
ECO-JUSTICE

Tropical Conservation and Grassroots Social Movements: Ecological Theory and Social Justice

Among the myriad political issues that are of concern to ESA, three stand out as not only important in their own right, but together take on a particular urgency. These are (1) environmental justice, (2) globalization, and (3) tropical conservation. The environmental justice movement has focused on the urgent contemporary task of documenting and struggling against political and economic decisions that place underprivileged groups at environmental risk. For example Memphis, site of the 2007 ESA meetings, has communities of mainly African Americans who remain subject to the environmental hazards that originally stemmed from the production of chlordane by the Velsicol Company (the same chemical and same company, by the way, that was so active in attempting to block the publication of *Silent Spring*). Even though the use of chlordane was banned in the United States in 1988, residues remain in soil and sediments throughout the Memphis area, especially in areas populated by low-income families and people of color.

Chlordane itself provides a bridge to the next political issue we identify as critical, the political debate associated with recent trends of globalization. When chlordane was banned for use in the United States, as so frequently happens, Velsicol simply changed marketing strategies and began shipping its now acknowledged dangerous chemical to unwitting Third World farmers. The globalized economy certainly aided Velsicol at a time when it faced a clear underconsumption crisis (no market for a product it was geared up to produce in large quantities). The small farmers and farm workers in Latin America, Africa, and Asia, thus became victims of an environmental injustice that had a clear ecological connection to the African American community in Memphis. In most recent times those small farmers and farm workers of the Global South have not been sitting idly by as the contemporary globalization trend sends a tide that threatens them, but they have been major participants in one of the largest grassroots movements in the history of the world, the movement commonly referred to as the “anti-globalization” movement.

Those small farmers sit in the midst of what is, for nonhuman nature, one of the most important places in the world—the agroecosystems that surround the remaining patches of natural habitat in the vast majority of the world’s tropical terrestrial ecosystems. What we now know about the functioning of tropical ecosystems convinces us that the environmental injustice faced by these small farmers and farm workers, so similar in its political overtones to that faced by minority communities throughout the Developed World, has an inevitable connection to the political issue that probably inspires members of the ESA more than any other, that of the conservation of tropical biodiversity.

In this essay we argue that these three political movements are intrinsically interconnected and should not be viewed in isolation. Our argument is founded, not on a basis of political thought, but rather emerges from what

contemporary ecology tells us about the organization of biodiversity. The ESA is a particularly important venue for presenting this argument, since it is the science of ecology that allows us to see the inherent connection among these three crucially important politico-environmental issues. In what follows we briefly explain the ecological science behind our argument and then provide a brief example of extant political action based on that science.

The science of biodiversity

As Robert May once quipped, for all practical purposes all animals are insects (J. Vandermeer, *personal information*; see also May 1992). We similarly note that the conservation of biodiversity is not, as popular outlets frequently pitch it, the conservation of elephants, tigers, and other charismatic megafauna. Indeed, most members of ESA would agree with E. O. Wilson (1987) that the “little things that run the world” deserve as much if not more of our conservation concern. Furthermore, and of a similar epistemological status, our focus on charismatic habitats, the tropical rain forest or the coral reef, is a mixed bag. On the one hand it is in tropical regions of the world where the vast majority of contemporary biodiversity resides. (We might say, paraphrasing May, that for all practical purposes all biodiversity is in the tropics.) However, it is not necessarily the case that the romantic “pristine” rain forest is the only refuge for that biodiversity. Recent research in several nonpristine areas (e.g., coffee or cacao agroforestry systems) has shown that significant biodiversity remains in these habitats, depending, of course, on the precise nature of the habitat (e.g., some shade coffee contains almost equal biodiversity as local forests for some taxa, while the center of Mexico City has few jaguars). We argue, based on contemporary ecological research, that the current state of most of the tropics is highly fragmented, with islands of native habitat amidst a sea of agriculture, and that it is precisely within that sea of agriculture that our conservation activities should be focused.

