Preserving Biodiversity in Forest Ecosystems:

Case studies from Asia and Latin America hold lessons for a global response to the challenge of conserving biological diversity

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Abstract

This paper examines the commitments the international community made in the Convention on Biological Diversity, and contrasts them with the current status of biodiversity conservation efforts, specifically within forest ecosystems. Recognizing both the importance of action to preserve biodiversity, as well as the challenges encountered by both developed and developing countries in doing so, the paper examines three case studies which each present distinct approaches to sustaining biodiversity. The first case study, from Indonesia, emphasizes the central role that NGOs can play; the second, from a network based in Canada, explores the potential models of interaction between developed and developing countries; and the third, from Costa Rica, offers insights into a type of partnership which has yet to be fully explored at the international level – the introduction of a profit motive in preserving biodiversity. The paper then concludes with six general recommendations drawn from the experience of the three case studies, and informed by additional research.

"To halt the galloping extinction of other species, which has devastating implications for human life, we must clamp down on illegal and unsustainable fishing and logging practices; we must help people who currently depend on such activities to find other, more sustainable ways of earning their living; and we must fund new research into ecosystems and biodiversity."

Kofi Annan,
Secretary General of the United Nations[1]

"Knowledge is powerful only when it is shared."

Henry Lickers,
Mohawk Council of Akwesasne[2]

Introduction

Eleven years after the Convention on Biological Diversity was adopted amidst considerable publicity at the Earth Summit in Rio de Janeiro, the international challenge of preserving biodiversity remains unanswered – in spite of widespread commitment to the Convention (more than 180 parties).[3] While estimates concerning the cost of biodiversity vary, and are complicated by the very nature of the problem (how can one quantify a problem which is defined by its very uncertainty?), the alarming destruction of the principle reservoirs of biodiversity – tropical rainforests, wetlands, coastal mangroves and coral reefs – makes a compelling case for immediate action. Scientists now estimate that species have been disappearing at 50 – 100 times the natural rate (a pattern which is expected to increase), and that some 34,000 plants and 5,200 animal species currently face extinction.[4] In short, preserving biological diversity continues to be of significant

[1] Annan, Kofi. The Earth's Second Chance. *Financial Times* May 29, 2002. Internet URL: http://www.internationalforum.com/Articles/The%20earths%20second%20chance%20-%20annan.htm
[2] Lickers, Henry. The Effects of Toxic Chemicals on Ecosystems: Community-based Monitoring Programs. The Ecological Monitoring and Assessment Network, 1995. Internet URL: http://www.eman-rese.ca/eman/reports/publications/national95/part27.html
[3] Parties to the Convention on Biological Diversity. *Convention on Biological Diversity*. Internet URL: http://www.biodiv.org/world/parties.asp?sort=date
[4] Secretariat of the Convention on Biological Diversity. Sustaining Life on Earth. April 2000. p. 5

concern – in spite of a Convention which attracted much attention, but sadly not an equal commitment from the international community.

To be fair, why should countries be concerned with biological diversity? It is not a problem which seems to demand an urgent response: indeed, unlike other global concerns (such as AIDS), where the problem can be measured in lives lost, the problem of biodiversity is hard to quantify, and at best, can only be seen through the prism of lives not saved, a subtle but important difference. What, therefore, is so compelling about preserving biological diversity that precious resources and energy should be invested in conservation efforts?

While some proponents of action would advance an argument based on morality (and the notion that it is unethical for humans to cause the extinction of other species), there are other, more practical reasons, which, while not detracting from the moral position, are certainly compelling to those who would dismiss it. Consider, for instance, the fact that one quarter of all pharmaceuticals in the United States are made from plants; or that eighty percent of the people in the Third World depend upon natural remedies derived from plants for their primary health care.[5] Each day brings the increased destruction of ecosystems, and by extension, greater potential that humanity may be inadvertently destroying its best hope of beating AIDS, SARS or any other host of illnesses which at present have no cure by causing the extinction of even a single species. If this seems alarmist, the case of the Madagascar periwinkle makes a convincing case for the urgency of protecting the earth's biological resources.

[5] Coughlin Jr., M.D. Using the Merck-INBio Agreement to Clarify the Convention on Biological Diversity. *Columbia Journal of Transnational Law* 31 (2): 337 – 75

The Madagascar periwinkle, whose only natural habitat was the Madagascar rainforest (one of the ten recognized "hotspots" of biodiversity on earth, and home to many animal species found nowhere else on earth, including: butterflies and moths, 97%; primates, reptiles and frogs, 90%; and flowering plants, 75%) is now extinct in the wild due mainly to extensive and unsustainable logging practices.[6] The periwinkle increases the chance of survival for children with leukemia from 20 percent to 80 percent – a remarkable 300% increase from a single plant.[7] Had the periwinkle's properties not been recognized before the destruction of the forest ecosystem in Madagascar caused its elimination, thousands of patients suffering from leukemia would not have access to the vital medicines derived from the plant. As deforestation continues, how many "Madagascar periwinkles" are we destroying, and with them, our chance for a better life?

