Biopiracy in Latin America

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Abstract: *Biopiracy refers to the act of foreign multinational companies using intellectual property systems in order to legitimise the robbery of biological resources and traditional knowledge, without due compensation, recognition, or protection for the indigenous communities where those resources and knowledge originated. The problem is much more severe than the stealing of resources without compensation. For many indigenous populations, these resources are a source of food, medicine, and culture. It could be argued that patenting resources and the knowledge surrounding these resources, is equivalent to stealing and selling indigenous culture. In this essay, the problem of biopiracy and bioprospecting is explored. Definitions of biopiracy, bioprospecting and traditional knowledge are offered. Additionally, the following key questions are explored: Is it possible to own natural resources and traditional knowledge? Who owns natural resources? How can the value of such resources and knowledge be determined? How can indigenous communities be compensated for their participation in the discovery of the uses of natural resources? Finally, some solutions for the problem are suggested and calls for further research and further indigenous participation in the debates over the topic are made.*

Key Words: *Biopiracy, Bioprospecting, Traditional Knowledge, Intellectual Property, Latin America, Biodiversity, Indigenous Communities*

Introduction

Approximately five hundred years ago Christopher Columbus "discovered" the New World. His arrival resulted in the discovery of new and valuable natural resources that were previously unknown in the Old World, as well as the destruction of the indigenous peoples for these resources. Thus, since the beginning of the colonial period, Latin America has been treated, to a large degree, as a Spanish exploitation project. Today, this exploitation of indigenous communities continues in a different form.

Thousands of years before the arrival of Europeans, the indigenous communities of Latin America had discovered and domesticated a variety of natural resources with important medicinal properties and other uses. For these communities, these resources were much more than simple crops; they were part of their cultural identities. The knowledge and experience of the natives were crucial for the successful cultivation and harvest of these resources. Today, multinational companies are benefitting through the patenting of these resources and knowledge.

It may be argued that the knowledge and part of the cultural identity of the indigenous populations have been stolen, and a debt is owed. Today, the indigenous communities are some of the poorest of Latin America. It is not understandable that those who ensured the success of these resources continue to live in poverty while foreign companies become rich at the expense of their cultural patrimony. For this reason, biopiracy and intellectual property rights have become extremely important topics. In general, the populations of today's societies like to believe that much progress has been made in the area of human rights and human development since the colonial period, but the reality is that powerful international companies and governments continue to impose their western ideas and systems on indigenous populations, in order to benefit themselves. It is necessary to investigate alternative methods in which indigenous populations can protect their millenary knowledge and participation in the discovery and uses of natural resources, or at least increase the general awareness regarding this problem so that further steps can be taken towards progress in governmental policies and benefit sharing.

The term "biopiracy" is the word used to describe the process by which the rights of indigenous and local communities to their natural resources and related traditional knowledge are exploited by granting monopoly rights to foreigners.[1] The term first came into use in 1993, and was coined by Pat Mooney, president of the Rural Advancement Foundation International, (now known as ETC group). It refers to, "the use of intellectual property systems to legitimize the exclusive ownership and control of biological resources and knowledge, without recognition,

[1] Ana Isla. "An Ecofeminist Perspective on Biopiracy in Latin America". *Signs: Journal of Women in Culture and Society.* Vol. 32, No. 2 (Winter 2007), 324.

compensation or protection for contributions from indigenous and rural communities..."[2] The concept of biopiracy has existed since the colonial era and, "[t]he contemporary phenomenon of biopiracy continues to be justified through a variety of legally biased rules founded upon Western concepts and politico-economic objectives, which seek to enforce a worldwide high-level and non-discriminatory patent regime."[3] In other words, knowledge and resources are being taken from one part of the world to another and being used for profit by those who did not create that knowledge.

Some authors prefer to use the term "bioprospecting" as a less negative word for "biopiracy". In general, the word "bioprospecting" entails less sinister connotations, and was created in response to the problematic relationship between foreign commercial interests and the resources and knowledge of local communities.[4] The term was first used by Walter V. Reid et al. as, "the exploration of biodiversity for commercially valuable genetic resources and biochemicals."[5] It is a process which allows the selection and investigation of biodiversity with the goal of "discovering" commercially valuable biochemical resources.[6] Bioprospecting projects, "...appropriate local knowledge of the attributes of native plants and animals. Indigenous species identified as having valuable traits are collected and shipped to laboratories for modification by pharmaceutical, medical, and agricultural companies."[7] Often national

[2] Gian Carlo Delgado. "Biopiracy and Intellectual Property as the Basis for Biotechnological Development: The Case of Mexico". *International Journal of Politics, Culture and Society,* Vol. 16, No. 2 (Winter 2002), 299.
[3] Gavin Stenton,. "Biopiracy within the Pharmaceutical Industry: A Stark Illustration of just how how Abusive, Manipulative and Perverse the Patenting Process can be towards Countries of the South". *Hertfordshire Law Journal.* Vol. 1, No. 2 (2003), 30.
[4]Vandana Shiva. "Comparative Perspectives Symposium: Bioprospecting/Biopiracy". *Signs: Journal of Women in Culture and Society.* Vol. 32, No. 2, (2007), 307.
[5] Ibid, 307.
[6] Delgado (2002), 299.
[7] Isla, 324.

governments and multinational corporations work in coordination in order to benefit each other. Thus, bioprospectors have been given permission from their own governments, and also the governments of countries rich in biological resources, in order to seek knowledge and resources that do not belong to them. Multinational companies use contracts in order to convince states, investigation centres, indigenous communities and local communities to allow the appropriation of knowledge related to those resources, which in turn allows them to save millions of dollars in research.[8] There has been an, "... increasing [number of] 'bioprospecting' contracts through which the planet's principal areas of megadiversity are subordinated and integrated into corresponding schemes of 'bio-plundering.'"[9] In Mexico there are several examples of this kind of contract for example, *Contrato UNAM-Diversa; Contrato Omietech-Colegio de la Frontera Sur/Universidad de Georgia-Molecular /nature /limited; Contrato Uzachi/Sandoz; Contrato Jardín Botánico UNAM/American Cyanamid-American Home Products and La Universidad Arizona/ICBG.*[10] These kinds of contracts promote the exchange of natural resources of interest to multinational companies; and of course, the patents derived from those investigations belong to the multinational companies.[11] In other words, bioprospecting is a manner in which biopiracy is legalized and it does not necessarily guarantee that indigenous communities will participate in the benefit sharing. It has been suggested that, "...the difference between bioprospecting and biopiracy manifests itself, for example, in disputes about whether countries in receipt of traditional knowledge recognize 'foreign prior art'."[12] As Shiva points out, "[b]ioprospecting is

[8] González, 57.
[9] Delgado (2002), 298.
[10] González, 57.
[11] Ibid, 57.
[12] David Castle and E. Richard Gold,"Chapter 4: Traditional Knowledge and Benefit Sharing: From Compensation to Transaction", in *Accessing and Sharing the Benefits of the Genomics Revoultion*, by Peter W.B. Philips and Chika B. Onwuekwe, (AA Dordrecht, The Netherlands: Springer, 2007), 73.

an inappropriate term and an inappropriate process."[13] Whether one calls it bioprospecting or biopiracy, the fact remains that powerful multinational companies are essentially stealing local traditional knowledge and resources with the goal of profiting from them, without offering due compensations or recognition to those communities who created that knowledge.

One method that has been applied in order to protect knowledge and resources is intellectual property rights. Some authors promote the idea of traditional knowledge as intellectual property, stating that once such property rights are in place, "...no other market inventions are needed as the market automatically assigns rewards."[14] There are two common justifications for treating traditional knowledge as property. First, the argument that traditional knowledge is only known to certain groups, and not by everyone; therefore, traditional knowledge signals a unique way of knowing that can be claimed as property.[15] The second common approach to the justification of knowledge as property is to, "... identify the special nature of 'traditional' knowledge that imparts a special status on the knower."[16] According to this approach, this "special status" allows for property claims. Although there have been justifications for treating traditional knowledge as property, the problem of how to protect such property claims still exists. Most researchers of biopiracy, such as Posey and indigenous advocacy groups, reject the idea of intellectual property to protect traditional knowledge, by pointing out that they are merely another imposition of western categories on indigenous

[13] Shiva (2007), 307.
[14] Dora Marinova and Margaret Raven. "Indigenous Knowledge and Intellectual Property: A Sustainability Agenda". *Journal of Economic Surveys*. Vol. 20, No. 4 (2006), 587.
[15] Castle and Gold, 68.
[16] Ibid, 68.

