached global limits. Commodification and Keynesianism still have room for expansion. But these eventually will constrain capitalist expansion, which in turn will exacerbate further the contradictions of capitalism.

Environmental degradation continues to push new technological innovations and to exacerbate population pressure. We have already argued that the spatial scale of environmental degradation increases with the size of the system. The case of oil reserves reminds us that depletion is not the only way in which degradation operates on economic and political incentives. Degradation is also caused by the side-effects of consumption. Once the system has become global the possibilities of escape from ecological ruin are greatly reduced. Global industrial development wrecks the environment on a global scale, whereas earlier intensification wrecked it on a more local or regional scale.

Since the modern system is global, it is even more circumscribed than earlier systems have been. Most earlier systems could expand spatially in order to resolve internal contradictions. Most contained more than one non-contiguous core region. We contend that the modern world-system has only one core because the interactions among physically-distant core states are much denser and involve a single global BGN. Thus a possible future rise to hegemony of the Northeast Asian region would be an instance of mobility occurring within a single global core rather than the rise of a new unconnected core region. This is very different from the kind of leap-frogging development that occurred in earlier systems. Circumscription constrains the modern world-system to solve its contradictions within itself.

Future Transformation

What might these observations tell us about the possibilities for transformation in the contemporary world-system? Our original motivation for comparing world-systems was to build a scientific basis for understanding the potentials and transformational processes of the modern world-system. Of course we need to say again that we are not inevitablists or unilinear evolutionists. The contemporary system could destroy itself along with three billion years of biological evolution. Even if that does not happen there are several possible transformations that might take place, not just one.

The future we are discussing is the next few centuries. It took about 5000 years for human societies to invent the first states after the first sedentary communities had emerged. It took another 4500 years for capitalism to become a predominant mode of accumulation in a large region. In this temporal framework of comparison predominant capitalism is still very new -- a veritable infant. Still, the rate of social change has increased geometrically since the eighteenth century. In our view capitalism as a system contains such massive internal contradictions that it is unlikely to continue as the globally predominant mode of accumulation for more than a few centuries.

The contemporary world–system is far from the best of all possible worlds. Exploitation, oppression, and warfare are endemic and systemically reproduced. It may be that exploitation and oppression are relatively less onerous, at least in the twentieth century, than they were in earlier world–systems, but warfare has gotten worse. The proportion of national populations killed in "industrial" wars has risen geometrically (Galtung 1980). Rapid technological advancement, so fruitful in the area of material production, has, in the realm of military hardware, produced a species–threatening horror (McNeill 1982). We argue that the deadly rise of industrial warfare has been caused by capitalism. The "normal" operation of capitalist uneven development, periodic economic and political crises, and a cycle of world wars constitutes, in combination with nuclear weapons, a potential (perhaps even probable) death sentence for our planet. [7]

Another possible, perhaps even likely, doom scenario is based on the projections of Donella Meadows, et al. (1992) on world population, resource consumption, and pollution. A a global ecological disaster might produce many of the same consequences as a nuclear war. These problems supersede all others because they are matters of species survival, but their solutions need to take account of the processes by which capitalism produces not only technology and growth, but also uneven development and underdevelopment.

One solution would be to transform the interstate system into a system-wide world state. World state formation may be the only institutional mechanism that can, in the long run, prevent the use of nuclear weapons, regulate population growth and protect the environment. The question becomes one of the means by which world state formation can occur, and what kind of world state would it be.

Our analysis of historical world–systems does not provide happy implications for this problem. In all cases core-wide empire formation occurred through conquest, most often by an upwardly mobile semiperipheral state. Instances of peaceful confederation, a far more palatable form of state–formation, were rare. Virtually none of these were core-wide. Most occurred in non–core regions subjected to external threat.

Chinese dynasties, as Lattimore (1940) pointed out, were usually formed after long periods of warfare and disorder, when a consensus formed around one central state that could provide order. In our iteration model this is the period of conflict that precedes state formation. Unfortunately such a long–term period of disorder is likely to be fatal in the modern context, although it is possible that a near–catastrophe, in which some large portion of the world's population was annihilated, might create the political will among the survivors to sustain an effective monopoly of nuclear violence. This is the scenario painted by Warren Wagar (1992) in his *A Short History of the Future*.

