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OVERVIEW OF BIOLOGICAL DIVERSITY

EDITORIAL NOTE*

The Editors of the *Buffalo Journal of International Law* recognize the significance and expansive nature of biological diversity, especially as it pertains to the international community. With the ever changing and increasing implementation of legislation regarding this issue, the complexities become more apparent. With this in mind, the Editors have prepared this simplistic introduction to biological diversity to provide a synopsis for readers who are not well versed in this area. Particular attention has been paid to the footnotes in order to provide the reader with the location of further, more detailed information regarding this issue.

Biological diversity (biodiversity) involves the individual flora and fauna of the earth, their respective ecosystems and how they interact. Biodiversity comprises the assortment of life on Earth;[1] it is Nature's arsenal of life-giving and life-saving secrets, "a framework for sorting what we know about nature."[2] Many of these processes and elements have yet to be discovered. There is currently a conscious effort being put forth by the international community to discover and develop these processes. The opportunity to learn from biodiversity is being threatened by the continued growth of industrialized countries and the rapidly developing third world nations.

* We would like to thank Dawn R. Fenneman, Anne M. Gaulin, and Laura S. Mangan for all of their help.

1. Melanie J. Rowland, *Biodiversity and Ecological Management: Bargaining for Life: Protecting Biodiversity Through Mediated Agreements*, 22 ENVTL. L. 503, 505 (1992).

2. Robert L. Fischman, *Biodiversity and Ecological Management: Biological Diversity and Environmental Protection: Authorities to Reduce the Risk*, 22 ENVTL. L. 435, 436 (1992).

Regional and global efforts to preserve the declining biological diversity and to alleviate the increasing environmental problems, (although partially successful) need to be overhauled to incorporate a holistic, integrated and focused approach. There is a need to strike a balance between economic development and the consequential environmental and ecological problems. We must halt the devastation and encourage restoration and preservation. We need to restore the earth's natural equilibrium by stopping indiscriminate destruction.

The fiscal benefit, for both the public and private sectors, in maintaining biodiversity and controlling the escalating problems of pollution and other environmental dilemmas is tremendous. For example, identifying bacteria or genes naturally found in the various diverse environments of the world may benefit society in any number of ways. This includes, but is not limited to, the discovery of new and more effective pharmaceuticals which can aid in disease prevention and control, to better agricultural products and processes which can increase production and alter products to make them more useful to society as a whole. Businesses need to understand and believe this before any adequate commercial efforts will be undertaken. Furthermore, both local and international businesses must not look at short-term economic gain, rather they must realize that long-term economically sound practices can lead to even bigger profits and aid in public relations programs. Massive re-education must take place.

The extinction of species also includes a large economic loss. As the array of fauna and flora is depleted, society forfeits the chance to identify and extract useful genes and processes. Consider that half of all prescription drugs come from natural sources and wild organisms. The annual commercial value of pharmaceuticals derived from indigenous breeds is at least $40 billion US. There is also great impetus for the societal benefit of having better medicines to prolong life and to increase the quality of life for all inhabitants of the world.

There is also a somber side to biodiversity, that is not as widely discussed. Biodiversity can also have negative effects. For example, as we explore the forests of the world, altruistically trying to discover life-saving and more efficient means and processes, we may be uncovering bacteria and viruses never before exposed. This could have a detrimental effect on society. One theory holds that this curiosity that we have has led to the development/discovery of the AIDS virus; that the virus was unearthed during efforts to discover new species and processes in the African forests.[3]

Additionally, biodiversity and its associated organic processes include the power of natural destructive forces, such as hurricanes, tornadoes, avalanches and earthquakes. While these forces produce a genuine fear in

3. *Aids in Africa*, The New Yorker (Oct. 1992) at 16.

people due to their inherent strength – and the fact that they interfere with policy and social goals – it must be understood that these natural processes are necessary. The earth is using these and other natural forces to cleanse itself and to digest the effects and byproducts of economic development. "The earth functions as a result of the complex relationships among the various life-forms on the planet."[4]

"Today we are faced with a whole series of global problems that are harming the biosphere and human life in alarming ways that will soon be irreversible. There are solutions, some of them even simple, but they all require a radical shift in our thinking, our perceptions, our values, and our life-styles."[5] Social and public policy can foster this awareness through massive educational campaigns, constructive exchange among the interested parties, and a team effort in designing a solution.[6]

There is great conflict among the nations of the world as to how the preservation of biodiversity can best be achieved. For example, developing nations are disinclined to conserve their forests in order to absorb industrialized nation's carbon dioxide.[7] Additionally, people depend upon such industry for their livelihood. Therefore, nations are even further discouraged from actively pursuing this goal.

