Pirate Patents:
Arguing for Improved Biopiracy Prevention and Protection of Indigenous Rights Through a New Legislative Model

"Indigenous peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions, as well as the manifestations of their sciences, technologies and cultures, including human and genetic resources, seeds, . . . [and] knowledge of the properties of fauna and flora . . . . They also have the right to maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions."[1]

I. INTRODUCTION

Many common agricultural crops have developed through human tinkering; alteration and experimentation have given rise to food species whose existence depends entirely on humans.[2] The development of these crops has generated specific, traditional knowledge associated with particular species, and this potent combination of genetic material and phenotypic value creates a modern-day treasure trove of valuable commercial material.[3] Individual and corporate parties have increasingly sought to collect such indigenous knowledge and capitalize on its value through existing intellectual property patent protections.[4] This practice, known as "biopiracy," evades easy definition; by common

1. Declaration on the Rights of Indigenous Peoples, G.A. Res. 61/295, art. 31(1), U.N. Doc. A/Res/61/295 (Sept. 13, 2007).

2. *See* Brooke Glass-O'Shea, *The History and Future of Genetically Modified Crops: Frankenfoods, Superweeds, and the Developing World*, 7 J. FOOD L. & POL'Y 1, 3 (2011) (explaining inextricable link between human development and crop development); *see also* NINA V. FEDOROFF & NANCY MARIE BROWN, MENDEL IN THE KITCHEN: A SCIENTIST'S VIEW OF GENETICALLY MODIFIED FOODS 145-46 (2004) (elaborating on human intervention in agricultural crops).

3. *See* Zachary Hiller, *The Promise & Peril of TRIPS*, Note, CURRENTS: INT'L TRADE L.J., Summer 2009, at 54, 54-56 (asserting traditional knowledge appropriated under developed country's intellectual property laws and exclusion of indigenous cultures). Although Hiller argues that the plants themselves are not being patented, the case studies cited in this Note dispute that. *See infra* Part II.B (detailing examples of pirated plants in addition to traditional knowledge).

4. *See* Hiller, *supra* note 3, at 54-55 (stressing role of intellectual property rights in protecting commercially viable assets). Prior to the enactment of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), U.S. businesses lost an estimated $80 billion per year from intellectual property right infringement. *Id.*; *see infra* notes 18-19 and accompanying text (explaining purpose of TRIPS); *infra* notes 75-80 and accompanying text (discussing operation of TRIPS).

consensus, the practice may best be characterized as a form of biological theft, in which plants identified and cultivated by indigenous communities are collected and patented by noncommunity members without granting property protection to the original cultivators.[5] Biopiracy is also viewed as the appropriation of biodiversity from its original owners and innovators through the creative definition of seeds, medicinal plants, and associated medical knowledge as nature, thereby removing the plant materials from patent eligibility.[6] This definition combines a variety of loosely associated but poorly defined notions of biopiracy, demonstrating the difficulty in identifying the practice.[7] The derivation of genetic and biochemical materials is both scientifically and commercially valuable, and companies attempt to patent these materials to "justify legal ownership through intellectual property law."[8] Additionally, the lack of agreement over the actual subject matter of the patent, namely the plant versus the traditional knowledge with which it is associated, further confuses the issue.[9] "Biodiverse" developing countries have accused their developed Western counterparts of removing genetic resources and the traditional knowledge with which they are associated and patenting these resources in their original forms or in the form of derived inventions.[10]

5. *See* Graham Dutfield, *Protecting the Rights of Indigenous Peoples: Can Prior Informed Consent Help?*, *in* INDIGENOUS PEOPLES, CONSENT AND BENEFIT SHARING: LESSONS FROM THE *SAN-HOODIA* CASE 53, 56 (Rachel Wynberg et al. eds., 2009) (defining biopiracy as "free-ride" on genetic resources, traditional knowledge, and technologies of developing countries). Biopiracy acts include, for example, the unauthorized use of common traditional knowledge and the filing of patents claiming traditional knowledge as acquired, without further refinement. *Id.* at 57.