culture.[17] It has been argued that patents on intellectual property guarantee financial benefits to parts of the world that are already rich and powerful, while preventing economic progress in the less-developed areas and marginalized populations.[18] Furthermore, the purpose of a patent is to protect, "...inventions, which must be novel. Existing knowledge--the product of thousands of years of collective innovation by indigenous cultures--is not an invention."[19] Foreign companies are claiming to be the creators of products which they did not invent. Brush identifies the following four types of intellectual property: patents, copyrights, trade secrets, and plant variety protection.[20] When it comes to the issue of biopiracy, the most common forms of intellectual property rights that have been discussed are patents and plant variety protection (PVP).[21] Both of these forms of intellectual property rights are problematic. PVP is ineffective in regards to protection and benefits to indigenous communities, as "...the protections offered under these expanding IP regimes are largely inaccessible to indigenous and peasant farmers. This is most commonly the case because of a perceived failure of 'traditional crop varieties to meet the 'distinctiveness, uniformity, and stability' criteria of PVP."[22] Further problems can be encountered with the patent system for intellectual property rights. First, they are designed to benefit society by granting exclusive rights to "creative individuals", and not collective entities such as entire indigenous communities. Second, intellectual property rights cannot protect information that does not result from a specific act of "discovery". Since indigenous knowledge

[17]Darrell Addison Posey. "Biodiversity, Genetic Resources, and Indigenous Peoples in Amazonia: (Re) Discovering the Wealth of Traditional Resources of Native Amazonians". *Amazonia 2000: Development, Environment, and Geopolitics. (*24-26 June, 1998), 8.
[18] Marinova and Raven, 588.
[19] Shiva (2007), 307.
[20] Stephen B. Brush. "Indigenous Knowledge of Biological Resources and Intellectual Property Rights: The Role of Anthropology". *American Anthropologist,* New Series, Vol. 95, No. 3. (Sep., 1993), 665.
[21] Thom van Doreen. "Inventing seed: the nature(s) of intellectual property in plants". *Environment and Planning D: Society and Space.* Vol. 26 (June 2008), 678.
[22] ibid, 678.

tends to be passed down through generations and shared communally, it is considered to be in the public domain and cannot be protected. Third, intellectual property rights are a western creation and cannot be applied to complex non-western systems of ownership. Intellectual property is a capitalist system and is not compatible with systems used in many indigenous communities. Fourth, the goal of patenting knowledge and resources is to stimulate private earnings through the commercialization and distribution of said resource. At times, the goal of indigenous communities is the opposite, where they wish to prohibit the large scale distribution of culturally important knowledge and resources. Fifth, intellectual property rights only acknowledge market value and ignore spiritual, aesthetic and cultural value. Sixth, they are subject to manipulation by those who hold tremendous political power. Finally, they are expensive, complicated and time consuming to obtain and indigenous communities simply do not have the resources to acquire intellectual property rights.[23] In legal terms, the following three conditions need to be met in order for something to be patentable: novelty, an inventive step, and an industrial application.[24] Technically patents cannot be granted on traditional knowledge for two reasons. First, "[i]t was the consistent legal view that patents could not be granted on living things or products of nature. It has only been with the advent of biotechnology in the past two decades that this view has changed."[25] Thus historically, traditional knowledge connected to plants and animals could not be patented; consequently even if a person or community wished to patent traditional knowledge, it would have been impossible to do so.[26] Second, "...in order to patent the knowledge now, it must be novel today, in the sense that it must not be known to the public. Traditional knowledge, by its very nature, is knowledge that has

[23] Posey (1998), 8-9.
[24] Udgaonkar, 414.
[25] Ibid, 415.
[26] Ibid, 415.

been known over a long period of time and therefore it lacks novelty."[27] It appears that patents are not an effective way of protecting traditional knowledge. Intellectual property laws have been described as a kind of "double theft", as multinational companies are acquiring ownership of resources and knowledge that do not belong to them; in addition, they prevent indigenous peoples from taking advantage of the economic opportunities linked to their traditional knowledge, if they choose to do so.[28] Even more, it has been argued that the problem is even greater than this "double theft", as patents on intellectual property create impoverishment in communities from which the knowledge originated by forcing those communities to pay for what was originally theirs.[29] In the view of the indigenous populations, it is not believed that intellectual property rights will protect traditional knowledge and resources.[30]

When researching the topic of biopiracy and the stealing of traditional indigenous knowledge, it is necessary to explain exactly what is meant by "traditional knowledge". According to the Convention on Biological Diversity (CBD),

> Traditional knowledge refers to knowledge, innovations, and practices of indigenous and local communities all over the world. Conceived from experiences acquired over centuries, and adapted to the culture and local surroundings, traditional knowledge is transmitted orally, from generation to generation. It tends to be collective property and can be in the form of stories, songs, folklore, proverbs, cultural values, rituals, communal laws, local language and agricultural practices, including the evolution of species of vegetables and animal races. Traditional knowledge is basic natural practices, especially in the fields of agriculture, fishing, health, horticulture and forestry. [31]

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[27] Ibid, 415.
[28] Marinova and Raven, 602.
[29] Shiva (2007), 308.
[30] Posey (1998), 9.
[31] *El conocimiento tradicional y el Convenio sobre Diversidad Biologica,* PNUMA: <http://www.biodiv.org./doc/publication/8j-brouche-es.pdf.>

It is important to recognize that the origins of indigenous knowledge are diverse. Much of the knowledge concentrates on the behaviour of animals in nature, which plants can heal, or which fruits are not poisonous. Another source of indigenous knowledge comes from the behaviour of people in general, after much observation it is possible to learn and understand the phenomena of nature. A third source of indigenous knowledge is the observations made by people with special powers, such as shamans and healers.[32] It has been suggested that the concept of "traditional knowledge" can be better understood within the concept of colonialism and the interruption of the natural development of pre-colonial epistemological frameworks.[33] Applied in the situation of biopiracy, it can be argued that the process of imposing Western intellectual property rights on indigenous communities is an example of the interruption of the development of indigenous epistemological frameworks. Additionally, traditional indigenous knowledge, "...is part of the legal and socio-cultural claims of indigenous peoples to shared equality, dignity, and respect with other peoples across the world."[34] Often, the knowledge regarding certain natural resources has been passed down through generations and hold important cultural and religious significance. For indigenous communities, biodiversity is priceless and therefore cannot be negotiated. For these communities, "[b]iodiversity is their source of medicine, their source of food, and, critically, the source of their myths and customs. Selling their biodiversity is comparable to selling their culture and, more deeply, their souls—a kind of suicide."[35] Instead of, "...being protected and genuinely respected, traditional and indigenous peoples' knowledge

[32] Bárcenas in González, 21-22
[33] Ikechi Mgbeoji. "Chapter 6: Lost in Translation? The Rhetoric of Protecting Indigenous Peoples' Knowledge in International Law and the Omnipresent Reality of Biopiracy". In P.W.B. Philips and C.B. Onwuekwe (eds.), *Accessing and Sharing the Benefits of the Genomics Revolution.* (2007), 115.
[34] Ibid, 115.
[35] Isla, 328

systems have been ridiculed by the dominant epistemology and legal culture."[36] The world Intellectual Property Organization (WIPO) offers another definition of traditional knowledge. According the WIPO, traditional knowledge can be defined as,

> ...tradition-based literary, artistic or scientific works; performances; inventions; scientific discoveries; designs; marks, names and symbols; undisclosed information; and all other tradition-based innovations and creations resulting from intellectual activity in the industrial, scientific, literary or artistic fields...[37]

This definition refers to "knowledge about products or processes, natural or artificial, that are relevant to biotechnology innovation, and known by some people but not all."[38] Generally, when using the term "traditional knowledge", one is referring to traditional know-how, innovations, information, practices, skills and learning.[39] Indigenous communities hold traditional knowledge regarding agriculture, environment and medicine associated with their regions.[40] Two types of knowledge related to biodiversity and innovation have been identified. "First, there is knowledge about the use of biological resources in health on agricultural based on previous exploitation...Second, there is the information about the existence of particular plants or animals that have characteristics that may be of interest to a pharmaceutical company."[41] This information is extremely important as, "Indigenous peoples' subsistence livelihood is based in knowledge of how to read the land, the plants, and the animals. As biological diversity is the material base for human life, biopiracy is an attack on people's means of survival."[42] Some knowledge is communal and shared by the entire population, while other knowledge is often

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[36] Mgbeoji, 111.
[37] WIPO, Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore, 2002, in David Castle and E. Richard Gold "Chapter 4: Traditional Knowledge and Benefit Sharing: From Compensation to Transaction", (AA Dordrecht, The Netherlands: Springer, 2007), 2.
[38] Castle and Gold, 66.
[39] Marinova and Raven, 290.
[40] Ibid, 290.
[41] Castle and Gold, 67.
[42] Isla, 329.

restricted to shamans or elders. The fact that traditional knowledge is shared from generation to generation implies that this type of knowledge is shared socially. Thus, the society functions as the "scene" where knowledge is produced.[43] Furthermore, since indigenous knowledge is passed from person to person over thousands of years, it can transform and evolve to be perfected.[44] Thus, in order to maintain and protect traditional knowledge and its development, it is necessary to conserve the social context in which it is created, and to do this it is necessary to respect and recognize the right of indigenous communities.[45] At times, certain resources carry important cultural meanings in addition to being an important source of nutrition. This is certainly true in the case of the Zuni, and indigenous population in modern day Arizona. The Zuni have domesticated a variety of types of maize.[46] These varieties of corn are necessary because different colours of corn have different religious significances and are related to legends involving the seven corn maidens, who, according to the Zuni brought life to the people.[47] Thus, crops of corn are grown separately in order to maintain preferred characteristics. It is obvious that this crop is much more than a simple food item for the Zuni population; it is an important religious symbol. Moreover, the Zuni population created their own farming techniques in order to produce and maintain the desired types of corn for specific purposes, and, "... through this combination of both the diverse requirements placed on crops and the utilisation of traditional farming systems that peasant farmers have developed to produce almost all of the genetic diversity on which modern agriculture is based."[48] Indigenous populations have given cultural meaning to their natural resources, and have developed agricultural techniques for the successful

[43] Bárcenas in González, 23.
[44] Ibid, 23.
[45] Ibid, 23.
[46] Van Dooren, 676.
[47] Ibid, 677.
[48] Ibid, 677.

cultivation and harvest of these resources. It could be argued that by appropriating and/or stealing this knowledge, multinational corporations are destroying indigenous culture.