One current argument provides that the solution to this potentially life threatening problem needs a new approach – "adopting biological diversity as a fundamental focus."[8] In the United States, for example, public policy has been too limited in its strategy. The current legislative focus on governmental land effectively ignores the other two-thirds of privately held land, which is a major problem when addressing environmental issues.[9] Land-use and the resulting legislation needs to be reassessed to accommodate the reality of the United States' situation.

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4. William M. Flevares, *Ecosystems, Economics, and Ethics; Protecting Biological Diversity at Home and Abroad*, 65 S. CAL. L. REV. 2039 (1992).

5. Fritjof Capra, *Biodiversity and Ecological Management: Ecologically Conscious Management*, 22 ENVTL. L. 529 (1992).

6. Senator Albert Gore, *The Transforming Relationship Between Human Beings and the Earth*, (June 5, 1992), in *Concordare, The International Environmental Negotiation Network*, HARVARD LAW SCHOOL, PROGRAM ON NEGOTIATION, No. 2 (1992).

7. Governor Bill Clinton, News Conference (June 12, 1992) (transcript *available in* LEXIS, Nexis Library, Achnws File).

8. Fischman, *supra* note 2, at 436.

9. *Id.* at 437.

Species do not consider provincial or international borders during their normal course of functioning. What is needed is an integrated approach concentrating on the use of commercial legislation to "limit or mitigate damage to biological diversity."[10] It would be worth taking the idea of focusing on commercial laws, via redrafting, to involve and increase environmental protection, and apply them on an international scale. Environmentalists cannot hope to effectively address their problems without considering "the commercial incentives that drive environmentally destructive processes," just as businesses cannot adequately address their problems without considering the impact on the environment.[11] There needs to be a convergence of the laws in these areas.

Every human activity affects the natural flora and fauna found in any given environment. It is important to accurately evaluate the effect of the endeavor and try to strike a balance combining the commercial and social aspects of the enterprise with current environmental policy considerations. These dangerous threats to the environment are a direct consequence of society's unprecedented monumental development and accumulation of material wealth.[12] During this industrialization process, nations have ignored the devastating effect on the ecosystem.

The most prominent danger facing biological diversity is the loss or destruction of habitat resulting from human actions.[13] This is especially troublesome when there are competing biodiversity issues at hand. Just like any business venture, it is a gamble. Whether a calculated risk or not, we do not know what the effect of losing a particular variety of flora or fauna will be. For example, when considering the preservation of two endangered species, it is difficult to determine which one should take precedence.

Another contemporary approach addressing species preservation is alternative dispute resolution.[14] "Joint problem-solving can enable competing

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10. *Id.*

11. *Id.* at 502.

12. *Information Unit on Climate Change, Global Environment Monitoring System (GEMS)*, CLIMATE CHANGE DOSSIER, UNEP, (1992).

13. Paul R. Ehrlich, *The Loss of Diversity: Causes and Consequences*, in BIODIVERSITY 21 (Edward O. Wilson ed., 1988).

14. Many environmentalists are skeptical of this remedy as a result of a long history of distrust of policy-makers due to the divergent interests and agendas. *See generally*, Rowland, *supra* note 1, at 67.

interests to create innovative solutions that make the pie bigger and result in a 'win-win' solution."[15]

In order to expedite innovation, many scientists and researchers have been working with indigenous tribal leaders, learning what they can from the tribes' centuries-old practices. Although this may be a very effective way to unearth the life-saving power of nature, great care must be taken as these major multi-national corporations are in a position to take terrible advantage of these groups by exploiting their knowledge without just compensation.[16] It is estimated that one breakthrough is made out of every 5,000 discoveries, or every 10 years, and that these findings translate into billions of dollars in the world marketplace.

For any world-wide biodiversity policy to "succeed[,] it must be designed to be economically, environmentally, and institutionally sustainable over the long term."[17] Third world and developing nations must be assured of sustainable development if they are to consider abandoning their main sources of revenue generating industry. The concerns of "Industrialized countries that long ago cut down most of their own forests [are being pitted against] developing countries for whom logs are money."[18]

There is a current argument which focuses on the effect on ecosystems as a whole, rather than the effect on a particular species. Additionally, it is asserted that an underlying force in the indiscriminate destruction is the developed world's desire for, and willingness to pay for, these products. As long as there is a market for these products, there will be an industry to support it.

