

Global assemblages, resilience, and Earth Stewardship in the Anthropocene

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In this paper, we argue that the Anthropocene is an epoch characterized not only by the anthropogenic dominance of the Earth's ecosystems but also by new forms of environmental governance and institutions. Echoing the literature in political ecology, we call these new forms of environmental governance "global assemblages". Socioecological changes associated with global assemblages disproportionately impact poorer nations and communities along the development continuum, or the "Global South", and others who depend on natural resources for subsistence. Although global assemblages are powerful mechanisms of socioecological change, we show how transnational networks of grassroots organizations are able to resist their negative social and environmental impacts, and thus foster socioecological resilience.

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Crutzen and Stoermer (2000) proposed that humanity is now in the Anthropocene, a geologic epoch characterized by human dominance over the Earth's ecosystems. For many, the Anthropocene has become an important framework for thinking about the processes and consequences of worldwide environmental change, particularly global climate change, widespread species extinctions, and the erosion of the "global life support system" (Steffen *et al.* 2011). We write this paper to begin a conversation with our colleagues in ecology and other disciplines about Earth Stewardship in the Anthropocene. We do so by discussing how some social theorists are thinking about the Anthropocene's emergent properties of multi-scaled governance, with particular attention to the roles that inequalities in social and economic power play in the transformation of the world's ecosystems, communities, and more broadly, global

approaches to Earth Stewardship. To begin this conversation, we introduce the concept of the "global assemblage", a framework adopted widely in the social sciences (Collier and Ong 2005; Sassen 2006). Many scholars in the social sciences and humanities draw upon "assemblage theory", a theoretical approach indebted to the relational philosophy of Donna Haraway (Haraway 2008), Bruno Latour (Latour 1993, 2004), and Gilles Deleuze and Félix Guattari (Deleuze and Guattari 1987; DeLanda 2006). While distinct, this scholarship shares an approach to understanding life as a process that unfolds through changing assemblages of humans, other species, technologies, and institutions.

Like many of our colleagues in ecology, we, as anthropologists and geographers, share research approaches that focus on a range of different kinds of "relations" that are embedded within ecosystems, habitats, biomes, communities, and so forth. While these methodological and conceptual lenses have served as robust analytics for understanding the complexities of social and environmental change, we suggest that Earth Stewardship requires a more deliberate inclusion of conceptual approaches that help in understanding how the "local" articulates with and is transformed by economic globalization and global climate change.

When Arthur Tansley developed his ideas about ecosystems (Tansley 1935), he suggested that they were not simply composed of "natural" dynamics, but also included human-made dynamics. In so doing, he laid the foundations for understanding the Anthropocene, forcefully arguing for a new conceptual apparatus for ecology: "We cannot confine ourselves to the so-called 'natural' entities and ignore the processes and expressions of vegetation now so abundantly provided by man [sic]. Such a course is not scientifically sound...the 'natural' entities and the anthropogenic derivatives must be analyzed in terms of the most appropriate concepts we can find." Following Tansley and others, political ecologists have

In a nutshell:

- Earth Stewardship requires science and policy approaches that take into account how socioecological drivers of global change simultaneously create key patterns of environmental injustice and economic inequalities
- New forms of environmental governance and global economic institutions are, in part, responsible for the accelerated changes in the Earth's systems that we associate with the Anthropocene
- Transnational social movements offer important lessons for achieving greater socioecological resilience in the Anthropocene

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developed approaches that analyze the complex ways in which “natural” entities are transformed and contested through changing social contexts. However insightful, Tansley and early political ecologists were writing at a time before globalization and global institutions began to transform ecological processes and functions to the extent we all recognize today. In this paper, we suggest that (1) the Anthropocene is an epoch constituted by drivers of socioecological change that are no longer localized, as they were for most of human history and (2) “global assemblages”, as a conceptual framework, provide a sophisticated multi-scalar approach for analyzing these changes.