Indigenous knowledge has proven useful in a variety of ways. First, biological resources have been specially screened, selected and maintained by indigenous populations over hundreds of generations and they represent the collective work of thousands of individual selections. Second, local knowledge systems are used in the collection of resources and plant collectors from foreign countries rely on indigenous informants to determine which plants are useful. Finally, industrial companies depend on indigenous knowledge for the conservation and maintenance of biological resources.[49] It has been estimated by the World Resource Institute that, "Indians dwelling in the Amazon Basin make use of some 1300 medicinal plants including antibiotics, narcotics, abortifacients, contraceptives, anti-diarrheal agents, fungicides, muscle relaxants and many others."[50] In addition, over a quarter of modern drugs prescribed all over the world come directly from plants and most of these plants can be attributed to traditional indigenous knowledge.[51] In Mexico, according to estimates, 12.4% of national territory is indigenous, in which 21.69% of all water can be found; furthermore, in these region about 50% of tropical rainforests (with five thousand species) and fog forests (with three thousand species), can be found; as well as 25% of temperate forests (with seven thousand species).[52] Mexico can be describes as the center of origin, domestication, and diversification of about 26 000 species of

[49] Brush (1993), 660.
[50] Mgbeoji, 123-124.
[51] Ibid, 124.
[52] González, 55.

plants, of which 40% are endemic.[53] It has been determined that at least 7000 compounds used in Western medicine are derived from plants. Approximately 40% of the new drugs approved by U.S. Food and Drug Administration between 1983 to 1994 were plant derivatives, and more than half of the 150 top-selling drugs of 1993 were derived from natural active ingredients.[54] In an early study by Posey, it is noted that natural based pharmaceuticals from Latin America earn about $43 billion US dollars per year, and there is as much as $50 billion US dollars per year to be gained from seeds derived from traditional crop varieties.[55] Furthermore these earnings have a potential growth rate of between 5% and 15% per year.[56] It is clear that indigenous knowledge is economically valuable. Companies such as Shaman Pharmaceuticals (now Shaman Botanicals) and the Body Shop found that research and development costs could be cut by about 40% by relying on traditional knowledge held by local communities.[57] These types of industries gain enormous benefits through the patenting of resources used for drugs and medications. Some of these drugs could have life saving potential for those infected with diseases in underdeveloped regions of the world such as Africa, Asia, and South America.[58] By putting patents on these resources, industries are limiting the people who have access to these potentially life saving medicines. Moreover, many of these resources and the knowledge associated with them were created in underdeveloped regions, and the people who developed them and carried the information throughout centuries are not seeing any profits or being given due recognition.[59] Recently, the United States and other highly industrialized countries have been aggressively

[53] Emanuel Gómez Martínez, "Análisis de la iniciativa de ley de conservación de y aprovechamiento sustentable de los recursos fitogenéticos para la alimentación y la agricultura" in *Recursos genéticos y pueblos indígenas.* Compiled by Óscar Banda González. (Mexico: Centro de Producción Editorial, 2008), 64.
[54] Roger Alex Clapp and Carolyn Crook, "Drowning in the Magic Well: Shaman Pharmaceuticals and the Elusive Value of Traditional Knowledge", *Journal of Environment & Development,* Vol. 11, No. 1, March 2002, 80.
[55] Posey (1998), 2.
[56] Stenton, 30.
[57] Posey (1998), 4.
[58] Marinova and Raven, 588.
[59] Ibid, 588.

promoting the international standardization of intellectual property laws, which would mean that patents would be valid throughout the world.[60] This poses a threat to the well being of indigenous populations, as it would be a lot easier for multinational companies to acquire patents on knowledge and resources that do not belong to them. Biodiversity is becoming more and more at risk and corporations are coming to the realization that species and ecosystems are rapidly disappearing from the face of the earth. Scientists estimate that there may be as many as 10 to 13 million species to discover.[61] As such, life industry corporations such as Novartis, Monsanto, and Merck, to name a few, must compete for access to the resources. These corporations hold an enormous amount of power and "maintain close links with a state (a case in point being the United States) that regulates and protects them, and provides them with a range of subsidies."[62] Governments and these types of companies often negotiate for their own individual interests only, and indigenous groups have lacked the ability to negotiate more favourable terms.[63]

The act of bioprospecting or biopiracy is by no means a new concept as can be seen by the frequently cited case of Sir Henry Wickham who smuggled around 70 000 highly perishable *Hevea* rubber seeds out of the Brazilian Amazon in the late 1800s and brought them to Kew Gardens in Britain. This resulted in the ability for British botanists to cultivate their own rubber, and earned Wickham his knighthood. At the same time it completely destroyed the rubber boom

[60] Delgado (2002), 305.
[61] Robert L. Ostergard, Jr., Matthew Tubin, and Jordan Altman. "Stealing From the Past: Globalisation, Strategic Formation and the Use of Indigenous Intellectual Property in the Biotechnology Industry". *Third World Quarterly,* Vol. 22, No. 4 (Aug., 2001), 650-651.
[62] Delgado (2002), 298.
[63] Neil Harvey. "Globalisation and Resistance in Post-Cold War Mexico: Difference, Citizenship and Biodiversity Conflicts in Chiapas". *Third World Quarterly,* Vol. 22, No. 6, The Post-Cold War Predicament, (Dec., 2001), 1050.

of the Brazilian Amazon.[64] Today, the problem of biopiracy is becoming more severe with the invention of biotechnologies. In order for multinational companies to be granted a patent one of the conditions that must be met is an inventive step.[65] Biotechnologies, "...are ideally poised to provide that inventive step. For example, isolating the active principle of a plant could be sufficient to make it patentable as something new, above and beyond the existing knowledge."[66] Instances of natural resources and traditional knowledge being taken from one part of the world to another are numerous. Biopiracy has been occurring in diverse region all over the world. For example, quinine is used for the treatment of malaria and comes from the traditional knowledge of the uses of the *cinchona officinalis* tree.[67] Perhaps the most frequently cited instance of biopiracy is the example of the Neem tree in India. Local indigenous farmers have seen the tree as "the curer of all ailments".[68] Twenty-three different parts of the Neem tree have been used in traditional remedies, for over 2000 years. Between the years 1994 and 1999 approximately 70 patents were granted to various Western universities, drug and cosmetic companies, and genetic researchers, for different properties of the tree.[69] Another case that has received a great amount of attention from the media is that of the Enola bean, which was patented in 1999 on the basis of the bean's distinct yellow colour.[70] The justification is that, "...seeds of this cultivar had been obtained as part of a mixed bag of seeds of different colors purchased in Mexico in 1994."[71] The seeds were brought to the United States and grown. In reality, yellow beans are traditional bean

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[64] Beth A. Conklin. "Shamans versus Pirates in the Amazonian Treasure Chest". *The American Anthropologist.* New Series, Vol. 104, No. 4 (Dec., 2002), 1057.
[65] Udgaonkar, 414.
[66] Ibid, 416.
[67] Mgbeoji, 123.
[68] Stenton, 32.
[69] Ibid, 32.
[70] L. Pallottini et al. "Plant genetic Resources: The Genetic Anatomy of a Patented Yellow Bean". *Crop Science Society of America*. No. 44 (2004), 968.
[71] Ibid, 968.

