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Abstract

Salvation or Commodification?

The Role of Money and Markets in Global Ecological Preservation

There are many policy proposals which use the market mechanism to internalize externalities, such as the carbon tax and cap-and-trade. Further, there are green bonds and green stock funds to accumulate capital for green infrastructure investment and new green industries, so-called ESG investing. There is some skepticism, nonetheless, that pricing an environmental pollutant, CO_2, or seeking for-profit ventures, will actually improve awareness of climate change and promote rapid economic substitution to renewable fuels. An alternative approach would eschew the market entirely, and would seek to develop biophysical metrics, and system goals, such as water quality and quantity, eutrophication, land and sea surface temperatures, status of the global ocean currents, melting of ice sheets, net primary production, biodiversity, and climate resilience. Instead of the market as the predominant governance mechanism, an alternative approach would rely on global governance institutions such as the UN, the Paris Climate Accord, the UNIPCC, and NGOs. It may also be possible to enlist the market-oriented global institutions, such as the IMF, the World Bank, and the WTO, in incorporating climate indicators into their decision-making mechanisms. It is also possible to adjust accounting rules to a new standard of environmental reporting. Once conceived as a global governance issue, advanced information technology could be recruited to locate key resources, threats, and preservation strategies on a global scale. That is, this paper addresses the pros and cons of approaching climate change within a market framework, or whether other approaches are possible, separately or in combination.

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I. Introduction

Existing proposals regarding climate change make use of the market mechanism, such as carbon taxes and carbon permit trading schemes. Market failures are well known, such as inequality, imperfect competition, omission of home production, as well as environmental and social externalities. The environmental externalities are not part of the market mechanism because of the existing definition of property based on individual private ownership based on discreet parcels of land. It is possible to tweak the rules of the market and to develop alternative definitions of property, to internalize externalities, in such manner as proposed by Pigou and Coase. Carbon pricing is based on the assumption of induced substitution by profit-maximizing competitive rational firms, and the availability of substitutes produced as public goods, such as renewable energy and mass transportation. Ideally, green industrial policy can guide a transition away from fossil fuels, while creating jobs in the process. Instead there are global oligopolies with sufficient market and political power to resist any such mechanism.

A broader approach would alter the "base" of the economy to land, and to develop new forms of human solidarity (in addition to identity categories, such as gender, worker, race, ethnicity, sexual preference) grounded on ecological resilience. A redesign based on ecological principles is more effective, and human settlements conducive to cohesion and community. It is possible to define regional ecological districts, and to manage investments in terms of restoration goals, global ecological indicators, and human development indicators. Market price need not be the primary or the only indicator of investment, and rates of return in money need not be the only or primary guide to investment.

Capitalist for-profit financial systems are based on trading time, the value of the worker's daily reproduction for the entire working day, while externalizing the costs of human and environmental reproduction and public goods. Capitalist financial systems contribute to the homogenization of inputs and outputs of the production process, the increase in the rate of production, and subjecting the entire system to the accounting discipline of the "bottom line." Financial metrics are not well-suited to long term time horizons (Davis 2017b). Alternatively, the unique attributes of humans and regions provide the basis for a new ecological economy, returning to the *oikos*, the "home" based on the land, now understood as the entire earth.

II. Property Definitions

Property has had an important role in the political economy of the West. In the context of the enclosures in England and the colonization of North America, Locke justified such changes by the associated improvements in productivity. Locke and Smith famously justified property and the labor theory of value by the "mixing" of one's own labor with the earth. Hegel believed that property was necessary for personality, and Marx noted the alienation caused by separation from the product of one's own labor (Pierson 2013, 2016). Contemporary progressive property scholars (Underkuffler 2003) see property as structuring social relationships. For Marx, quoting from and commenting on the French Constitution of 1793, Article 16,

> The right of property is, therefore, the right to enjoy one's fortune and to dispose of it as one will; without regard for other men and independently of society. It is the right of self-interest.

> This individual liberty, and its application, form the basis of civil society. It leads every man to see in other men, not the *realization*, but rather the *limitation* of his own liberty. It declares above all the right 'to enjoy and to dispose *as one will*, one's goods and revenues, the fruits of one's work and industry.' " (Marx 1978, 42; italics in original)

The usual definition of property in mainstream economics focuses on the two key features, subtractability and excludability. According to many discussions of property (Rosser 2015), exclusion is a central aspect of its definition. Whether one's use subtracts from the enjoyment of the other is another key aspect of the definition of "private" property. See Table 1. below the typical grid from textbook economics.