This doom scenario, however, is not one that can form the basis of political action. If it happens, those who survive will make the best of it. In the meantime the only sane path is to promote peaceful cooperation and contractual limitations of arms buildups among potentially conflictive powers, and to promote the institution–building of international organizations that can move toward the provision of global security.

A somewhat more encouraging indication is suggested by the circumscription hypothesis. Recall that regions from which escape was difficult were more likely to develop states. The Earth is such a "region." Flight to external arenas is no longer possible, except in the imagination. New, last, and final frontiers are inspirational images, but the fact is that the crew of spaceship Earth must now learn to survive together. This may be an important condition for the emergence of a global political system that can regulate conflict.

Seen in a long run comparative perspective, the struggle for democratic socialism within core states, though currently in the doldrums, is crucial for eventual systemic transformation. Contemporary involvement in electoral politics, coalition–formation, and in reformist movements represents a realistic adjustment to the current period of neo-liberal ideological hegemony. A new mode of accumulation builds by accretion in the interstices of an old one. The continuation of capitalist uneven development will likely spur new broad populist, anti–systemic movements. World socialists should be prepared to provide direction and leadership to these, lest they be harnessed by reactionaries or neo–fascists. A period of social polarization is quite likely, and this, in the context of the potential nuclear holocaust, is a frightening prospect. Building ties of cooperation and friendship amongst peoples, institutions based on democratic and collectively rational (i.e., planned) economic organization and exchange, and a more ecologically balanced and egalitarian form of global development are important both as immediate goals and as long run means for reducing the probability of systemically-produced warfare.

A vivid contrast between the historical transition to capitalism and the potential transition to democratic socialism stems from differences in the logics of the two modes of accumulation. Capitalism can exist and thrive as a subsystem in the interstices of another mode of production, as it did for many centuries, gradually creating the institutional bases

for its own eventual predominance. Its individualist and partial rationality thrives in a competitive and conflictive setting.

Democratic socialism, on the other hand, is a holistic mode of accumulation in which the whole arena of interaction needs to be organized on a collectively rational and democratic basis in which reciprocity and politically-articulated redistribution play an important role. So efforts to build socialist relations (those that survive) tend to become reintegrated into the institutional logic of capitalism because they are exposed to the strong forces of the larger capitalist system. But the interaction of capitalism and socialism has produced an interactive spiral in which the spatial scale of organization of each has increased in interaction with the other -- the spiral of capitalism and socialism (Chase-Dunn 1992).

People have long struggled against market forces that would convert them into commodities. Guilds, labor unions, cooperatives, socialist parties, welfare states, communist states, and movements for national liberation in peripheral areas are all social movements that have attempted to resist commodification and exploitation. So, too, are many of the contemporary "fundamentalist" and conservative movements. Many justify their resistance through ideologies that originated in tributary world-systems (Islam and Christianity). For the most part, these have been subverted by the growing scale and wider institutionalization of the capitalist world market. Even the largest communist states found themselves influenced not only by the military threats of the capitalist core states, but also by the opportunities of the world market for high technology and profitable commodity production. The partial rationalities of state capitalism and state socialism do not in themselves help build cooperation at the world level. Rather, they create a world in which semi-collectivized subunits compete with one another militarily and through commodity production.

This does not mean that efforts by socialist parties to come to state power in the periphery and semiperiphery will, or should, cease, or that socialists in core states should stop trying to organize more humane, just, and democratic institutions. But it does imply that these alone will not be enough. Democratic socialism must be organized as well at the level that has been attained by the capitalist mode of accumulation, and that is the global level. That is why transnational and international socialist forms of exchange and political organizations are crucial. The struggle for socialism already has a history of 200 years. Labor unions, workers' cooperatives, agrarian cooperatives, socialist parties, and communist states have all tried to protect members from exploitation and to transform the capitalist system into a more collectively rational mode of accumulation. These efforts have interacted with the trends and cycles of capitalism. The increasing scale of socialist organizational forms has been an important force behind the expansion and reorganization of capitalism. Workers' struggles were the main force behind democratic reforms (Rueschemeyer, Stephens, and Stephens 1992). Labor movements caused wages to rise and supported the emergence of welfare states in the core. This was an important spur to capitalist expansion into the periphery. Socialist parties played their parts in these same reform movements.