The Convention on Biological Diversity

The Convention on Biological Diversity, recognizing the critical importance of preserving humanity's inheritance from mother nature, was an effort to bring countries from around the world together to develop mechanisms to support biodiversity. The Convention also sought to reconcile the various factors which contribute to a decrease in biodiversity. The Convention recognizes, for instance, the crucial role that indigenous communities can play in preserving biodiversity – but this can only be achieved with the understanding that these communities often draw their livelihoods from the principle reservoirs of biological diversity – the forests and the oceans. It is not enough simply to

[6] Bryant, Peter J. Biodiversity and Conservation. p. 12 Internet URL: http://darwin.bio.uci.edu/~sustain/bio65/lec10/b65lec10.htm
[7] Taylor, Leslie. Herbal Secrets of the Rainforest. Prima Publishing, 1998. Internet URL: http://rain-tree.com/facts.htm

say that it is important that this life must be protected – policy makers must also ensure that in protecting the biodiversity for all of humanity, indigenous people do not suffer severe economic consequences.

This paper seeks to analyze current systems of promoting and conserving biological diversity within the context of the mandate defined by the Convention on Biological Diversity, and to provide recommendations for how these valuable efforts can be strengthened. Of particular note is the attention paid to technology transfer in the case studies and the recommendations derived from them – although technology transfer is by no means the only solution to the problem, it certainly presents interesting opportunities for further collaboration which have yet to be explored fully.

Due to the scope of biodiversity, this paper narrows the discussion to those elements which relate to forest ecosystems. Although the case studies are drawn from Latin America and Asia, the recommendations certainly apply to Africa. In part, this is because of the rich, and in many respects, unique biological life which can be found in Africa; in part because this life is little documented and poorly understood; and in part because the framework of the G-8 and NEPAD collaboration, as well as other new initiatives, such as the Millennium Challenge Account, might provide additional sources of funding and support channeled at Africa nations in particular.

The principle objectives of the Convention, "are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies."[8]

[8] Convention on Biological Diversity Article 1: Objectives

When the Convention was drafted, developing countries, confronted with a variety of more immediate and more pressing problems (hunger, poverty, disease to name a few) insisted that without support from developed countries – both through funding and through the transfer of technology – they would not be able to effectively support biological diversity. As a result, a remarkable clause was inserted into the Convention, placing the onus for advancing the agenda of the Convention squarely on developed countries who signed the Convention (including the United States): "The extent to which developing country Parties will effectively implement their commitments under this Convention will depend on the effective implementation by developed country Parties of their commitments under this Convention related to financial resources and transfer of technology."[9]

Technology transfer is frequently conceptualized through the prism of infrastructure development (i.e. assistance with electricity generation projects) and its connection with preserving biodiversity has yet to be fully explored – or indeed, understood – in spite of the prominence it is given in the Convention. Technology transfer does not necessarily imply (and in fact, ideally should not involve) the migration of highly advanced technologies from developed countries to developing countries. Technology transfer may involve something as simple as developing more fuel efficient stoves requiring less wood (or even better, shifting the fuel source from wood to methane for instance) or something as complicated as an advanced set of computer tools to develop projections for biodiversity.

Technology transfer also does not necessarily imply the transfer of technology (or knowledge) from developed countries *to* developing ones. Indeed, some of the most

[9] Ibid. Article 20, Paragraph 4

effective types of technology transfer involve the transfer of technologies from developing countries to other developing countries. Such transfers are known as South-South transfers; by extension, North-South are from developed to developing countries, and South-North obviously the opposite.

Effective transfer of technology has several important characteristics. The first is a solid grounding in local concerns and capacity. Technology transfer will understandably be most useful where the technology responds closely to an identified need of the local community. In addition, if the transfer takes the form of the exchange of physical technology, the technology should be easily maintained with resources and materials available locally.

Technology transfer does not necessarily imply the free distribution of knowledge or goods, although this is of course one form it can take. The transfer of technology will have a cost at some point – even if that cost is borne by the developed country entirely. Effective technology transfer will also look at the relationship between the cost of the transfer and the potential effect it will have. In some cases, while transferring technology may make a particular operation more efficient, it may be cheaper to fund it using more traditional methods. This is particularly true in developing countries with low labour costs, where replacing manual with mechanical labour can often be more costly, and has obvious negative implications for the financial and economic stability of the population.

Those involved with the transfer of technology also have to pay particular attention to the question of ownership. Developing countries have in the past complained of transfers where not only the technology remains controlled by the donor, but the products of the technology do as well. In short, developing countries do not welcome a

system where foreign companies can patent exclusively products designed on the basis of the biodiversity found within their borders. Developed countries, on the other hand, have justifiable concerns about intellectual property rights and the abrogation of patents by developing countries. As a result, technology transfer has stagnated and has never achieved the central role to the preservation of biological diversity that the Convention envisioned. Clearly, there is a need to rethink the technology transfer paradigm and to develop a new system which will address the concerns of developed countries while recognizing and resolving the valid issues raised by developing countries, perhaps by involving more directly those who hold the patents, as one of the case studies explores.