6. *See* VANDANA SHIVA, BIOPIRACY: THE PLUNDER OF NATURE AND KNOWLEDGE 4 (1997) (explaining biopirates' avoidance of liability through creative definition of plant products). "In continuity with conquest by naturalization, biodiversity is being defined as nature—the cultural and intellectual contributions of non-Western knowledge systems are being systematically erased." *Id.* at 5. Thus, by confining the definition of biodiversity to products of nature, which by definition are not patent eligible, biopirates decouple these plants from their associated traditional knowledge and prevent the plants' original owners from seeking protection for their intellectual investment. *See id.*; *infra* Part II.C (explaining domestic and international patent requirements and exclusions for products of nature).

7. *See* Maggie Kohls, Note, *Blackbeard or Albert Schweitzer: Reconciling Biopiracy*, 6 CHI.-KENT J. INTELL. PROP. 108, 108-09 (2007) (enumerating various definitions of biopiracy). Biopiracy ranges from the corporate exploitation of indigenous folk wisdom to the outright "patenting of indigenous biodiversity-related knowledge." *Id.* at 109.

8. *See* Tak Jong Kim, *Expanding the Arsenal Against Biopiracy: Application of the Concession Agreement Framework To Prevent Misappropriation of Biodiversity*, 14 SMU SCI. & TECH. L. REV. 69, 69 (2010) (linking patent rights and monetary benefit). "Bioprospecting" yields genetic and chemical materials that are commercially lucrative and legal ownership is justified through intellectual property law. *Id.* at 69-70.

9. *See* Hiller, *supra* note 3, at 56 (asserting confusion over properly patentable subject matter). For example, the Convention on Biological Diversity (CBD) decrees that individual countries hold the intellectual property rights over their biological resources but fails to provide recourse options to such nations with claims over ethnobiological knowledge. *Id.*

10. *See* Cynthia M. Ho, *Biopiracy and Beyond: A Consideration of Socio-Cultural Conflicts with Global Patent Policies*, 39 U. MICH. J.L. REFORM 433, 435-36 (2006) (elucidating practice of patenting traditional knowledge without adequate reference to inventor). Allegations of biopiracy arise not only when patents are sought for materials that are identical to the traditional knowledge, but also when these patents are clearly

The biopiracy conflict surfaces in part because there is no global consensus about who owns plant genetic resources and what global rights, if any, the indigenous innovators have.[11] Intellectual property rights, including copyrights, trademarks, patents, and trade secrets, constitute governmental protections of individual innovation and creativity.[12] Patent law in the United States provides particularly critical protection to agricultural intellectual property and hinges on the principle that inventions, not discoveries in nature, are patentable.[13] American patent law has historically honored this distinction through the Plant Patent Act (PPA) of 1930.[14] Additionally, the regulations of the United States Patent and Trademark Office (USPTO), in connection with patent case law, expand upon the PPA's statutory requirements, conferring upon the patent holder the right to exclude others from making, using, offering for sale, selling, or importing inventions into the United States.[15] In sum, these laws merge to create a broad patent regime that promotes the creation and protection of invented and discovered patentable material.[16] Other countries have attempted to comply with international intellectual property requirements by passing their own domestic legislation protecting their patentable natural

derived from such knowledge. *See id.* at 449-50. For holders of the traditional knowledge, this practice can acquire a morally offensive hue because such knowledge is frequently considered sacred and beyond private ownership. *Id.* at 436.

