

At Sidebar

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Biodiversity: It Is the Law of Nature and We'd Better Take Heed!

In the spirit of the theme of this issue of the *Federal Lawyer*—environmental law—and because environmental concerns of so many types are frequently lead stories in the news, it seems appropriate for me to put in my two cents. Frankly, I am not an environmental lawyer and I am certainly not a scholar of environmental issues, even though—and probably much to the chagrin of the Science Department at Long Island University—I did graduate with a minor in environmental sciences and have retained a reading interest in a wide variety of subjects within the broader discipline of environmental studies.

Because there is so much conflicting information, so many scientific perspectives, and apparently far too many political agendas being pursued, a “Sidebar” such as this certainly cannot be “politically correct” to the point of attempting to offend no one. Neither can it possibly attempt to synthesize into a cogent summary the vast amount of scientific data underlying the issues. Nor can this essay summarize the arguments for and against any given issue. What it can do, however, is draw the attention of members of the Federal Bar Association to areas in which we can contribute in the various ways that are available to us—whether it be financially or otherwise. The point is, we all better do something or our planet may go the way of the dodo bird. That said, please accept my apologies in advance, because there is no doubt in my mind that a great deal of what is written in this short space in an effort to provide some insight into “biodiversity” will offend some readers and be inaccurate in the minds of others.

It appears that the overall issue of the benefit of biodiversity is something upon which most of us can agree. Loosely defined, “biodiversity” relates to the variety of life on earth. The number of species of plants, animals, and microorganisms, and the different ecosystems on the planet, such as deserts, rain forests, and coral reefs, are all part of a biologically diverse Earth. The concern is that the loss of or reduction in biodiversity has a huge potential adverse impact on our planet and, as a result, on the continuing vitality of the ecosystems of the only place that human beings know can support life as we know it.

Some general background may prove useful. In some way or form, almost all cultures have recognized the importance for their societies of nature and its biological diversity. With that has come an understanding of the need to maintain biodiversity. The concept of biodiversity holds to the tenet that ecosystem produc-

tivity is crucial to the proper functioning of nature, where each species, no matter how small, has an important role to play. For example, greater species diversity, flora and fauna alike, ensures natural sustainability for all life forms. Biodiversity is the foundation for the world's ecosystems, and healthy ecosystems can better withstand and recover from a variety of disasters, regardless of whether they are caused by human activity or the forces of nature.

It has long been recognized that human domination of the planet compromises the general principles underlying biodiversity. In that regard, it has long been feared that human activity is causing massive extinctions of species and changes to ecosystems that upset the delicate balances that are essential to their continued productivity for all species. Preserving species and their habitats is important for ecosystems to remain self-sustaining and “healthy.” Increased efforts at conservation have not seen enough progress and biodiversity losses continue. The costs associated with deteriorating or vanishing ecosystems will be high. At risk are various ecosystems, the most noteworthy—and most attention-getting—being the polar ice caps, tropical rain forests, oceans and seas, inland water ecosystems, and coral reefs.

At the forefront of the problem may be what we all hear the most about in the news—global warming. Global warming, particularly if it is “rapid,” can jeopardize an ecosystem's chances to adapt to this climate change, thus threatening the species that live in an ecosystem and other ecosystems. Loss of biodiversity all too closely resembles the classic domino effect, whereby one occurrence sets off a chain reaction of events. Economic and lifestyle pressures place a heavy burden on ecosystems in particular and biodiversity in general. As such, conservation efforts are a struggle. Look in your mailbox every day—the “snail” mail, not the e-mail—and take note of the number of requests for charitable giving that you receive from organizations advocating environmental protection and habitat preservation. It might be time to begin contributing to those worthy causes!

A consensus seems to have been reached when it comes to identifying certain factors and circumstances that affect biodiversity. These are habitat loss and degradation, climate change, excessive nutrient load and other forms of pollution, overexploitation and unsustainable use, and invasive species. Those factors provide evidence that loss of biodiversity is real and that

the rate of loss is not being significantly reduced.