cultivars from Mexico and Peru, and have been known in these regions for years under different names such as *Azufrado* and *Canario*.[72] In recent years, Mexican bean breeders have developed a new variety of these beans, called *Azufrado Peruano* by crossing the seeds of the yellow beans originally found in both Mexico and Peru.[73] It is these beans which have been taken to the United States and sold under the name Enola. It could be argued that local Mexican bean breeders are the owners of these new yellow beans. Another controversy over yellow beans involves a Mexican bean called "Mayacoba", and the U.S. bean "Enola". It has been determined that Mexican farmers have been growing and using the yellow bean since the times of the Aztecs.[74] More recently Mexican agronomists developed a new variety of the yellow bean that they registered in 1978 as the "Mayacoba bean".[75] In 1999, a Colorado company acquired a certificate of patent and plant variety protection for the Enola bean, which was developed from beans that originated in Mexico. The company has also taken legal action against several bean importers, stating that Mexican farmers have been raising Enola beans and selling them under the name "Mayacoba".[76] This is a problem because it has substantially slowed Mexican exports of beans to the United States, as, "...U.S. customs officials stop bean shipments from Mexico to search for Enola beans."[77] While the two bean varieties have difference, they are almost impossible to distinguish superficially.[78] Thus, "[i]t is possible that the Enola variety is superior to the Mayacoba and that Mexican farmers have been using it without authorization. If so, the normal justification for IP protection applies—to encourage innovation. The social justification

[72] Ibid, 968.
[73] Ibid, 968.
[74] Michael Finger and Philip Schuler, *Poor People's Knowledge: Promoting Intellectual Property in Developing Countries.* (Washington, D.C.: The World Bank and Oxford University Press, 2004), 24.
[75] Ibid, 24.
[76] Ibid, 24.
[77] Ibid, 24.
[78] Ibid, 24.

depends, of course, on the Enola variety being substantially better in some nutritional or economic way... "[79] Fortunately this patent was revoked in May of 2008. Another example from Mexico comes from the region of Veracruz; in this area the mazatec indigenous population used barbasco to make soap, to facilitate fishing, and as a natural abortifacient.[80] Recently, the company *Laboratorios Hormona, S.A.* (now known as Syntex), used local knowledge related to the barbasco plant in order to exploit said resource without recognition or compensation to the mazatec community.[81] Recently, the Hoodia *gordonii* cactus from Africa has come to the attention of pharmaceutical companies. It has been used traditionally by one of Africa's oldest tribes, the San, since prehistoric times.[82] Hoodia has been traditionally used to suppress thirst and hunger during extended periods of time.[83] Today it is a popular ingredient in obesity cures, with a market potential of $6 billion.[84] The San have yet to see any of the profits which resulted from the marketing of their traditional resource. In Latin America the bark of the *Banisteriopsis caapi* has traditionally been used by indigenous shamans to diagnose and treat illnesses.[85] A patent of this specimen was granted to a United States company in 1986, and not until 1994 did the Coordinating Body of Indigenous Organizations of the Amazon Basin learn of the patent.[86] Despite opposition from this organization, it has been determined that this patent is valid.[87] Ayahuasca is a sacred plant of the amazon that was used traditionally by shamans in order to contact the Gods and for healing diseases of "the spirit", it was patented by Plant Medicine Co.

[79] Ibid, 24.
[80] González, 56
[81] Ibid, 56.
[82] Stenton, 33.
[83] Ibid, 33.
[84] Ibid, 33.
[85] Ibid, 33.
[86] Ibid, 33.
[87] Ibid, 33.

in the United States in order to develop psychiatric medicine.[88] Other examples from around the world include the *withania somnifera* which has anti-tumour properties, *gymnema sylvestre* has healing properties for diabetes and *centella asiastica* is anti-leprotic.[89] It is very rare that these resources and knowledge surrounding them are duly compensated. In the rare instances where indigenous communities have been recognized as the rightful owner of a resource, the cases do not receive much attention from the media, or are rarely even mentioned in the current literature on biopiracy.

As previously stated, there are very few examples that have been registered where payment for royalties have been made anywhere in the world, even though the necessary technical support has been provided for extracting natural resources.[90] The fact that the few successful cases do not receive much attention is problematic. It could be argued that one of the main problems surrounding the issue of biopiracy is the fact that there is a great lack of awareness on the part of the general public. Regardless of the rarity of the successful cases of accreditation to indigenous communities, a few examples do exist. The first case in which a patent was denied on the basis that it dealt with traditional knowledge occurred in India. In this case, an application was made on December 28, 1993, for a patent on the use of turmeric powder for wound healing. In this application Suman K. Das and Hari Har P. Cohly were listed as the inventors, and the University of Mississippi Medical Centre as the assignee. The patent was granted by the United States Patent and Trademark office in March, 1995. This patent was challenged by the Council of Scientific and Industrial Research in India on the basis that

[88] González, 56.
[89] Mgbeoji, 123.
[90] Delgado (2002), 315

turmeric has been known and used for the healing of wounds in India for centuries, and that the "inventors" did not add anything new to this knowledge. The challenge was successful and the patent was cancelled.[91] In this example, the patent was successfully revoked; however the community did not receive any compensation for their knowledge. The world's first case of an indigenous community successfully being accredited and compensated for their participation in the maintenance of natural resources, and knowledge related to said resources, occurred in November 2004, in Australia. In this example, the Songman Circle of Wisdom in partnership with Aveda Corporation (a well known cosmetics company based in the United States) and Mt. Romance (an exporter of Australian Sandalwood) created an indigenous plant accreditation protocol. Both Aveda and Mt. Romance donated $50 000 each to the Kutkabubba indigenous population of Australia.[92] It appears that the companies entered into the protocol voluntarily in order to boost their images as environmentally friendly and socially aware, thus the companies probably had their own goals in mind when the decision was made to compensate native populations. Nevertheless, the indigenous community was recognized as the traditional owner of the land and resources, it was given credit for its knowledge and participation in the care of sandalwood trees, and it was given a share of the profits made from the sales of pure sandalwood oil.[93]

The San Francisco based pharmaceutical company, Shaman Pharmaceuticals, offers another story of successful accreditation to native communities. Shaman Pharmaceuticals was established with the goal of using shaman and indigenous healing knowledge in order to develop

[91] Sangeeta Udgaonkar, "The recording of traditional knowledge: will it prevent 'bio-piracy'?". *Current Science.* Vol. 82, No. 4, (25 February, 2002) 416.

[92] Marinova and Raven, 599.
[93] Ibid, 599.

drugs and treatments, and adequately compensate these communities for their participation.[94] One of the company's main goals was to compensate the indigenous people with whom it worked by providing benefits in both short and medium term.[95] It also promised to share an undisclosed portion of the profits on any products developed with the communities.[96] By the year 2000, Shaman Pharmaceuticals contributed up to 15% of the total costs of its ethnobotanical expeditions to community development projects in Peru, Papua New Guinea, Brazil, Ecuador and Indonesia.[97] The Royalties that Shaman Pharmaceuticals paid to the communities and governments it worked with were to be divided between collaborating cultural groups and host national governments. Supposedly, "...50% of royalties were to be directed to the indigenous communities and 50% to the host country's government conservation agency."[98] In 2001, Shaman Pharmaceuticals declared bankruptcy. Some argue that the company's failure can be attributed to the management and its inability to simultaneously maintain the triple bottom line, rather than a problem with the company's vision.[99]

The example from Shaman Pharmaceuticals brings up several important questions in regards to biopiracy. First, is 15% an adequate amount to be sharing with indigenous communities? Who determines how much their resources and knowledge are worth? And for that matter, how can one determine the monetary value of knowledge and resources that often have cultural and religious meanings to these communities? Can one put a value on this knowledge? Brush has described the problems in determining the value of indigenous

[94] Ibid, 601.
[95] Clapp and Crook, 88.
[96] Ibid, 88.
[97] Marinova and Raven, 601.
[98] Clapp and Crook, 89.
[99] Ibid, 601.

knowledge. First, there is no market for knowledge or resources from indigenous people. Second, it is difficult to distinguish between the contributions of knowledge from the resource itself. For example, a plant may be used for one property by indigenous peoples and for another by pharmacologists. Finally, it is difficult to differentiate the contributions made by indigenous communities and the contributions made from scientists of industrial countries.[100] Additionally, within indigenous communities natural resources have been used culturally for thousands of years. They hold important nutritional, cultural, and religious significance that cannot be given a monetary value. For thousands of years the land has been a source of work and a source of subsistence.[101] In the rare cases in which monetary compensation is given to local communities, "...the sum is grossly inadequate and insulting when considering the salaries of pharmaceutical chief executives."[102] Usually, only market value is considered, while spiritual, aesthetic and cultural values are completely disregarded.[103] Some authors have criticized multinational company's contributions to local communities. For example, in the case of Shaman Pharmaceuticals, some authors have pointed out that the benefits provided by the company have been minimal. In Ecuador, Shaman Pharmaceuticals provided health care to 60 individuals and provided $1500 for supplies and labour to lengthen an air strip.[104] Total benefits provided to this community are estimated to be around $3000 and the money was used to pay for services rendered to Shaman Pharmaceuticals or to solve problems for their own research team.[105] Ecological economists have offered economic rationales for the preservation of biological diversity, stating that if people gain material benefit from conserved ecosystems, they will have a