The contemporary ecological research to which we refer is the general field of metapopulation and metacommunity research. Since most of the tropical world has already been fragmented, viewing the remaining biodiversity as contained in the fragments of remaining natural habitat most naturally conjures up the image of a metapopulation. The basic metapopulation equation is $p = 1 - e/m$, where p is the proportion of fragments that contain the species in question, e is the extinction rate of that species (the relative number of fragments from which the species disappears over a given time period), and m is the rate of migration of that species from fragment to fragment (the relative number of fragments absent that species that receive individuals of that species over a given time period). If migration rate is very large, p approaches 1.0 and the species obviously survives in the region. If the migration rate approaches the extinction rate, p approaches 0 and the species goes regionally extinct. This basic idea of metapopulation when applied to multiple species is referred to as metacommunity theory.

One of the messages of ecological research in metapopulations is that local extinction of subpopulations is a perfectly normal and expected process. A vast number of empirical studies (e.g., Bolger et al. 1991, Newmark 1995, Fischer and Stöcklin 1996, Helm et al. 2006) leave little doubt that species disappear from habitat fragments, even large ones. It is beyond the intention of this essay to discuss why this is the case, but the fact that it is true is hardly debatable. When a habitat is fragmented, the rate of extinction from the fragments is extraordinarily high.

This high rate of local extinction carries an important message for biodiversity conservation. Recalling the basic metapopulation equation, if e is high, p is likely to be low, which puts all species at risk of extinction. Since local extinction is a perfectly normal process and no amount of intervention can change that fact, we are left with the migration rate as the main intervention objective. The matrix in which the fragments of natural habitat exist

is also the matrix through which the organisms must pass in their interfragment migrations. That is, an important component of the “matrix quality” is the degree to which organisms can migrate through it to retain as high a migration rate as possible (thus countering the inevitably high values of extinction rate e).

The science of agroecology

When Albert Howard (1940) examined the problems of India’s agriculture in the 19th century, he looked to the nearby native forests for insights into what was wrong with the agroecosystem, finding, not surprisingly, that monocultural production would likely lead to diseases. As it was for the many Indian small farmers he interacted with, Howard found in the natural habitats a model for how agriculture should be organized. This natural systems paradigm has been applied in a variety of settings. For example, the development of an agriculture based on the biology of the natural prairie of central North America has long been promoted at the Land Institute (a research institute, founded by Wes Jackson, located near Salinas, Kansas; see Jackson 2002). Many researchers have pointed to the fact that early, more traditional forms of agriculture indeed tended to mimic the natural world far more than what has become known as the “conventional system,” by which is mainly meant an agriculture based on monoculture, biocides, and synthetic fertilizers. Agroecology (or alternative agriculture, or ecological agriculture, or a variety of other names) has become a very active field of research, defined to some extent by what it is not, namely “conventional.” Eschewing the use of agrochemicals and emphasizing techniques like intercropping and agroforestry, agroecology effectively promotes an agriculture that uses the ecological principles known from the natural world as a basis for agricultural planning.

Especially in the tropics, the majority of small farmers already see this vision to some extent. Much like their parallels in the pre-World War II United States and Europe, they view the farm as a collection of ecological interactions, not all that different from the interactions in the surrounding natural vegetation, with herbivores, predators of those herbivores, detritivores, nitrogen fixers, and the host of biodiversity that is known by both farmer and ecologist as characteristic of the natural world. To some extent the imitation of that natural world in the agroecosystem is the natural tendency of small farmers, and forms the backbone of the developing discipline of agroecology.

If one of the goals of agroecology is, to whatever extent possible, to mimic the natural world, it seems obvious that the agroecological approach to the development of the matrix would be the best way to promote high values of the migration rate. Will a Roundup-ready soybean field be as enticing as a silvopastoral system to a monkey who needs to migrate from one fragment of forest to another? This point is so theoretically obvious that it hardly needs mention. To the extent that the matrix environment can be made to resemble the fragment habitat, from the point of view of the organisms that must pass through it, the goal of raising migration rate m will be met.

