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THE MIDDLE GROUND: WHY WE CAN'T SAVE NATURE FOR NATURE

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INTRODUCTION - APES AT THE HELM

Human beings as a collective are currently a biogeochemical force unparalleled on the planet. Being ecosystem engineers on a massive scale, we have halved the amount of forest cover that the Earth had 10,000 years ago and replaced it with farmland, settlements and wasteland (Freedman 2008). We and our horde of mutualistic plants and animals have annexed vast stretches of land, more than half the earth (Pimentel and Kounang 1998) and we have fundamentally altered the ecology of lakes and seas. An auspicious outcome of this massive engineering project has been a greatly accelerated extinction rate, approximately 1000 times faster than the natural background rate (Novacek 2007). Many conservationists see the best way of protecting nature from this onslaught to be setting aside vast tracts of pristine wilderness in the form of parks, where humans can sometimes visit but cannot dwell. This sort of conservation, however, is often criticized as overlooking a major component of those landscapes – local people. Sometimes the political turmoil surrounding conservation issues seems to pit the welfare of people against that of the environment.

Are human beings by necessity a detrimental force to ecosystems? Can we rightly speak of a qualitative distinction between 'natural' versus 'managed' ecosystems at all? For instance, some pastures in Europe have had cows grazing on them for so long that they seem to have reached an anthropogenic stable state, with some biologists calling for their preservation as a conservation strategy (Fink *et al.* 2002). The same sort of situation could be true of much of the American plains before the arrival of Europeans, as Native Americans used controlled burning to control forest cover and therefore increase their hunting grounds (Howe 1994). Some human activities, such as replacing old growth tropical forest with oil palm monoculture, assuredly reduce biodiversity. Others though, like the cloud gardens and complex agroforests found in the tropics, may help preserve it.

The first part of this essay will sketch some of the history of ecology in order to understand how changing ecological ideas can change our understanding of our own role in nature. The idea that humans necessarily upset a pre-existing 'balance' has its roots in early ecological thinking, but more recent study has largely abandoned this notion. The second part will consider how to improve the 'middle ground', the place between the purely cultural and the purely natural in which humans actually dwell and make a living. This is where the real battle against ecological destruction will take place.

Part I: Harmony and Discord: Where Have We Come From?

Ecology as we know it today was set into motion by the 19th century biological geographer, Alexander von Humboldt. Humboldt was the most notorious world traveler of his day, intent not only on describing and classifying organisms, but explaining why they occurred where they did. For him, mountains provided much of the world condensed into one place, for as he ascended hundreds of metres, the biotic communities changed just as they would if he had traveled hundreds of miles toward the poles. Thus, in his explanations for the distribution of organisms, climate took the preeminent explanatory role. Presciently, he wrote that these observations "furnished the rough materials for a science, to which no name had as yet been given" (Humboldt 1866). Just twenty years later, the German evolutionist Ernst Haeckel would coin the word *oecology* for the "the comprehensive science of the relationship of the organism to the environment"(Haeckel, in Worster 1994).

In 1895, the Danish botanist and geographer Eugenius Warming was the first to truly lay out the scientific program of ecology, dealing in his book *Plantesamfund* with the plant communities of every major biome (Worster 1994). Warming showed how the plant communities everywhere in the world, although consisting of entirely different species, adapted to the various environmental challenges they faced in very similar ways. Although Warming was an evolutionist, he and many of the early founders of ecology were believers in neo-Lamarckism, or the inheritance of acquired characteristics. Frederic Clements, a newly minted botanist at the University of Nebraska just at the time Warming's work was filtering into America, was also strongly influenced by neo-Lamarckism. Clements was very taken with the holistic theories of British neo-Lamarckian philosopher Herbert Spencer, especially his ideas of the super-organism, which he applied to plant communities (Tobey 1981). He thought of assemblages of plant species as organic entities in and of themselves, with corresponding cycles of birth, growth, and death. Following Humboldt's emphasis on climate, for every particular set of climatic conditions, Clements thought that

a very particular kind of species assembly would occur, developing through many successional stages. Each stage paved the way for the next one until the fully mature form of the ecological super-organism was reached, termed its climax (Clements 1935). Clements' 1916 book *Plant Succession*, in which he laid out this theory of the 'monoclimax,' became the standard of ecology for the next thirty years.