11. *See* Lorna Dwyer, *Biopiracy, Trade, and Sustainable Development*, 19 COLO. J. INT'L ENVTL. L. & POL'Y 219, 220 (2008) (discussing conflict between rights of plant developers and rights of discoverers and subsequent adapters). "There is no global consensus over such fundamental issues as who owns plant genetic resources . . . and what rights, if any, indigenous communities have when outsiders use their resources and traditional knowledge to develop profitable products." *Id.*

12. *See* Jean Raymond Homere, *Intellectual Property Rights Can Help Stimulate the Economic Development of Least Developed Countries*, 27 COLUM. J.L. & ARTS 277, 279 (2004) (explaining basis for continued reliance on intellectual property protection). Intellectual property protections promote not only knowledge dissemination, but also economic investment in knowledge creation and business innovation. *Id.* at 280.

13. *See* Jo Lynn Jeter, eBrief, *Agricultural Biotechnology: United States Statutory Law*, 2 OKLA. J.L. & TECH., no. 24, 2004, at 1, 1-3, http://www.law.ou.edu/sites/default/files/files/FACULTY/2004okjoltrev24.pdf (enumerating interpretation of United States patent statutes and protection). Today, patent applicants in the United States have three choices of applicable law, each containing different requirements and entitlements: the Plant Patent Act (PPA) of 1930, the Plant Variety Protection Act of 1970, and the Patent Act of 1952. *Id.*

14. *See* 35 U.S.C. § 161 (2012) (protecting "[w]hoever invents or discovers and asexually reproduces any distinct and new variety of plant"). Characteristics granting distinctiveness in plants include immunity from disease, productivity, form, and ease of asexual reproduction. *See* Jeter, *supra* note 13, at 1-3.

15. *See* Diamond v. Chakrabarty, 447 U.S. 303, 310 (1980) (defining nonpatentable nature of discoveries); Zulmarie Urrutia-Vélez, Note, *Biopiracy: Is There a Need for a More Extensive Definition of "Novelty" Within the Context of US Patent Laws?*, 2 U. PUERTO RICO BUS. L.J. 323, 323 (2011) (enumerating USPTO standard that patent confers).

16. *See* Sivashree Sundaram, Comment, *Battling Bills, Beans & Biopiracy*, 15 ALB. L.J. SCI. & TECH. 545, 548 (2005) (explaining PPA enacted to incentivize plant research and development in United States). The legislation aimed to remedy a "perceived inequity for plant inventors and provide them with the same opportunity to seek patent protection as their industrial inventor counterparts." *See Plant Breeders Equity Act of 2002: Hearing on H.R. 5119 Before the Subcomm. on Courts, Intellectual Prop. & the Internet of the H. Comm. on the Judiciary*, 107th Cong. 9 (2002) (statement of Vincent E. Garlock, Deputy Executive Director, American Intellectual Property Law Association).

resources.[17]

The international community has attempted to set threshold guidelines for protecting intellectual property rights, primarily through the 1994 Agreement on Trade-Related Aspects of International Property Rights (TRIPS).[18] TRIPS attempts to harmonize national standards for intellectual property protection by aligning its recommendation for an international norm with the methods currently employed by developed nations.[19] Further biological protection measures are enumerated in the International Convention on Biological Diversity (CBD), adopted in 1992 at the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil.[20] The CBD may be considered the preeminent treaty on biodiversity conservation and addresses the concern of developing countries' control over the genetic resources within their borders.[21] The CBD emphasizes the respect, preservation, and maintenance of traditional knowledge while encouraging equitable sharing of the benefits of its use.[22] Its provisions are intended to protect indigenous communities in the least developed countries, which are particularly vulnerable to intellectual property infringement because their traditional knowledge systems are typically collective and run contrary to the individualistic focus of Western property regimes.[23]

17. *See generally* The Protection of Plant Varieties and Farmers' Rights Act, No. 53 of 2001, INDIA CODE (2001), vol. 64, *available at* http://indiacode.nic.in (codifying Indian interpretation of international treaty); Ley Federal de Variedades Vegetales [LFVV] [Federal Law on Plant Varieties], Diario Oficial de la Federación [DO], 25 de Octubre de 1996 (Mex.) (codifying Mexican interpretation of international treaty).