We show how diverse forms of global assemblages drive these changes – with some forms facilitating, and other forms hindering, socioecological resilience. On the basis of insights from ecology, we understand resilience as the capacity for communities and environments to adapt to changes, whether these changes are biophysical, economic, or sociopolitical (Pickett *et al.* 2013; see also Adger 2000 for a discussion of social and ecological resilience). We base our discussion in the growing discipline of political ecology. Our argument is that only by acknowledging humans as part of ecological systems, with particular attention to global socioecological relations, will we be in a position to fully understand and respond to the Anthropocene’s challenges.

■ Global assemblages and the Anthropocene

Despite important debates about the “start” of the Anthropocene, most scholars associate its origins with European industrialization (Zalasiewicz *et al.* 2010). Not only is the Industrial Age characterized by production practices that have led to widespread degradation of the Earth’s ecological systems, it also created profound transformations in social, economic, and political relations. For most of human history, our subsistence strategies (eg foraging, hunting, small-scale agriculture) were predicated on local cultural expectations regarding the use and meaning of the material world (plants, animals, land, water) and, importantly, by social obligations regarding the distribution of resources among members of a community, as well as, for many peoples, social obligations to the material world. Key to the shift has been a decoupling of societal obligations to nature, or Earth Stewardship, from practices and ideologies related to the continuation of social and economic systems.

The anthropologist Eric Wolf was particularly interested in understanding the ways in which industrialization gave rise to a global economic system that relied on cheap labor and raw materials from the Global South (Wolf 1982). As Wolf and others have demonstrated (Smith 2008), the reach of industrial capitalism transformed the livelihood strategies of peasants, horticulturalists, and pastoralists throughout the world, and in many cases promoted the overuse of resources (Blaikie 1985;

Blaikie and Brookfield 1987; see also Biersack and Greenberg 2006 for discussion). Political ecologists have sought to understand the role of the modern economic system in creating “ecological distribution conflicts”, such as conflicts over access and control of land and other resources (Escobar 2008). Political ecology, including the influential work of Wolf and others, was shaped by systems approaches, such as World Systems Theory (Wallerstein 1974), that conceptualized the connections between the Global South and Global North as historically constituted by uneven political economic relations.

More contemporary approaches recognize that these binaries (North/South) do not account for the diverse institutional, political, and economic processes that alter local ecosystems and communities, many of which transcend the boundaries and power of the state. Global assemblages are socioecological “constellations” that include multinational corporations, development initiatives, political treaties and other forms of governance, lending organizations, and non-governmental organizations (Tsing 2005). Key institutions and agents within global assemblages, whether the International Monetary Fund or multinational corporations, serve as “instruments” that drive socioecological changes associated with the world today (Sassen 2008). Many of these global assemblages are guided by market-driven trade agreements that leave communities and ecosystems in the Global South less resilient to socioecological change, as shown by Daly and Goodland (1994). These global assemblages should be seen as new, transnational forms of socioecological governance.

Recently, Steffen *et al.* (2011) analyzed broad patterns of global change associated with transformations in the global economy since the Industrial Revolution. In particular, numerous social and economic indicators show that rates of consumption, production, and population growth have accelerated dramatically in the past 50 years (Steffen *et al.* 2011). The authors go on to carefully demonstrate the correlations between these accelerated rates of change and the continued degradation of the functioning and structure of the Earth’s systems. Importantly, Steffen *et al.* (2011) argued that this “accelerated” rate of global change was disproportionately driven by consumption patterns in the Global North, *even* in the context of increased population growth throughout the rest of the world. Yet consumption does not happen by “nations”; instead, consumption is a process facilitated by global assemblages that include commodity markets, media networks, trade policies, and other apparatus that transcend the nation-state.

