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Global "Development" and its Environmental Ramifications - the Interlinking of Ecologically Sustainable Development and Itellectual Property Rights

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COMMENT

GLOBAL "DEVELOPMENT" AND ITS ENVIRONMENTAL RAMIFICATIONS - THE INTERLINKING OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT AND INTELLECTUAL PROPERTY RIGHTS

I. INTRODUCTION

Biodiversity is the diversity of species, genetic material, and ecosystems.[1] This valuable resource is rapidly disappearing as human development increasingly encroaches on unique natural habitats that are rich in biodiversity.[2] The vast majority of this diversity exists in the tropical rainforests[3] and remains unknown to modern science.[4] The current extinction rate is approaching that of great natural catastrophes of the Paleozoic and Mesozoic eras.[5]

Those most interested in preserving the forests, generally the indigenous people, are powerless to prevent the destruction.[6] Compensating local government and indigenous people provides an incentive for promoting sustainable use of the forests.[7] Proposals by various scholars for slowing the loss of

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1. United Nations Conference on Environment and Development, Convention on Biological Diversity, June 5, 1992, 31 I.L.M. 818 (entered into force Dec. 29, 1993) [hereinafter Biodiversity Convention]. Biological diversity is defined as "the variability among living organisms from all sources including inter alia terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems." *Id.* Art. 2, at 823.

2. For an overview of the biodiversity problem see E.O. WILSON, THE CURRENT STATE OF BIOLOGICAL DIVERSITY, BIODIVERSITY (E.O. Wilson, ed.,: National Academy Press, 1988). *See* generally GLOBAL BIODIVERSITY: STATUS OF THE EARTH'S LIVING RESOURCES (Chapman and Hall, B. Groombridge, ed. 1992). For an updated assessment *see* GLOBAL BIODIVERSITY ASSESSMENT (Cambridge, U.K.: Cambridge University Press, B. H. Heywood & R.T. Watson, eds. 1995) [hereinafter Global Biodiversity Assessment].

3. *See* WILSON, *supra* note 2, at 3-10. The tropical rain forests contain more than half of the species, while covering only 7% of the earth's land surface. *Id.*

4. *See* D. L. Harksworth et al., *Magnitude And Distribution Of Biodiversity*, *in* Global Biodiversity Assessment, *supra* note 2. The 1.7 million species described represents only a small fraction of the estimated 4-111 million species. *Id.* at 107.

5. WILSON, *supra* note 2, at 3. The current rate of extinction is up to a thousand times the "natural" background extinction rate of one species per year. N. Meyers, *Tropical Forests and Their Species: Going, Going . . . ?*, *in* WILSON, *supra* note 2, at 28-32.

6. Michael J. Huft, Comment, *Indigenous Peoples And Drug Discovery Research: A Question Of Intellectual Property Rights*, 89 Nw. U. L. Rev. 1678, 1679 (1995).

7. *Id.* at 1679-84, 1687-88. The indigenous people can be compensated for their traditional knowledge (indigenous knowledge) relating to drug development from plants by recognizing this traditional knowledge as intellectual property. *Id.*

biodiversity include treating forests as natural resources with property value, such as Intellectual Property Rights (IPR).[8]

The Convention on Biological Diversity (hereinafter "Biodiversity Convention") at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro was the first global treaty to take a comprehensive, eco-system based approach to the protection of biodiversity.[9] The Biodiversity Convention created IPR for biodiversity, giving member nations the right to restrict access to biodiversity and the right to compensation for the use of this biodiversity.[10]

However, such an interlinking of biodiversity and IPR can have conflicting implications at both the national and the international levels.[11] The United States plays a central role in this conflict due to its large biotechnology industry[12] and well developed patent system.[13] The United States has shown sup-

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8. *Id.* Intellectual Property Rights (IPR) include patents, trademarks, knowhow and copyrights. For a brief description of IPR see RALPH H. FOLSOM ET AL., INTERNATIONAL BUSINESS TRANSACTIONS: A PROBLEM ORIENTED COURSEBOOK, 720-729 (West Publishing Co., 3d ed. 1995).

9. Biodiversity Convention, *supra* note 1; *see* Kal Raustiala & David G. Victor:*Biodiversity Since Rio: The Future Of The Convention On Biological Diversity*, ENV'T, Vol. 38, No. 4 (1996).

10. Biodiversity Convention, *supra* note 1, Art. 15, 31 I.L.M. at 828. These IPR have a different basis from the traditional IPR, wherein an object must be "useful, novel and non-obvious" to be patentable. 35 U.S.C. §§ 101-103 (1996). For a detailed discussion of the domestic and international patent laws see Amy E. Carroll, Comment, *Not Always The Best Medicine: Biotechnology And The Global Impact Of U.S. Patent Law*, 44 AM. U. L. REV. 2433, 2441-59 (1995).

11. Alan S. Gutterman, *The North-South Debate Regarding the Protection of Intellectual Property Rights*, 28 WAKE FOREST L. REV. 89, 90-91 (1993).

12. *See* THE OFFICE OF TECHNOLOGY ASSESSMENT (OTA), OTA REP. 3 BIOTECHNOLOGY IN A GLOBAL ECONOMY, (1992) [hereinafter OTA Report]. The report emphasized that "biotechnology is likely to be the principal scientific driving force for the discovery of new drugs and therapeutic chemical entities as the industry enters the 21st century". *Id.* at 5. In the United States estimated revenues from biotechnology products were approximately $1.5 billion in 1989 and $2 billion in 1990. *Id.*; *see also* Robert Pear, *U.S. Will Tighten Health-Lab Goals*, N.Y. TIMES, Aug. 24, 1992, at A1. Biotechnology is multi-billion dollar industry in United States and with expected sales of $50 billion by year 2000. *Id.* The fine tuning of recombinant DNA technology produced a rapid growth in the biotechnology industry since 1975. NEIL A. CAMPBELL, BIOLOGY, 396 (The Benjamin/Cummings Publishing Company, Inc., 1987). This technology allows scientists to manipulate genes and produce them in large quantities for research purposes. *Id.*

13. *See* ROBERT P. MERGES, PATENT LAW AND POLICY: CASES & MATERIALS 9-10 (1992). The U.S. intellectual property system creates economic incentives to

port for the connection between patents and development by promoting globalization of stringent and broad patent protections similar to those used in the United States.[14] However, patents can also have detrimental effects on the development of domestic industries in other countries.[15]

This Comment will examine the necessity of preserving biodiversity in general, and the specific influence of International Environmental Law (IEL) and Intellectual Property Rights (IPR) on preserving the earth's biodiversity.[16] Additionally, this Comment focuses on the numerous problems arising from the rapid destruction of biodiversity and how application of IPR may abate these problems.[17] Part II discusses the evolution of IEL, including the chronological development of global environmentalism and the need for further ecologically sustainable development.[18] Part III reviews two recent treaties that provided a forum for discussing the connection between the preservation of biodiversity and IPR: the United Nations Conference on Environment and Development's (UNCED) Convention on Biological Diversity,[19] and the Agreement on the Trade-Related Aspects of Intellectual Property Rights (TRIPS).[20] Part IV focuses on the ongoing debate

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industry and bestows patent benefits to inventors and the public, at no cost to government. *Id.* However, the contribution of intellectual property to future economic growth is unresolved. *Id.*

14. *See* John A. Armstrong, *Trends In Global Science And Technology And What They Mean For Intellectual Property Systems, in* GLOBAL DIMENSIONS OF INTELLECTUAL PROPERTY RIGHTS IN SCIENCE AND TECHNOLOGY 192 (Mitchel B. Wallerstein et al. eds., 1993) [hereinafter Global Dimensions] Global intellectual property protections similar to that of the U.S. patent system is necessary for a widespread participation in research and technological development. *Id.* at 201.

15. Dru Brenner-Beck, *Do As I Say, Not As I Did*, 11 UCLA PAC. BASIN L.J. 84, 103 (1992). Increased intellectual property protection is beneficial only after a developing country has reached threshold level of economic development. *Id.* See Carlos Alberto Primo Braga, *The Economics of Intellectual Property Rights and the GATT: A View from the South*, 22 VAND. J. TRANSNAT'L L. 243, 256-57 (1989) for an interesting mathematical presentation of how to determine what this threshold is and whether or not a country has reached it (equation to use in cost/benefit analysis of IPR for developing countries).

16. *See* WILSON, *supra* note 2 and the accompanying text; Huft, *supra* note 6, at 1679-88.

17. *See generally* Huft, *supra* note 6.

18. *See infra* notes 26, 28, 44 and 45 and accompanying text.

19. Biodiversity Convention, *supra* note 1.

20. General Agreement On Tariffs And Trade, Oct. 30, 1947, 61 Stat. A5, T.I.A.S. No. 1700, 55 U.N.T.S. 187. GATT was founded in 1947 for the purpose of

between developed and developing nations[21] regarding the sovereignty of biological resources, IPR and the preservation of biodiversity.[22] Finally, Part V discusses future actions and recommendations to harmonize the approaches of developed and developing nations.[23] This Comment cites examples of ongoing actions by various organizations towards resolving the differences between the Biodiversity Convention and the TRIPS Agreement.[24]

II. THE EVOLUTION OF GLOBAL ENVIRONMENTALISM

A. ENVIRONMENTALISM BEFORE THE 1980'S

During the last two centuries, rapid advances in science and technology have transformed agricultural societies into industrialized or *developed*[25] societies, resulting in environmen-

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overseeing the negotiation of international rules governing trade. R. MICHAEL GADBAW & TIMOTHY J. RICHARDS, *Introduction to* INTELLECTUAL PROPERTY RIGHTS: GLOBAL CONSENSUS, GLOBAL CONFLICT? 29 (R. Michael Gadbaw & Timothy J. Richards eds., Westview Press, 1988). Until recently GATT has focussed on eliminating many tariffs based obstacles to trade. *Id.* More recently, however, GATT has focused on non-tariff trade barriers such as IPR. *Id.* Uruguay Round Negotiations of the General Agreement on Tariffs and Trade (GATT) ended GATT and established a new body called the World Trade Organization (WTO). *See* Final Act Embodying The Results Of The Uruguay Round Of Multilateral Trade Negotiations, Agreement Establishing The World Trade Organization, GATT Doc. MTN/FA, Preamble (Apr. 15, 1994), *reprinted in* 33 I.L.M. 1125, 1145 (1994) [hereinafter WTO Agreement]. As part of the Uruguay Round Agreement, President Clinton signed the TRIPS Agreement into U.S. law in December 1994. Final Act Embodying The Results Of The Uruguay Round Of Multilateral Trade Negotiations, signed at Marrakech on April 15, 1994, *reprinted in* H.R. Doc. No. 316, Vol. 1, 103d Cong., 2d Sess. (1994). Uruguay Round Agreements Act, Pub. L. No. 103-465, §§ 501-534, 108 Stat. 4809, 4973-90 (1994). *See* Final Act Embodying The Results Of The Uruguay Round Of Multilateral Trade Negotiations, Agreement Trade-Related Aspects Of Intellectual Property Rights, *reprinted in* 33 I.L.M. 1125, 1197 (1994) (hereinafter TRIPS Agreement).

21. *See generally* Gutterman, *supra* note 11, at 89. The author discusses the existence and development of North-South debate regarding appropriate legal framework for governing IPR. *Id.*

22. *Id.* The author discusses the divergent IPR interests of technology-rich, developed northern countries and less prosperous, developing southern countries. *Id.*

23. *See infra* notes 209-218, and 245 and accompanying text.

24. *See infra* notes 231-236, 241-244 and 250-253 and accompanying text.

25. The developed countries generally include the United States, Canada, Australia, Japan, members of the European Community. This group of countries is

tal deterioration.[26] This continued industrialization of *developing*[27] countries further exacerbates global environmental pollution.[28]

Economic policy rather than environmental policy has shaped the rapid global cultural and industrial growth.[29] Conventional economic theory has been concerned only with the allocation of scarce resources and, under this paradigm, nature is not a constraining factor.[30] This economic theory assumes that resources are unlimited and that humans will not deplete these resources as long as they have the necessary technology.[31]

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also referred to as the North, the Western or high-income Industrialized Nations. CIA: THE WORLD FACT BOOK (1995) (visited Mar. 3,1997) <http://www.odci.gov/cia/publications/95fact/appendc.html>.