18. *See* Homere, *supra* note 12, at 281-82 (explaining legislative history of TRIPS). Prior to the creation of TRIPS, numerous countries generated various treaties and conventions to "harmonize intellectual property laws in the international arena;" these agreements included the Paris Convention, signed in 1883 and the Berne Convention, signed in 1886. *Id.*

19. *See* Lee Petherbridge, Comment, *Intelligent TRIPS Implementation: A Strategy for Countries on the Cusp of Development*, 22 U. PA. J. INT'L ECON. L. 1029, 1032-33 (2001) (enumerating intellectual property model of industrialized countries as preferred international prototype). "[I]ntellectual property, at least in the form of patents, has evolved in and is primarily the province of developed, industrialized countries." *Id.* at 1029.

20. *See* Katie Bates, *A Penny for Your Thoughts: Private and Collective Contracting for Traditional Medicinal Knowledge Modeled on Bioprospecting Contracts in Costa Rica*, 41 GA. L. REV. 961, 980-81 (2007) (clarifying history of CBD enactment). The CBD arose to address the differing ideas of knowledge ownership that had arisen between indigenous populations and "Western" communities and the inability of traditional "knowledge holders" to utilize Western patent systems to protect their native resources. *Id.* at 979.

21. *See* Homere, *supra* note 12, at 293-94 (describing CBD goals). Despite the measures proposed by the CBD, traditional knowledge continues to be increasingly misappropriated from indigenous communities in order to secure exclusive intellectual property rights on such knowledge in developed countries. *Id.* at 294.

22. *See id.* at 293-94 (stressing balance inherent to language of CBD). The CBD recognizes the economic value of biodiverse resources and encourages the equitable sharing of the benefits from its use. *Id.* at 294.

23. *See* Rachel Wynberg et al., *Introduction* to INDIGENOUS PEOPLES, CONSENT AND BENEFIT SHARING: LESSONS FROM THE *SAN-HOODIA* CASE, *supra* note 5, at 3, 7 (explaining indigenous property as ancient communal concept and universal sharing of its benefits); *see also* Ho, *supra* note 10, at 459-60 (highlighting nonmonetary ethos of traditional knowledge and incompatibility with Western notions of value); Pollyanna E. Folkins, Note, *Has the Lab Coat Become the Modern Day Eye Patch? Thwarting Biopiracy of Indigenous*

Modern patent law lacks accommodation for indigenous knowledge and two primary reform movements have appeared to compensate for this legal gap: modification of current patent law and the creation of new laws, *sui generis*.[24] Some scholars have opined that although biopiracy in developing countries is a real concern, these countries lack the ability to address the issue without outside assistance.[25] Similarly minded scholars have recommended shared ownership of patents, in which the local producer and the outside prospector can share the intellectual property rights of the plant.[26] Ultimately, however, none of these approaches elaborate on the process required to prevent and compensate for instances of international biopiracy.[27]

This Note traces the rise of biopiracy and the domestic and international approaches to remedying its impact. Part II.A explores the roots of biopiracy and defines it culturally in the global sphere. Part II.B presents three biopiracy case studies from their origins through their resolution. Part II.C examines current domestic and international regulation pertaining to the protection of intellectual property rights, as utilized in the three test countries involved in the sample case studies: the United States, Mexico, and India. Finally, Part III evaluates the varied approaches to protecting biological diversity and presents a sample legislative model to indigenous communities for remedying the effects of biopiracy.

Resources by Modifying International Patenting Systems, 13 TRANSNAT'L L. & CONTEMP. PROBS. 339, 341 (2003) (explaining lack of monetary compensation for traditional knowledge). Indigenous peoples can be defined as "self-defined peoples who consider themselves to be distinct from other peoples, adjacent or distant, and who are descendants of the original inhabitants of a region, having the characteristics of a common sense of historical identity, a common destiny, and a common territory or geographical location." Folkins, *supra*, at 342-43 (quoting S. & MESO AM. INDIAN RIGHTS CTR., PROTECTING WHAT'S OURS: INDIGENOUS PEOPLES AND BIODIVERSITY 116 (David Rothschild ed., 1997)).