In many cases, poorer countries become “entangled” with these global assemblages through the export of natural resources. Countries dependent upon export of primary commodities (eg agricultural goods and minerals) tend to experience persistent levels of social inequalities and poverty (UNCTD 2004) and are extremely vulnerable to price fluctuations, market consolidations, and

Panel 1. Coffee in Papua New Guinea

After petroleum, coffee is the second most frequently traded commodity on world markets. Coffee cultivation has profoundly shaped global economies, transformed tropical mountain ecosystems, and redefined how both consumers and producers live in the world. For instance, in Papua New Guinea (PNG), coffee production has been part of social and ecological life since the colonial period. Today, one in three people in PNG is connected to the coffee industry, illustrating the way in which demand for commodities can define local socioenvironmental relations, even in places that are often thought of as on the edges of the global market economy. West (2012) examined the movement of coffee from indigenous producers in PNG to consumers around the world, revealing the eagerness of the Gimi peoples – who grow coffee in PNG's highlands – to expand their businesses and social relationships with the buyers, processors, and exporters, as well as with consumers in cities such as Hamburg, Germany; Sydney, Australia; and London, UK. At the same time, West (2012) also showed how the “market” for specialty coffee misrepresents the Gimi, using images of primitivity and poverty to sell coffee (Figure 1). By implying that the “backwardness” of PNG impedes economic development, these images obscure the structural relations and global political economy that actually cause poverty in PNG. Coffee producers in PNG make about US\$0.15 per hour on specialty coffee that sells for more than US\$12.00 per pound at Starbucks, exemplifying the asymmetrical relations that constitute the Anthropocene's global economic system.

Figure 1. Exotic images such as this one are often used to sell coffee from Papua New Guinea.



environmental hazards (eg floods, pests), as well as changing demands for these commodities. Yet the ways in which global commodity markets transform people and places vary considerably (Panel 1). Sometimes, as Robbins' (2007) work on the political ecology of lawns has shown, wealth and education do not always correlate with healthier local environments.

Climate change – driven by fossil-fuel consumption in the world's wealthiest nations – poses the greatest challenge to achieving environmental and social equity in the world (HDR 2011). The Anthropocene's poorer nations have contributed less than 1% of the cumulative atmospheric emissions that are driving climate change (Steffen *et al.* 2011). At the same time, it is the 1.3 billion people who rely on natural resources for their income and subsistence (eg through export agriculture, forest products, and fishing) that are the least resilient to climate-driven environmental change. For example, societies in resource-rich Arctic regions contributed little to the causes of climate change, yet they are among the first to observe and respond to its impacts (Panel 2; Krupnik *et al.* 2004; Crate and Nuttall 2009). Women in poorer countries, who are disproportionately involved in subsistence farming, gathering of forest goods, and water collection, are even more vulnerable to the environmental impacts of climate change (HDR 2011).

These socioecological inequalities are a result of what Leichenko and O'Brien (2008) have called a “double exposure” to global environmental change and processes of globalization associated with market-driven processes of change. Leichenko and O'Brien's (2008) double expo-

sure framework directs attention to the non-linear interactions and feedbacks of these two “transformative” processes of change (Panel 3). Importantly, they demonstrate how the groups most vulnerable to the impacts of global environmental change often simultaneously experience the negative impacts of globalization. In other words, the interactions between these processes contribute to “growing inequalities, increasing vulnerabilities, and accelerated and unsustainable rates of change” (Leichenko and O'Brien 2008). As described above, the Anthropocene is characterized by unequal processes of global connection and governance (economic, political, social, and technological). Moreover, a conceptual tool, such as the global assemblage, provides a multi-scalar approach to examining these new forms of socioecological governance in ways that a focus on “the local” (ie community or ecosystem) only partially reveals.

■ Resilience and Earth Stewardship

While national governments and supra-national organizations, such as the United Nations, have exhibited increasing interest in sustainability and socioecological resilience, grassroots groups have tended to be the most vocal proponents of protecting the environment and promoting local autonomy in the process. Clearly, these social movements emerge out of global networks of activists and offer important insights into alternative forms of socioecological governance in the Anthropocene. An example from the lead author's (LO) research site in Tierra del Fuego, Chile, illustrates the