For Clements, though unpredictable factors and chance events might deflect a plant community from its trajectory, the eventual destination was a single unalterable one (Clements 1935). In this picture humanity was not able to truly upset the nature of things, and any designs of our own stood firmly outside of the true natural order. While the monoclimax held sway over a whole generation of ecologists, there were plenty of dissenters. British ecologist Arthur Tansley, originally one of Clements' most ardent supporters, decided in 1935 that the super-organism idea was untenable. In his paper "The use and abuse of vegetational concepts and terms" he replaced the super-organism with the term ecosystem (Tansley 1935). Tansley advocated for a less strict interpretation of the climax, and rejected the notion that humans could not play a constructive role in the formation of stable climax communities. It is interesting to note that while Clements did his work on the wild American prairie, Tansley did his in England, most of which had been under human influence for thousands of years.

Another critic, Henry Gleason, argued in 1926 for what he called an individualistic view of communities, the pure antithesis of Clements' super-organism. Gleason saw succession as nothing more than the sum of individual organisms striving to do what organisms do: grow and reproduce (Gleason 1926). It was the outcome of all the little struggles between individuals; if there was regularity it was only because the players and their behaviors were often the same and they were adapted to the same climate. In this view humans are just individuals playing out their role in nature, with human-influenced climaxes not essentially different from natural ones in any qualitative way. This does not exonerate people for ecologically destructive behavior but blurs the formerly clear cut line between natural and human-influenced communities. Largely ignored and overshadowed by Clements until the 1950's, Gleason's views have since grown in popularity. The story of ecology since 1900 can in some ways be seen as an oscillation between the ideas of Clements and those of Gleason.

The true test of Clements' ideas came during the great drought of the 1930's. This prolonged dry period caused a phenomenon known as the Dust Bowl, in which vast tracks of the American and

Canadian prairie lost plant cover and blew away. This ecological catastrophe was intensified by the fact that huge tracts of the prairie had, in the previous generation, been ploughed up and planted with wheat, leaving the soil far more vulnerable to the desiccating wind (Worster 1994). During this period ecology was thrust into the public sphere, and for the first time ecologists were called upon to use their field of knowledge to assess the situation and provide practical solutions (Tobey 1981). Much of this work was based on the ecological ideas of Clements, and Clements himself was quite involved in the matter. Through comprehensive studies of prairie vegetation before and after the Dust Bowl, many people came to the conclusion that some grassland communities had permanently changed as a result of the drought, contradicting predictions of Clements' monoclimax theory. Also, while before the Dust Bowl the prairie school's view was that human action could only deflect the natural climax succession, afterwards some were calling for human action as the only way to *preserve* this native climax (Tobey 1981).

The sixty years since the Dust Bowl has seen a great proliferation of ecologies: evolutionary, physiological, systems, population, community, and ecosystem ecology are just some of the various routes a professional ecologist might take today. Many of the questions still, however, centre around what holds biological communities and ecosystems together and what makes them work. Often, the questions arise out of and have implications for the way in which humans interact with the living systems around us. One example of a major area of research in this vein concerns the relationship between biodiversity and ecosystem stability. If we are disturbing biological communities and decreasing biodiversity, how will this affect their functions and processes? The biodiversity-stability question has its roots in a simple question, most lucidly put forward by G.E. Hutchinson in his influential 1959 address titled "Homage to Santa Rosalia, or why are there so many kinds of animals?" The answer that he put forward has had a large impact on ecology, and reverberates through the environmental movement: "the reason why there are so many species of animals is at least partly because a complex trophic organization [food web] of a community is more stable than a simple one" (Hutchinson 1959).

This idea had, and still has, an intuitive appeal to many. In 1973, however, Robert May overturned Hutchinson's hypothesis based on mathematical analyses of food webs. May showed that instead of stability increasing with increasing diversity, it actually *decreased* (Worster 1994). Using different mathematical models, many other mathematical biologists began to corroborate this contrary position, while some field studies instead supported Hutchinson's original view

(Tilman 2006). This debate continues in ecological research, with comprehensive empirical studies few and far between. According to David Tilman in a 2006 paper in *Nature*, while our understanding has greatly improved, contrary views continue to be published and even the best studies yield inconclusive results. The relationship between diversity and stability will most likely not follow a direct correlation or an asymptotic one, but instead an idiosyncratic one, with the impact of species loss or gain having a unique effect on stability depending on that species particular characteristics. Species are not elements or molecules, and extrapolating from the particular to the general in ecology is always fraught with difficulty.