26. SOMPONG SUCHARITKUL, ASEAN AND THE ENVIRONMENT, REGIONAL MEETING OF THE AMERICAN LAW SOCIETY OF INTERNATIONAL LAW, GOLDEN GATE UNIVERSITY SCHOOL OF LAW, 2-3 (1993); GARETH PORTER & JANET WELSH BROWN, *The Emergence Of Global Environmental Politics*, *in* GLOBAL ENVIRONMENTAL POLITICS, 2 (Westview Press, 1996). The burning of fossil fuels, indiscriminate discharge of toxic chemicals in the air, water and soil, the elimination of forest covers are all the cumulative effects of industrialization. *Id.*

27. The developing countries include the emerging economies of Latin America, Asia, and Africa. These countries are also referred to as the "South" or "Third World" countries. The term "Third World" is considered pejorative and is being phased out of use. CIA: THE WORLD FACT BOOK, *supra* note 25.

28. PORTER & BROWN, *supra* note 26, at 2-6. Significant increases in consumption have generally occurred in the highly industrialized, rich countries, while the population growth has been predominantly in the poorer countries. *Id.* The increased industrialization leads to increased urbanization, in both developed and developing countries. *Id.* Experts expect half of the world's population to reside in the cities by the year 2000. *Id.* The increased population and urbanization of the developing countries will have a pronounced impact on the natural resources of developing countries, especially with respect to land, forests and air pollution. *Id.* at 3-5.

29. PORTER & BROWN, *supra* note 26, at 23. The economic policy is referred to as the exclusionist paradigm because it excludes humans from the laws of nature. *Id.* It is also referred to as "frontier" economics signifying a society with an open frontier. *Id.*

30. *Id.*

31. PORTER & BROWN, *supra* note 26, at 23. Capitalist societies were based on economic assumptions that the free market will maximize social welfare, and that nature has both an infinite supply of resources and "sinks" for waste disposal, and this would function efficiently as long as the free market is operating. *Id.* Humans would not deplete resources and waste disposal could continue and absolute scarcity could be postponed indefinitely. *Id.*

However, in the early 1960's, new scientific data revealing numerous threats to the environment galvanized environmental activism in the United States and Europe.[32] In 1967, a Swedish initiative convened the first worldwide environmental conference, the United Nations Conference on The Human Environment ("Stockholm Conference"), and established the United Nations Environment Programme ("UNEP").[33] In 1972, the World Heritage Convention aimed to protect biological diversity by initiating the protection of broad ecosystems in which various species live rather than by protecting individual species.[34]

In 1970, the United States Congress passed the National Environmental Policy Act (NEPA), the first significant environ-

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32. *Id.* at 23-24. Some examples of these threats include dangers to human health from synthetic pesticides such as DDT, radiation, heavy metal toxic wastes, chlorinated hydrocarbons in the water, global warming. *Id.*

33. Philippe Sands, *Introduction to* GREENING INTERNATIONAL LAW, xv (Philippe Sands ed., 1994), [hereinafter Greening International Law]. In his introduction, Sands describes international environmental efforts that predate the Stockholm Conference. *Id. See* Edith Brown Weiss, *International Environmental Law: Contemporary Issues and the Emergence of a New World Order*, 81 Geo. L.J. 675 (1993). The conference convened in Stockholm in 1972 and 114 states, excluding the Soviet Bloc states, attended it. PORTER & BROWN, *supra* note 26, at 23-24. On the recommendation of the conference, in December 1972, the UN created the United Nations Environment Program (UNEP) to provide a focal point for environmental actions and coordination of environmentally related activities within the UN system. *Id.*

See Institutional And Financial Arrangements For International Environmental Cooperation, G.A. Res. 2997, pt. II, para. 1, 27 U.N. GAOR, 27th Sess., Supp. No. 30, at 43, U.N. Doc. A/8730 (1972). The UNEP was designed to "promote international cooperation in the field of the environment and to recommend, as appropriate, policies to this end; [and] to provide general policy guidance for the direction and coordination of environmental programmes within the United Nations system." *Id.* pt. I, para. 2(a)-(b).

The UNEP serves as a secretariat to several environmental treaties and offers technical assistance to developing countries in the formation of environmental legislation. It has also played a key role in the negotiation and adoption of numerous treaties, as well as a series of nonbinding environmental principles and guidelines. *See* Carol Annette Petsonk, *The Role of the United Nations Environment Programme (UNEP) in the Development of International Environmental Law*, 5 AM. U. J. INT'L L. & POL'Y 351 (1990).

34. Convention For The Protection Of The World Cultural And Natural Heritage, Nov. 16, 1972, 27 U.S.T. 37, 1037 U.N.T.S. 151 [hereinafter "World Heritage Convention"]. The World Heritage Convention provides for the protection of cultural and natural sites of universal value. The ecosystems that the World Heritage Convention protects include the Great Barrier Reef, the Everglades, and the Olympic Rainforest. *Id.* Art. 11.

mental regulation enacted in the United States.[35] After adopting the NEPA, Congress launched a series of acts principally aimed at addressing pollution-related problems.[36]

Nevertheless, despite the rapid rise in international environmental consciousness in the 1960s and early 1970s, the essential assumptions of classical economics still remained.[37] In 1969, the Commission on International Development submitted the Pearson Report, discussing the link between development and the foreign-aid for a free market economy.[38] The Pearson Report acknowledged that political independence, foreign aid and industrialization did not provide adequate answers to the problems confronting the developing world.[39] The Pearson Report recommended increased availability and development of science and technology in developing countries, such as resource management and alleviation of poverty.[40] Additionally, two breakthrough studies released in 1972 and 1980 forecasted that the earth's resources would not sustain continued economic growth coupled with the population explosion.[41] Increasing awareness and environmental consciousness

35. *See* Pub. L. No. 91-19042, codified at 42 U.S.C. §§ 4321-4370a (1970). For a discussion of the early stages of NEPA history, see generally FREDRICK R. ANDERSON & ROBERT H. DANIELS, NEPA IN THE COURTS: A LEGAL ANALYSIS OF THE NATIONAL ENVIRONMENTAL POLICY ACT (Resources For Future, Inc., 1973). NEPA directed federal agencies to support international cooperation in "anticipating and preventing a decline in the quality of mankind's world environment". PORTER & BROWN, *supra* note 26, at 23-24.

36. After NEPA, Congress launched a series of acts principally aimed at addressing pollution-related problems. *See* Comprehensive Environmental Response, Compensation & Liability Act, 42 U.S.C. §§ 9601-9675 (1980); Resource Conservation & Recovery Act, 42 U.S.C. §§ 6901-6992 (1976); Toxic Substance Control Act, 15 U.S.C. §§ 2601-2629 (1976); Safe Drinking Water Act, 42 U.S.C. §§ 300 et seq. (1974); Endangered Species Act, 16 U.S.C. §§ 1531 et seq. (1973); Federal Insecticide, Fungicide, & Rodenticide Act, 7 U.S.C. §§ 135 et seq. (1972); Water Pollution Control Act, 33 U.S.C. §§ 1251-1376 (1972); Clean Air Act, 42 U.S.C. §§ 7401-7642 (1970).

37. PORTER & BROWN, *supra* note 26, at 23-24.

38. In 1969, the Commission on International Development, chaired by former Canadian Prime Minister Lester B. Pearson submitted its report to the World Bank (visited Nov. 16, 1996) <http://www.irdc.ca> (hereinafter Pearson Report). For a discussion of the World Bank-commissioned Pearson Report see ANTHONY SAMPSON, THE MONEY LENDERS: BANKERS AND A WORLD IN TURMOIL, 99 (Viking Press, 1982).

39. Pearson Report, *supra* note 38.

40. *Id.*

41. PORTER & BROWN, *supra* note 26, at 23-25. The "Limits to Growth" study

prompted a move towards Ecologically Sustainable Development (ESD) by early to mid-1980's.[42]

B. ECOLOGICALLY SUSTAINABLE DEVELOPMENT (ESD)

Ecologically sustainable development gained popularity in 1987 due to the Brundtland Report, a publication of the Reports of the World Commission on Environment and Development.[43] The Brundtland Report defined sustainable development as development that is "consistent with future as well as present needs."[44] The Brundtland Report stated that the earth's resources are finite, and continuous and indiscriminate production and excessive consumption would result in irreversible damage to the life-sustaining natural systems.[45]

ESD would require greater equity between wealthy and poor nations, while conserving the ecosystem for the benefit of

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by the Club of Rome was published in 1972, and in 1980 the U.S. Council of Environmental Quality released the "Global 2000 Report to the President." *Id.* The studies suggested economic development and population growth would strain the earth's "carrying capacity" resulting in depletion of natural resources and degradation of ecosystems. *Id.*

42. PORTER & BROWN, *supra* note 26, at 24-25. Sustainable development was the "buzz" word in the Non-Governmental Organization (NGO) and governmental circles alike. *Id.*

43. *See* OUR COMMON FUTURE, WORLD COMM. ON ENV'T & DEV., 95 (Oxford University Press, 1987) [hereinafter Brundtland Report].

44. Brundtland Report, *supra* note 43. The Brundtland Report defined *sustainable development* as "a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations." *Id.* The Brundtland Report further suggested that the term "development" should be redefined to include energy efficient and sustainable systems of renewable natural resources. *Id.* at 43-60.

In 1990, the Australian government defined Ecologically Sustainable Development (ESD) as "using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased." National Strategy for Ecologically Sustainable Development (NSESD) Part 2 Chapter 1. On 7 December 1992, the Council of Australian Governments endorsed the NSESD (Last modified July 31, 1996) <http://www.erin.gov.au/portfolio/esd/nsesd/intro.html>.

45. Brundtland Report, *supra* note 43, at 43-60. The Brundtland Report stated that both wealth (over-exploitation) and poverty (neglect) threaten sustainable development. *Id.* The "poor and hungry will often destroy their immediate environment in order to survive: they will cut down forests; their livestock will overgraze grasslands; they will overuse marginal land; and in growing numbers they will crowd into congested cities." *Id.*

future generations.[46] Highly industrialized countries would have to alter their consumptive lifestyle to be more sustainable.[47] The concept of ESD also allows for the developing countries to satisfy the basic needs of their poor without depleting their natural resources.[48] Meanwhile, it encourages industrialized nations to reduce the excessive and wasteful lifestyles.[49]

C. GLOBALIZATION OF ENVIRONMENTAL LAW

It is imperative for the world community to find ways to stop further deterioration, manage and eventually improve the environment.[50] Developing countries have the challenging task of striking a balance between better managing their environment and achieving sustainable development in economic, social and cultural fields.[51] Environmental protection, economic development, and legal and humanitarian concerns are all

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46. PORTER & BROWN, *supra* note 26, at 25-26. The ESD approach requires reduction in consumption, implying a rapid transition to sustainable systems of renewed natural resource management systems and stabilizing the world population at the lowest possible levels. *Id.* This approach assumes a greater equity between wealthy and poor nations and between generations (intergenerational equity). *Id.*

47. *Id.* Economic growth of highly industrialized countries, such as the United States, is inherently unsustainable due to their disproportionately greater use of the world's environmental resources. *Id. See also infra* note 155 and accompanying text.

48. SUCHARITKUL, *supra* note 26, at 14, 28; PORTER & BROWN, *supra* note 26, at 25-27; ANDREW HURREL & BENEDICT KINGSBURY, *The International Politics Of The Environment: An Introduction, in* INTERNATIONAL POLITICS OF THE ENVIRONMENT (Oxford University Press, 1992). The authors discuss the power and conflicts of interest between the developed and the developing nations. *Id.* at 36-43. Governments in developing countries face enormous social and political pressures for rapid development. *Id.* at 40. Poverty is a primary cause of environmental destruction and any developmental and environmental concerns have to include measures for poverty alleviation. *Id.*

49. HURREL & KINGSBURY, *supra* note 48, at 3; PORTER & BROWN, *supra* note 26, at 25-27. For example, market prices should include cost of producing and consuming a given resource in order to encourage sustainable use of natural resources. PORTER & BROWN, *supra* note 26, at 27.