Panel 2. Northern indigenous people, climate change, and food security

The subsistence activities of the Iñupiat of Wainwright on the North Slope of Alaska at the Chukchi Sea intimately connect them to the region's biodiversity (Figure 2). The residents maintain ecological relations with many marine mammals to meet their nutritional needs despite the risks associated with travel on open water and sea ice (Nelson 1969, 1982; Luton 1986; Ivie and Schneider 1988; Fuller and George 1999; Kassam and The Wainwright Traditional Council 2001; Kassam 2009). The Iñupiat have therefore developed an important context-dependent understanding of sea ice and of methods for interacting with it. Climate change is leading to increasing uncertainty regarding patterns of sea-ice formation, challenging the predictive capacity of Iñupiat knowledge of sea ice. Climate-change impacts therefore make subsistence activities potentially dangerous, because the harvesting of marine mammals requires calm seas and strong ice for safe travel. The risk that climate-change impacts may overwhelm these communities is increased by other chronic stressors, including legacies of colonialism and economic imperialism that constrain local economies. Put tersely, climate change is an additional layer of complexity on already existing inequities (Kassam *et al.* 2011).

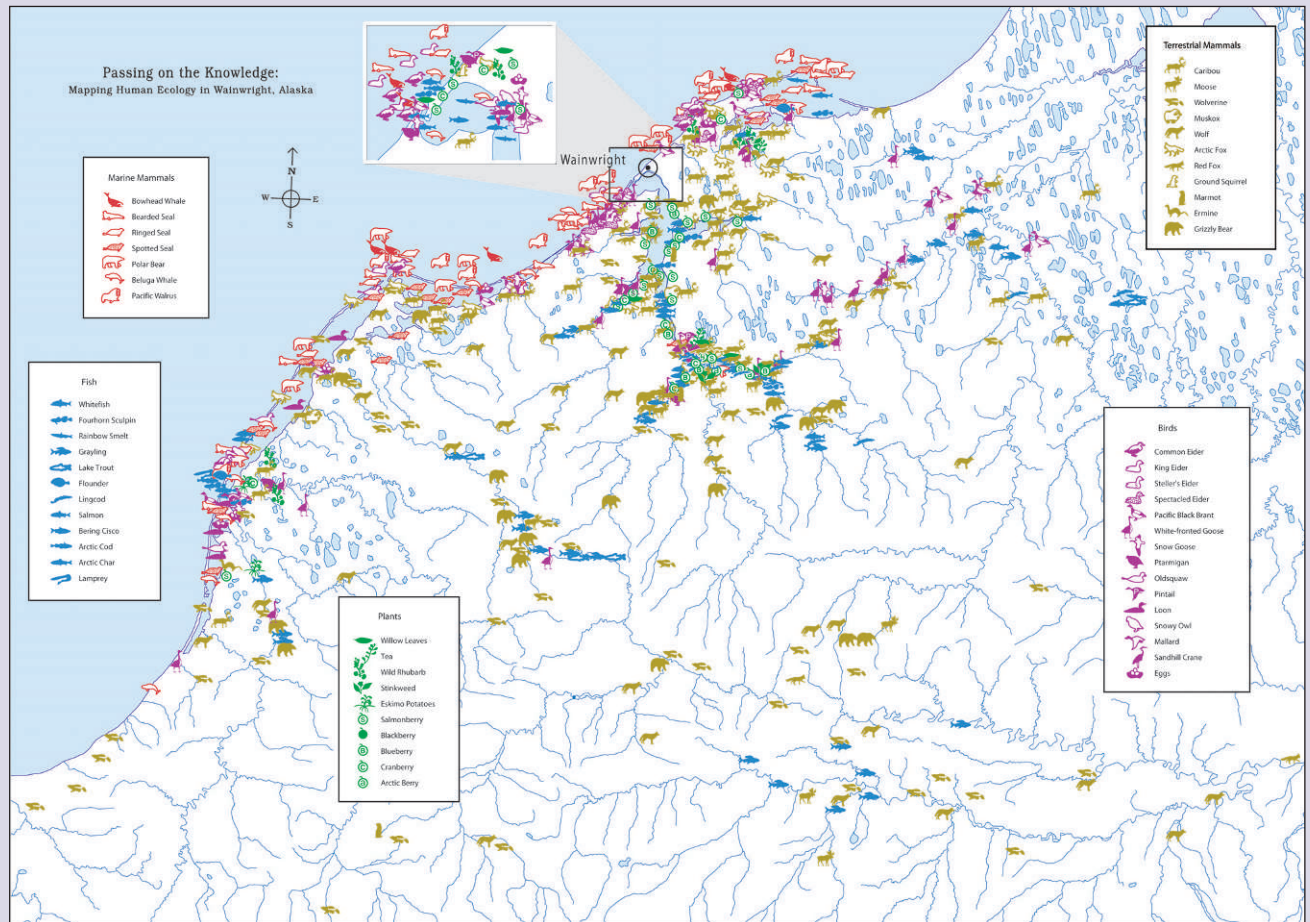


Figure 2. Map of Iñupiat human–ecological relations, showing how subsistence is fundamentally dependent on biodiversity.

ways in which social movements can resist global assemblages to foster more resilient ecosystems. In 1993, the Trillium Corporation (Bellingham, WA) purchased 400 000 ha of temperate rain forest at the southern end of Isla Grande, the largest island in the archipelago. Trillium's *Rio Condor* project was considered a model of sustainable forestry and corporate responsibility (Ginn 2005). Although the company had obtained all the necessary legal permits and funding to move forward on *Rio Condor*, Chilean environmental activists were able to use the media to cast considerable doubt on the true environmental impacts of the project and, eventually, relied on the Chilean courts to slow the project's implementation

and drain its financial resources (Klepeis and Laris 2006). These environmental activists organized themselves to fight the *Rio Condor* project by collaborating with anti-Trillium activists in the US city of Bellingham. Ultimately, *Rio Condor* went bankrupt and, in the process of debt liquidation, the investment firm Goldman Sachs Group, Inc acquired the forests and transferred them to the New York City-based Wildlife Conservation Society for protection.