The role of grassroots movements

Today’s tropics are organized by the historical accidents of European colonialism. Trappings of plantation agriculture devoted to export crops are ubiquitous and frequently dominate tropical landscapes. Yet in the post-World War II decolonization movements, followed by the revolutionary ideas of the 1960s and 1970s on whose heels the current social movements follow, the people who work the land, the small farmers and the farm workers in the interstices of the plantation agriculture systems, have long tried to claim their rights—to land and the prosperity it implies. And from the point of view of the migration rates among fragments of native habitat, the small farmer who tends a shade coffee farm or *cabruca* (shaded) cacao plot is far friendlier to the quality of the matrix

than is an executive of a large banana corporation in his office suite in Cincinnati, no matter how much money he contributes to Wildlife International.

The worldwide agrarian reform movements are undoubtedly going to have a major effect on tropical biodiversity in the future (e.g., Cullen et al. 2005, Campos and Nepstad 2006, Vandermeer and Perfecto 2007). Given what we now understand about landscape structures of biodiversity, and given the current fact that the vast majority of the tropical landscape is already fragmented, what happens to those millions of farmers and potential farmers who are currently involved in struggles to take back their land? Will they coalesce into large cooperatives that will simply reproduce the style of plantation agriculture, as has happened in some cases? Or will they bring some of their own roots with them, perhaps aided by knowledgeable and devoted ecologists who not only want to conserve biodiversity, but also to participate in the struggle for environmental justice?

Whatever the position of grassroots rural movements on the question of biodiversity, given the fact that the future is likely to see them more frequently with land titles, and given the inexorable ecological fact that the quality of the matrix is a crucial issue for conservation in the landscape as a whole, these movements are going to be crucial to the future of tropical conservation.

There are several suggestive examples that have already developed. The MST (The Landless Movement) of Brazil is perhaps the largest rural social movement in the world today. While the formal goal of the MST is focused on social justice through land reform, they are also moving rapidly toward a land ethic that specifically includes agroecology and conservation at its core (Wright and Wolford 2003). And the MST is a member of a much larger organization, Via Campesina [The Farmer's Way], which extends its influence to every continent on the globe. On Via Campesina's web page are listed the organization's major priorities, which include "...agrarian reform, *food sovereignty*, production, trade, research, *genetic resources*, *biodiversity*, *environment* and gender [emphasis added]", perhaps the first truly massive popular movement that so directly incorporates environmental concerns into its platform, explicitly including biodiversity.

Conclusion

Conservationists in the past have focused on the purchase and protection of large tracts of land. From what we now know about how biodiversity is structured ecologically, this is a doomed strategy. While there is no rational need to convert any more forests to agriculture, and we join with others who seek to preserve whatever remaining natural habitat exists in the world, the forests are in fact being converted, and the future almost certainly will present us with mainly fragmented landscapes. It is in those fragmented landscapes that the world's biodiversity will be located. A long-term plan for biodiversity conservation needs to acknowledge that fact and work at the landscape level not only to preserve the patches of native vegetation that remain, but to construct a landscape that is "migration friendly." That landscape is most likely to emerge from the application of agroecological principles. Those principles are most likely to be enacted by small farmers with land titles. Small farmers with land titles are a consequence of grassroots social movements. Indeed, it would be only slight exaggeration to suggest that these social movements in fact hold the key to real biodiversity conservation. If we allow ourselves to be constrained to the ever-shrinking area of formally protected areas, we concede to the enemies of biodiversity conservation the millions of fragments of natural habitat that today probably contain most of the world's biodiversity. Joining the struggle of the millions of small farmers all over the world is as much part of the environmental justice movement as joining the struggle of African Americans in Memphis for a cleaner environment.

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