50. HURREL & KINGSBURY, *supra* note 48, at 3; PORTER & BROWN, *supra* note 26, at 25-27.

51. SUCHARITKUL, *supra* note 26, at 14, 28; PORTER & BROWN, *supra* note 26, at 25-27; HURREL & KINGSBURY, *supra* note 48, at 36-43. The authors discuss power and conflicts of interest between the developed and the developing nations. *Id.*

intertwined. Therefore, any attempt to resolve these issues must be done on a global scale.[52]

Awareness of the long term environmental impact of industrialization by the more sophisticated industrialized nations[53] has resulted in the increasing importance of International Environmental Law (IEL).[54] The rising number and scope of international and multinational environmental agreements illustrates the greater role of IEL.[55]

Modern environmental treaties focus on preventive or precautionary approaches to protect the global environment rather than on liability for transboundary harm.[56] In 1990, the Bergen Ministerial Declaration on Sustainable Development [hereinafter "Bergen Ministerial Declaration"] recommended that relevant policies must be based on precautionary principles to achieve sustainable development.[57] The Bergen Ministerial Declaration further added that environmental measures anticipate threats of serious and irreversible dam-

52. HURREL & KINGSBURY, *supra* note 48, at 3, 36-47; PORTER & BROWN, *supra* note 26, at 25-27.

53. *See* HURREL & KINGSBURY, *supra* note 48. The environmental awareness is particularly high in the United States and the European countries. PORTER & BROWN, *supra* note 26, at 25-27.

54. *See* Jeffrey L. Dunoff, *From Green To Global: Toward The Transformation Of International Environmental Law*, 19 HARV. ENVTL. L. REV. 241, 242-48 (1995).

55. *Id.* at 247-48 (1995). Examples include the Geneva Convention on Long-Range Transboundry Air Pollution of 1979, the Vienna Convention for Protection of Ozone Layer of 1985, the Basel Convention on the Control of Transboundry Movement of Hazardous Waste and Their Disposal of 1989, the United Nations Conference on Environment and Development held in Rio in 1992.

56. Philippe Sands, *The Greening of International Law: Emerging Principle and Rules*, 1 IND. J. GLOBAL LEGAL STUD. 293, 296-302 (1994). Both the preventive or precautionary approaches require action in face of scientific uncertainty, reflecting a shift from the traditional approach which requires action based upon "scientific findings" or "in light of knowledge available at the time." *Id.* For a discussion on the preventive and precautionary principles, see Elli Louka, *Cutting The Gordian Knot: Why International Environmental Law Is Not Only About The Protection Of The Environment,* 10 TEMP. INT'L & COMP. L. J. 79, 81-84 (1996).

57. *G.A. Preparatory Committee For The United Nations Conference On Environment & Development*, 44th Sess., Annex I at 19, A/CONF.151/PC/10 (1990), *reprinted in* Y.B. INT'L ENVTL. L. 429, 431 (1990). [Hereinafter Bergen Ministerial Declaration].

age.[58] The current lack of complete scientific knowledge should not postpone preventive measures.[59]

The United States perceives this precautionary principle as limiting the development of new technologies, processes and practices.[60] As a result, the United States has consistently opposed such measures during negotiations of international treaties.[61] Nevertheless, the signatories of the Rio Declaration unanimously endorsed this widely accepted principle.[62]

III. RECENT TREATIES AND CONVENTIONS

Two recent forums discussed the connection between the preservation of biodiversity and IPR : the Biodiversity Convention and The Agreement on the Trade-Related Aspects of Intellectual Property Rights (TRIPS).

A. THE BIODIVERSITY CONVENTION

Over one hundred nations signed the Biodiversity Convention[63] at the United Nations Conference on Environment and Development (UNCED),[64] which took place in Rio de Janeiro

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58. *Id.* at 431.

59. *Id.*

60. Sands, *supra* note 56, at 297.

61. *Id.*

62. Rio Declaration on Environment & Development, United Nations Conference on Enivornment & Development, 46th Sess., Agenda Item 9, princs. 15, at 3,4, U.N.Doc. A/CONF.151/5/Rev. 1 (1992), 31 I.L.M. 874, 878, 879 (hereinafter Rio Declaration). On June 14, 1992, at the close of the Earth Summit (Rio Summit), the conferees adopted the Rio Declaration. *See infra* notes 64, 65 and accompanying text.

63. *See* Michael D. Coughlin, Jr., Comment, *Using the Merck-Inbio Agreement to Clarify the Convention on Biological Diversity*, 31 COLUM. J. TRANSNAT'L L. 337, 340-41 (1993). The Biodiversity Convention was first discussed within United Nations Environment Programme (UNEP) in 1990. *Id.* UNEP held seven negotiating sessions for drafting international treaty on conservation of biological diversity. *Id.* The Biodiversity Convention was put forth at the Rio Summit after several drafts and revisions. *Id.* at 341. At the end of Rio Summit, 156 nations signed the Biodiversity Convention. *Id. See also* Ann Devroy, *President Affirms Biodiversity Stance: Citing Jobs Bush Firmly Rejects Treaty*, WASH. POST, June 8, 1992, at A1 (President Bush refused to sign the treaty); Rose Gutfeld, *EPA Chief: Memo Renews Attention on Criticism of U.S.*, WALL ST. J., Aug. 3, 1992, at B4. The memo describes the U.S. policy toward Rio Summit and Biodiversity Treaty. *Id.*

64. This conference is commonly referred to as the "Earth Summit" or the "Rio

in June 1992.[65] UNCED (Earth Summit) included additional agreements focusing on the Rio Declaration,[66] the Convention on Climate Change[67] and the Statement of Principles on Forests.[68] The Biodiversity Convention's explicit objectives are to conserve the earth's biological diversity[69] for future generations, to exploit this biodiversity in a sustainable way and to share its benefits in a fair and equitable manner.[70]

Increasingly industries, governments, and indigenous people are more cognizant of the potential loss of natural resources and the traditional knowledge of indigenous peoples.[71] The Biodiversity Convention addresses IPR in three separate articles, relating primarily to indigenous peoples.[72]

First, the Biodiversity Convention recognizes a limited sovereign property right in genetic material[73] found within a

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Summit." See William Claiborne, *Greens, Browns Find Common Ground in the World's Cities*, WASH. POST, Sept. 26, 1994, at A3 (wherein the conference is referred to as "Rio Summit" and "Earth Summit"); George Melloan, *Global View: Al Gore's Seven Seals and What They Cost*, WALL ST. J., July 12, 1993, at A13 (the conference was commonly referred to as "Earth Summit").

65. *See* Karen A. Goldman, Note, *Compensation for use of Biological Resources Under the Convention on Biological Diversity: Compatibility of Conservation Measures and Competitiveness of the Biotechnology Industry*, 25 LAW & POL'Y INT'L BUS. 695, 696 (1994). The Earth Summit, attended by representatives from 178 nations around the world, was the largest gathering of world leaders in history. *Id.* The Summit aimed at discussing environment as an international issue. *Id.*

66. Rio Declaration, *supra* note 62.

67. United Nations Conference On Environment & Development: Framework Convention On Climate Change, done May 9, 1992, 31 I.L.M. 849.

68. United Nations Conference On Environment & Development: Statement of Principles For A Global Consensus On The Management, Conservation And Sustainable Development Of All Types of Forests, 31 I.L.M. 881 (1992), [hereinafter Statement of Forest Principles].

69. For a definition of Biological diversity see Biodiversity Convention, *supra* note 1.

70. Biodiversity Convention, *supra* note 1, Art. 1, 31 I.L.M. 823. The prepared statement by Sen. Chafee outlined the Convention's basic steps. *Id.* at 3.

71. Huft, *supra* note 6, at 1679. For a detailed discussion of the complex issues raised by granting IPR for indigenous knowledge see, INTELLECTUAL PROPERTY RIGHTS FOR INDIGENOUS PEOPLES: A SOURCEBOOK (Tom Greaves ed., Society For Applied Anthropology, 1994) [hereinafter Indigenous Peoples].

72. Biodiversity Convention, *supra* note 1, at Art. 15, P7, Art. 19, P2, Art. 16, § 1, at 829.

73. Genetic material is defined as "any material of plant, animal, microbial or other origin containing functioning units of heredity". *Id.* Art. 2, at 824.

nation's boundaries.[74] Specifically, Article 15 sets forth "the aim of sharing in a fair and equitable way the results of research and development and the benefits arising from the commercial and other utilization of genetic resources."[75]

Second, the Biodiversity Convention calls on developed countries to provide "access to and transfer of technology which makes use of those resources, on mutually agreed [upon] terms, including technology protected by patents and other intellectual property rights," particularly to developing countries.[76] Article 19 references IPR by requiring that contracting parties "take all practicable measures to promote and advance priority access on a fair and equitable basis . . . to the results and benefits arising from biotechnologies" when based on genetic resources provided by other contracting parties, especially developing countries.[77] Article 8(j) requires each contracting party to "respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity."[78] This subsection also directs parties to "encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices."[79]

Third, the Biodiversity Convention entails the establishment of a multilateral fund financed by the developed countries to support the preservation of biodiversity and the other purposes of the Biodiversity Convention.[80] Finally, the Biodiversity Convention contains provisions related to the monitoring of biodiversity[81] and the handling of biotechnology.[82]

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74. *Id.* Art. 15, §§ 1, 4, 5, 7, at 828.
75. *Id.* Art. 15, P7.
76. Biodiversity Convention, *supra* note 1, Art. 16, § 1 at 829.
77. *Id.* Art. 19, P2.
78. *Id.* Art. 8(j).
79. *Id.*
80. *Id.* Arts. 20-21 at 830-32.
81. Biodiversity Convention, *supra* note 1, Art. 7 at 825. The provision requires identification, monitoring, through sampling and other techniques, of components of biological diversity, identification of processes and categories of activities likely to have significant impact on sustainability and maintenance and organization of the data. *Id.*
82. Biodiversity Convention, *supra* note 1, Art. 14 at 827-28, The Convention

Although most industrialized nations signed the Biodiversity Convention at Rio,[83] the United States was reluctant to adopt it for several reasons.[84] The main problems involved the provisions regarding the selection of the financing mechanism, the transfer of technology, the treatment of Intellectual Property Rights (IPR), and the safety regulations imposed on the biotechnology industry.[85]

1. Technology and Financial Transfers

During the Earth Summit, developing nations insisted that their obligations under the Biodiversity Convention be coupled with financial and technical transfers to pay the incremental cost of compliance.[86] However, the developed nations feared that the Biodiversity Convention was an excuse to include items only tangentially linked to conservation.[87] The industrialized countries reiterated their right to determine the extent of access to technology and financial transfers.[88]

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requires impact assessment and promotion of its objectives based on reciprocity of notification exchange of information and consultation of activities under the Party's jurisdiction. Art. 19 at 830.

83. A total of 156 nations, including the European Union, signed the Biodiversity Convention at UNCED. Raustiala & Victor, *supra* note 9, at 19.

84. Daniel T. Jenks, Comment, *The Convention On Biological Diversity - An Efficient Framework For The Preservation Of Life On Earth?*, 15 NW. J. INT'L L. & BUS. 636, 636-39 (1995). *See Keep the Rio Summit in Perspective*, CHI. TRIB., June 12, 1992, at C18. The "onerous provisions" in Biodiversity Convention could threaten patents and profits of U.S. biotechnology industry because the provisions offer receiving countries greater latitude of control in their programs. *Id.*

85. United States Declaration Made At The United Nations Environment Programme For The Adoption Of The Convention On Biological Diversity [hereinafter U.S. Declaration], issued May 22, 1992, 31 I.L.M. 848. *See U.S. Pledges Support for Global Environmental Facility*, REUTERS [hereinafter Reuters report], USA, Aug. 4, 1993, available in WESTLAW, INT-NEWS; Tom Kenworthy, *Saving Plant and Animal Life: Treaty on Biological Diversity Offers Possibility of Breakthrough*, WASH. POST, June 1, 1992, at A15.

86. For case studies of the incremental cost concept in practice see I.A. BOWLES & G. PRICKETT, REFRAMING THE GREEN WINDOW: AN ANALYSIS OF THE GEF PILOT PHASE APPROACH TO BIODIVERSITY AND GLOBAL WARMING AND RECOMMENDATIONS FOR THE OPERATIONAL PHASE (Conservation International and Natural Resources Defense Council, 1994).