In another example, McFarlane (2009) described the global reach of the “Slum/Shack Dwellers International” (SDI) group, an urban housing rights organization based in Mumbai, India. Unlike a traditional development

organization, SDI does not have a centralized, hierarchical structure. Instead, SDI-affiliated housing rights organizations have emerged in 20 different countries – from Cape Town, South Africa, to Phnom Penh, Cambodia – through global networks of social activists (McFarlane 2009). Although modeled on SDI's activities in Mumbai, such as demonstrating homebuilding techniques in the city's informal settlements, each node of the SDI global network is highly localized in terms of aesthetics, knowledge, materials, and the organizational infrastructure of the group in each country.

Transnational activist networks of this kind are becoming increasingly important in the struggle to protect local environments from unsustainable extraction and exploitation practices: for example, gold mining and agro-industrial monoculture in Colombia's tropical rainforests (Escobar 2008; Oslender 2008). Some of these struggles have led to notable achievements and a critical rethinking of humankind's relationship with nature. In 2008, Ecuador issued a new constitution that has garnered international attention because of its pioneering treatment of the rights of nature; on par with human rights, nature is endowed, constitutionally, with the right to be protected and to be treated with respect. In this conceptualization, nature is no longer regarded as an inert object for humans to appropriate. According to Escobar (unpublished), nature's inclusion in the Ecuadorian Constitution is based on an ecological worldview in which all beings exist in relation to others: "To endow Nature with rights means to shift from a concep-

tion of Nature as object to be exploited to one in which Nature is seen as subject; indeed, in this conception, the idea of rights of Nature is intimately linked with the humans' right to exist. This notion implies an expanded ecological notion of the self, which, unlike the liberal notion, sees the self as deeply interconnected with all other living beings and, ultimately, with the planet as a whole." What these examples illustrate, as do many others, is the power of grassroots global movements, in collaboration with other institutions, to foster resilience in sites that are vulnerable to economic globalization and global environmental change.