To examine the effect of human activity on the environment, consider the example of forests. At first glance, forest maintenance is a seemingly simple undertaking, but in reality it is a very complex issue with many interrelated intricacies. The National Forest Management Act of 1976 and the National Environmental Policy Act of 1977 (NEPA) were designed to take this into account.

Environmentalists assert that too much logging is being done and is having a detrimental effect on the forests of America, while the wood industry puts forth that logging should be increased. The National Forest Service

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15. Rowland, *supra* note 1, at 505.

16. *See generally, Concordare, The International Environmental Negotiation Network, supra* note 6, (explaining the exploitation of indigenous people).

17. *Office of Technology Assessment,* TECHNOLOGIES TO MAINTAIN BIOLOGICAL DIVERSITY 313 (1987), in Flevares, *supra* note 4, at 2039.

18. *Forests: Loss Threatens Biodiversity, Native Groups,* Greenwire, May 22, 1992, *available in* LEXIS, Nexis Library, Achnws File.

supplements and regulates the timber grown and sold from national forests. The decision to regulate the planting of a particular species of wood can affect entire ecosystems.

The NFS has a philosophy of "multiple use and sustained yield."[19] When National Forest timber is sold, the use of the entire forest system must be taken into account. Logging roads are planned to augment existing trails, so it will be useful in the future to "hikers, snowmobilers, hunters and berry pickers."[20] Keeping the forests 'green' also promotes tourism. Additionally, using local timber for furniture and fuel lessens American dependence on fossil fuels and synthetics. The natural composting of dead trees allows the captured carbon dioxide to escape back into the atmosphere, so proper forest management can actually reduce the carbon dioxide in the atmosphere.

Many of the effects of logging are obvious, such as the loss of habitat for certain species of mammals, birds and insects, and soil erosion from the lack of protection from rain and other environmental elements. However, there can be positive effects as well, creating fields and different habitats for deer and other forest animals, although these benefits are short-term.

The subtleties of logging are far more serious. The increased soil run-off from the escalating erosion will directly affect the neighboring waterways. Nearby streams become too muddy for fish to swim upstream; this affects their ability to reproduce and naturally affect the ecosystems upstream. As a result, certain species will or will not become prey, which can ricochet into other ecosystems within the same area. Certain fungi are necessary for certain species of tree roots to be able to absorb nutrients; if these fungi are lost, so are the trees. "Thus the loss of a single species may weaken and threaten, even destroy, entire natural ecosystems."[21]

The Blue Mountains in Oregon serve as an example. The trees that were logged were replaced with a different species of timber. These other species were cheaper and grew faster than the original growth forests of the area. The public relations aspects of this commercial enterprise appeared desirable because the forest would be replaced quickly. The only problem with this 'managed monoculutre'[22] was that the species used to replant the forest was the wrong type. The original trees were a hearty blend which

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19. Ed Barna, *Green Mountain Logging Plan Debated*, VERMONT BUSINESS MAGAZINE, Vol. 19, No. 9, Sec. 1, (1992) at 36.

20. *Id.* at 36.

21. R. John Roush, *The Disintegration Web: The Causes and Consequences of Extinction*, NATURE CONSERVATORY, Nov./Dec. 1989, at 7, in Rowland, *supra* note 1, at 506.

22. *The Future of Forests, Tree-lover, spare the woodman*, THE ECONOMIST, June 22, 1991, Special, U.K. Ed. at 19, *available in* LEXIS, Nexis Library, Omni File.

withstood the attacks of the many kinds of locally vibrant pests; the replacement trees were not able to survive such attacks and died. As a result, the forest of this area was almost destroyed.[23]

All-age forests[24] appear to provide the greatest diversity. Living and composting trees are important for all aspects of an ecosystem: the wildlife, the mosses, the fungi, the insects and the fauna. Ancient forests provide a unique habitat that cannot be replaced.[25]

When the habitats for species are destroyed, whether by changing the deciduous nature of an area, filling the streams with an abundance of mud or leveling the forests altogether, the effects can be widespread. For example, migrating birds may no longer have a place to rest on their way to or from their migration place and fisheries can be adversely affected. Even if the replacement trees are correct for the area, environmentalists are concerned with the effect of logging on nature.[26]