87. Raustiala & Victor, *supra* note 9, at 20.

88. *Id.* Nineteen industrialized nations asserted this right. *Id.*

The debate over financial terms revolved around questions of what problems would be specifically covered by a biodiversity fund and who would control the fund.[89] Developing nations preferred to place the fund under common control.[90] Eventually, the developed nations succeeded in establishing and controlling the Global Environment Facility (GEF) to oversee the management and disbursement of the funds.[91]

2. Biotechnology Regulation and Biosafety

The Biodiversity Convention directs its signatories to "establish or maintain means to regulate, manage, or control the risks associated with the use and release of living modified organisms resulting from biotechnology."[92] Although industrialized nations closely regulate the biotechnology industry, very few international regulations exist.[93] The developing nations introduced the biosafety issue to establish regulatory procedures to govern biotechnology activities.[94] The United States and other developed nations maintained that the biosafety concerns were exaggerated.[95] However, biotechnology is a growing industry and developed nations expressed concern that these regulations would hamper the industry's growth.[96]

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89. Biodiversity Convention, *supra* note 1, Art. 20, 21, addressing financial resources and financial management.

90. Raustiala & Victor, *supra* note 9. At 37.

91. *See* World Bank: Documents Concerning The Establishment Of The Global Environment Facility, Mar. 14, 1991, 30 I.L.M. 1735; Instrument For The Establishment Of The Restructured Global Environment Facility, Mar. 16, 1994, 33 I.L.M. 1273. In 1991, the World Bank and the United Nations launched the GEF as a pilot program and it was restructured and established as a permanent financial mechanism in March 1994. *Id.* During the Pilot Phase, membership in the GEF was limited to donor nations. *See* Jacob D. Werksman, *Greening Bretton Woods*, *in* GREENING INTERNATIONAL LAW, *supra* note 33, at 82.

92. Biodiversity Convention, *supra* note 1, Art. 19.

93. Raustiala & Victor, *supra* note 9, at 37.

94. *Id.*

95. *Id.* A UNEP study found almost no links between biodiversity and safety of biotechnology, and if links existed, they were beneficial. Id. (citing L. V. Giddings & G. Persley, *Biotechnology and Biodiversity*, UNEP/Biodiv/SWGB. 1/3 (United Nations Environment Programme, October 1990)).

96. Raustiala & Victor, *supra* note 9, at 37.

3. Technology and Intellectual Property Rights (IPR)

The United States interpreted the Biodiversity Convention as allowing countries to require technology transfer in exchange for access to genetic resources, and, therefore, found it unacceptable.[97] The United States was reluctant to accept a provision that required developed countries to "take legislative, administrative, or policy measures to ensure technology transfer."[98] The United States also opposed the requirement that access to and transfer of technology "be provided and/or facilitated under fair and most favorable terms, including concessional and preferential terms where mutually agreed to and when necessary."[99]

The development of drugs is an expensive and complex process.[100] Patent rights grant the inventor the "right to exclude others from making, using, offering for sale, or selling the invention throughout the United States, or importing the invention . . . ."[101] These exclusive rights allow the inventor to get a return on the investment via royalties and licensing.[102] The United States biotechnology industry was concerned that the insufficient IPR protection would be a

97. Carroll, *supra* note 10, at 2476-79.

98. Biodiversity Convention, *supra* note 1, Art. 18, 3,4 at 829. The Bush administration was very reluctant to regulate the transfer of technology, as it believed that excessive government regulations harm the economy and cost the US businesses money. *The President's News Conference in Rio de Janeiro, Brazil*, 28 Weekly Comp. Pres. Doc. 1043, 1049 (June 13, 1992), *reprinted in* Adam L. Streltzer, *U.S. Biotechnology Intellectual Property Rights as an Obstacle to the UNCED Convention on Biological Diversity: It Just Doesn't Matter*, 6 TRANSNAT'L LAW. 271, 272 (1993). President Bush specifically stated, "I believe that American biotechnology can help others. But it can't be if the product of that is taken away or if the incentive to innovate and the incentive to profit by your research is removed." *Id.*

99. Biodiversity Convention, *supra* note 1, Art. 16, 2, at 829.

100. Huft, *supra* note 6. The author describes at great length the process of drug development and the cost associated with this development. *Id.* at 1680 n.7. On an average, the process of taking a drug form research to the market takes 12 years at a cost of $231 million to the manufacturer. Curtis M. Horton, *Protecting Biodiversity And Cultural Diversity Under Intellectual Property Law: Toward A New International System*, 10 J. ENVTL. L. & LITIG. 1, 7-9 (1995).

101. United States Patent Act, 35 U.S.C § 154 (1996).

102. Mark A. Urbanski, Note, *Chemical Prospecting, Biodiversity Conservation, And The Importance Of International Protection Of Intellectual Property Rights In Biological Materials*, 2 BUFF. J. INT'L L. 131, 143-45 (1995).

disincentive to the development of new biotechnology products,[103] which could result in fewer discoveries of new drugs.[104]

However, international environmental groups and domestic supporters of the Biodiversity Convention argued that absent conservation incentives for the developing world, very little biodiversity would remain, a condition that would further jeopardize long-term pharmaceutical research.[105]

The United States eventually signed the Biodiversity Convention[106] in 1993, but retained the right to issue an "interpretive statement" concerning certain provisions.[107] At the

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103. *See* U.S. Declaration, *supra* note 85; Reuters report, *supra* note 85; Kenworthy, *supra* note 85, at A15.

104. *See* John H. Barton, *Biodiversity at Rio*, 42 BIOSCIENCE 773, 775 (Nov. 1992). The Biodiversity Convention's critics believed Art. 16, § 5 calls for compulsory licensing. *Id.* Art. 16, § 5 is the most objectionable provision related to intellectual property protection. Melinda Chandler, *The Biodiversity Convention: Selected Issues of Interest to the International Lawyer*, 4 COLO. J. INT'L L. & POL'Y 141, 163 (1993). In spite of the low level of intellectual property protection in the developing world, the language of treaty suggests compulsory licenses. Dan L. Burk et al., *Biodiversity and Biotechnology*, 260 SCI. 1900, 1901 (1993). The concerns of biotechnology companies include the possible need under Article 19 for a protocol on the handling of biotechnology. *Draft Statements to Interpret Treaty Said Under Examination By Administration,* Apr. 5, 1993, *available in* WESTLAW, BNA-IED. The U.S. biotechnology industry supported President Bush's decision not to sign treaty. *See also Industry Trade Groups Laud President Bush for Decision Not to Sign Biodiversity Treaty*, PAT. TRADEMARK & COPYRIGHT L. DAILY (BNA), June 15, 1992.

105. Streltzer, *supra* note 98, at 272.

106. Alex Barnum, *Companies, Environmentalists United on Treaty*, S.F. CHRON. , Apr. 24, 1993, at B1; *As It Signs Treaty, United States Calls For Global Patent Protection For Biotechnology*, June 8, 1993, *available in* WESTLAW, BNA-IED; Remarks on Earth Day, 29 Weekly Comp. Pres. Doc. 632 (Apr. 26, 1993). President Clinton signed the Biodiversity Convention on June 4, 1993. The Biodiversity Convention had the 30 signatures it needed for ratification without United States support. Coughlin, *supra* note 63, at 341. Apparently, the United States signed the Biodiversity Convention on the last day it was open for signature, to ensure U.S. participation in negotiations among the parties to the Biodiversity Convention. *Id.*

107. *See As It Signs Treaty, United States Calls For Global Patent Protection For Biotechnology,* June 8, 1993, *available in* WESTLAW, BNA-IED. *See also Ratification Sought for the Convention on Biological Diversity*, 5 Dept. of State Dispatch 16 (statement of Timothy E. Wirth, Counselor to the Dept. of State, before the Senate Foreign Relations Committee on Apr. 12, 1994). A draft of the United States "interpretative statement" is set forth in the Appendix to Mr. Wirth's testimony. The interpretive statement is in form of seven "understandings". *Senate*

time of this writing, the Senate has not yet ratified the Biodiversity Convention.[108]

In spite of subsequent criticism, the Biodiversity Convention has succeeded in expanding the international discussion of biodiversity and IPR by recognizing the right of ownership of biological resources and traditional knowledge.[109]

B. THE AGREEMENT ON THE TRADE-RELATED ASPECTS OF INTELLECTUAL PROPERTY RIGHTS (TRIPS)

Multinational efforts directed toward intellectual property generally fall into two classifications.[110] Developing countries favor efforts to regulate technology transfers, asserting that technology is a common asset and ought to be freely shared.[111] Developed countries support efforts to protect technology because they consider technology to be valuable private property.[112]

Recent discussions regarding trade have recognized the vital role of intellectual property in international trade.[113]

Comm. on Foreign Relations, Convention on Biological Diversity, S. Exec. Doc. No. 30, 103d Cong., 2d Sess. 2-25 (1994) [hereinafter Biodiversity Convention Report]. The U.S. Government interprets transfer of technologies under Article 16 to occur only if transfer is consistent with adequate and effective protection of IPR. *Id.* at 6-16. Several "developed countries issued interpretive statements on the Biodiversity Convention's financial and intellectual property provisions." Goldman, *supra* note 65, at 697. The United Kingdom, France, Italy, and Switzerland signed the Biodiversity Convention with the understanding that the Conference could not require contributions of a specified amount, nature, or frequency to developing countries. *Id.* at 697 n.8.

108. Raustiala & Victor, *supra* note 9, at 42-43. Many members of Congress were concerned about the vagueness and ambiguity of the text. *Id.* (citing a letter from Senate Committee on Foreign Relation to majority leader George Mitchell (D-Me), 5 August 1994; and a reply from Secretary of the Interior Bruce Babbitt, Secretary of Agriculture Mike Espy, and Secretary of State Warren Christopher, 16 August 1994).

109. Goldman, *supra* note 65, at 696-97. While the Biodiversity Convention provides broad framework for international interaction, it leaves open many specifics regarding its implementation. *Id.*

110. FOLSOM, *supra* note 8, at 845.

111. *Id.*

112. *Id.*

113. Thomas Mesevage, *The Carrot and the Stick: Protecting U.S. Intellectual Property in Developing Countries*, 17 RUTGERS COMPUTER & TECH. L. J. 421

1. The United Nations Conference on Trade and Development (UNCTAD)

The United Nations Conference on Trade and Development (UNCTAD)[114] was one of the first forums to address the issue of an international "Code of Conduct" (hereinafter "Code") for transfer of technology.[115] Developing nations insisted that such a Code be internationally legally binding, while developed nations preferred that the Code serve as a guideline for international transfer of technology.[116] Although the Code served as a model for some national laws, the United Nations General Assembly has not formally adopted the Code.[117] The forum for the discussion of intellectual property shifted away from the United Nations to another trade forum, the General Agreement on Tariffs and Trade (GATT) process.[118]

2. General Agreement on Tariffs and Trade (GATT)

The Tokyo Round of GATT in 1979, took the first, albeit faltering steps toward acknowledging a connection between intellectual property issues and international trade.[119] How-

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(1991). The United States threatened to cease trade preferences if developing countries did not respect United States patents. *Id.* at 421. Part of reason that the United States Congress linked trade issues with IPR enforcement was because of American frustrations with world's diverging economic alignments. *Id.* at 422. The evolution of technology is a global phenomena, thus, it requires uniform global protection of IPR. Armstrong, *supra* note 14, at 192-93. Intellectual property system is vital to any country's economic infrastructure. Armstrong, *supra* note 14, at 194.

114. UNCTAD, a subsidiary of the United Nations General Assembly, seeks to focus international attention on economic measures that might accelerate development of developing countries or less developed countries (LDC). RALPH H. FOLSOM ET AL., 1995 Document Supplement to INTERNATIONAL BUSINESS TRANSACTION: A PROBLEM ORIENTED COURSEBOOK, 18 (West Publishing Co., 3d ed. 1995)

115. FOLSOM, *supra* note 8, at 845. The United Nations was the center of an attempt by the developing countries to require a greater transfer of technology without recognition of IPR. *Id.*

116. *Id.* at 721.

117. *Id.* at 845-46.