Communist states in the semiperiphery made the strongest efforts to create a self-sustaining socialist mode of accumulation, though they were greatly compromised by the necessity of organizing military and economic protection from capitalist core states. The successes of the communist states at catching up with capitalist industrialization, mass education, urbanization, and health care was another important stimulus to reform within the capitalist states and to the rising international liberalism promoted by the United States in the twentieth century. The communist threat sustained U.S. leadership and "Western" solidarity, and facilitated the emergence of an even more integrated and spatially larger world market than had existed before. The peculiar absence of concern for the environment demonstrated by the communist states, along with their absence of democracy, are shortcomings that future socialist efforts must overcome.

The technological dynamism of global capitalism and the extraordinary costs of the modern arms race led to the reincorporation of the Soviet Union into the international polity of the capitalist states and to the partial reincorporation of China. Thus, capitalism has evolved partly as a result of the socialist challenges mounted over the past 200 years. Are these challenges now finished with the ideological hegemony of neo-liberalism? We think not, because the structural causes of socialist challenges -- uneven development, increasing inequalities, environmental degradation -- are still prevalent. Despite the global scale of capitalist organization and the new forms of production that are characterized as "flexible accumulation" we expect that both old and new forms of resistance will again play an important part on the stage of world politics.

Socialist modes of integration and exchange involve democratic planning that organizes reciprocity and politically-mediated forms of redistribution that can place limits on the operation of uneven development and unequal exchange. Some of these ends can also be achieved by socialist markets. The Soviet tendency to try to convert all exchanges into redistributive exchange was excessive. Markets are good institutions for providing some goods and services, and need not be subsumed by an all–encompassing planned economy as long as certain functions, such as collective security and planning for basic infrastructural development, are socialized.

Johan Galtung's (1980) vision of a multicentric, multilevel world economy, emphasizes self–reliance at various levels wherever feasible, and encourages a multicultural approach in which peoples and civilizations cultivate their own expressive forms and identities. Many other social theorists who see the horrors of existing capitalism and the soulless future painted by the ideologues of capitalist globalization have emphasized self-reliance and multiculturalism. Contemporary nationalisms, ethnic identities, and alternative life-styles are part of the post-modernist philosophy and are motivated by powerful currents of resistance to the declining cultural, economic, and political hegemony of the United States and the older European core. Friedman (1994) and Bergesen (1996) show

evidence that multiculturalism and identity resistance has occurred during periods of hegemonic decline in all state-based world-systems. The question here is whether or not it makes sense to try to construct a better world around these decentralization forces, or whether we should instead build a more humane, balanced, and sustainable global system.

In this we side with Warren Wagar (1992, 1995) who argues that overcoming the problems that capitalism has created (danger of terminal warfare, ecological crisis, and huge inequalities) will require the construction of a democratic and socialist world federal state. Wagar's vision of the future includes an ecotopia of decentralized communities, but this can only emerge after the work of creating a more balanced, sustainable, and integrated world society has been done. The instrument that Wagar proposes for the job of building the world socialist state is a "World Party." Despite current unhappiness with the Old Left and formal organizations in general because of their "oligarchical" tendencies, Wagar contends that there is really no workable alternative to a dedicated and rationalized organization for carrying out the process of "mundialization." This is not the place to engage the issues raised by the idea of the World Party. But we contend that Wagar is probably right.

What about semiperipheral development? We have already noted that the communist states were semiperipheral. Class struggles in the capitalist world-system have been dampened by nationalism in both the core and in the periphery. In the core the domination of the periphery and competition with other core states have operated to reinforce nationalism at the expense of working class solidarity in several ways. In the periphery peasants and workers have either been suppressed by elites in alliance with the core or they have made common nationalist alliances with elements of the elite against the core. So class struggle was either suppressed or crosscut in both the core and the periphery.