24. *See* Yuqin Jin, Note, *Necessity: Enacting Laws To Protect Indigenous Intellectual Property Rights in the United States*, 19 TRANSNAT'L L. & CONTEMP. PROBS. 950, 962 (2011) (discussing adaptive approaches to patent-regime modification). For example, creating new laws to protect indigenous intellectual property rights would empower indigenous people under modern legal standards while accommodating the "unique characteristics" of indigenous peoples. *Id.* at 965.

25. *See* Ho, *supra* note 10, at 438 (doubting indigenous ability to resolve indigenous property right issues). Patent litigation is protracted and costly, subjecting indigenous communities to a prolonged patent dispute. *See id.* at 437-38.

26. *See* Jacques de Werra, *Fighting Against Biopiracy: Does the Obligation To Disclose in Patent Applications Truly Help?*, 42 VAND. J. TRANSNAT'L L. 143, 167-68 (2009) (defining shared-ownership theory). This model requires sharing of rights *and* costs, however, and may not be the most favorable benefit-sharing system for indigenous communities lacking economic resources. *Id.* at 168.

27. *See id.* at 169 (asserting communities will still face liability even should co-ownership be adopted); *see also* Homere, *supra* note 12, at 293-94 (highlighting cultural benefits of indigenously controlled traditional knowledge). "[C]o-ownership of intellectual property rights is frequently difficult to manage, particularly internationally." *See* de Werra, *supra* note 26, at 168.

II. HISTORY

A. Biopiracy Defined

A vast range of plant utility has been recognized and cultivated since the dawn of man.[28] Ten thousand years of cumulative intellectual inventions and improvements by human beings have resulted in stronger, healthier, and higher-yielding plants.[29] These plants have been coaxed into foods, flavorings, spices, medicines, cosmetics, fabrics, and dyes, among others.[30] This trend toward human intervention has occurred in the agricultural development of plants, frequently resulting in crops unable to function without continued cultivator involvement.[31] As trade has expanded around the globe, sovereign states have increasingly sought new sources of plants and other biological resources, not only to address the needs of their growing populations but also to maximize their profits in new trading spheres.[32] A modern term, "bioprospecting," has arisen to describe a long-established discovery practice.[33] Bioprospecting encompasses the protection, collection, research, and development of

28. *See* IKECHI MGBEOJI, GLOBAL BIOPIRACY: PATENTS, PLANTS, AND INDIGENOUS KNOWLEDGE 58, 62 (2006) (noting contemporary plant life forms are result of continued, persistent human intervention). Biodiversity of agriculture is purposefully derived from human activities and occurs as farmers make carefully considered decisions to enrich biodiversity. *See id.*; *see also* SHIVA, *supra* note 6, at 51 (explaining indigenous varieties' evolution through both natural and human selection). Agricultural evolution through seed manipulation occurs not only when indigenous farmers consciously shift cultivation of particular crops, but also when seeds are purposefully hybridized in a lab. *See* SHIVA, *supra* note 6, at 51.

29. *See* MGBEOJI, *supra* note 28, at 62 (emphasizing plant strength acquired through human selection for diversified seeds). Human intervention that operates to narrow the genetic pool in favor of fewer, though more commercially viable, crops actually weakens biodiversity through the "cascade effect," causing the collapse or malfunctioning of other species dependent on the formerly present crops for their survival. *See id.* at 65.