[100] Brush (1993), 661.
[101] Delgado, La Amenaza biológica. (2002), 21.
[102] Stenton, 42.
[103] Posey (1998), 9.
[104] Clapp and Crook, 89.
[105] Ibid, 89.

motive to protect them. While economic ecologists recognize that many aspects of nature, such as intrinsic, spiritual, and aesthetic elements, are of incalculable value and will always be undersupplied by the market, many analysts have argued that the value of biodiversity must be quantified in order to guide conservation and land use decisions.[106] In order to protect biodiversity, its monetary value must be made explicit. Many authors have estimated the value of biological diversity for pharmaceutical research and development by relating it to the economic consequences of the loss of tropical forests.[107] For example, according to estimation by Simpson, Sedjo and Reid, the net value of plant species for a drug company in the United States should be about $9, 500, after taking into account the costs of drug development.[108] These estimations, do not take into account the cultural value of such natural resources. Perhaps if some indigenous communities were consulted on the matter, it may be argued that it is impossible to put a monetary value on biodiversity due to its tremendous spiritual value, and instead of putting a price on nature for its conservation, foreigners should learn to recognize and respect the importance of natural resources and their services. In order to provide fair compensation, indigenous communities need to be consulted and their perspectives need to be heard. In some cases, indigenous communities do not wish to commercialize their resources and important cultural knowledge.[109] For this reason it is critical to have indigenous input on the matter.

Another question that must be considered is that of the role of indigenous peoples. To what extent should the indigenous population take part in decisions surrounding the control of

[106] Ibid, 79.
[107] Ibid, 81.
[108] Simpson, Sedjo, and Reid (1996) in Clapp and Crook, 81.
[109] Posey (1998), 9.

natural resource? One of the main themes that has been discussed among scholars, such as Conklin[110] and Greene[111], is the struggle of native populations to gain political voice at the local, national, and global levels. Conklin tends to argue that natives have not been given sufficient voice to state their own perspectives on the matter of bioprospecting; whereas Greene focuses more on the new problems that arise as a result of the participation of indigenous communities. Harvey argues that resistance to biotechnology on the part of indigenous populations should be understood as something more than an opposition to the privatization of biodiversity and indigenous knowledge, but also an opposition to the re-defining of cultural identities and political power.[112] There has been a lack of the consultation of indigenous communities, and consequently laws have been made, and continue to be made, that mention indigenous communities without clearly recognizing the subject of the law and without guaranteeing rights.[113] Obviously there is a need for greater indigenous participation in decisions regarding the use of traditional knowledge and resources. When,

> ...modern intellectual property regimes were created and institutionalized, the consent and opinion of indigenous and traditional peoples across the world was neither sought nor obtained. Similarly, when the dominant intellectual property regime was imposed on colonized territories, neither the consent nor permission of indigenous and traditional peoples was sought.[114]

While it is true that there is a need for indigenous input, Delgado warns against granting indigenous peoples entire rights over the management of resources. Instead, the rights must be

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[110] Conklin.

[111] Shane Greene,. "Indigenous People Incorporated? Culture as Politics, Culture as Property in Pharmaceutical Bioprospecting". *Current Anthropology*. Vol. 45, No. 2 (April, 2004) 211-237.

[112] Harvey, 1046.

[113] Aldo González Rojas, "Algunas Razones para no legislar en materia de acceso a los recursos fitogenéticos" in *Recursos genéticos y pueblos indígenas.* Compiled by Óscar Banda González. (Mexico: Centro de Producción Editorial, 2008), 89.

[114] Mgbeoji, 112.

understood and respected by all parties involved as collective rights, rather than individual.[115] In other words, regulations should not be defined by indigenous groups alone, and nor should they be defined by governments alone. There is a need for all parties to collaborate on these matters. It appears that Moran, King and Carlson would agree with Delgado, arguing that governments need to include indigenous populations in discussions on the interpretation and implementation of policies regarding biodiversity, however they emphasize the fact that the process should be democratic, meaning indigenous groups should not have complete control in determining to what extent they will participate.[116]

Indigenous peoples have been defined as

> ...peoples in independent countries who are regarded as indigenous on account of their descent from the populations which inhabited the country, or geographical region to which the country belongs, at the time of conquest or colonization or the establishment of present state boundaries and who, irrespective of their legal status, retain some or all of their social, economic, cultural and political institutions.[117]

It should be emphasized that this definition makes reference to the colonial period, noting that indigenous peoples have been competing with other, more predominant cultures for resources and land.[118] Furthermore, the definition notes the indigenous social institutions that were kept in place, meaning that new institutions and legal processes cannot be applied in these societies.[119] International law recognizes indigenous communities as holders of collective rights.[120] The problem is that although the political constitutions of certain countries, such as Mexico, recognize indigenous communities, they do not recognize their rights over their territories and

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[115] Delgado (2002), 315.
[116] Katy Moran, Steven R. King and Thomas J. Carlson. "Biodiversity Prospecting: Lessons and Prospects". *Annual Review of Anthropology*. Vol. 30, (2001), 519.
[117] Marinova and Raven, 589.
[118] Ibid, 589.
[119] Ibid, 590.
[120] Bárcenas en González, 17

the natural resources that exist within them.[121] It appears that many western scientists still hold the belief that traditional knowledge is folklore and not scientific. This is used as a justification for the dispossession from Indians and peasants from their land and resources in the name of development, conservation, and progress.[122] It appears as though the same type of rationale that was being used in the colonial period is also being applied today. In the colonial era, natives were seen as savages who did not use the land and resources "correctly" because they did not know the potential value for their resources; and therefore, it was appropriate for Europeans to claim them. According to this colonial and racist idea, "...indigenous and traditional peoples were intellectually incapable of making innovations worth protecting through the mechanism of the dominant intellectual property regimes."[123] This same justification is still being used today through bioprospecting projects. It appears that, "[w]hile biodiversity is fast becoming green gold or green oil for the pharmaceutical and biotechnologies, the metaphor of prospecting suggests prior to prospecting the resources lie buried, unknown, unused, and without value."[124] This is untrue however, as local communities have known the uses and value of their biodiversity for many years, and should be given the rights associated with it.[125]

Some authors have argued that natives tend to be portrayed as "noble savages"[126], as protectors of the forests and that they should also be seen as protectors of knowledge.[127] For thousands of years natives have contributed their knowledge and skills to the management of certain crops. With the arrival of Europeans on their land, many of these indigenous populations

[121] Ibid, 19.
[122] Posey (1998), 4.
[123] Mgbeoji, 113.
[124] Shiva (2007), 309.
[125] Shiva (2007), 310.
[126] Conklin, 1054.
[127] Ibid, 1056.

were completely lost, and with them the knowledge on how to maintain certain crops was also lost. It is interesting to consider all of the resources that could potentially exist today, but do not because the knowledge on how to maintain them was lost. There are two attributes of indigenous knowledge which are based on sustainable development: the environment and the satisfaction of human needs.[128] Indigenous knowledge has allowed communities to develop ways of life in order to live and use the forest and its resources without ending its existence.[129] Today, developed societies tend to see themselves as "information societies", in which there is an emphasis on the value of knowledge and information.[130] It seems hypocritical to see the value in one's own knowledge and at the same time have complete disrespect for the indigenous capacity to create knowledge.

The view of natives is slowly starting to change. More and more scientists are beginning to see that it is unacceptable to believe that just because landscapes and species appear to outsiders to be "natural" does not mean that they are "wild".[131] For example, traditionally native populations of Latin America planted beans, squash and maize together. To an outsider this mixture of different plants may have appeared to be a cluttered mess when compared to modern methods of agriculture, where each plant is organized separately. The combination of these three plants, however, was actually a brilliant agricultural accomplishment. By planting maize, the beans can use the stem as a pole to climb. The beans in turn convert nitrogen in the air into a form that can be used by the maize.[132] Near the end of the life cycle of the maize, the squash seeds are planted. As the maize begins to die, more moisture is left in the soil for the squash to

[128] Bárcenas in González, 22.
[129] Ibid, 22.
[130] Conklin, 1055.
[131] Posey (1998), 6.
[132] Judy Newton. The Complete Guide to *Vegetables for Amateurs and Experts.* (Vancouver: Whitecap Books, 1991), 27, 69.

utilize. The squash leaves keep the moisture in the soil, and at the same time protects the beans from weeds.[133] Furthermore, beans, squash and maize provide a completely balanced diet of protein, fat, carbohydrates, amino acids, vitamins and minerals.[134] This is just one example of a situation where indigenous knowledge of traditional crops provides an extremely low maintenance agricultural system and a completely balanced diet. Forests that appear to be "wild" are important for indigenous populations as they provide food and medicine for the communities. Children often satisfy vitamin requirements by gathering fruits and seeds from the forests. Additionally, many forests hold cultural significance for indigenous populations and are used for rituals and burial sites.[135] The importance of these forests should be given more consideration by foreign prospectors. In indigenous communities, conservation ethics tend to emphasize cooperation, family bonding and cross-generational communications, concern for the well being of future generations, reliance on locally available natural resources, rights to land and resources which tend to be collective rather than individual, restraint in resource exploitation and respect for nature, especially sacred sites.[136] Foreign bioprospectors are coming into these lands with the goal of gaining more wealth at the expense of others. One must ask the question, who are the real "savages" in these situations?