118. FOLSOM, *supra* note 8, at 845-46. The GATT was founded in 1947 for the purpose of overseeing the negotiation of international rules governing trade. Gadbaw & Richards, *supra* note 20, at 29. The GATT was successful in eliminating many tariffs as obstacles to trade, and has recently focussed on non-tariff trade barriers such as IPR. *Id.*

119. GADBAW & RICHARDS, *supra* note 20, at 41, 43-44. There is growing inter-

ever, due to the concerns of developed countries, the debate focussed on non-tariff trade barriers rather than intellectual property issues.[120] In 1986, a Ministerial Declaration issued in Geneva further emphasized the appropriateness of the GATT framework to resolve trade aspects of IPR protection.[121]

Additionally, the United States' dissatisfaction with the IPR provisions of the Biodiversity Convention, resulted in an aggressive United States policy to incorporate biotechnology and IPR within the realm of GATT negotiations.[122]

In 1987, the Uruguay Round of GATT[123] resulted in new rules for the protection of IPR and the formation of the World Trade Organization (WTO).[124] The WTO Agreement includes in its preamble language recognizing the importance of environmental concerns.[125] WTO has condensed the complex social, ethical, and cultural issues of the Biodiversity Convention exclusively to trade issues of IPR.[126] The Agreement on the Trade-Related Aspects of Intellectual Property Rights (TRIPS) embodies the results of the Uruguay round.[127]

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national appreciation of the fact that intellectual property standards increasingly determine the patterns of global trade. *Id.*

120. Braga, *supra* note 15, at 262. After the Tokyo Round, developed countries were concerned with what they termed "free rider" trade activities which could act as non-tariff barriers to trade. *Id.*

121. Ministerial Declaration of November 29, 1982, *reprinted in* GENERAL AGREEMENT ON TARIFFS AND TRADE: BASIC INSTRUMENTS AND SELECTED DOCUMENTS 9 (29th Supp. 1981-82) at 19. The Ministerial Declaration discussed the trade aspects of commercial counterfeiting, such as infringement of IPR. *Id.*

122. Armstrong, *supra* note 14, at 192. United States patent system is beneficial and similar global intellectual property protection is necessary to ensure widespread participation in research and technological development. *Id.* at 201.

123. The Uruguay Round, launched in September 1986 in Punta del Este, Uruguay, after long and complex negotiations resulted in the formation of the WTO in 1994. FOLSOM, *supra* note 8, at 306-309.

124. WTO Agreement, *supra* note 20.

125. *Id.*

126. James Buchanan, *Between Advocacy and Responsibility: the Challenge of Biotechnology for International Law*, 1 BUFF. J. INT'L L. 221, 228-229 (1994).

127. TRIPS Agreement, *supra* note 20.

3. Patent Protection Under the TRIPS Agreement

The TRIPS Agreement provides protection for a broad spectrum of IPR,[128] including patents, copyrights, trademarks and geographical indications, as well as industrial designs.[129] Section 5 of the TRIPS Agreement defines patentable subject matter as any new invention, whether product or process, that involves an inventive step and is capable of industrial application.[130] Additionally, the TRIPS Agreement strengthens international patent protection by prohibiting various forms of discrimination against foreign patent applicants.[131] While guaranteeing strengthened patent protection to all signatory nations,[132] TRIPS does contain provisions which exclude certain subject matter from patentability[133] for a limited time.[134]

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128. *See* Michael L. Doane, *TRIPS and International Intellectual Property Protection in an Age of Advancing Technology*, 9 AM. U. J. INT'L L. & POL'Y 465, 477 (1994). TRIPS ensures international intellectual property protection by proscribing minimum substantive standards for domestic intellectual property legislation, mandating national enforcement mechanisms, and providing international dispute settlement provisions. *Id.*

129. Monique L. Cordray, *GATT v. WIPO*, 76 PAT. & TRADEMARK OFF. SOC'Y 121, 125 (1994). *See* TRIPS Agreement, *supra* note 20 Arts. 15, 20, 21, 30, 31, 39. Earlier, U.S. law allowed a 17 year patent term from the date of issue, whereas under the TRIPS provisions, the patent term is 20 years from the application date. *Legislation: Bill Would Amend GATT Legislation to Provide 17 or 20 Year Patent Term*, PAT. TRADEMARK & COPYRIGHT L. DAILY (BNA), Jan. 20, 1995, at D3. This legislation harmonizes U.S. patent law with that of other developed countries, including the European Community, and curtails terms of so-called "submarine patents," which make use of continuation devices to extend patent life. *Id.*

130. TRIPS Agreement, *supra* note 20, Art. 27. In the Dunkel Draft, terms such as "inventive step" and "capable of industrial application" are considered synonymous with terms "non-obvious" and "useful" as used in United States patent law. Doane, *supra* note 128, at 477-78. However, these provisions do not acknowledge the IPR created under the Biodiversity Convention. *Id.* at 478.

131. Doane, *supra* note 128, at 477. The Dunkel Draft prohibits countries from discriminating based on place of invention, field of technology, or whether product is imported or domestically produced, when granting patents. *Id* at 478. The TRIPS Agreement requires nations to extend similar treatment to nationals of all member countries, i.e. extend Most-Favoured-Nation (MFN) treatment to all member nations. TRIPS Agreement, *supra* note 20, Art. 4.

132. TRIPS Agreement, *supra* note 20, at Art. 70, s 8. All Members, including "least-developed countries," must provide patent protection for pharmaceutical and agricultural chemical products as of the date of entry into force of the Agreement Establishing the World Trade Organization (WTO Agreement) (of which the TRIPS Agreement is a part). *Id.*

133. Doane, *supra* note 128, at 477-78. The TRIPS Agreement allows nations to exclude diagnostic, therapeutic, and surgical methods from patentability, in addition to excluding plants, animals, and biological processes to make plants or ani-

Such subject matter includes products that protect human, plant, or animal life and health, or products that are harmful to the environment.[135] The TRIPS Agreement allows compulsory licensing of patents only as a last resort after reasonable attempts to obtain authorized use.[136]

Despite their displeasure with these concessions,[137] the United States and other developed countries view the stringent patent protections in the TRIPS Agreement as an overall victory and "an important first step in obtaining effective international intellectual property protection."[138]

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mals. *Id* at 478. TRIPS Agreement, *supra* note 20, at Art. 27, §§ 2, 3 (a),(b).

134. TRIPS provides a 10-year grace period for developing countries not previously affording patent protection to certain product categories. J.H. REICHMAN, IMPLICATIONS OF THE DRAFT TRIPS AGREEMENT FOR DEVELOPING COUNTRIES AND COMPETITORS IN AN INTEGRATED WORLD MARKET 4 (1993).

135. Braga, *supra* note 15, at 262. Exclusions are consistent with the domestic laws of many signatory countries which do not permit patenting of life-forms, pharmaceuticals and food, based on social considerations, such as availability of inexpensive health care and nutrition. *Id.* at 253. Most developing countries have traditionally denied patents for inventions in agriculture and medicine in order to improve the country's standard of living. Stefan Kirchanski, *Protection of U.S. Patent Rights in Developing Countries: U.S. Efforts to Enforce Pharmaceutical Patents in Thailand*, 16 LOY. L.A. INT'L & COMP. L. J. 569, 576-77, 583 (1994).

136. TRIPS Agreement, *supra* note 20, at Art. 31, § b. Compulsory licensing should be nonexclusive, nonassignable, and limited "predominantly" to the domestic market. *Id.* at Art. 31, §§ d-f. Patent holders must receive "adequate remuneration," and judicial review must be available. *Id.* at Art. 31, §§ h-j. The scope and duration of the compulsory license is "limited to the purpose for which it was authorized," and otherwise terminated. *Id.* at Art. 31, §§ c, g. Although the Trips Agreement does not specifically address working requirements, it permits "a reasonable period of time" to seek authorized use on fair terms. *Id.* at Art. 31, § b.

137. Due to the broadness of exclusions, without interpretive statement, these exclusions could be expanded to exclude pharmaceutical products and processes from patentability. Doane, *supra* note 128, at 478. *See* discussion in note 132 *supra*.

138. Doane, *supra* note 128, at 476-77. Many aspects of the TRIPS Agreement match the initial proposal submitted by the United States After the opening of the Uruguay Round, stating basic objectives and outlining specific substantive requirements for a TRIPS Agreement. *Id.* Since strong patent protection is important to United States high technology industry, many nations complained that TRIPS favors the United States. *Id.*

4. Biodiversity Convention and the TRIPS Agreement

The provisions of the Biodiversity Convention and the TRIPS Agreement regarding preservation of biodiversity and IPR appear to be in conflict. The Biodiversity Convention establishes IPR in biological resources and traditional knowledge and encourages transfer of technology.[139] Further, the Biodiversity Convention gives member nations the right to restrict access to biodiversity and the right to compensation for the use of this biodiversity.[140] However, the TRIPS agreement does not provide for the protection of traditional knowledge, eventhough it requires its signatories to expand patent protection.[141] Moreover, while the TRIPS Agreement allows exclusion of certain subject matter from patentability, it requires nations to extend Most-Favoured-Nation treatment to all member nations.[142]

Furthermore, developed and developing nations have different goals for preservation of biodiversity and protection of IPR.[143] Developed nations want to promote conservation, continue to have free access to the biological resources and control technology transfer.[144] Meanwhile, developing countries seek to obtain a sustainable use of biological resources, sovereign right to their genetic resources, financial and technological assistance in biodiversity protection and an equitable distribution of the economic benefits derived from biodiversity.[145] Resolving this conflict requires a balancing of the concerns and objections of both the developed and developing nations.

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139. Biodiversity Convention, *supra* note 1, Arts. 8, 15, 16 and 19.
140. *Id.*
141. TRIPS Agreement, *see supra* notes 130-134 and 136 and the accompanying text.
142. TRIPS Agreement, *see supra* notes 131-135 and the accompanying text.
143. *See generally* Raustiala & Victor, *supra* note 9.
144. *Id.*
145. *Id.*

IV. The Debate Between Developed And Developing Nations Regarding Ecologically Sustainable Development

Wide economic gaps between developed and developing nations result in different outlooks and priorities with respect to environmental concerns.[146] These differences have hampered international cooperation regarding ESD.[147] Many developing nations lack sufficient financial and technical resources to develop adequate domestic legislation, set up effective administrative systems, and hire and train enforcement personnel.[148]

Developed nations often do not give high priority to international environmental agreements.[149] In addition, developed nations often do not assign appropriate resources or personnel necessary for successful completion of environmental projects.[150]

A. COMMON BUT DIFFERENTIATED RESPONSIBILITIES

The Earth Summit attempted to bridge the divide between the developed and developing nations by recognizing the "common but differentiated responsibilities" that nations share for global environmental problems.[151] This principle suggests that particular nations have contributed to various environmental problems.[152] However, the special needs of developing

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146. Cliff Haas, *Wellstone Raising His Voice On The Environment*, STAR TRIB., May 31, 1992, at 12A.

147. *Id.*

148. S. Jacob Scherr & Jared E. Blumenfeld, *Implementing UNCED*, *in* GREENING INTERNATIONAL LAW, *supra* note 33, at 237.

149. *Id.*

150. *Id.*

151. Principle 7 of the Rio Declaration provides, in part:

> In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.

Rio Declaration, *supra* note 62, at 877.

152. *See* Sands, GREENING INTERNATIONAL LAW, *supra* note 33, at xxxiv-xxxv.

countries, such as poverty, overpopulation and urbanization, must be considered to encourage those countries to participate in global environmental agreements.[153]

Further, this principle creates the moral and legal basis for holding the United States and other industrialized countries accountable for great proportion of global environmental harm.[154] High-consumption societies, led by the United States, still demand a continuous supply of rapidly depleting global natural resources.[155] Industrialization and the associated rise in living standards cause an increasing demand for shrinking natural resources and create exceedingly high levels of pollution.[156] Rising living standards coupled with a dramatic rise in population of the developing nations will only aggravate the situation.[157] Industrialized nations, while continuing their highly consumptive lifestyle at the expense of the environment, expect developing countries to forgo industrialization.[158] Developing countries are not willing to sacrifice development to stabilize global environment, and absent a cooperative effort, the deterioration of the biodiversity will continue.[159]

For a further discussion of the principle of common but differentiated responsibilities see Ileana Porras, *The Rio Declaration: A New Basis For International Cooperation, in* GREENING INTERNATIONAL LAW, *supra* note 33 at 27-30.

153. *See* Sands, GREENING INTERNATIONAL LAW, *supra* note 33, at xxxiv-xxxv. *See also, supra* note 45 and accompanying text.