The scope of this paper does not allow for detailed engagement with the specifics of any of the case studies – clearly, each case raises a number of issues which in and of themselves could stretch the breadth of the paper. The case studies are therefore not presented as ideal models which should be adopted without consideration of their possible drawbacks, but rather as innovative programs which have achieved demonstrably significant results for biodiversity conservation and which may provide a basis on which to build new initiatives.

Forest Ecosystems

Although it is difficult, and in many ways impractical, to quantify certain elements of the environment as "more important" than others, there is little doubt that forests have a significant relationship with the continued survival of humanity. Forests are home to more than half a billion people around the world, and directly support the

livelihood of roughly 150 million indigenous people.[10] Forests alone are estimated to nurture more than 13 million distinct animal, plant and insect species, with tropical rainforests accounting for half of all terrestrial biodiversity.[11]

For too long, forests have been exploited in an unsustainable (and, as new studies have shown, often unprofitable) manner which has had widespread results.[12] By absorbing and regulating run-off water, forests prevent topsoil erosion, which in turn reduces the risk of severe flooding. In mountainous regions, by anchoring the soil, forests help to prevent landslides whose destructive properties are well known. Of particular note in a number of countries in Africa, forests help to act as a buffer between increased desertification and agriculturally productive land. With respect to biodiversity in particular, however, there is a direct relationship between forest loss and species loss.[13]

Most significantly for the purpose of this paper, however, is the role that forests play in fostering biological diversity. The US National Cancer Institute has identified over 3,000 plants which have significant medicinal value in counteracting the effects of cancer.[14] More than 70% of these plants come from the forest (in some cases, very specific forests – such as the example of the Madagascar periwinkle described earlier).[15] Tropical forest ecosystems left intact, therefore, promote and foster a biological diversity unrivaled anywhere else, except perhaps in select areas of the world's oceans.

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[10] International Model Forest Network. Spreading the seeds for a sustainable future. p. 3
[11] Putz, Francis E. *et al*. Biodiversity Conservation in the Context of Tropical Forest Management. *Environment Department Papers*. p. 17
[12] Secretariat of the Convention on Biological Diversity. Assessment, Conservation and Sustainable Use of Forest Biodiversity. *CBD Technical Series 3*. Montreal, 2001. p. 6
[13] Sancho, Eugenia. Biodiversity Planning Support Programme Integrating Biodiversity into the Forestry Sector. *CIFOR, UNEP* and *GEF*. p. 25
[14] Taylor, Leslie. Herbal Secrets of the Rainforest. Prima Publishing, 1998. Internet URL: http://rain-tree.com/facts.htm
[15] Ibid.

The world's forests are increasingly under attack for a variety of reasons. The demand for the principle products from wood – paper, fuel, furniture – has exploded over the last century. Large swaths of forest have been cleared to make way for sprawling cities or new agricultural land (the clearing of the Brazilian rain forest to make room for new cattle ranches which require significant tracts of land are the best known but certainly not only example of this). In addition, short-sighted forest logging policies driven by a desire for maximum profit with minimal consideration for the environment – from clear cutting for timber, to indiscriminate slash and burn tactics to prepare land for agricultural use. As a result, the world's forest cover has diminished by an astonishing four million square kilometers since 1900 – and seventy five percent of that has been achieved in the last twenty years.[16] To place the scope of this deforestation in context, forests the size of India have disappeared since 1980. If deforestation continues at this rate, forests the size of Mexico will be eliminated in fifteen years.[17]

Deforestation ironically may lead to the very problems that it is meant to resolve in the first place. The destruction of forests to make way for new agricultural land can cause productive soil to be depleted so quickly that the land rapidly becomes like a desert. The UN in 2000 reported that half of all land in South Asia has lost agricultural potential because of desertification.[18] Cyclically trapped in a system which requires more trees to be cut down to compensate for desertification, a significant, and more intelligent, response is required not only to halt desertification, but slowly to begin the process of reversing it.

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[16] Armstrong, Jim *et al*. IMFNS Outcomes Assessment. *The Governance Network*. July 2000.
[17] Ibid.
[18] The State of the Environment Report in Asia and the Pacific. UNEP. 2001.

Deforestation however cannot be resolved by reforestation alone. It is not enough to cut down a forest diverse in tree species which provides a flourishing ecosystem for a variety of animals, plants and insects, and to replace it with a "monoculture" plantation (which is often the form that reforestation takes). Even if every tree which was logged or destroyed was replaced by another tree, the implications for biological diversity would continue to be significant.