In the past few decades the awareness among native population of the issues of biopiracy has begun to increase. The recognition of the value of knowledge is escalating and some native groups have taken matters into their own hands. The 1990s saw an expansion of regional,

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[133] Paul C. Mangelsdorf, "The Mystery of Corn: New Perspectives" *Proceedings of the American Philosophical Society,* Vol. 127 No. 4. (1983), 244.
[134] Ibid, 244.
[135] Posey (1998), 6.
[136] Ibid, 5.

national and international indigenous organizations.[137] The Convention on Biological Diversity (CBD) of 1992, was the first major convention with the agenda of establishing guidelines for biodiversity, however it denied natives a voice in the matter. Thus, indigenous leaders organized their own parallel gathering at Kari-Oca.[138] In addition to this gathering, in September of 1994, a group known as the Consultation on the Protection and Conservation of Indigenous Knowledge organized by native groups from Bolivia declared a moratorium on all research and bioprospecting projects until appropriate protections were in place.[139] This has some implications for researchers of biopiracy. Negotiations and access to indigenous communities may be difficult and has become a very political act.[140] More recently, in 2000 FUNAI held a gathering of shamans from 17 Brazilian tribes. Out of this gathering came the "Letter of Principles of Indigenous Knowledge", which demanded protection of knowledge against biopiracy. In May of the same year, a total of twenty-one shamans from a variety of tribes marched on the presidential palace to deliver the letter to the president.[141] It seems that there is an increasing awareness of the issues of biopiracy amongst the native populations, as well as a desire to gain recognition. It appears that natives do have some degree of voice on the matter. The problem is that they lack power and authority to make any large difference, at this time. In Mexico, perhaps the most well known and controversial bioprospecting project, known as the ICBG Maya project, was cancelled by the indigenous people.[142] Greene comments that perhaps the most internationally visible forum for discussions on biopiracy is the United Nations Work

[137] Conklin, 1052.
[138] Ibid, 1050.
[139] Posey (1998), 10.
[140] Ibid, 10.
[141] Conklin, 1051.
[142] Isla, 330.

Group on Indigenous Populations.[143] However, the author underlines the importance to consider whose voice is being heard; is it native self-representation or international mediators?[144] A revised version on the COCOPA law on indigenous rights and culture restricted the degree of indigenous autonomy to single municipalities, and denied constitutional recognition of indigenous peoples as subjects with the right to decide on their own form of governance and development.[145] Therefore, indigenous communities do not have a large amount of representation regarding these matters; and they require more respect and consideration by government authorities. If changes are not made, Zapatista and other movements will likely continue to demand greater autonomy in how decisions are made concerning governance and development projects on their lands.[146] As stated by a Zapatista leader,

> Mexico's natural resources are not merchandise to be bought and sold, because we won't accept the destruction of our territories by the imposition of projects and mega-projects that state and federal governments try to impose on indigenous regions of the country... we demand a moratorium on all prospecting projects concerning biodiversity, mining, water, etc and all acts of biopiracy being carried out in our territories and in our country, until the indigenous peoples have discussed in their own conditions the issues pertaining to the control of their resources.[147]

There is a desperate need for greater indigenous participation. Each party involved in the debate over biodiversity should be given an equal opportunity to be heard and acknowledged. Latin America is a region rich in biodiversity and culture, with enormous potential. Since the colonial era the indigenous populations have faced exploitation and marginalization from powerful foreigners, without being given the opportunity to be heard. As a result, the regions with large indigenous populations are the poorest in Latin America. It does not make sense that this should

[143] Greene, 211.
[144] Ibid, 211.
[145] Harvey, 1048.
[146] Ibid, 1049.
[147] Ibid, 1051.

be the case, as natives were the ones who domesticated and allowed the success of these multinational corporations. If society truly wants to progress in the area of indigenous rights, more attention needs to be given to the indigenous perspective.

In addition to the previously mentioned indigenous campaigns, several non-indigenous movements against biopiracy have also taken place. In 1992, the Convention on Biological Diversity (CBD) was held in Rio de Janeiro in order to set guidelines regarding intellectual property.[148] Article 1 of the CBD guidelines calls for

> ...the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the use of genetic resources including appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all right over those resources and technologies, and by appropriate funding.[149]

The three main goals of the CBD are (i) to respect, preserve, and maintain traditional knowledge; (ii) to promote wide application of traditional knowledge, and (iii) to encourage equitable sharing of benefits from traditional knowledge.[150] Moreover, Article 8(j) of the CBD agreement states that bioprospecting efforts that use traditional biological resources and result in successful commercial ventures should entail protection for and benefit sharing with indigenous local populations whose knowledge contributed to biologically engineered products.[151] These guidelines went into effect in December, 1993 and were agreed upon at the Earth Summit.[152] Some authors note the problems of Article 1, by pointing out that "right" refers to sovereign states, and "beneficiaries of equitable sharing" means the contracting parties rather than

[148] Posey (1998), 7.
[149] Ibid, 7.
[150] Paul Alan Cox. "Will Tribal Knowledge Survive the Millennium?" *Science*, New Series, Vol. 287, No. 5450 (Jan. 7, 2000), 44.
[151] Shane Greene, "Indigenous People Incorporated? Culture as Politics, Culture as Property in Pharmaceutical Bioprospecting". *Current Anthropology*, Vol. 45, No. 2 (April, 2004), 213.
[152] Delgado (2002), 300.

individuals or communities, while "relevant technology" could be interpreted to include indigenous and traditional methods.[153] The article is not effective as it promotes bilateralism in private access to biodiversity.[154] Another problem which exists in the CBD article is that it is ambiguously worded and does not distinguish indigenous peoples from local communities.[155] It is important to make such a distinction as indigenous knowledge of the use of medicinal plants for medicines is typically generational, sacred and always deeply imbedded in culture, whereas farmers' manipulation of germ plasm for improved crops is usually individual and more secular.[156] Additionally, there must be a distinction between indigenous town and indigenous community, as the first refers to a collective subject with rights, recognized by international law; while the second refers to the integral parts of that subject.[157] In the same way, a local community can or cannot be of farmers and a community of farmers can be local but not necessarily indigenous.[158] These definitions are particularly important in the case of Mexico the land in which genetic resources are found does not belong to indigenous communities or to indigenous towns, but to the owners of agrarian communities.[159] A further problem with the CBD guidelines is that it does not guarantee any kind of protection on the rights of indigenous communities, and instead guarantees an international deregulation on material.[160] The decades succeeding the CBD have been quite disappointing for advocates of indigenous rights, as very few countries have implemented access and benefit-sharing regimes, the flow of genetic resources has slowed, few, if any, new drugs have resulted from bioprospecting, large

[153] Posey (1998), 7.
[154] Delgado (2002), 300.
[155] Moran, King and Carlson, 518.
[156] Ibid, 518.
[157] Bárcenas in González, 17.
[158] Ibid, 17.
[159] Ibid, 17.
[160] Bárcenas in González,28.

pharmaceutical companies have withdrawn from the screening of plants, and the loss of biodiversity has continued.[161] While the CBD was successful in increasing scholarly interest on the topic of biopiracy, it was ineffective in accomplishing any type of change to the situation. The guidelines are often violated in practiced reality, and Article 8(j) is commonly ignored.[162] The general impression is that the native communities are not optimistic that national governments will suddenly begin to defend their rights. Indigenous populations do not appear to be convinced that equitable sharing will make its way down to the communities where the knowledge and resources originated. Governments do very little to protect indigenous interests and guarantee basic rights.[163]

Since the CBD occurred, several other conventions and workshops have taken place. Immediately after the CBD, the International Cooperative Biodiversity Group (ICBG) was formed. The ICBG was an experimental program in which eight grants were awarded to study biodiversity and was designed to operate in coordination with the goals of the CBD.[164] According to the ICBG definition, benefit-recipients are those people who can be rewarded for their identifiable input of labour and innovation into nature.[165] Thus the same kinds of problems that are seen in Article 1 of the CBD are repeated in the ICBG projects. Two of these projects, in particular, seem to have been controversial and are frequently discussed in the literature. These two projects were the Maya ICBG and the Aguaruna ICBG, as they involved direct negotiations between indigenous communities and bioprospectors, as well as the intervention of

[161] Stephen B. Brush in Greene, 226.
[162] Harvey, 1050.
[163] Posey (1998), 7.
[164] Greene, 214, 221.
[165] Cori Hayden, "From Market to Market: Bioprospecting's Idioms of Inclusion". *American Ethnologist,* Vol. 30, No. 3 (Aug., 2003), 362.