A related notion that has been largely abandoned within the last generation of ecology has been that of stable equilibrium states around which ecosystems fluctuate, akin to the popular notion of the 'balance of nature' (Stevens, 1990). In contemporary ecology, Gleason's view has largely won out over Clements'. Sometimes the gazelle *will* be driven to extirpation or extinction by the lions, says more recent thinking. Sometimes drought *will* alter the basic conditions of an ecosystem. Paleoecology has brought to our attention that climatic changes are a regular phenomenon of the planet, constantly causing biological communities to shift and reinvent themselves (Novacek 2007). The massive Boreal forest that rings the Earth did not exist until the end of the last ice age some 15,000 years ago, when the glaciers that stood in their place began to retreat (Lindsey 2002). Species outcompete one another, the loser being driven to extinction. Invasive species are not a new phenomenon; the recent concern is about how rapidly human activity is shuffling species around the planet. Rather than just noise around a stable point, disturbances are now seen as a major force in structuring ecosystems, such as in the flood/fire cycles of the Everglades (Walker and Salt 2006). The concept that upon awakening our procreative and technological potential, humans have upset some ancient mystical balance is not borne out by modern ecology. While the storybook version of ecology is still reiterated by environmentalists and the media, we can now say fairly certainly that the "balance of nature" view is untenable. With this in mind, we are faced with the question 'well then, what needs saving?' As Lynne Margulis puts it in her book *The Symbiotic Planet,* "We cannot put an end to nature; we can only pose a threat to ourselves" (Margulis 1998). Rachel Carson said very much the same thing 40 years earlier in her writings about the sea.

Part II: Battle for the Middle Ground – Where Are We Going?

In a 2005 article in *Orion* magazine titled "Conservation Refugees: when protecting nature means kicking people out," Marc Dowie

wrote that while it is well recognized that native peoples have been pushed off their land as a result of resource exploitation and commerce, “few people realize that the same thing has happened for a much nobler cause: land and wildlife conservation. Today the list of culture-wrecking institutions put forth by tribal leaders on almost every continent includes not only Shell, Texaco, Freeport and Bechtel, but also more surprising groups such as Conservation International (CI), The Nature Conservancy (TNC), the World Wildlife Fund (WWF), and the Wildlife Conservation Society (WCS)” (Dowie 2005). In the world today, there exist more than 15 million so called ‘conservation refugees,’ people whose very existence clashed with the classical idea of wilderness, laid out in the US Wilderness Act of 1964: “an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain” (in Dowie 2005). Conservation refugees throw the major philosophical assumption of the Wilderness Act in stark relief. It says: “For nature to be truly natural, and therefore pristine, it needs to be free from the meddling activities of humans”. True nature and human habitation are mutually exclusive. As the brief historical sketch has shown, however, this sort of assumption is not drawn from the study of nature, but is an idea imposed onto it. It might be useful or detrimental, depending on the situation, but it should not be accepted as absolute truth.

The major problem with this dividing line is that it separates the world around us into two neat categories: pristine nature, regarded as being in a fragile balance that our actions could disrupt, and everything else, regarded as the part of the world firmly under human control. A large amount of focus is being put on the preservation of the pristine, but it is not how much land we can save in its ‘virgin’ state that will determine our survival. It is how we treat the land under our control. A caveat, however, is needed at this point. I understand that the argument I am making is polemical, and will rub some people the wrong way. Parks and wilderness areas are undoubtedly a very important part of any global environmental strategy, but their implementation must deal with human and economic realities. A notable trend from around the world raises the question of whether the exported American idea of wilderness will really bring about long term progress. As Douglas Adams has pointed out in his wonderfully incisive way in *Last Chance to See*, the economic model usually works like this: natural areas are exploited precisely to the point where it becomes more economically viable to preserve them for tourism and parks than to exploit them further. As economic circumstances change, however, so may attitudes towards the natural areas (Adams 1992). Another recent

strategy, paying the poor of the world not to exploit natural areas, is even less sustainable; in the long run people don't need money for nothing, they need lasting livelihoods.

In the case of the 15 million conservation refugees, Downey notes that displaced people are usually slowly and awkwardly brought into the monetary economy where they end up on the bottom rungs of the socio-economic ladder. Whereas before they may have lived off the land in a relatively harmless way, they are now members of that ever-growing class, the landless poor, who occupy the fringes of the largest cities in the world (Dowie 2005). These people contribute to the demand for cheap industrial food and products that further drives the degradation of the middle ground. This degradation in turn creates market pressure to exploit new resources. Consider this: the amount of arable land in crop production today is about equal to the amount of land that has been abandoned since the advent of agriculture (Pimentel and Kounang 1998). Historically this abandonment follows mistreatment, which arises from the same sort of economic pressure felt by farmers around the world today: get big or get out (Montgomery 2007). In the past, when there were but few people, there were always greener pastures or new continents to colonize when good land ran short. If this sort of degradation continues today, however, governments will not be able to justify keeping pristine parks full of valuable soil and plant resources while their people starve. And the billions of rural poor, needing to squeeze another little bit out of the land to survive, will not care about the intrinsic values of pristine nature. This is why our survival must start in the middle ground, for without the middle ground the 'pristine' parks are lost as well.