Deforestation is not only the act of large, insensitive multinational corporations, however. The forest is the source of livelihood – and indeed, survival – for millions of people around the world. In developing countries, in particular, the forest is often viewed as a critical resource which can mean the difference between life and death. In some cases, deforestation occurs because there is no alternative fuel source. Large scale deforestation in Afghanistan and Tajikistan over a series of successive cold winters has demonstrated this reality. In other cases, the need for agricultural land to sustain one's immediate family causes small scale deforestation, which, when aggregated on a national scale, can develop a new significance. The extraordinary value of a number of trees found in tropical forests – particularly rainforests – cannot be overlooked. In many areas, the local population will log the forests for larger corporations out of desperation for income and employment – simply prohibiting logging in the area will not solve the critical needs of these people.[19]

This is not, of course, to suggest that deforestation should be allowed to continue simply because poverty exists. Instead, it is clear that any solution to the problems of deforestation and decreased biodiversity must entail a comprehensive approach which

[19] Bryant, Peter J. Biodiversity and Conservation. p. 9 Internet URL: http://darwin.bio.uci.edu/~sustain/bio65/lec10/b65lec10.htm

recognizes the various social and economic dimensions of the problem. The three case studies which follow offer hope for developing policies which will seek to reconcile the wide variety of interests and needs which connect with the forest, and therefore preserve their resources for future generations of people across the globe.

Case Study #1 – Sumatra

An immediate and obvious problem confronting many developing countries today is their ability to enforce environmental policies. While those in developed countries have access to greater financial resources, technology such as satellite imagery (for monitoring logging in remote areas), and can rely on strict financial and legal penalties for non-compliance, some developing countries are, to a certain extent, unable to monitor corporations effectively and are faced with a limited set of consequences they can apply to multinationals whose base is outside of the country. Such a situation occurred in Sumatra, Indonesia in the mid 1990's, where the illegal logging of the rich forests of Indonesia had reach the point where it accounted for half of all logging in the country.[20]

A complicated system of logging permits, established in part to protect Indonesia's resources, and in part, some would argue, as a result of an overactive and underpaid bureaucracy, led some companies to conclude that it would be more profitable and more efficient to make arrangements with local communities to harvest the wood in their areas. An intricate network of bribery, coercion and black market activities emerged in Sumatra, which was a focal point for this type of business.

[20] McCarthy, John F. 'Wild Logging': The Rise and Fall of Logging Networks and Biodiversity Conservation Projects on Sumatra's Rainforest Frontier. CIFOR Occasional Paper 31. p. 3

The companies had little concern for logging the forests in an environmentally sensitive manner – and clear cut logging and other mass harvesting practices were common.[21] By paying their workers salaries significantly above the local norm (but marginal wages nevertheless when compared with the profits the companies were making), the companies distorted the equilibrium of the local economies, causing significant price inflation and a scarcity of goods. Frustrated villagers, recognizing the implications of the exploitation, appealed to external agencies, including the World Wildlife Fund, for assistance.

WWF initiated a series of interventions in the region, which collectively, came to be known as community-based conservation (CBC), an approach the emphasized community participation in sustainable development. CBC takes a distinct approach from other conservation efforts. Instead of advocating the separation of people and forests (essentially, declaring zones to be "protected areas" and prohibiting commercial activity linked to the forest), CBC sought to find some sort of common ground which would reconcile indigenous rights to use the forests for their survival and livelihood with the need to conserve biodiversity.

The CBC program in Sumatra was multi-faceted. Recognizing first and foremost that a change in the mindset of local leaders was necessary (many of whom were profiting comfortably from the arrangements with logging corporations), WWF organizers facilitated a series of meetings with local community and religious leaders. WWF approached these meetings not with the intention of telling communities to stop supporting logging, but rather, to inform these leaders about the environmental consequences of these actions. The atmosphere at these meetings was one of trying to

[21] Ibid.

find middle ground between the need to protect the environment and the need for indigenous communities to sustain themselves, and as a result, led to a series of positive collaborations between the NGO and community.

CBC began then to explore alternative income-generation schemes tied to the forest. One of the immediate options that arose was the idea of creating an "extractive reserve", where members of the community could harvest particular products growing in the forest in a sustainable manner. The forests were found to yield large quantities of damar resins, oil and rattan, among other products. WWF brought in staff to teach villagers the most effective methods for harvesting these products, and also to instruct community leaders on the importance of not over-harvesting the products out of a desire for short-term gain at the expense of long-term development.

With support from the community, leaders of the CBC program approached the national government and regional councils responsible for natural resource management. An agreement, signed in 1997, provided a tract of almost 14,000 hectares to be set aside as an extractive resource for indigenous communities in the area.[22] The contract was established on a 5-year, indefinitely extendable term, but most importantly, guaranteed the sanctity of the forest. The active cooperation of local communities also meant that corporations and other groups were no longer in a position to by-pass the national government or to log in the area without a permit.[23] While early results were positive, the economic crisis sweeping through the region dramatically affected the potential for harvesters to earn a substantive income. However, other factors being equal, the

[22] Ibid.
[23] To avoid the possibility of having "cheaters", local communities instituted stringent laws for illicit logging (including jail time of up to 10 years for possessing a chainsaw without a license) and in addition, began a high profile (covered in the media) campaign to spike the trees in the reserve, thereby providing significant incentive for loggers not to cheat.

Indonesian example provides an excellent model of cooperation leading to a sustainable forest ecosystem.