In the semiperiphery class struggles have been less dampened by the core/periphery hierarchy. The contradictory interests of semiperipheral elites and masses regarding alternative development paths have provided contexts in which strong peasant/worker socialist and communist parties could come to state power. The Russian and Chinese revolutions are the best examples, but the Mexican revolution and populist regimes in Brazil and India also fit this model to some extent. We predict that semiperipheral challenges to capitalism will continue to emerge in the future. The industrialization of the semiperiphery has already led to important labor movements and electoral challenges. It is likely that these forces will continue to grow. If all the semiperipheral industrializing countries could attain core status these movements might pose only mild challenges to capitalism. But it is quite likely that most of the semiperipheral countries will not move

into the core. This will create the context for future democratic socialist movements to come to state power (electorally or by means of revolution) in the semiperiphery.

Older forms of socialist organization will need to be retooled for the new conditions of global capitalism. Newly socialist states can learn from the mistakes as well as the partial successes of the Soviet Union and Peoples' China. Labor unions will organize in new ways to meet the challenges of global capitalism and flexible specialization -- though it needs to be remembered that many of the older forms of organization are still quite useable and appropriate. Mass production industry (Fordism) has not been eliminated by flexible specialization. Rather, much of it has moved to the semiperiphery. Trade unions of the traditional kind will continue to be quite relevant in these contexts. Both trade unions and socialist parties need to develop international structures for protecting constituents and the environment. We mentioned above that socialism does not thrive in the interstices as well as capitalism does. Socialism -- democratic and collective rationality -- requires much more in the way of normative structures than capitalism or tributary systems do. It is much more dependent on consensus among all the people and across different types of people. In this way it bears some similarity to the kin-based world-systems.

The communications technology that the capitalist world-system has produced can greatly facilitate the formation of world society while at the same time allowing people to understand one another's differences. The emergence of global democracy will require more than an international civil society composed of national elites, though this is how it is emerging. Trade unions and socialist parties need to understand the dynamics of the modern world-system and the prospects for transforming it into a socialist system. This will require organization at the global level, though that must be linked to local and regional organizations. Communications technology will help in this grand organizational task. But a clear understanding of the developmental dynamics of the capitalist world-system will also be necessary. The processes of globalization are an important arena of contention for ideological and organizational hegemony.

Despite the current hegemony of neo-liberalism we are optimistic about the prospects for world socialism if we can survive the next window of vulnerability without bringing on a nuclear holocaust or environmental catastrophe. World state formation, international and transnational socialist organization and forms of exchange are, thus, our prescriptions for political action. Further comparative study of world–systems and earlier systemic transformations will help us to survive and to build the institutions of a more peaceful and just world. We have made great advances in the natural and biological sciences that have transformed us from servants of the gods to kings of the jungle. Social science can now help us to understand our own past and to shape a more harmonious and wise collective future.

Notes

1. The earliest sedentary foragers so far discovered are the Natufians who enter the archaeological record approximately twelve thousand years ago in the Levant.

2. Jon Berquist (1995) brought this possibility to our attention in his discussion of the Achaemenid empire's treatment of its various western colonies. Mitchell Allen (1996), as noted above, discusses this issue in considerable detail.

3. Greg Woolf (1990) argues that there was no semiperiphery in the Roman world-system according to Wallerstein's definition. However, the situation he describes would seem to fit some of our other types of semiperipheries. The larger point is that the confusion that Woolf points out is generated by an overly-narrow definition of the semiperiphery.

4. Randall Collins (1978) contends that the advantages of states in the marchlands is primarily geomilitary. Because they are near the edge of the core "heartland" they do not need to defend several borders at once and so they can concentrate their resources on a strategy of conquest that adds territory sequentially without threats from the rear. The disadvantage of older core powers is that they must defend themselves from many sides and so their resources are spread thinly.

5. Island societies provide laboratory-like settings for the study of social evolution. Patrick Kirch's work on Polynesian evolution tells of some fascinating cases. When the ancestral Maori arrived in New Zealand there were ten foot tall flightless birds -- the Moa. These Polynesian's gave up fishing and planting and became hunters of Moa until the Moa were exterminated, and then the Maori's again adopted horticulture.

6. This is not teleological reasoning. Increasing complexity does not cause hierarchy formation or extension. Rather, for systems that face complex regulation, those that develop hierarchical systems tend to survive more often than systems that do not.

7. For a fuller explanation of this scenario and its causes see Chase-Dunn and Podobnik (1995). A related future that emphasizes the interaction of regional challengers to global leaders is presented by Rasler and Thompson (1994).

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