third-party non-governmental organizations acting on behalf of natives. [166] Another workshop known as, the Workshop on Traditional Knowledge and Biodiversity, took place in Madrid in 1997. In this case, it was agreed that a regionally balanced panel of experts be developed in order to create a common understanding of concepts and explore all options for benefit sharing.[167] In 1998 the *ley de la biodiversidad* was established in Costa Rica, to protect indigenous peoples and communities.[168] Another step that has been taken was with the Andean Pact of Common System on Access to Genetic Resources, which was adopted in 1996 by Bolivia, Colombia, Peru, Ecuador and Venezuela. This pact recognizes the value of derivatives of natural resources, knowledge, and individual or collective innovations.[169] Some governments do have policies in favour of the interests of indigenous communities, for example the usufruct rights of indigenous people in Brazil. These rights are protected by Brazil's Federal Constitution.[170] However there appears to have been some debate regarding the role of governments and other organizations. Green notes that the question of who speaks for whom in native affairs causes a crisis of representation. Indigenous leaders, organizations, and others are forced to re-negotiate their representativeness among themselves as well as in relation to the motives of foreigners, who typically have more power, resources, and influence.[171] This debate introduces the question of whether or not non-governmental organizations are helping the situations, or making the matter worse. It appears that there have been numerous attempts at establishing guidelines and regulations for the treatment of biodiversity and acknowledgement of indigenous contributions; however political factors such as the six year presidential cycle (el

[166] Greene, 221.
[167] Posey (1998), 11.
[168] Ibid, 12.
[169] Ibid, 14.
[170] Marinova and Raven, 601.
[171] Greene, 222.

sexenio) in Mexico, have prevented policy continuity and long term commitments to environmental law.[172] Thus, the problem of actually implementing and practicing these guidelines still exists.

When it comes to the topic of biopiracy, there are several questions which must be asked. One of the main questions that authors have posed, concerns the issue of how far back should one look in order to determine whether or not certain resources and knowledge belong to specific groups. Some resources that were domesticated by indigenous populations thousands of years ago are so common in every society today that it is difficult to determine exactly which communities took part in their domestication. Additionally, many of these resources, such as maize, held extremely important cultural value for different indigenous groups. Therefore, a multitude of groups were probably involved in the domestication of the products, and possessed their own knowledge and beliefs surrounding those resources. Since the sixteenth and seventeenth centuries Latin America has been treated, to a large degree, as a European exploitation project and since these centuries, the origins of certain knowledge have been lost. By studying the archives it has been determined that, "...between the years 1503 and 1660, 185,000 kilograms of gold and 16,000,000 kilograms of silver arrived in San Lucas de Barrameda from America (Mexico, Peru, and Bolivia)."[173] Some of the crops found in the Americas during the colonial period had enormous impacts in Europe. For example, potatoes from Peru increased production, population and value of the land in Europe;[174] and maize from Mexico was used to produce oil and food for domesticated animals, which increased the amount

[172] Harvey, 1051.
[173] Isla, 325.
[174] Ibid, 325.

of protein in the European diet.[175] These resources obviously had a huge effect in Europe, and have become extremely common today. It would be virtually impossible to control resources like these with systems such as intellectual property rights. Therefore it must be determined precisely how far back researchers must look in order to protect indigenous knowledge, and what types of resources should be protected.

This generates another important question. Is it possible for one to own natural resources? Today, the minimum international standard for most intellectual property rights is set through the World Trade Organization (WTO), and its 1995 TRIPS agreement.[176] TRIPS is a multilateral agreement that links intellectual property standards with trade.[177] In Article 27.1 of the TRIPS agreement it is stated that, "patents shall be available for any invention, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application."[178] Thus, according to this agreement, patentable material has been modified in some way. There is a distinction between what has been discovered and what has been modified. In other words, "...the border between the seed that is patentable and that which is not maps onto the border between what is natural and what is *meaningfully* cultural or human made."[179] Therefore, in legal terms, it appears that what makes it possible for one to own a natural resource is if it has been given meaning. In 2006, it was determined that

[175] Ibid, 325.
[176] Van Dooren, 679.
[177] Ibid, 679.
[178] Ibid, 679.
[179] Ibid, 679.

...life forms in their natural state would not satisfy the criteria for patentability in the TRIPS agreement. However, if the subject-matter of a patent has involved sufficient human intervention, such as production by means of a technical process or isolation or purification, and if isolated or purified subject is not of a previous recognized existence, then it is capable of constituting an invention.[180]

Thus, it appears that it is possible for one to own natural resources, as long as it has been given cultural meaning or has been modified in some manner. It could be interpreted that the centuries of care and domestication of certain resources, on the part of the natives, would be considered as sufficient human intervention, which resulted in a new invention. In order to determine which resources can be patented, it is necessary to determine which products are natural and which have been invented. As new plants cannot be created from scratch, it appears that in the field of plant development there is no actual "creation".[181] Therefore, it could be argued that there is nothing that is completely human-made.[182] Thus, in order for a plant to become the property of an individual or group, "...it must be mixed with culture; it must involve enough ('sufficient') human labour for it to no longer be 'purely natural'.[183] According to Van Dooren,

...the distinction between those who can and those who cannot invent seed is grounded on a distinction between humans who are able to know nature as it is in *reality* (and therefore rework it) and those who have access only to their own *representations* of nature and must therefore work within it, unable to fully escape it.[184]

Using this as a guide to define whether or not one can own culture, it could be argued that the thousands of years of knowledge passed down through generations, the maintenance and domestication, and the cultural significance given to these resources, would qualify indigenous communities as the rightful owners and creators. It is a racist idea to believe that indigenous

[180] Ibid, 680.
[181] Ibid, 681.
[182] Ibid, 681.
[183] Ibid, 681.
[184] Ibid, 685.

knowledge and contribution are less important than modern scientific and Western knowledge. This idea simply justifies the stealing of indigenous knowledge and resources.

If it is indeed the case that one can own natural resources, another question that must be considered is the matter of *who* owns natural resources. Traditionally geographic space and natural resources were considered as public property. Recently however, the concept of geographic space has become dominated by capitalist ideas, and is not seen in an individual perspective but rather, as an area in which to extract resources for profit.[185] This privatization process establishes rules that allow the appropriation of goods that, until several years ago, were considered non-appropriable.[186] With the privatization of genetic resources, chemical industries that have taken over seeding companies, will dominate the market through aggressive marketing strategies.[187] During the 1992 Convention on Biological Diversity it was determined that, "States have sovereign rights over their own biological resources."[188] Consequently, those resources are no longer freely available and are exclusively available to a select few. [189] Beginning in the 1990s, countries such as Brazil, Costa Rica, Colombia and Mexico began to gain an increasing awareness of the economic interests that northern countries have in their biodiversity.[190] By this time, other countries like Bolivia, Ecuador, and Peru had already benefited from biodiversity projects, but the funds that were being transferred from first world non-governmental organizations to domestic non-governmental organizations in these countries, were beyond the control of the governments and led to the suspicion that environmentalism was

[185] Delgado-Ramos, Gian Carlo. *La Amenaza Biológica.* (Plaza y Janes: México, 2002), 20.
[186] Ibid, 20.
[187] Mantel Baltasar Baptista da Costa. "Recursos genéticos y seguridad Alimentaria" in *Recursos genéticos y pueblos indígenas.* Compiled by Óscar Banda González. (Mexico: Centro de Producción Editorial, 2008), 99.
[188] Delgado (2002), 300.
[189] Ibid, 300.
[190] Posey (1998), 2.

a cover for foreign takeover of lands and other resources. Thus, in the past, biodiversity conservation and environmental interests have been viewed with great suspicion as a threat to national sovereignty on the part of government authorities.[191] It appears that at present, national governments have been determined to be the legal "owners" of natural resources within their borders, and their concern for protecting those resources has increased in the past decades. If indigenous communities would have the ability to act with autonomy over natural resources they would be considered to be acting contrary to the law.[192] Thus, it is necessary to find a middle ground, where indigenous communities are able to manage their own natural resources, but at the same time obey national law.