Case Study #2 – The International Model Forest Network

The International Model Forest Network (IMFN) was announced by the Canadian Government following the Earth Summit in Rio de Janeiro in 1992. The IMFN aimed to build upon the experiences and accomplishments of the Canadian Model Forest Network (whose primary emphasis had been the sustainable management of forests for logging and timber harvesting) and extend this engagement with forests to include a wider spectrum of issues, particularly those dealing with ecosystem and biological diversity preservation.[24]

The IMFN, headquartered in Ottawa, "aims to facilitate international consensus and action on the sustainable development of forests in all eco-regions of the world."[25] The Network is driven by three principles:

1. Identifying all relevant stakeholders and building working partnerships among them (stakeholders may include governments, local communities, corporations with interests in the forest, research centers, universities, indigenous peoples, farmers, and private land owners, among others);
2. Applying and sharing new technologies and management concepts (these may include new / more efficient logging techniques, the use of advanced computer modeling and GIS to predict the effects of logging on biological diversity, the exchange of information from scientific / research groups to

[24] International Model Forest Network. Spreading the seeds for a sustainable future. p. 14
[25] Armstrong, Jim *et. al.* IMFNS Outcomes Assessment July 2000 p. 5

policy makers, the introduction of new agricultural techniques to enhance land productivity, and the development of new policies intended to promote sustainable forest use);

3. Developing programs that balance environmental conservation with social and economic objectives from the perspective of local needs and global concerns (these programs may involve development of alternative forest-based industries such as eco-tourism, promotion of local industry engaged in the secondary and tertiary development of logging products, supporting indigenous use of forest resources for income-generation, and encouraging new policies such as user fees for the preservation of biological diversity).

The IMFN currently runs a number of "model forests" across the globe, with a scope totaling more than 12 million hectares.[26] The success of the program has depended on large part on the active cooperation of national and regional governments – in countries like Ecuador, the program has failed, principally because of the lack of national government support, in spite of the significant financial resources invested in the project.[27]

The IMFN seeks to foster biological diversity in two significant ways: firstly, by setting aside a portion of the model forest as a natural reserve (the traditional approach to biodiversity), and secondly, by seeking to develop innovative approaches to the traditional use (and destruction) of forests for subsistence. Model forests are established in areas where there is significant biological diversity and where a potential threat exists to this biodiversity – so at the heart of the IMFN is a desire to preserve biodiversity.

[26] Ibid. p. 12
[27] Ibid. p. 29

Much of what the IMFN has learned and applied over the eight years it has been in operation may generally apply to more than simply preservation of forest biodiversity. The need for local community engagement in the project is seen as an essential component of preserving forests – an engagement that covers the full spectrum of forest resource use and preservation. Indeed, studies have demonstrated (unsurprisingly perhaps) that awarding forest concessions to local communities (instead of corporations with a base outside of the community) demonstrably reduces uncontrolled fires and general forest degradation.[28] The experience of the IMFN has also shown that inclusion of actors not usually thought to have an interest in the preservation of biodiversity (such as the Catholic Church in Chile) can also help catalyze sustainability efforts.[29]

The experience of the IMFN in Chile is one case which deserves particular attention. The 173,000 hectare model forest established by the Chilean government on the southern island of Chiloé. The model forest, linking indigenous peoples, community leaders, the Catholic Church, a number of NGO's, and corporate interests, was created to improve living conditions, conserve biodiversity, and promote the island's distinct traditional culture.[30] The forests of Chiloé were threatened by two major forces: excessive timber harvesting and clearing land for agricultural purposes. The IMFN coordinated the transfer of agricultural best practices from Canada and Mexico to Chile as an initial step to reduce the pressure on the forests. It also established programs among the local community to engage in income-generation projects outside of forest logging, including charcoal production, basket weaving, wood carving, nut harvesting and the production of natural dyes. Finally, it helped to reorient logging to target the

[28] Ibid p. 5
[29] International Model Forest Network. Spreading the seeds for a sustainable future. p. 16
[30] Ibid. p. 16

native Canelo tree, considered to be a weed species in such a way that logging ultimately *helped* to foster greater diversity in the forests. Efforts to encourage lumber and furniture production from the Canelo are currently underway.

One final strength of the IMFN model should be noted. The IMFN, as noted earlier, is coordinated through a secretariat based in Ottawa. Although the office is small (only two employees), the advantages of centralizing information sharing between various model forests should not be overlooked. The existence of the IMFN secretariat allows not only for a dedicated body to promote the development of new model forests, but facilitates the important transfer of technology (such as GIS mapping software developed in Canada and used extensively now in Mexico and Chile) and the exchange of ideas and experiences between different model forests.

The IMFN model therefore, while dependent on the strong commitment of a variety of partners, particular national and regional governments, is one which presents exciting opportunities for the preservation of biodiversity in vital forest ecosystems of Africa through a broad-spectrum approach to development.