154. Sands, *supra* note 56, at 310-11.

155. The United States, representing 6% of the world's population, consumes 30% of the world's mineral production. G. Kevin Jones, *United States Dependence on Imports of Four Strategic and Critical Minerals: Implications and Policy Alternatives*, 15 B.C. L. REV. 217, 220 § 2 & n.21 (1988). The United States also consumes 25% of the world's energy and emits 22% of all carbon dioxide produced. Dr. Ranee Khooshie Lal Panjabi, *Can International Law Improve the Climate? An Analysis of the United Nations Framework Convention on Climate Change Signed at the Rio Summit in 1992*, 18 N.C.J. INT'L L. & COM. REG. 491, 509 (1993).

156. Kenneth Miranda & Timothy R. Muzondo, *Government Must Consider the Possible Impacts of their Environmental Policies on Key Macroeconomics Balances*, 28 FIN & DEV. 2, 25 (1991).

157. Jose A. Egurbide, Comment, *Stop Biting The Hand That Feeds US: Safeguarding Sustainable Development Through The Application Of NEPA's Environmental Impact Statement To International Trade Agreements*, 22 PEPP. L. REV, 1089, 1100-03 (1995).

158. *Id.*

159. HURREL & KINGSBURY, *supra* note 48, at 36-43.

B. TECHNOLOGY TRANSFER AND IPR

Developed and developing countries have long disagreed on the benefits of IPR.[160] Developed countries contend that IPR are just and efficient, and promote the development of technological advances.[161] However, many developing countries view IPR as economically non-feasible and fundamentally unjust.[162] Despite being the major providers of many pharmaceutical, agricultural and biotechnological innovations, developing countries reap little or no benefits from them.[163] Due to their unfair bargaining position, developing countries are forced to adopt domestic patent laws that conform to those of developed countries.[164]

1. Appropriate Transfer Of Technology

Historically, developing countries have perceived stringent IPR as mainly safeguarding colonial governments and multinational corporations.[165] Developing countries rely on the inter-

160. A. Samuel Oddi, *The International Patent System and Third World Development: Reality or Myth?*, 1987 DUKE L.J. 831, 842. The author described a critical study by Edith Penrose in 1951 which questioned "economic justification for developing countries to participate in international patent system." *Id.* A detailed analysis of the North-South debate indicates that "it has become evident that expanded protection of IPR is not sensible for all countries; neither is it wise to allow the United States and other developed countries to impose their conventions upon the rest of the world". Gutterman, *supra* note 11, at 136-37.

161. Doane, *supra* note 128, at 477. According to western views, the patent law system leads to economic development despite cost of royalties. Kirchanski, *supra* note 135, at 571-72.

162. Oddi, *supra* note 160, at 848. The net social cost to developing country of granting patents is likely to be more than net social benefits. *Id.* The language, stating that reciprocal arrangements between developed and developing countries to grant patent protections did not necessarily promote economic development in developing country, was struck from original Omnibus Trade and Competitive Act. Mesevage, *supra* note 113, at 428. *Also see* C. Hardy, *Patent Protection and Raw Materials:the Convention on Biological Diversity and Its Implications for the U.S. Policy on the Development and Commercialization of Biotechnology,* 15 U. PA. J. INT'L BUS. L. 299 (1994).

163. *See* Hardy, *supra* note 162. *See generally* Huft, *supra* note 6.

164. GADBAW & RICHARDS, *supra* note 20, at 29. Theoretical economic arguments alone provide insufficient incentive for developing countries to undertake IPR reform. *Id.* Potential loss of other economic benefits, however, immediately convinces many governments that reforming IPR regimes is in their best interest. *Id.* at 21.

165. PETER NANYENYA-TAKIRAMBUDDE, TECHNOLOGY TRANSFER AND INTERNATION-

national transfer of technology to accelerate domestic industrialization and economic growth[166] and decrease their dependency on foreign capital and technology.[167] However, technology transfer to developing countries has resulted in "technological colonialism" by multinational corporations.[168] Developing countries have been required to accept conditions set forth by the donor countries and the multinational corporations in order to acquire technology.[169] These forced reforms explain the skepticism of developing countries towards both international technology transfer and strong domestic patent laws.[170]

Most developing countries favor transfer of technology because they recognize its importance in establishing a strong foundation for their own domestic industries.[171] Developing

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AL LAW 4, 70-71 (Praeger Publishers, 1980). Developing countries have curbed activities of multinational corporations which control the bulk of western based technology. *Id. See* Mark Greenberg, *Recent Developments in Latin American Intellectual Property Law: The Venezuelan Response to Andean Pact Decision* 313, 25 U. MIAMI INTER-AM. L. REV. 131 (1993) for a brief historical perspective on Latin American industrial property law. The laws primarily benefitted foreign economies because foreigners held 90% of patents in developing countries in 1983, and 73% in 1988. Brenner-Beck, *supra* note 15, at 97. In addition, 64% of patents awarded by developed nations in 1988 went to nationals of other developed nations. *Id.*

166. Industrialization and regional economic integration are key instruments in the economic development of most developing countries. Greenberg, *supra* note 165, at 134-35. Developing countries purchase the technology from a developed country, the latter presumably assisting in the practical application and use of this technology. Oddi, *supra* note 160, at 849. There are both economic and social benefits derived from effective technology transfers, the developing country acquires the needed technical information at a reasonable cost without reinventing and redeveloping technology. *Id. See generally* Christopher J. Harnett, *The Human Genome Project and the Downside of Federal Technology Transfer*, 5 RISK: HEALTH SAFETY, & ENV'T 151 (1994).

167. Mesevage, *supra* note 113, at 421. Developing countries see technology transfer as aid to supply basic needs and services, while maintaining their sovereignty. *Id.*

168. Greenberg, *supra* note 165, at 134-35. The author quoted David M. Haug, *The International Transfer of Technology: Lessons that East Europe can Learn from the Failed Third World Experience*, 5 HARV. J.L. & TECH. 209, 218 (1992). *Id.* In many transfers, multinational corporations used stronger bargaining positions to negotiate agreements incorporating restrictive use clauses, effectively "colonizing" the developing nations. Greenberg, *supra* note *165*, at 135. Developing countries are skeptical of assertions that strong intellectual property protection will ensure economic development. *Id.*

169. Carroll, *supra* note 10, at 2465-68.

170. *Id.*

171. Greenberg, *supra* note 165, at 134-35. Since developing countries lack the scientific and financial infrastructures necessary to create patent-induced innova-

countries are also aware that developed countries will not transfer proprietary technology without guaranteed and sufficient patent protection.[172] However, due to different levels of development, developing countries are unable to sufficiently optimize or benefit from the technology transferred.[173] As a result, the original incentive for issuing patents, to encourage transfer of technology, is lost.[174]

2. Economic Concerns

Despite the benefits of increased technology transfer, developing countries are concerned with the administrative costs of implementing patent laws.[175] The initial cost of establishing the legal framework to grant and enforce patents is prohibitive. Furthermore, the domestic economies in these countries will suffer from an initial drop in the number of products on the market[176] and an increase in the prices of those patented

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tions, they are far more interested in technology transfer than in encouraging domestic innovation. *Id.* Recognition of technology to developing countries is important. Mesevage, *supra* note 113, at 421.

172. See GUNDA SCHUMANN, *Economic Development And Intellectual Property Protection In Southeast Asia, in* INTELLECTUAL PROPERTY RIGHTS IN SCIENCE, TECHNOLOGY, AND ECONOMIC PERFORMANCE 157, 173 (F. Rushing & C. Ganz Brown eds., 1990). In a 1987 survey, 75% of companies surveyed viewed inadequate protection of IPR as a strong disincentive to licensing technology to developing countries. *Id.*

173. Less than 10% of technology patented in developing countries is in use, compared to 30 to 50% of worldwide patents in use. Brenner-Beck, *supra* note 15, 97. Depending on the level of industrial sophistication within developing countries, most patent applications originating in developed countries are likely to be inadequate to practice an invention in developing countries. Oddi, *supra* note 160, at 850.

174. Oddi, *supra* note 160, at 850.

175. Oddi, *supra* note 160, at 840. Costs attributable to the patent system include: under-utilization of inventions, either by "blocking" or non-use, abuse of patent monopoly, increased research expenditures to avoid patent infringement and over-allocation of resources to applied research as compared to basic research. *Id.* Administrative costs of a patent system in a developing country often require high percentages of the country's net resources. *Id.*at 846. Additionally, an "inefficient allocation of trained technical personnel, probably already in short supply in a developing country, for the administration of a patent-granting agency" may exist. *Id.*

176. Oddi, *supra* note 160, at 847. Only patented items will be on the market, while other similar items will have to be removed from market until licensing occurs. *Id.* The effects of this temporary monopoly are particularly harmful to a developing country when the patents are granted to foreigners in a case where the patented item is or can be produced locally. *Id.* Granting a patent in this case

goods that do reach the market.[177] While these problems will presumably diminish, the future economic benefits for developing countries do not balance the initial expense entailed.[178]

3. Benefits Of Patent Protection

Developed countries argue that, in the long-run, patents promote development.[179] These countries assert that patents are the best incentives for invention, which will thereby increase domestic productivity.[180] When a government grants exclusive rights in a patented invention, it assures domestic enterprises sufficient returns on their investment of costly or risky research and development expenses.[181] Developing countries would benefit from the greater eagerness of developed countries to export products and technology to those countries that grant and enforce patent protections.[182] Developing

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precludes all domestic competition, undermining one of the important justifications for a patent system. *Id.*

177. *Argentina Faces Sanctions Due to Delay in Enacting Patent Law,* 6 J. PROPRIETARY RTS., June 1994, at 39. The Argentine pharmaceutical industry leaders fear patents in industry will add to the nation's unemployment and increase drug prices. *Id.* Opponents of increased patent protections in Columbia argue that allowing pharmaceutical patents will increase prices of necessary medications, making them unaffordable for the ordinary citizens. *Colombian Pharmaceutical Patents Spark Controversy,* 6 J. PROPRIETARY RTS., Oct. 1994, at 28. *See also* Kirchanski, *supra* note 135, at 579-80 (1994). Prices of imported patented drugs are usually beyond the means of the average consumer in Thailand. *Cf.* Stephen B. Brush, *A Non-Market Approach to Protecting Biological Resources, in Indigenous Peoples, supra* note 71, at 137. Implementation of intellectual property system among indigenous populations will increase the cost of food and drugs, result in inequitable benefits, and increase the power of national bureaucracies that enforce monopolies. *Id.*

178. Oddi, *supra* note 160, at 840. The start-up and maintenance costs associated with developing and enforcing new IPR may be too high for some developing countries to bear. *Id.*

179. NANYENYA-TAKIRAMBUDDE, *supra* note 165, at 97. The basis for the grant of exclusive IPR to individuals is the notion that the community at large benefits from technological advances derived from this exclusive grant (citing W.F. Baxter, *Legal Restrictions on Exploitation of the Patent Monopoly,* 76 YALE L.J. 267, 267-68 (1966)). "An innovator's ability to obtain those monopoly rights inherent in a patent grant provides an incentive for higher level of domestic investment in innovative activities." Gutterman, *supra* note 11, at 119.

180. *See supra* note 179 and accompanying text.

181. The patent system plays a vital part in stimulating innovation and compensating private investment costs. NANYENYA-TAKIRAMBUDDE, *supra* note 165, at 103.

182. Availability of patent protection for new products increases the flow of new

countries would also benefit from greater direct foreign investment into domestic research and development.[183]

C. INDIGENOUS/TRADITIONAL KNOWLEDGE AND IPR

Most of the rainforests that maintain the earth's biodiversity and the majority of the indigenous people reside in the developing countries.[184] Thus, developing countries possess the traditional knowledge and the resources, while the developed countries are generally the beneficiaries.[185] Countries with significant genetic resources affirm their rights to control access to all natural resources within their borders.[186] These developing countries argue that they should receive compensation from the developed countries profiting from their use of resources and traditional knowledge that are otherwise free.[187]

The Biodiversity Convention creates IPR in traditional knowledge and urges unprecedented compensation and knowledge-sharing.[188] By patenting traditional knowledge, developing countries would presumably profit in the same way that developed countries currently profit from technical knowledge.[189]

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products into developing countries, thereby increasing the welfare of the population. Gutterman, *supra* note 11, at 119. Countries with weak intellectual property systems receive less technical knowledge from the international pool of research, development, and invention. Armstrong, *supra* note 14, at 205.