Habitat Loss and Degradation

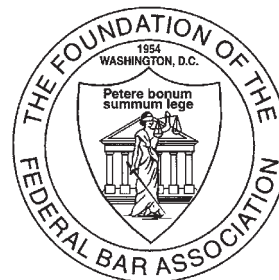
Habitat loss and degradation are generally considered to be the biggest single sources of pressure on global biodiversity. Habitat loss generally is the result of pristine land being stripped for agricultural use and the cutting of timber without replacing it with new planting. Recently, a new form of habitat destruction and degradation has entered the playing field: the demand for biofuel. In Southeast Asia, for example, birds face an especially high risk of extinction because production of biofuel has necessitated extensive development of plantations producing oil palms to create the fuel. Those plantations occupy huge geographical areas and their existence results in a destruction of native, undeveloped land. That development has a direct effect on species in the affected areas. Habitat degradation is the greatest cause of species moving closer toward extinction. Therefore, when we consider “going green” by using biofuels, we must consider the impact of their use on biodiversity, but will probably fail to take this outcome into account.

Infrastructure development—such as housing, industrial facilities, mines, and transportation networks—contribute on a large scale to the loss of native habitats. More than half of the world’s population now lives in what are considered to be urban areas. The concentration of the world’s population in sprawling urban centers has led to the disappearance of many native habitats. It is not surprising, however, to find that there are countervailing circumstances, the most noteworthy being that higher population density of cities can also reduce the negative impacts on biodiversity by allowing for the use of less land for human habitation with a positive increase in the amount of “wild” habitat. That positive note, however, cannot dispel the notion that habitat degradation is a serious concern and a major threat to biodiversity because there are no signs that global loss of native habitats is declining significantly. Nevertheless, there are indications that purposeful planning and consistent action can result in the reversal of historically negative trends in habitat degradation. The primary example of this is the recent reduction in the rate of deforestation in the Amazon Forest in Brazil.

Climate Change

Climate change is a topic in the environmental debate that seems to have leaped to the front of the line in the minds of politicians and the electorate alike. No matter what an individual’s perspective may be or on which side of the fence he or she may fall, it is at least strongly arguable that climate change is occurring and that it is beginning to have an impact on biodiversity. It seems to make sense that, if climate change becomes more pronounced, it will become a

SIDEBAR continued on page 71



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minds of politicians and the electorate alike. No matter what an individual's perspective may be or on which side of the fence he or she may fall, it is at least strongly arguable that climate change is occurring and that it is beginning to have an impact on biodiversity. It seems to make sense that, if climate change becomes more pronounced, it will become a progressively more significant threat to biodiversity. In addition to warming temperatures (and the need for significant mitigation efforts becoming more urgent based on projections for the remainder of this century), more frequent extreme weather events and changing patterns of rainfall and drought can be expected to have significant impacts on biodiversity. The highest rates of warming have been observed in the areas of the polar ice caps. Unfortunately, that historical trend is projected to continue. Ocean acidification, resulting from higher concentrations of carbon dioxide in the atmosphere, is also already being observed. The rapid reduction in the extent, age, and thickness of Arctic Sea ice, exceeding even recent scientific forecasts, has major implications for biodiversity. Yet, a recent study also shows that the ice caps in the Himalayas may be growing larger and thicker.

Scientists have also reported that the timing of flowering in the spring has already been observed. In Europe, over the last 40 years, the beginning of the growing season has advanced by 10 days on average. These types of changes can alter food chains and create "clashes" within ecosystems where different species have evolved based on varying degrees of interdependence related to mating seasons, food availability, pollinators, and plant fertilization. Changes in migration patterns have also been observed globally and may be related to the changing times for the onset of the seasons. For example, did anyone notice what appeared even to me to be a change this winter in the migration patterns of Canada geese?

A recent study has concluded that, of 122 species observed, approximately three times as many experienced a drop in population as a result of climate change as those that had experienced an increase in their numbers. Climate change is also a potential cause of a shift in the travel ranges of disease-carrying organisms. See *Invasive Alien Species, infra*. Increased distances traveled by such organisms will bring them into contact with potential hosts that, because of distance alone, have not developed immunity to a disease that may suddenly appear in a different ecosystem. Such dramatic changes will have an impact on species population bases and, ultimately, on survival because certain species (and it not yet known which ones) will be unable to keep up with the pace and scale of projected climate change. When an ecosystem is disrupted, the only options for its inhabitant species are to adapt, move, or die, thus potentially exacerbating already developing problematic conditions, particularly in those ecosystems that are already at, or close to, their abilities

to tolerate extreme temperature and precipitation levels not previously experienced. This is a vicious cycle of nature, which starts at the lowest levels of oceanic micro-organisms that lie at the very foundations of the food chain.