Table. 1. Property Grid

Property Dimensions		
	Subtractable	**Not Subtractable**
Excludable	Private property	Club good
Not excludable	Common pool resource	Public goods

It is possible to develop an alternative set of criteria for property, without necessarily assuming that subtractability is the usual case. There is a literature that suggests that there can be too much property, called the "gridlock economy" (Heller 2008). If one allows for synergy across property owners, there is possible a new view of property relations.

Further, land is the template for property. The land mass on the globe is a critical interface with the atmosphere and the oceans, affecting global climate and agricultural productivity, as well as species habitat and evolutionary pressures (Wilson 2016). Common investment in land restoration may achieve increasing returns in terms of those linkages across biospheres.

Table 2. New Property Grid

Alternative Property Dimensions		
	Subtractable	**Synergistic**
Excludable	Private property	Community
Scalable	"Tragedy of the commons"	Natural capital; Scientific community; Sharing economy Ecological community

As illustrated in Table 2. above, possible synergies exist with ecological phenomenon, whereby protection of habitat for key species increases productivity of others. In the scientific community, there is possible synergy among researchers in the same and related fields, comparing findings and challenging evidence. In the "sharing economy" (Lessig 2008), the investment by some in a technology platform for others improves the productivity of the entire economy, an example of increasing returns. By managing the commons collaboratively, there are new methods of social engagement which produce

stronger, more resilient communities, another type of synergy (Velicu and Garcia-Lopez 2018). By understanding the sources of "true wealth," communities can live more sustainably (Schor 2010; Schor and Thompson 2014).

The typical assumptions in existing models, illustrated in Table 1. above, rule out the possibility of increasing returns, and do not build upon such expanded social capacities.

III. Land Aggregation Tools

Land use is controlled by municipal and county governments, which have themselves become largely administrative units, instead of the independent self-governing corporations of the colonial era. The public domain acquired by the War of Independence and later colonial expansion was distributed in the form of private property by such policies as the Homestead Act (Davis 2015, 181-188). With the coming of the automobile, interstate highways, and policies to subsidize private housing, most of the US population lived in the suburbs as of 1970s.

Land use is typically fragmented in the suburbs, reducing the habitat for various species, covering fertile soil with impervious surfaces, and reducing forest cover which provide carbon sinks. The aggregation of land, for commercial as well as ecological purposes, relies on eminent domain or easements. Land purchase for conservation by non-profit organizations is feasible but expensive, only possible in high income regions (Davis 2017a). Various techniques like zoning and transfer of development rights have been available since the early twentieth century, but rely on the planning capacities of local governments. The proposal of "land assembly districts" (Heller and Hills 2008) would simplify such efforts, but still require revision of existing property law and would interfere with existing real estate investment expectations.

IV. Economic Trends

Continuous technological change is characteristic of modern capitalist economies. Long term productivity trends and automation have reduced the employment in agriculture, manufacturing, and soon to be followed by services and the "knowledge economy" (Averitt 1968; Reich 1991). "Urban shrinkage" in the "rust belt" has resulted from downsizing and outsourcing, leaving major cities with population less than the existing infrastructure and reduced tax base. Entire urban areas are available for "commoning" and reclamation, for production of use value based on shared usufruct, employing the local population for new purposes (Parr 2015).

V. Scientific instead of Financial Indicators

Rather than build on for-profit financial systems, one can eschew profit as the overarching goal of the political economic system. A new system can be based on ecological balances and nutrient cycles, such as nitrogen, carbon, water, heat flux. The technology currently exists for detailed global cycling of key nutrients required for all life on earth. Rather than the abstraction of capitalist financial systems (Davis 2017b), the recognition and integration of complex interrelationships is possible with biogeochemical indicators and models.

Ecological research has developed biogeochemical indicators, such as carbon and nitrogen budgets, energy flows, biodiversity, and net primary production. Rather than parcelize land based on homogeneous market metrics, such as square feet, and market-based grids which homogenize diverse

land surfaces, one could begin with distinctive ecological features. Such concepts as "watershed" provide a way to internalize key ecological features, and to catalogue related forms of flora and fauna. Further, examination of the existing species and habitats provide a way to view the landscape in terms of all living beings.

Ecological models have combined the atmosphere, land, and ocean into comprehensive "earth system models" (https://globalchange.mit.edu/research/researchtools/earth-system-model), on which climate change projections are based (Edwards 1996, 2010). This application of advanced information technology requires highly skilled experts, which carry the aura of "science" (Bijker, Bal and Hendriks 2009). Yet the management of human life on earth requires citizen science, participation in the observations which are typical of altered biogeochemical processes related to climate change, and innovative adaptations with which human communities can remain resilient. That is, scientific advisory bodies are important at all scales, but not the apolitical spaces of the "lab" which confined scientists to a certain mode of objective inquiry. A new model of embedded science would participate in democratic deliberations at all scales, although informed by the latest research findings.