Case Study #3 – Merck-INBio Agreement

When the US Ambassador to the UN, Madeline Albright, signed the Convention on Biological Diversity, she did so noting that the United States had reservations about the Convention. Two items in particular concerned the United States: firstly, the funding mechanism which placed an onus on developed countries, and secondly, the approach to patent rights and royalties, combined with the US interpretation that the Convention would force technology transfer. A unique partnership developed between the private

sector in the United States and the government Costa Rica offers one alternative model for circumventing US concerns, while advancing the purpose and goals of the Convention.

In late 1991, the US pharmaceutical giant, Merck, concluded an agreement with the government of Costa Rica, specifically, the National Biodiversity Institute (INBio), a non-profit scientific organization created by the government. Costa Rica's rainforests are among the richest and most diverse in Latin America, but, as with forests in other parts of the region, they were under threat from loggers and agriculturalists seeking new land. Indeed, had the rate of deforestation from the 1970's continued unabated, Costa Rica would have exhausted her forests by 2000.[31] Costa Rica's government has long supported steps and measures to improve biodiversity (such as the innovative program known as Payment for Environmental Services, where the income from a tax on fossil fuel use is returned to private owners of forested areas as a payment for the public good they are providing[32]), and the creation of INBio was a significant step in this regard. INBio is responsible for studying and cataloguing the thousands of different forms of biological life found in Costa Rica's forests – the results of its research will help the government to design policies which are more responsive to specific threats to the biological diversity of the island.

Under the terms of the agreement signed with Merck, the company agreed to provide INBio with $1 million in immediate funding, and additionally, to donate more

[31] Sancho, Eugenia. Biodiversity Planning Support Programme Integrating Biodiversity into the Forestry Sector. *CIFOR*, *UNEP* and *GEF*. p. 1
[32] Secretariat of the Convention on Biological Diversity. Assessment, Conservation and Sustainable Use of Forest Biodiversity. *CBD Technical Series 3*. Montreal, 2001. p. 6

than $130,000 of laboratory equipment to the organization.[33] Merck will also provide technical guidance and support to the INBio staff to further facilitate the cataloging and analysis of the various plants and animals. In return, INBio provided Merck with the exclusive right to study 10,000 samples of plants, animals and soils for two years. Merck would retain the patent on any discoveries with medicinal value. Most significantly, however, was the provision in the agreement that Merck would pay the Costa Rican government a percentage of the royalties from whatever drug it produced – royalties not only from sales in the United States or Costa Rica, but from all sales. The Costa Rican government has committed to reinvesting at least half of these proceeds into further efforts to preserve its biological diversity.

This remarkable agreement generated a great deal of attention in 1991, with detractors claiming that Merck was exploiting the Costa Rican government, and supporters arguing that this type of partnership resolved both developing country concerns about the exploitation of their natural resources and corporate worries about not retaining the patent on products they invest significant amounts of research and resources in. Whether the specifics of the agreement were "just" is not the matter for this paper – it is the principle of the agreement that is so appealing.

The agreement takes the inherent biases of the capitalist market system and puts them to work in favor of biodiversity conservation – a rare feat in a world where the choice is often painted as one between the environment and economy. Merck may have paid a million dollars to the Costa Rican government, but that investment is marginal compared to the potential profits that could be made from just a single significant

[33] Coughlin Jr., M.D. Using the Merck-INBio Agreement to Clarify the Convention on Biological Diversity. *Columbia Journal of Transnational Law* 31 (2): 337 – 75

discovery. Equally, Costa Rica's efforts to support its biodiversity have received a large financial boost which does not come at the price of seeing a multinational corporation destroy its natural resources. Furthermore, the Costa Rican government has an incentive to further develop and preserve its biological diversity – having given Merck access to 10,000 samples, presumably it could turn around to sell additional samples for more money. Finally, profits from any drugs which are developed through this partnership will be invested in preserving the biodiversity of the island – an outcome which allows both the Costa Rican people and their environment to win.[34]

The inherent strength of such partnerships should not be overlooked or marginalized in the quest to conserve biological diversity. This agreement involved both technology and knowledge transfer: first, the immediate donation of technical equipment which would support INBio's efforts to catalogue Costa Rica's biological organisms, and second, capacity building by scientists from Merck to develop the skills of their counterparts in Costa Rica.

Furthermore, such partnerships recognize the importance of maintaining biodiversity for economic profit, not only for a moral or logical basis. For developing countries, this has consistently been a problem with biodiversity – countries primarily concerned with bringing their citizens out of desperate poverty are hardly inclined to commit resources to an activity, which although important, can hardly be justified as an immediate priority. Additionally, as these countries often do not have the technical or financial resources to capitalize on their biodiversity, they have historically been forced to watch as multinational corporations exploit local knowledge and retain all the profits for themselves. The Merck-INBio agreement, therefore, points to a future where both the

[34] Ibid.

MNC and local government have stakes in any discoveries from which both can expect to gain, in addition, of course, to the strengthening of biological diversity.