One of the major problems in the protection of knowledge and resources is that it is difficult to control. Biodiversity does not respect political borders, thus it is necessary to study the issue of biopiracy at the global and national level. It is difficult to determine who should own these resources. It is almost impossible to control biodiversity even at the local level. For example, Hayden accurately points out that many herbs and other resources are sold in large markets such as La Lagunilla in Mexico City. Anyone can enter these markets and observe which plants are being sold and which parts of the plants are considered to be important.[193] Two main methods that are being used to control biodiversity have been identified. The first is *In-Situ*, in which regions of great biodiversity, such as the Amazon of Latin America, are protected. The Second method is *Ex-Situ*, in which botanical gardens and germ plasm banks are created.[194] In the colonial era, European powers, "...used the botanical gardens to control plant transfers

[191] Ibid, 2.
[192] Delgado (2002), 300
[193] Hayden (2003), 363.
[194] Delgado (2002), 301.

across their empires to the point that the natural complexity of nature was replaced by the simplicity of monoculture—commodified agriculture."[195] Most researchers of biopiracy warn against the danger of the *Ex-Situ* method of controlling world biodiversity as they create monopolies and are economically unfair and ecologically suicidal.[196] Learning from the previously cited turmeric case in India, efforts have been made to control traditional knowledge by creating a written record of all traditional knowledge in that region.[197] By keeping a record of traditional knowledge, that knowledge legally becomes public domain knowledge and would not be patentable by multinational companies.[198] The problem with this system is that with the invention of biotechnologies it is easy for scientists to take small inventive steps, such as isolating the useful property of a plant. This small inventive step allows for a patent to be granted.[199] Thus, a written record of all traditional knowledge would make information about useful natural resources easily available to bioprospectors, and instead of preventing biopiracy it could have the opposite effect.[200] If protection towards indigenous knowledge and resources is to be granted, more effective methods of controlling the knowledge and resources are needed.

A further question that must be posed concerns who exactly should be compensated for natural resources and traditional knowledge. Many authors, for example Brush[201] and Hayden[202], have pointed out the problems in deciding which native groups to compensate. According to Hayden, those who sell the plants in markets should not be receiving a share of the

[195] Isla, 326.
[196] Delgado (2002), 301.
[197] Udgaonkar, 416.
[198] Ibid, 416.
[199] Ibid, 414.
[200] Ibid, 417.
[201] Brush (1993), 660-661.
[202] Hayden (2003), 360.

profits, as they are simply distributing them, they did not make the knowledge.[203] In the same manner, multinational companies did not make the knowledge that they are using to develop drugs and other products. Another problem that arises is that traditional knowledge is often communal. An innovation may have been developed by a group of communities working together. Bioprospecting contracts enable foreign companies to take the collective knowledge by signing an agreement with only one of the communities.[204] Thus, even though bioprospecting projects often involve researchers talking to a member of the indigenous community in order to settle on compensation with an individual or the entire community, there is still the problem that other communities may feel the impact of this agreement.[205] The problem arises when a genetic resource can be found in two or more communities and one accepts the conditions of commercialization, while the other does not, or if they both agree, one could decide to do business with one company while the other prefers a different company.[206] Further problems may arise if other communities do not support the decision to privatize common heritage.[207]

This brings up yet another question which must be resolved. How can indigenous communities be compensated? How can biodiversity be protected without undermining the power of old land based oligarchies and industries that depend on cheap natural resources?[208] This theme has a tendency to re-emerge in the majority of scholarly literature, as it is at the base of the problem. When it comes to bioprospecting and appropriately compensating indigenous communities, what is required is, "...informed consent from all communities and all members of

[203] Ibid, 364.
[204] Shiva (2007), 311.
[205] Ibid, 310.
[206] Bárcenas in González, 19.
[207] Shiva (2007), 310.
[208] Posey (1998), 4.

each community who have used and contributed to collective innovation in biodiversity-related knowledge."[209] This includes consideration of farmers and the seed industry, traditional healers, pharmaceutical corporations, Western and non-Western scientific traditions, as well as masculinist and feminist ways of knowing.[210] Thus, it is necessary to consult with various communities and various members of each community, in order to ensure that all parties involved have agreed to commercialize the resources. The next question should be what format should the compensation take? One suggestion has been, "technology transfer and development accompanied by local involvement..."[211] as both parties would be able to benefit. By working in cooperation with indigenous communities, multinational corporations would gain a motivated partner and the indigenous communities would benefit from the economic rewards.[212] Some multinational companies claim that indigenous communities are supposedly beginning to take part in the profit sharing in the form of money, technical equipment, scientific qualification, social development programs and environmental development programs.[213] However, they often omit the fact that in these projects those involved are research institutes as well as companies dedicated to commercializing biodiversity.[214] Perhaps the creation of community development programs, as in the cases with Shaman Pharmaceuticals, would be an effective method to compensate entire communities rather than a small group of individuals.[215] However, as it has previously been pointed out, the benefits given to the communities by companies such as Shaman Pharmaceuticals is subjective, and it could be argued that the community development programs established by such companies benefit the companies more than they benefit the

[209] Shiva (2007), 311.
[210] Ibid, 311.
[211] Stenton, 42.
[212] Ibid, 42.
[213] Delgado (2002), 314.
[214] Ibid, 314-315.
[215] Marinova and Raven, 601.

communities with which they are working. For this reason criteria need to be developed as guidelines for how communities should be compensated and how much they should be given. Another strategy for compensation would be to pay royalties to indigenous communities by giving them a portion of the profits from all sales, as in the example of the Kutkabubba community of Australia, for their participation in the maintenance of sandalwood trees.[216] By reviewing the case of sandalwood oil in Australia, it seems as though the companies involved agreed to compensate the indigenous community, with the goal of promoting their images as socially aware and environmentally friendly.[217] Therefore, a possible approach may be to advertise the issues surrounding biopiracy to the general public. It appears that in general, in developed countries, awareness regarding the problem of biopiracy is severely lacking. Perhaps by publishing this information to consumers, they will become more conscious of the products they invest in and also of where these products are coming from; thus encouraging more multinational corporations to enter protocols similar to that created in Australia. It is possible that alternative strategies against biopiracy would need to be developed in less developed countries, where there is an awareness of biopiracy, but those who are faced with the problem, such as indigenous populations, lack voice and power in the matter.

It is clear that the topic of biopiracy has become important over the last few decades, and as biodiversity becomes more at risk, the amount of attention to this topic will increase. There is a desperate need for further research in order to offer more satisfying answers to the questions previously discussed in the literature. Furthermore, those who wish to continue research in this

[216] Ibid, 599.
[217] Ibid, 599.

area need to ask the question, how can one study this extremely diverse and complex topic? It is necessary for researchers to consider their role in the protection of traditional knowledge and resources. There appears to have been some debate regarding the roles of researchers and representatives from non-governmental organizations in discussions concerning bipopiracy. The problem is that all foreign researches of every type have their own biases and motives, and this will influence the politics of native representation.[218] In his article, Greene discusses the role of the researcher, and the consequences of the involvement of non-natives.[219] In Brush's opinion, achieving the conservation of biodiversity and protection of indigenous knowledge will require states and users of biological resources to be educated on the matter; therefore the role of the researcher is to provide them with this education.[220] According to Conklin, the researchers need to portray themselves not only as advocates for indigenous interests, but also national interests.[221] It is apparent that the researcher can take a number of roles in the debate over biopiracy and intellectual property rights. For this reason, it is important that those who wish to investigate the issue determine their own motives and acknowledge their biases in order to conduct a successful study. It appears that for now, the main goal of interdisciplinary researchers should be to inform the public regarding this issue while maintaining minimum bias and investigating all perspectives.

Conclusion

Only over the past few decades has the issue of biopiracy begun to catch the attention of scholars and researchers. For centuries traditional indigenous knowledge and resources have

[218] Greene, 223.
[219] Conklin, 1054.
[220] Brush (1993), 667.
[221] Conklin, 1054.

been exploited by powerful foreigners. Modern day biopiracy has been compared to the colonial era and described as the "second coming of Columbus"[222]. The process of commercialization and the multiple stages involved in importing and selling products has become so disconnected that it is rare that people think about where these products are coming from. This is one of the most important questions that people need to be asking, as it appears that one of the biggest problems is that there is a large degree of unawareness that there is an issue. Without awareness it is more difficult to develop more efficient solutions. By not publicizing successful cases of compensation people are not aware of the fact that biopiracy is taking place and that indigenous peoples have been struggling for the rights and profits related to the resources that rightfully belong to them. By making examples of indigenous recognition and accreditation accessible it is more likely that these cases could be studied and applied in Latin America, and elsewhere. Biopiracy and the issue of indigenous rights is an extremely important topic, as it relates to the problems of social and economic inequality in most countries of Latin America. Indigenous peoples domesticated and maintained resources for thousands of years, sometimes manipulating said resources to produce preferred qualities. In addition, indigenous populations discovered the uses of these resources and developed methods for using them. Often these methods and resources held cultural and spiritual meaning. It appears that some multinational companies are following the colonial example by justifying the stealing of knowledge and resources by taking the racist view that indigenous communities do not know how to use their resources "correctly", in order to gain the maximum profits from said resources; and thus it is reasonable to take advantage of those resources. Today, indigenous population of Latin America live in some of the poorest and most marginalized communities of the region, while foreign companies become

[222] Vandana Shiva. *Biopiracy: The Plunder of Nature and Knowledge.* (Boston, Massachusetts: South End Press, 1997), 1-5.

wealthier by exploiting their traditional knowledge. It could be argued that biopiracy is a major contributor to economic inequality in Latin America, and there is a desperate need for more effective solutions to this problem.

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