183. GADBAW & RICHARDS, *supra* note 20, at 27-28.

184. *See generally* Huft, *supra* note 6.

185. *Id.*

186. The Biodiversity Convention grants developing nations the right to exclude nationals of foreign countries from access to biological organisms within their territory. Coughlin, *supra* note 63, at 343.

187. Developing countries argue that they should share in the profits of the biotechnology research which makes use of their natural resources and biodiversity. David R. Downes, *New Diplomacy for the Biodiversity Trade: Biodiversity, Biotechnology, and Intellectual Property in the Convention on Biological Diversity*, 4 TOURO J. TRANSNAT'L L. 1, 6 (1993). Developed countries have benefitted from utilizing tropical genetic resources as common heritage, without compensating the source-countries. *Id.* at 6. Developing countries have been supplying resources to the biotechnology research machines in developed countries. *Id.* at 6-8.

188. Biodiversity Convention, *supra* note 1, Art. 8(j), 15 p 5.

189. IPR protections for indigenous peoples are a legally enforceable basis for indigenous peoples to share profits in commercial applications of their knowledge. Tom Greaves, *IPR, A Current Survey, in* Indigenous Peoples, *supra* note 71, at 4.

1. Patentability Of Traditional Knowledge

For centuries, indigenous groups have known the medicinal value of certain natural products.[190] Modern collectors seek out the keepers of traditional medicinal knowledge and collaborate with them to gather samples.[191] Collectors analyze these samples for pharmacological activity and marketability of any resulting product.[192] Such exploration and exploitation of the commercial potential of biodiversity is known as biodiversity prospecting.[193] Indigenous groups seeking to protect their traditional knowledge face serious obstacles to patentability under the current utility patent law in many countries, including the United States.[194]

The TRIPS Agreement defines a patentable invention as any "product or process . . . provided they are new, involve an inventive step and are capable of industrial application."[195]

These rights to traditional knowledge holders whose knowledge contributed to the development of a sustainable use to receive commercial profits. Downes, *supra* note 187, at 4.

190. Walter V. Reid et al., *A New Lease On Life, in* BIODIVERSITY PROSPECTING: USING GENETIC RESOURCES FOR SUSTAINABLE DEVELOPMENT, 35, (World Resources Institute, 1993) [hereinafter Biodiversity Prospecting]. This knowledge is restricted and handed down to a privileged few within the communities. *Id.*

191. Sarah A. Laird, *Contracts For Biodiversity Prospecting, in* Biodiversity Prospecting, *supra* note 190, at 99, 105-06. Examples of modern collectors include researchers for nonprofit institutions such as universities and botanical gardens, entrepreneurs servicing drug companies, and in-country institutions. *Id.*

192. Reid et al., *supra* note 190, at 16-17. One out of 4,000 randomly selected plants may produce a commercial drug. *Id.* at 17. Traditional knowledge can improve those odds considerably. *Id.* at 17. *See* CONG. RES. SERVICE, REPORT FOR CONGRESS: BIOTECHNOLOGY, INDIGENOUS PEOPLES, AND INTELLECTUAL PROPERTY RIGHTS, 103d Cong., 1st Sess. 10 (1993). The most famous examples are vincristine and vinblastine, anticancer drugs derived from the rosy periwinkle which is native to many tropical countries. *Id.* Eli Lilly & Company earns over $100 million annually from these compounds manufactured from plants cultivated in Texas. *Id.*

193. Reid, *supra* note 190, at 6-14.

194. Horton, *supra* note 100, at 15-16.

195. TRIPS Agreement, *supra* note 20, at Art. 27, § 1. In the United States, a patentable invention must be "useful, novel, and non-obvious." 35 U.S.C. §§ 101-103 (1996). Novel is defined as not publicly known or used by others. *Id.* § 102. An invention is non-obvious if the invention as a whole would not have been obvious to a person with ordinary skill in the art pertaining to the invention. *Id.* at § 103. The European Patent Office (EPO) uses an "obvious to try" test, setting a tougher standard for inventors to meet. Shayana Kadidal, Note, *Plants, Poverty, and Pharmaceutical Patents*, 103 YALE L.J. 223, 246-47 (1993).

Traditional knowledge is generally known and used for much longer than the typical one-year grace period allowed before a patent application must be filed.[196] Further, this information may be published and, therefore, is not "novel."[197] Consequently, satisfying the non-obviousness standard for patentability is a difficult proposition for traditional medicine.[198]

While a traditional method is unlikely to be novel and/or non-obvious, a newly modified natural product or a method of using a natural product could be patentable in some countries, including the United States.[199] Patent laws of most developed nations allow drug manufacturers to obtain patents on these samples with only minor modifications, while traditional medicine is unpatentable.[200] By recognizing IPR for natural resources and traditional knowledge, the Biodiversity Convention provides developing countries a way to reaffirm their sovereign right to their genetic resources and to promote a more equitable sharing of the benefits form biodiversity.[201]

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196. Horton, *supra* note 100, at 15. In the United States, a patent is statutorily barred if the application is filed more than one year after the invention is known to, or used by the public. *See* 35 U.S.C. § 102(b) (1996).

197. Horton, *supra* note 100, at 15. *See* 35 U.S.C. § 102 (1996).

198. Horton, *supra* note 100, at 15. *See* 35 U.S.C. § 103 (1996).

199. Horton, *supra* note 100, at 15.

200. IVER P. COOPER, BIOTECHNOLOGY AND THE LAW § 3.02 (Clark Boardman Co., Ltd. 1988). The author discusses product of nature doctrine. A structurally altered natural compound that retains its original useful properties or other new semisynthetic drugs are patentable, subject to the novelty and non-obviousness requirements. Kadidal, *supra* note 195, at 239. A purified drug is patentable if it differs "not only in degree but in kind" from the identical but impure natural substance and has unexpected properties. *Id.*

The Fourth circuit held that vitamin B12 was patentable in crystalline form although derived from an unpatentable natural substance, since this purified form was useful and differed "in kind" from the impure natural state. Merck & Co. v. Olin Mathieson Chem. Corp., 253 F.2d 156 (4th Cir.1958). The United States has issued patents for many plant-derived drugs, and pharmaceutical firms continue to patent such drugs. Examples include vincristine and vinblastine, two of the compounds isolated from the rosy periwinkle. U.S. Pat. No. 3,205,220 (vincristine); U.S. Pat. No. 3,097,137 (vinblastine). These compounds were purified and isolated and thus differed "in kind" from the natural compound, and were used for purposes other than what the plants were used for by indigenous groups. Therefore these compounds were patentable. *See* Dennis v. Pitner, 106 F.2d 142, 146 (7th Cir.) ("A discovery in the field of science of a new quality or phenomenon of an old product may be . . . the proper subject of a patent"), *cert. denied*, 308 U.S. 606 (1939).

201. Biodiversity Convention, *supra* note 1; *see generally* Raustiala & Victor, *supra* note 9.

Viewed as a whole, the current national IPR regimes offer relatively little to developing countries seeking fair compensation for their contributions to the global economy and biodiversity protection.[202] A fair settlement, establishing a procedure for preserving biodiversity and protecting IPR acceptable by both groups of countries, will only be reached if the developing countries' position is better understood and its legitimacy is recognized. Developed countries need to establish environmentally sustainable economies themselves before requiring ESD from developing countries.

V. POST-RIO FOLLOW-UP ACTIONS

In order to implement the Biodiversity Convention's basic principles, its signatories must negotiate specific measures, including compensation for use of biodiversity, for access to genetic resources and for technology transfer.[203] Agreement on such measures require legal, economic and social research and analysis.[204] Guidelines should be established to measure the value of biodiversity and the concrete effect of biotechnology IPR on ecologically sustainable development in the developing world.[205] These guidelines must allow for equitable distribution of benefits and encourage conservation of biodiversity.[206] Institutions within the Biodiversity Convention structure should continue to assess these policy issues through transparent processes involving all affected interests.[207] In particular, these institutions should focus on the indigenous peoples and the developing nations who, as owners of biodiversity, depend on it for economic and cultural survival.[208]

In order to maximize the benefits of, and to ensure sustainable use of the biodiversity trade, a number of countries are seeking to regulate the collection and export of their

202. *See supra* notes 160, 162, 165, 176 and 177 and accompanying text.
203. Downes, *supra* note 187, at 25.
204. *Id.* at 25.
205. *Id.* at 25-26.
206. *Id.*
207. Downes, *supra* note 187, at 26.
208. *Id.*

biodiversity.[209] International agreements that set standards to which all parties can be held accountable would be the most effective way to ensure sustainable use of genetic resources while enhancing conservation efforts.[210] The Biodiversity Convention provides the framework for the development of minimum standards for national regulation of transactions involving both the public and private sector.[211]

A. STANDARDS FOR PROTECTION OF TRADITIONAL KNOWLEDGE - EQUITY IN NATURAL RESOURCE USE

Resource-management policies and programs must integrate environmental, social and economic objectives, and provide equitable access to these resources.[212]

1. Minimum Standards For IPR Protection

Countries should establish minimum standards for national intellectual property laws that require recognition of IPR for indigenous peoples and other preservers and holders of traditional knowledge about the valuable qualities of biodiversity.[213] Specifically, patent applicants would have to demonstrate that they had obtained prior informed consent of the country of origin and the holders of the traditional knowledge for an invention based on any biological resources or traditional knowledge.[214] Additional measures could require

209. For instance, leaders of seven Central American countries have declared their intent to coordinate passage of legislation regulating research on their countries' biological diversity that results in the development of commercial products. *See Central American Presidents Resolve To Pass Laws Restricting Use of Resources,* 15 INT'L ENVTL. RPTR. (BNA) 397 (Jun. 17, 1992).

210. Albert Gore Jr., *Essentials for Economic Progress: Protect Biodiversity and Intellectual Property Rights*, 4 J. NIH RES. 18, 19 (1992).

211. Downes, *supra* note 187, at 26-29.

212. IDRC annual report 1995/96, International Development Research Center (IDRC, Canada), (visited on Mar. 3, 1997) <http://www.idrc.ca/library/document/annual/ar9596.html>, [hereinafter IDRC report]. The IDRC, an NGO based in Canada, supports research for sustainable and equitable development. *Id.*

213. Downes, *supra* note 187, at 34.

214. Downes, *supra* note 187, at 34-35. Various NGOs proposed such measures to the U.S. Administration. *Id.* The NGO's include the Center for Development of International Law, CIEL, Center for Marine Conservation, Defenders of Wildlife,

benefit sharing, either through some type of IPR or another mechanism, for providers of traditional knowledge.[215] Such a requirement would ensure that genetic resources or traditional knowledge are obtained on mutually agreed terms and with the approval of the traditional holders of that knowledge.[216]

2. Traditional Forest Related Knowledge (TFRK)

As part of an ongoing effort to establish a procedure for preserving biodiversity and protecting IPR, the UN Commission on Sustainable Development (hereinafter "Commission") held an Ad Hoc Intergovernmental Panel on Forests (hereinafter "Panel"), on September 9-20, 1996.[217] The Commission discussed the work of the Panel on "Traditional Forest Related Knowledge" (TFRK),[218] its relationships with property rights and the important distinctions for integrating traditional knowledge into forest management.[219] While recognizing the importance of IPR in the global economy, the Panel emphasized that all economic activity ultimately rests on the management of ecosystems.[220]

Environmental Defense Fund, National Audubon Society, National Wildlife Federation, Sierra Club, Western Ancient Forest Campaign, and The Wilderness Society to Ms. Katie McGinty, Director, White House Office on Environmental Policy. *Id.* at n.98.

Article 8(j) of the Biodiversity Convention requires prior approval of indigenous or local people only for use of traditional knowledge or practices. Downes, *supra* note 187, at 30-35. However, requiring informed consent of locals prior to collecting is consistent with Article 8(c) which requires parties "as far as possible and as appropriate [to] [r]egulate . . . biological resources . . . with a view to ensuring their conservation and sustainable use," and Article 11, which requires parties "as far as possible and as appropriate [to] adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of . . . biological diversity," and Article 8(j). *Id*

215. Downes, *supra* note 187, at 34-35.

216. Biodiversity Convention, *supra* note 1, Arts. 8(j), 15.

217. United Nations Commission On Sustainable Development, Ad Hoc Intergovernmental Panel on Forests [hereinafter Panel], 3rd Sess., 9-20 September, 1996 (visited on Mar. 3, 1997) <gopher://://goher.un.org:70/00/esc/cn17/ipf/session3/IPFDOC16.I3>.