Recommendations

International concern for the preservation of biological diversity, as reflected in the number of countries signing the Convention on Biological Diversity, has clearly not manifest itself in broad and productive action – yet. As this paper is being written, the outbreak of the SARS epidemic, which has quickly reached international dimensions, presents a compelling and current argument for the importance of ensuring that we have access to a wide variety of biological resources which may be useful for treating diseases we are not presently in contact with.

Six simple recommendations have been derived from the experiences of the case studies and the more general principles of biological diversity that the US Government (and for that matter, other governments) should strongly consider.

Recommendation #1: Provide financial and technical support to developing countries with significant biological diversity at risk to increase their monitoring of critical resources, and ensure compliance with regulations.

As has been seen in Indonesia, and as experience has shown with a variety of environmental resources in many African countries (the poaching of ivory tusks for instance), even if a government is committed to ensuring that biological diversity is protected, this is no guarantee that it will in fact be conserved. Developed countries can offer developing countries a variety of technical tools which can help to ensure compliance with government regulations by corporations and local communities. These tools may range from providing satellite imagery of select areas of critical importance to

biological diversity to training local technicians in the use of advanced computer modeling programs (such as GIS). GIS can further help governments to analyze policy implications by building scenarios which illustrate the likely consequences on biodiversity. The US Government (through US AID) can fund technical exchanges where such information is conveyed, and help to subsidize the cost of some of the technical infrastructure.

In addition, countries such as the United States, where a number of multi-national corporations engaged in logging are based, can help to ensure that these corporations are given an incentive not to engage in illegal logging, particularly of areas with rich biodiversity. By instituting a series of punishments and fines for any US-based company caught "poaching" timber from valuable areas, the government would help to support indigenous efforts to preserve a resource which has significant value for all of humanity. Any income generated from such fines could equally be reinvested in the protection of biological diversity around the world (see recommendation #6).

Recommendation #2: The US Government should support the work of NGO's, local governments, and community organizations to educate their populations about the importance of biological diversity.

Two factors should be considered with this recommendation. Firstly, education should not only be one-way, but rather should seek to foster a dialogue. There is a great deal of indigenous knowledge about the properties of local plants which has yet to be tapped, and such an exchange could certainly help to advance an understanding of the medicinal value of particular species. Secondly, indigenous communities which depend on the forest for their livelihood may not appreciate the broader implications of continued deforestation. It is important that programs are established (such as the CBC program in

Sumatra) which not only provide valuable information to indigenous groups, but which also provide a support network for these communities to transition away from environmentally destructive patterns of behavior.

US AID funding again can be channeled to support organizations engaged in this kind of community awareness. A particular type of program that would merit special attention would be to encourage the development of curriculum materials for school-aged children. By integrating environmental awareness with elementary and secondary education, organizations can be certain not only of developing a new generation more sensitive to the importance of biological diversity, but equally, one which can carry these lessons pack to their families and communities outside of school.

Recommendation #3: The US Government should provide financial and technical assistance to networks such as the International Model Forest Network.

The IMFN has proven itself to be a viable tool for linking governments and organizations concerned with the preservation of forests around the world. As a clearing house for distributing information, best practices, and lessons learned, the IMFN has demonstrated considerable success in an area which is repeatedly stressed in the Convention as one of the most important elements of conserving biological diversity.

The IMFN also seeks to resolve the perceived tension between economic, social and environmental issues, and has achieved a remarkable equilibrium even in communities where the balance had previously heavily favored economic concerns. Forest services from Canada and other developed countries already play key roles as facilitators and disseminators of information. The US Government can encourage the USFS to play a more active role in the transfer of technology and knowledge, and more importantly, in the funding of new model forests (each model forest requires

approximately US $1.4 million to establish, although this cost may vary slightly depending on the size of the forest). Most of the funding thus far has been provided by the Canadian government, various UN agencies, the World Bank and of course recipient governments. By channeling funding through US AID or the USFS, the US Government can help to increase the scope and reach of the model forest network.

Recommendation #4: The US Government should encourage new partnerships between the private sector in the United States and foreign governments / organizations for the preservation of biological diversity.

Partnerships such as the Merck-INBio agreement certainly provide an impetus for new coordinated efforts between other pharmaceutical corporations and custodians of biological resources. The agreement should be a model for cooperation where all parties benefit, and where, particularly, biodiversity is strengthened through a funding mechanism which recognizes (as the Convention on Biological Diversity does) that each state should retain intellectual property rights over its natural resources.

Although the US Government was not involved directly in the establishment of this agreement, it can continue to provide incentives to other US-based pharmaceutical companies to engage in these types of initiatives. Funding could be provided, for instance, to match donations of technical equipment, or to support other expenses of the non-profit groups such as INBio. Indeed, INBio's principle sources of funding are EU nations – surprisingly, since it was a US company that stood to benefit significantly from INBio.[35] However, beyond the profit motive and encouraging US industry, the US government should recognize the importance of the work of organizations such as INBio

[35] Ibid.

in cataloguing and documenting thousands of species whose benefits may be felt by all of humanity for years to come.

Recommendation #5: The US Government should adopt a policy of including biodiversity destruction as a factor in its investments, loans and grants.