Pollution and Nutrient Load

Pollution from various sources is a growing threat to biodiversity. Modern industrial processes used in burning fossil fuels and certain agricultural practices involving the use of fertilizers have had significant negative impacts on ecosystems and biodiversity. Nitrogen fertilizers that stimulate plant growth have resulted in human activities adding more reactive nitrogen to the environment than all natural processes combined. The result is that plants that benefit from the added nutrients out-compete many other species and cause significant changes in the overall balance between the different types of plants that may inhabit any given ecosystem. Certain plants will live while others will die, and that affects the food chain, which, in turn, affects the wildlife. The ultimate long-term effects are likely to come in ways that we cannot now predict. And that is what makes the loss of biodiversity so alarming.

Aside from its impact on plant life, increased deposits of nitrogen are already believed to have become a major factor in species change. Biodiversity loss from this source may be more serious than first thought. For example, increased nitrogen deposits may also affect animal biodiversity by changing the composition of available food. In addition, in inland water and coastal ecosystems, the build-up of nitrogen results in increased growth of algae and bacteria, which, in turn, presents potential dangers to lakes and water quality. The oceans are not immune to the effects of increased nitrogen as they are known to experience "dead zones," in which decomposing algae use up oxygen in the water and leave large areas virtually devoid of marine life. The number of reported dead zones is increasing at an alarming rate and they are now known to exceed 500 in number.

Overexploitation and Unsustainable Use

Overexploitation and destructive harvesting practices are at the heart of the threats being imposed on the world's ecosystems and biodiversity in general. And, unfortunately, there has been no significant reduction in these activities. Overexploitation is the primary consideration in connection with marine ecosystems. Capture of marine life quadrupled from the early 1950s to the mid-1990s. The fact that, since that time, total catches have fallen is a deceiving statistic because many marine biologists fear that the reduction may be an indication not of successful conservation efforts but, rather, evidence that many stocks have been pushed

beyond their abilities to replenish their numbers. In fact, there are reliable estimates that more than a quarter of marine fish stocks are overexploited or depleted. Unless the trend is reversed, continued movement in those directions will only lead to extinction of these fish stocks. Conservation efforts typically involve imposing more realistic expectations on the size of catches that can safely be taken out of the oceans. Management practices at fisheries that give fishermen a stake in maintaining healthy stocks are proving to be effective when these practices are applied. But many stumbling blocks to success are exhibited by the activities of government and private enterprise alike.

Invasive Alien Species

Invasive alien species represent serious threats to all types of ecosystems and species native to them. A significant sample, which is admittedly an estimate, gleaned from 57 nations and involving nearly 550 alien species—including plants, marine and freshwater fish, mammals, birds, and amphibians—reflects a marked impact on biodiversity. Intervention to control alien invasive species has been successful in particular cases. But it is difficult to assess whether damage from this source is increasing because attention has been focused on the problem on a global scale only recently. In Europe, however, where introduction of alien species has been recorded for many decades, the cumulative number of invasive species continues to increase and the threat to biodiversity from new invasions remains a significant concern.

On the brighter side of the equation, since the 1980s, 11 bird species, five mammal species, and one amphibian species have seen a substantial reduction in the risk of their extinction as a result of invasive alien species. That change is primarily attributable to the successful control of the invaders. Overall, however, birds, mammals, and amphibian species have, on average, become more threatened because of invasive alien species. Unfortunately, it seems to be widely accepted that invasive species are a leading cause for concern in

connection with potential for extinction.

Combined Pressures and Underlying Causes of Loss of Biodiversity

The factors identified above do not act in isolation on biodiversity and ecosystems. Rather, each factor contributes to the impacts of the others. In general, the effect of human beings' activities on biodiversity may be best explained by reference to humans' "ecological footprint." Simply stated, that footprint may best be described as a calculation of the geographical area of land and water needed to provide the resources we use and to absorb our waste. In 2006, human beings' ecological footprint was estimated to exceed the planet's biological capacity by 40 percent! To make matters worse, the trends from available indicators suggest that the state of biodiversity is declining, the pressures upon it are increasing, and the benefits derived by humans from biodiversity are diminishing. The overall message from these indicators is that, despite the many efforts taken around the world to conserve biodiversity and use it sustainably, the efforts to date have been inadequate to address the scale of biodiversity loss or to reduce the pressure on affected ecosystems.

We all agree that diversity is a worthwhile goal and condition. We promote it in our government, in our communities, and in our workplaces. It is time to protect and promote biodiversity in our world. **TFL**

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