30. *See* DANIEL F. ROBINSON, CONFRONTING BIOPIRACY: CHALLENGES, CASES AND INTERNATIONAL DEBATES 4 (2012) (describing diverse range of plant uses). The plants' useful traits, which have been noted through observation and discovered through experimentation and chance, largely drove the diversification of plants and their domestication for specific purposes. *Id.*

31. *See* Glass-O'Shea, *supra* note 2, at 3 (explaining range of human interference in agricultural evolution). "Many of our common crops—including rice, wheat, corn, and beans—cannot reproduce themselves without human help, because we have altered them over the centuries to make them better at producing food for us." *Id.*

32. *See* Laura Grebe, Comment, *Requiring Genetic Source Disclosure in the United States*, 44 CREIGHTON L. REV. 367, 370 (2011) (explaining logistics of bioprospecting and biopiracy); *see also* ROBINSON, *supra* note 30, at 9 (detailing trade in plants for use as foods, medicines, and fibers). "Trade in plants and other biological resources for use as foods, medicines and fibres has expanded according to the demands of booming populations and increased global consumption." *See* ROBINSON, *supra* note 30, at 9.

33. *See* Rachel Wynberg & Sarah Laird, *Bioprospecting, Access and Benefit Sharing: Revisiting the 'Grand Bargain'*, *in* INDIGENOUS PEOPLES, CONSENT AND BENEFIT SHARING: LESSONS FROM THE *SAN-HOODIA* CASE, *supra* note 5, at 69, 70-71 (defining bioprospecting as exploring biological material for commercial value and tracing origins to ancient civilization). Bioprospecting is particularly characterized by its exploratory nature, involving the search for desirable genetic matter. *See id.* at 70; *see also* ROBINSON, *supra* note 30, at 11 (defining bioprospecting as "exploration of biodiversity for commercially valuable genetic and biochemical resources"). Bioprospecting is especially based on the recognition of the importance of natural product discovery for the development of new crops and medicines, often based on traditional knowledge. *See* ROBINSON, *supra* note 30, at 11.

biodiversity, in conjunction with reliance on local communities to facilitate the search for resources.[34] Bioprospecting and biopiracy have occurred in developing nations for decades because biologically diverse areas located in these nations are "goldmines of potential economic gain."[35]

Bioprospecting should properly be distinguished from biopiracy—a practice that connotes a misappropriation of the biocultural resources of indigenous peoples through traditional intellectual property mechanisms.[36] Bioprospectors utilize biological resources as the basis for extracting, isolating, and purifying patentable genetic products.[37] Conversely, biopirates obtain and utilize genetic resources without compensating the traditional owners for that knowledge or seeking their consent for the use.[38] This failure to recognize and compensate indigenous peoples for creations arising out of their biocultural resources is a key feature of biopiracy.[39] Biopiracy has been viewed as a form of thievery, perpetrated against indigenous cultures and performed at the expense of the resources' countries of origin, which might otherwise protect and commercially profit from them.[40] Upon recognition of the pirated material as patent eligible,

34. *See* Kim, *supra* note 8, at 74-75 (defining steps of bioprospecting). In particular, bioprospectors search globally for useful biological resources because they are "the raw materials that fuel the modern biotechnology industry." *Id.* at 73.

35. *See* Grebe, *supra* note 32, at 370 (explaining appeal of biodiversity as source of profits for businesses in developed nations). Advancements in technology that permit biological samples to be rapidly collected and analyzed for economic value have facilitated both bioprospecting and biopiracy. *See id.* at 373. These advances have fueled the demand and marketability of biological research specimens and products; in 2002, the market value for biological research specimens in the United States hovered between $30 and $60 million and in 2000, the estimated cost of research and development for pharmaceutical drugs derived from biological samples exceeded $800 million. *See id.*; *see also* MARCELIN TONYE MAHOP, INTELLECTUAL PROPERTY, COMMUNITY RIGHTS AND HUMAN RIGHTS: THE BIOLOGICAL AND GENETIC RESOURCES OF DEVELOPING COUNTRIES 12 (2010) ("The global trade in pharmaceutical and agricultural products is estimated at US$300 billion annually, of which the commercial sale of agricultural seeds amounts to US$30 billion.").