How then should we approach the management of the middle ground? Ecology has not borne out the idea of the sacred balance and the human/nature divide, but that doesn't mean that we can't use ecology to evaluate our actions and long-term plans. An emerging concept, one that underpinned the UN's 2005 Millennium Ecosystem Assessment (MEA), is ecosystem services. Ecosystem services are defined in the MEA report as "the benefits people obtain from ecosystems" (MEA 2005). Ecosystems here are defined broadly enough to include everything from the conservation area hours away to the little garden on the roof of an apartment or office building. A major aspect of the ecosystem service idea, and one that has made many people uncomfortable, is that in its framework a price can be put on things like the flood prevention and microclimate regulating services of a forest, services that wouldn't exist if the forest was cut down for timber. Global markets now exist for services like carbon sequestration, and are generally the rationale for paying people to leave forests intact. The question of just how

much global markets can be trusted to maintain the conservation incentive, especially in tumultuous economic times, is an open one.

Using the ecosystem services model as a guide, there exist other routes to managing the middle ground so that degradation is avoided and the ecosystems improved. The essential goal is to fit the land use strategy to the land itself and to diversify and optimize the ecosystem services provided (Bennett and Balvenera 2007). As an example, where there are steep slopes and thin rocky soil, annual cereal crop agriculture will not do. While it may provide one ecosystem service, that of food provision, it seriously lacks those of erosion control, soil carbon sequestration and others. A much better land use strategy would be planting trees on such landscapes if the native forest is already cut down, or leaving the native forest intact if it is not. This strategy would provide those ecosystem services lacking in the former strategy. If, however, one still wanted to use the land for food production, many options are available, such as silvopasture (trees and pasture together), tree crops, cultivation of non-timber forest products below a natural forest canopy, and other forms of so called agroforestry. In time, trees could also be cut for timber in a rotation or tapped for resin and syrup. In Canada, 50-57 million hectares of marginal and degraded land could be put into these sorts of systems, improving ecosystem services a great deal (Thevathasan and Gordon 2004). It must be emphasized that agroforestry is not for all land, and this is just the point. In Kansas, the goal would be growing food like a prairie, while in Colorado it would be growing food like an alpine forest.

Since systems like this provide a wide variety of services all in one place, pressure is eased on places set aside for protection, as the need doesn't exist for their exploitation. They are economically sustainable due to the diversified income they provide and their lower need for inputs such as fertilizer and pesticides. This sort of model urgently needs to be adopted not only in places like Argentina, which now devotes more than half of its agricultural land to soybean production for export (GRAIN 2009), but in places like Nova Scotia, where vast potential exists on our marginal forests and abandoned farmlands. If managed properly and intensively, there is no reason why we could not use this strategy to improve both our ecosystem services and our agricultural, forestry, and tourism sectors at the same time. This would not only help our own economy, but in taking international market pressure off the soybean fields of Argentina and the oil palm plantations of south-east Asia, it would help those countries develop similar methods fitted to their own particular situation. Even such seemingly small actions as planting more trees in our urban areas and diversifying

the services provided by the green spaces in our communities can, when scaled up to a global level, turn the tide in the battle for the middle ground.

Bringing the fruits of this way of thinking to bear will require a sustained act of political and economic will on the part of governments and people. An important step in making this happen is the recognition that while capital N nature is important, the battle for nature is really in everyone's backyard. The title of the MEA synthesis report is "Ecosystems and Human Well Being," not 'the well-being of ecosystems', and this message should be taken to heart. Rather than wishing we could disappear so that nature can live, we need to recognize our current position on Earth: human actions collectively have greater negative influence on the functioning of the biosphere than any other biotic factor. Like it or not, we are increasingly at the helm of Gaia, and we had better learn to steer Mother Earth. To draw on a popular comic for an appropriate adage for the situation: "With great power comes great responsibility." Saving nature for nature is tantamount to escapism in the face of this challenge. As Margulis states, in the end nature will take care of itself. Let us do the same.

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