It is the loss of habitat which is the greatest threat to the survival of non-human species.[27] It is fairly clear to see that commercial enterprises should be evaluated very carefully, as the ripple effect can be devastating.[28] Forest management is one small part of environmental preservation and rejuvenation, but it provides an adequate demonstration of the intricacies and multiplicity of issues involved in biodiversity. Improved technology coupled with increased interest can make logging more efficient while doing less harm in the process, thus pleasing all parties involved.[29]

Expand the preceding example to include rain forests. As rain forests decrease in size, this could have a ripple effect and impact the climate

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23. Adapted from an interview with James A. Boyle, Oregon State Trade Representative, in Taipei, Taiwan, November 1992.

24. Forests with new, medium and old growth, thus sustaining a wide range of biodiversity.

25. The spotted owl in Oregon and Washington depends specifically on ancient forests for its habitat.

26. *The Future of Forests, Tree-lover, spare the woodman, supra* note 22.

27. Rowland, *supra* note 1, at 505.

28. Fischman, *supra* note 2, at 443.

29. "New forestry" includes sparing the odd mature tree, the trunks, the natural litter of the woods, leaving a more natural habitat for new growth and already existing wildlife. Sawmills are much more efficient, use less timber, recycle waste materials, and use less bleach in the production of paper. In-forest methods now include "feller-bunches" which cut commercial trees at the base and lay them down, to avoid crushing other fauna in the area. The machines used in logging are being redesigned to reduce damage to the forest floor. *The Future of Forests, Tree-lover, spare the woodman, supra* note 22, at 111.

substantially. This climate change will be felt globally and may affect agricultural production all over the world.[30] Although scientists are unsure as to the actual impact of climate change on agriculture, they believe that the increase in carbon dioxide levels in the atmosphere could promote crop growth. This would relocate the world's climatic and agricultural zones toward the poles. The resulting increase in temperature could increase summer dryness and foster the growth of some species while harming others. It is the uncertainty of the results of these forces which concerns scientists most.[31]

It is predicted that the poor would suffer disproportionately from these dramatic effects. Cultures relying on agriculture, marine industry, or forestry would see their livelihoods altered, if not destroyed, by the diminished rainfall and degraded soil, forests and fisheries. Countries and communities who have limited resources would suffer most prevalently due to their inability to adapt to the changing conditions. The effect of biodiversity loss and the resulting climate change could "exacerbate hunger and poverty around the world."[32] The solutions to many of these predicaments require long and expensive measures, things that poorer countries cannot afford.[33] However, the best solution may lie in an enforced multi-lateral agreement preventing the mutually destructive overdevelopment of industries that greatly contracts the available world biodiversity. All efforts should be made towards this goal.

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30. The climate system is complex. It is governed not only by what happens in the atmosphere, but in the oceans, the cryosphere (glaciers, sea ice, and continental ice caps), the geosphere (the earth's solid surface) and the biosphere (living organisms in the oceans and on the land). The interactions between these various "spheres" are difficult to predict, not least because their respective processes occur on widely differing time scales. The typical equilibrium response times of the climate system's various elements range from a single day to a few centuries. Taken directly from *Information Unit on Climate Change, United Nations Environment Programme Global Environment Monitoring System (GEMS),* CAUSES OF CLIMATE CHANGE, FACT SHEET 3, AN INTRODUCTION TO THE CLIMATE SYSTEM, UNEP, (1992).

31. For example, it is difficult to ascertain the effect on crops and pests, how their interaction will evolve and what affect, if any this will have on other species. *See Information Unit on Climate Control Impacts of Climate Change, Global Environment Monitoring System (GEMS),* 1 FACT SHEET 101, THE IMPACT OF CLIMATE CHANGE ON AGRICULTURE, UNEP, (1992).

32. *Information Unit on Climate Change, Global Environment Monitoring Systems (GEMS),* IMPACTS OF CLIMATE CHANGE, ,FACT SHEET 111, CLIMATE CHANGE SCENARIOS: WHY THE POOR ARE MOST VULNERABLE, UNEP, (1992).

33. For example, irrigation equipment, changes in production processes and crops themselves, innovative fishing methods and equipment, all would be difficult for a poorer civilization to acquire.