VI. Regional Ecological Governance Design

The mainstream neoclassical economic approach to land use is to consider land a *tabula rasa*, an undifferentiated plane, with distance and transportation costs measured between economic functions, such as central place, production and consumption. To reduce transaction costs, the real estate grid is made as homogenous as possible, to facilitate sale (such as the NYC street grid). Economic geography studies the effect of the built environment on culture and consciousness, such as David Harvey's discussion of Haussmann's Paris (Harvey 2003), rather than the ecological features which supported the location of Paris historically. The global pattern of location of the world's great cities at river deltas is a consistent feature due to the significance of water transport in earlier eras. This existing built environment is at greater risk due to sea level rise in the coming centuries.

An alternative approach to governance is to integrate land in ecologically meaningful units, such as a watershed (Davis 2017a). Human settlements would be designed with ecological regions as a foundation, with global interfaces based on trade, migration, scientific research, and tourism, rather than multiple overlapping municipal administrative units. One example is the Hudson River Watershed, the boundaries of which could be delineated, instead of overlapping counties, towns, villages, education districts, water districts, economic development districts, and industry clusters. Watersheds are an example of an ecological region for several reasons: water is required for all living things. In addition, watershed boundaries can be easily identified based on elevations draining into tributaries, streams and rivers. Further, historic population centers were located near rivers, due to ease of transportation, energy source, habitat, and amenities. Water is also a means of disposal and a solvent for pollutants. Integrated management is necessary on a global scale. Land use is an important determinant of regional precipitation, as well.

Existing capitalist financial systems are based on labor as the source of value (Postone 1996), but the proposed new governance system is based on the living land. Each region would be allocated a given quantity of biophysical resources, or permits, and full accounting of their resource flows would be required. For example, an allocation of carbon would include food and fuel, and carbon emissions would be limited by that same amount. Then the region could provide for carbon sinks by reforestation, or reduce carbon units by greater reliance on renewable energy sources. Similarly, permits for nitrogen

compounds used for fertilizer would be allocated, and then nitrogen sinks would be indicated such as improved methods for disposal or reprocessing of human and animal waste, or substitutions made by small mixed farms which use less synthetic fertilizer. Water use would be documented and related to regional sources, such as rainfall, rivers, lakes, and aquifers. Urban heat islands would be monitored, and new building materials used to reduce this effect.

The regional ecosystem, such as a watershed, would be the primary administrative unit, designed to balance nutrient flows. Global budgets in key nutrients would be allocated, including nitrogen, carbon, heat, water, and human labor. Substitution among inputs would be allowed within each regional nutrient cap, such that one region could increase the human labor in agriculture in order to reduce the carbon inputs of chemical fertilizer and internal combustion farm equipment, for example. Another region could redesign more compact human settlement patterns to reduce transportation, and to preserve forest habitat. Another region could preserve rain forests as a global carbon sink, while allowing existing population to resettle in other areas with existing infrastructure.

Each regional ecosystem would internalize all externalities, human and natural. Existing populations would largely remain in place, and given new responsibilities for integrated management, including all resources, production, consumption, and services. Economic entities, such as multinational corporations and small businesses, would be required to document human and resource flows, in each region where it operates, like the existing system of discharge permits for pollution but on a more comprehensive basis.

Permits for new development would be based on the existing state of resilience, and the design of new types of infrastructure. Water sources would be a key determinant for new settlements, and prioritized by use, such as ecological cycles, agriculture, human consumption, recreation, and new systems of recycling and waste disposal. Energy would be in renewable forms which are consistent with each location, such as solar, wind, tidal, geothermal. Construction methods would be based on resilience, not a typical suburban split-level house, two-car garage, and yard replicated regardless of ecological impact.

Instead of homogeneous products standardized for ease of pricing and financial contracts, unique "heirloom" varieties would be cultivated, to stimulate trade based on "natural" comparative advantage, not low wage competition. Manufacturing and product development would be prioritized for basic human needs, such as adequate food, clothing, and shelter for the existing human population. New product design would be based on the principles of industrial ecology, such as "waste= food," and the "circular economy" (McDonough and Braungart 2009). With use of toxic materials reduced or reused, the negative resistance of "Not in My Backyard" (NIMBY) could become a positive investment in place, and provide a shared sense of identity and commitment.