218. Panel, *supra* note 217. This approach assumes that no ecosystem can be managed sustainably without ecological knowledge and clear management aims. *Id.* The knowledge involved may be drawn form global or local experience, while management aims are determined based on the priorities of the society doing the managing. *Id.* ¶ 6.

219. *Id.*

220. Panel, *supra* note 217, ¶ 17.

The Panel proposed various alternative approaches to IPR regarding TFRK, including a proposal that prohibited patents for innovations based on TFRK.[221] The Panel recognized that forest areas located within indigenous land or territories, or inhabited by people would be subject to customary rights.[222] Further, the Panel acknowledged that nations had sovereign rights over uninhabited forest areas within their jurisdiction and could enter directly into partnerships with other parties.[223]

B. Regulatory And Economic Mechanisms For Biodiversity Conservation

Conservation regulations should establish standards requiring sustainable biodiversity prospecting, as well as regular assessments and audits of the environmental impact of biodiversity exploitation.[224] Under a uniform system, permits issued by exporting and importing countries could certify that the relevant requirements, such as informed consent, were satisfied.[225] The standards should provide for public reporting and monitoring of compliance.[226]

Biodiversity preservation should incorporate sustainable resource-management policies/practices and support the development of local alternatives and counter measures.[227] These policies should provide market-based incentives for the sustainable use of the products of biodiversity, especially medicinal plants and non-timber forest products.[228]

The Panel encouraged the availability of TFRK through inter and intra national partnerships, both public and private, that are based on free negotiation and informed consent.[229] The Panel also suggested adopting contract guidelines, man-

221. *Id.* ¶ 20.
222. *Id.* ¶ 25.
223. *Id.* ¶ 26.
224. Downes, *supra* note 187, at 30.
225. *Id.* at 33.
226. *Id.*
227. IDRC report, *supra* note 212.
228. *Id.*
229. Panel, *supra* note 217, ¶ 7.

dating minimum legal standards for negotiation, performance, compensation and dispute resolution methods, including mediation and arbitration.[230]

1. The International Tropical Timber Agreement (ITTA)

The International Tropical Timber Agreement (ITTA)[231] is an example of an international commodity agreement promoting trade in tropical timbers in a manner consistent with sustainable development and promoting long-term continued harvesting.[232] In exchange for technical and financial support from the consumers, the producer nations promise to practice environmentally sound use of their forests.[233]

2. The Merck-INBio contract

The 1991 contract between Costa Rica's National Biodiversity Institute (Instituto Nacional de Biodiversidad (INBio)) and Merck & Co., the world's largest pharmaceutical firm (hereinafter "Merck-INBio" contract) is another example of such an international partnership.[234] The contract allows Merck access to chemical extracts and other biological material collected by INBio for drug screening and other research.[235]

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230. Panel, *supra* note 217, ¶ 23. Countries should establish an international authority to monitor biodiversity trade agreements under the Biodiversity Convention secretariat. Downes, *supra* note 187, at 39. For a detailed proposal for such an international authority see Eric Christensen, Note, *Genetic Ark: A Proposal to Preserve Genetic Diversity for Future Generations*, 40 STAN. L. REV. 279 (1987).

231. International Tropical Timber Agreement, Jan. 10, 1994, U.N. Conference on Trade & Development Doc. TD/TIMBER.2/Misc.7/GE.94-50830 (1994), reprinted in 33 I.L.M. 1014 [hereinafter ITTA]. Much of the international trade in tropical timber is conducted under the terms of the ITTA. *Id.* This agreement is the organizing document of the ITTO, a trade group created in 1983 under the auspices of the United Nations Committee for Trade And Development (UNCTAD). *Id.* A successor agreement was concluded in January, 1994 and entered into force in February, 1995. *Id.* at 1037.

232. ITTA, *supra* note 231, ch. I, Art. 1, 33 I.L.M. at 1017.

233. *Id.* For a detailed discussion of the International Tropical Timber Agreement see Phillip E. Wilson Jr., Comment, *Barking Up The Right Tree: Proposals For Enhancing The Effectiveness Of The International Tropical Timber Agreement*, 10 TEMP. INT'L & COMP. L.J. 229 (1996).

234. Coughlin, *supra* note 63, at 356.

235. *Id.* INBio will provide 10,000 screened samples and extracts of plants, animals, and soil to Merck. *Id.* Merck has exclusive rights to the samples for two

In exchange, INBio receives royalties and funding for conservation of the forests.[236] This agreement is mutually beneficial to all parties in the agreement.[237] Merck gets unusually high quality, well documented samples.[238] INBio receives operating and technical assistance.[239] In addition, Costa Rica's conservation programs are supported while advancing the in-country capability for research, development, and manufacturing.[240]

3. Shaman Pharmaceuticals

Shaman Pharmaceuticals, Inc., a California based pharmaceutical firm, plays a leading role in recent efforts to recognize IPR for TFRK.[241] Shaman's mission is to develop drugs based exclusively on collaboration with traditional healers.[242] Shaman scientists urge the need for reciprocity in the development

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years and patent rights to any drugs which might be developed. *Id.*

236. Urbanski, *supra* note 102, at 137 n.16 (citing Thomas Eisner, *Chemical Prospecting*, Abstract of a talk given at the U.S. ECONOMIC OPPORTUNITIES IN GLOBAL ENVIRONMENTAL AGREEMENTS CONFERENCE, Smithsonian Institution, Washington D.C., March 6-7, 1992). Merck agreed to pay INBio an undisclosed royalty (estimated at one to five percent) on any revenues generated from such drugs. Laird, *supra* note 191, at 111. Merck also paid $1,135,000 advance to INBio, of which $135,000 is in the form of donated laboratory equipment. Ana Sittenfeld & Rodrigo Gamez, *Biodiversity Prospecting by INBio*, *in* Biodiversity Prospecting, *supra* note 190, at 69, 92. 10% of the cash payment, or $100,000, goes directly to conservation efforts, and 50% of any royalty payments will be used to maintain the National System of Conservation Areas (National Parks, etc.). *Id.*

237. Horton, *supra* note 100, at 30-31.

238. *Id.*

239. *Id.*

240. *Id.*

241. Shaman strives to be a model for corporate collaboration and benefit sharing with indigenous peoples. Horton, *supra* note 100, at 32-33 (citing from Steven R. King & Thomas J. Carlson, Biological Diversity, Indigenous Knowledge, Drug Discovery and Intellectual Property Rights: Creating Reciprocity and Maintaining Relationships 3, (1993) (unpublished manuscript)). Shaman policy objectives are "to provide a portion of the profits of any and all products to all of the communities and countries in which we have worked;" create a The Healing Forest Conservancy; and "the creation of new sustainable natural product supply industries in the countries in which we work." *Id.*

242. Steven R. King, *The Source of Our Cures*, CULTURAL SURVIVAL Q., Summer 1991, at 19-20; Josephine R. Axt et al., *Biotechnology, Indigenous Peoples, and Intellectual Property Rights*, CONG. RES. SERVICE REP. FOR CONGRESS, Apr. 16, 1993, at 15.

of genetic resources,[243] although no drug from this process has yet entered the United States market.[244]

C. STANDARDS FOR TECHNOLOGY TRANSFER.

Source countries should have an option to require that part of their compensation be in the form of technology transfer, with the parties mutually agreeing on measures for protecting IPR.[245] Exercise of this option may involve cooperation on technology, including information networks and clearinghouses, technical and legal assistance in transactions.[246] Transfer of technology appropriate in light of cultural, economic, technological and social conditions in the destination country can also contribute to the strengthening of infrastructure and training of personnel.[247] Further scientific research and collaborative projects among nations would promote conservation and increase the value of sustainable use of their biodiversity to biodiversity-rich countries.[248]

To reduce the information imbalance, developed countries should assist developing countries in the networking and the

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243. *See, e.g.*, Steven R. King, *Conservation and Tropical Medicinal Plant Research*, 27 HERBALGRAM 28 (1992); King, *supra* note 242, at 20-21; STEVEN R. KING ET AL., BIOLOGICAL DIVERSITY, INDIGENOUS KNOWLEDGE, DRUG DISCOVERY AND INTELLECTUAL PROPERTY RIGHTS: CREATING RECIPROCITY AND MAINTAINING RELATIONSHIP (Aug. 1994). Shaman's implementation of its reciprocal benefits policy include immediate assistance to improve health care in communities where it conducted research, direct support of in-country research institutions, and assistance in networking and strengthening indigenous peoples' organizations. Horton, *supra* note 100, at 32-33.

244. Shaman Pharmaceuticals, founded in May 1990 is a comparatively new company. Axt et al., *supra* note 242, at 15. Shaman is currently testing a drug which is a mixture of tannins from different South American species of the genus Croton. *See* R. Ubillas et al., *SP-303, an Antiviral Oligomeric Proanthocyanidin from the Latex of Croton lechleri (Sangre de Drago)*, 1 PHYTOMEDICINE 77 (1994).

245. For instance, standards could require that a contract provide for such transfer by giving entities in the source country a right of first refusal or access to multilateral financing for licensing of patents related to the transaction where the patented products were well-suited to the social and technological needs in the source country. Downes, *supra* note 187, at 31. This would promote the technology-sharing purposes of the Biodiversity Convention without creating concerns among IPR holders that they might be subjected to compulsory licensing. *Id.*

246. Downes, *supra* note 187, at 39-40.

247. *Id.* at 39-40.

248. *Id.* at 32. *Also see* IDRC report, *supra* note 212.

use of information and communication technologies to meet the needs of local communities and to promote equity in development.[249] The International Development Research Center(IDRC), a Canadian organization, through its GlobeSAR project uses radar remote sensing imagery to provide developing countries with the information they need to manage their resources.[250]

Further, the developing and developed countries should make a concerted effort to develop and support environmentally sound technologies for small and medium-sized enterprises (SME).[251] In an IDRC project in Bogota, Colombia, research has improved the efficiency of the city's tanneries and reduced the pollution in their effluent.[252] As part of cooperation on technology, the Colombian agency is making their production practices available to other entrepreneurs.[253]

Establishing guidelines that set standards to which all parties can be held accountable more effectively ensures sustainable use of, and the equitable distribution of the economic benefits from biodiversity. Communication and networking further enhance environmentally sustainable development.

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249. IDRC report, *supra* note 212.

250. *Id.* GlobeSAR partners in Africa, Asia and the Middle East are using this technology to measure and monitor a variety of environmental parameters. *Id.* In Morocco, remote-sensing data will help to highlight areas of heavy soil erosion, helping to improve maintenance of irrigation systems. *Id.*

251. IDRC report, *supra* note 212.

252. In pilot projects, improved technologies and production process significantly reduced the effluent from 300 SMEs involved in the city's leather-tanning industry, decreased pollution, lowered production cost and increased profits. IDRC report, *supra* note 212.

253. The Colombian agency responsible for introducing the changes is Promocion de la Pequena Empresa Ecoeficiente Latinoamericana (PROPEL). PROPEL is currently preparing a video to market their eco-efficient production practices to other entrepreneurs. IDRC report, *supra* note 212.

VI. CONCLUSION

Economic development and trade is inextricably linked to the global environment. The Biodiversity treaty and the WTO-TRIPS Agreement have established IPR as an additional link between development, trade and the environment. This convergence has enhanced the importance of environmentally sustainable development and the need for a concerted effort on the part of the developed and the developing nations to attain sustainable development. The Biodiversity Convention provides an international framework for sustainable development and biodiversity conservation. However, some of the provisions in the TRIPS Agreement are inconsistent with the IPR provisions of the Biodiversity Convention, especially those involving IPR of indigenous people. Additionally, the developed and the developing nations have different concerns and priorities in their approach to environmentally sustainable development. Therefore, any attempts to harmonize these provisions must take into account the interests of both the developing and developed nations, while achieving environmentally sustainable development.

Vandana Date[*]

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