■ Conclusions

The Anthropocene is not just an era of anthropogenic change. Indeed, the Anthropocene's changes arise out of new processes linked to a diversity of global assemblages. This reframing allows the development of novel approaches for more holistically engaging with a broader and necessarily more complicated articulation of Earth Stewardship. Here we suggest that analyzing global assemblages, as a new form of socioecological governance, allows us to better articulate and understand how processes of uneven development often disproportionately impact vulnerable communities and environments, making them less resilient to global environmental change. At the same time, we see how grassroots social movements facilitate socioecological resilience even in the context of "double exposure", as described by

Panel 3. Palm oil production: a complex global assemblage

In 1993, motivated by concerns over loss of biodiversity from unregulated timber extraction and gold mining, legislators in Colombia passed Law 70, which granted land rights to Afro-Colombian communities living in the tropical rainforests of the Pacific Coast lowlands. With this law, some 5 million ha of lands were to be passed into communal land ownership, an acknowledgement of the communities' role in preserving this fragile ecosystem for hundreds of years. Social activism in these communities was key to this landmark achievement (Figure 3).

Today, however, this conservationist rationale has been all but abandoned. As described by Oslender (2008), powerful multinational oil palm and gold mining corporations are colluding with illegal armed groups to displace local residents from their lands to gain access to the rich resource base. Targeted killings of activists and massacres of entire communities have led hundreds of thousands of local land owners to flee their lands since the mid-1990s.

Palm oil production has been aided by national and international organizations, such as the United Nations, who credit Colombia's oil palm industry with playing an important role in climate-change mitigation. Its principal product – palm oil – is converted into biodiesel, considered an important resource for reducing carbon emissions into the atmosphere. Palm oil companies mobilize environmental language and sentiment to expand oil palm cultivation, while Afro-Colombian peasant farmers and fishers (considered "guardians" of the region's rich biodiversity) continue to be displaced by the thousands (Oslender 2008). In this battle of competing environmental interests, community resilience and conservation continue to be jeopardized (Oslender 2008).

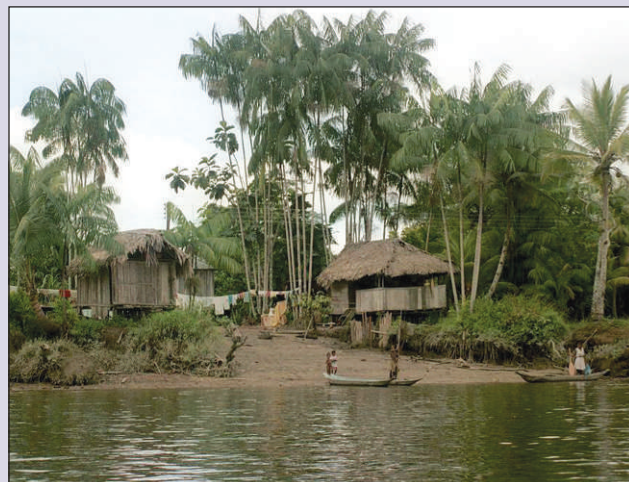


Figure 3. Pacific Coast settlements in Colombia where locals resist oil palm cultivation.

Leichenko and O'Brien (2008). We introduce this consideration of the Anthropocene's global assemblages to improve dialogue between ecologists and those of us who are committed to understanding the human dimensions of environmental change.

Earth Stewardship requires a willingness to recognize the politics of the Anthropocene and the socioecological consequences of such politics. For ecologists, this means explicitly considering the complex ways that global connections, and sometimes research, contribute to political, economic, environmental, and social inequalities. The Anthropocene's heterogeneous socioecological processes sound an important warning about the need to seek alternative forms of thinking about, and action toward, the world around us. To this end, Gibson-Graham and Roelvink (2010) suggested that "responding to the challenges of the Anthropocene is not simply about human beings finding a technological or normative fix that will control and restore the Earth. It is about human beings being transformed by the world in which we find ourselves – or, to put it in more reciprocal terms, it is about the Earth's future being transformed through a living process of inter-being". Following Ecuador's lead in spelling out the rights of nature might be a step in this direction. Of course, nature's rights are always political, and thus we hope this paper sparks continued dialogue about nature's politics in the Anthropocene.

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