Investment plans would be subject to global coordination, based on resource utilization and potential disruption to global biogeochemical cycles, such as CO_2 emissions and eutrophication. Resource management governance and deliberations would be consistent with principles for the management of the commons. The choices and trade-offs would be managed at the local and regional levels, where face-to-face deliberation and long term commitments are feasible. The nutrient balance for the earth would be calculated at the global scale, based on the plans and performance of each region. The commitment and authority would be both global and local, with deliberative bodies at each position. The required technology for planning, production, distribution, and communication is already feasible, like a combined Amazon/Facebook/TaskRabbit at each scale.

VII. New Global Citizenship

This arrangement is not a modern form of serfdom, tying people to the land, or a revised form of slavery, where intensified human labor produces commodities from plantations. With information technology and global sensors, it is possible for real-time deliberation on investments into ecology and human capacities (or "capabilities"). The attachment to land is not a reversion to pastoral forms of life and folk traditions celebrated by nationalists. This is not treating land as only "landscape," an idealized setting for vacations or reverie. This is not abstract equality of individuals and "human rights" presumably outside the setting of any particular nation state.

This is a new vision of ecological citizenship, where the integral connection of human life and the environment is studied and celebrated in its uniqueness for each person and each place. This is science-based understanding of ecology, not worship of immanence, which becomes the new literacy for every person. The design of work for such communities is based on sharing of necessary labor on an equal basis, and common deliberation of necessary investments. Education is grounded on the unique ecology of each region, and innovation is directed towards ways to integrate human life more sustainably with biogeochemical processes. Global competition for sustainable inventions would generate recognition and reward.

Ecological resilience is as important as current production, with long term restoration and investment the primary goal.

This design of ecological communities represents a new form of the state. The population has a new relationship to care for the land, collective stewardship without individual private property. The responsibility of each person is to manage her own interface with the local ecology, while understanding the interconnections with global biogeochemical processes. While everyone is assured of minimum standards of necessities, all would share with responsibilities for caring for other humans and living beings, and biogeochemical processes necessary for life. Education and socialization of new values becomes a high privilege and respected service to the community. This understanding is shared with citizens of the earth at all scales in deliberative decision-making. With this shared understanding and collective stewardship of each region, there is a new relationship among residents, and new awareness and commitment to each other in this common project.

VIII. Transition

The U.S. post-war suburbs were a strategy to overcome the Great Depression and the absorption of World War II production capacity. This "spatial fix" was designed to be resource-intensive, in terms of land use and resource use, such as oil, to reinforce consumerism. The Interstate Highway system linked suburbs with central business districts, and provided income-tiered consumer options and racial segregation. This "American Dream" was the preferred alternative to Communism and provided economic stimulus during the Cold War period (Davis 2015).

Since the fall of Communism, economic expansion has been debt-fueled, and reliant on credit from the emerging countries who acquire dollar-denominated financial assets as global reserves. The increasing inequality has supported a rentier economy, where "safe assets" are the method of accumulation (Davis 2018).

The required transition from consumerist suburbs to planned communities will help avoid the massive potential disruption of climate refugees. The U.S. has already experienced this possibility with intensified hurricanes and forest fires. Like the oil company "stranded assets," there will also be a hit to real estate values from rising sea levels, water shortages, and forest fires, and increasing claims on the insurance industry.

There is an emerging new consciousness, like settlers (Homestead Act), explorers (European discovery of the round globe), and utopian communities (Shakers, Oneida). There will be new exploration of ways to live on the land, with inspiration from ecological pioneers, rather than face the continuing reduction of habitable spaces on the globe due to climate change (McKibben 2018; Leopold 1989).

IX. Conclusion

The Lockean norms of independent private property, on which economics is based, assume that the parcelization of land improves productivity. In fact such divisions and exclusions degrade the earth and divide the people by ownership categories.

Capitalism is not sustainable, based on the exclusions and separations of private property, rather than internalizing responsibility. A new human solidarity based on common commitment to life on earth is the foundation of a new value system, a new way of life. A new accounting system based on global nutrient flows prioritizes life on earth, before profit. Global synergy of all life forms will support a new "economy" based on the *oikos*, or home on the land.

Instead of financial constraints to discipline labor, there are ecological constraints to promote life. Rather than divisions between economy and society, and between humans and nature, there is a unified governance entity, a community "grounded" on the land. The new vision is a whole earth and a whole people, without boundaries and exclusions, based on collaboration, mutual support, and nurturance.

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