As the World Bank recently agreed to do, the US Government should identify priority areas for the conservation of biological diversity, and refuse to fund or to facilitate the funding of any industrial or other projects which would irreparably damage or harm the natural biodiversity of the area.

Any significant destruction of biological diversity – particularly biodiversity which is unique and therefore extraordinarily rare – should be viewed as a threat to the National Security of the United States and treated as such. The US Government should not fund projects which result in the large scale destruction of forests – particularly rainforests – and the corresponding elimination of hundreds of unknown and unstudied species. Instead, the US should concentrate its resources on encouraging other governments to proactively work to protect those regions, to relocate development projects elsewhere, and to ensure that efforts to document the variety of biological diversity are undertaken and supported.

Recommendation #6: The US Government should provide direct funding to support the conservation of biodiversity in key areas around the globe.

Although this paper has explored innovative means of linking biodiversity conservation with economic and social concerns, the fact remains that the most efficient way of preserving biodiversity is simply to declare large tracts of land immune from human activity. In some cases, national governments may not have the resources to pursue this course of action. The US Government, recognizing the benefits to Americans

of having biologically diverse resources available, should consider (in partnership with other nations) investing in select nations and select areas to preserve biodiversity.

Conclusion

Eleven years ago, the international community, recognizing the importance of conserving biodiversity, made a series of commitments articulated in the Convention on Biological Diversity, commitments which to this day remain largely unfilled. In the decade since the Convention was announced, deforestation has continued at an alarming rate, and has not been balanced by reforestation efforts (limited though their effectiveness may be) or by comprehensive engagements to sustain global diversity of life.

The case studies and recommendations provided in this paper do offer hope for the future – preserving biodiversity does not necessarily have to be an inordinately expensive process. Instead, multi-sectoral approaches which seek to combine environmental, economic and social interests have proven to be both economical and effective.

The tragedy of course, with respect to biodiversity is that humanity may never be able to measure the full cost of continued inaction. While it is impossible to quantify precisely the rate of species extinction or its consequences, it is clear (and follows logically) that without urgent and coordinated action on the part of the international community, the biodiversity of the planet will increasingly be at risk. The United States can play an active leadership role in this area, and encourage other nations to meet their commitments articulated in the Convention on Biological Diversity.

References

Ad-Hoc Technical Expert Group on Traditional Knowledge and the Clearing House Mechanism. Report of the Ad-Hoc Technical Expert Group. *Convention on Biological Diversity*. March 2003.

Annan, Kofi. The Earth's Second Chance. *Financial Times* May 29, 2002. Internet URL: http://www.internationalforum.com/Articles/The%20earths%20second%20chance%20-%20annan.htm

Armstrong, Jim *et. al*. IMFNS Outcomes Assessment July 2000

Bryant, Peter J. Biodiversity and Conservation. p. 12 Internet URL: http://darwin.bio.uci.edu/~sustain/bio65/lec10/b65lec10.htm

Convention on Biological Diversity

Coughlin Jr., M.D. Using the Merck-INBio Agreement to Clarify the Convention on Biological Diversity. *Columbia Journal of Transnational Law* 31 (2): 337 – 75

International Model Forest Network. Spreading the seeds for a sustainable future. Internet URL: http://www.idrc.ca/imfn/doc/seeds-Eng.html

Lickers, Henry. The Effects of Toxic Chemicals on Ecosystems: Community-based Monitoring Programs. The Ecological Monitoring and Assessment Network, 1995. Internet URL: http://www.eman-rese.ca/eman/reports/publications/national95/part27.html

McCarthy, John F. 'Wild Logging': The Rise and Fall of Logging Networks and Biodiversity Conservation Projects on Sumatra's Rainforest Frontier. CIFOR Occasional Paper 31

Parties to the Convention on Biological Diversity. *Convention on Biological Diversity*. Internet URL: http://www.biodiv.org/world/parties.asp?sort=date

Putz, Francis E. *et al*. Biodiversity Conservation in the Context of Tropical Forest Management. *Environment Department Papers*.

Sancho, Eugenia. Biodiversity Planning Support Programme Integrating Biodiversity into the Forestry Sector. *CIFOR*, *UNEP* and *GEF*.

Secretariat of the Convention on Biological Diversity. Assessment, Conservation and Sustainable Use of Forest Biodiversity. *CBD Technical Series 3*. 2001.

Secretariat of the Convention on Biological Diversity. Review of the Status and Trends of, and Major Threats to, the Forest Biological Diversity. *CBD Technical Series 7*. March 2002.

Secretariat of the Convention on Biological Diversity. Sustaining Life on Earth. April 2000. p. 5

The State of the Environment Report in Asia and the Pacific. UNEP. 2001.

Taylor, Leslie. Herbal Secrets of the Rainforest. Prima Publishing, 1998. Internet URL: http://rain-tree.com/facts.htm

World Bank. Biodiversity Conservation in Forest Ecosystems. *Bank Biodiversity Portfolio*. July 2002.

World Bank. Mainstreaming Biodiversity in Development. *Environment Department Papers.* 1995.