36. *See* MAHOP, *supra* note 35, at 19 (describing biopiracy as use of genetic resources and traditional knowledge without consent or compensation). Unlike the focus on discovery in bioprospecting, biopiracy carries sociocultural implications, including the denigration and denial of intellectual input of indigenous farmers and the resulting disconnect between recognition of indigenous communities as the rightful inventors of crops and the international protection systems for intellectual property that favor the developed discoverers. *See id.*; *see also* Walid Abdelgawad, *The* Bt Brinjal *Case: The First Legal Action Against Monsanto and Its Indian Collaborators for Biopiracy*, 31 BIOTECH. L. REP. 136, 136 (2012) (characterizing biopiracy as illegal appropriation of biological diversity and traditional knowledge of local communities).

37. *See* Michael Woods, *Food for Thought: The Biopiracy of Jasmine and Basmati Rice*, 13 ALB. L.J. SCI. & TECH. 123, 128 (2002) (explaining biotechnologists can isolate and reproduce patentable genes). Biotechnologists have become genetic bioprospectors, isolating genetic material and inserting it into plants and animals to generate patentable subject matter. *See id.* at 128-29.

38. *See* MAHOP, *supra* note 35, at 19 (explaining distinguishing characteristics of biopiracy). Biopiracy connotes a "complete lack of ethics and respect from the part of those acquiring the assets of [indigenous] peoples." *Id.* at 20.

39. *See* MGBEOJI, *supra* note 28, at 12 (highlighting lack of compensation in biopiracy).

40. *See* Megan Dunagan, Comment, *Bioprospection Versus Biopiracy and the United States Versus Brazil: Attempts at Creating an Intellectual Property System Applicable Worldwide When Differing Views Are Worlds Apart—and Irreconcilable?*, 15 L. & BUS. REV. AM. 603, 620 (2009) (asserting biopiracy tantamount to thievery). Because biodiversity and its associated traditional knowledge have been cultivated by indigenous

the biopirate reaps the commercial rewards of its patentability by claiming ownership.[41] No global consensus currently exists over who owns plant resources and what rights should be accorded to indigenous communities for the use of their resources by outsiders.[42]

The disconnect between Western notions of knowledge ownership and indigenous attitudes toward bioculture and traditional knowledge contributes to this uncertainty.[43] Generally, indigenous knowledge encompasses a strong common heritage with communal sharing of traditional farming practices and plant cultivation techniques.[44] These traditions, underscoring a less aggressive or even nonexistent plant monopoly regime, may be contrasted with the practices of developed nations and their more aggressive grants of expansive plant rights.[45] Western patent regimes recognize traditional biocultural knowledge as occurring in the public domain and therefore freely usable by the public, lying in stark contrast to the indigenous conception of traditional bioculture as the heritage of those communities who have maintained them for centuries.[46] This disconnect widens over the nexus between ownership and compensation.[47] Upon granting of the patent, ownership disputes can result in

caretakers, biopiracy is "a process by which the rights of indigenous cultures to their genetic resources and associated traditional knowledge are replaced by monopoly rights of those who exploit these resources." *See id.* (quoting PADMASHREE GEHL SAMPATH, REGULATING BIOPROSPECTING, INSTITUTIONS FOR DRUG RESEARCH, ACCESS AND BENEFIT-SHARING 5 (2005)).

41. *See* John Reid, Comment, *Biopiracy: The Struggle for Traditional Knowledge Rights*, 34 AM. INDIAN L. REV. 77, 79 (2009) (reiterating original holder of knowledge receives no gains from patent). The value on the world market for medicinal plants found by appropriating the traditional knowledge of indigenous communities has been estimated at $43 billion and the original holders of this knowledge receive no gains from the use. *See id.* at 77, 80.

42. *See* Dwyer, *supra* note 11, at 220 (observing overlap and conflict among international treaties). International treaties reflect the competing interests of states, indigenous farming communities, private multinational corporations, nongovernmental organizations, and international organizations. *See id.* at 221-22. TRIPS, the preeminent international treaty protecting intellectual property, lacks regulations to protect traditional indigenous knowledge and biodiversity. *See id.* at 238.

43. *See* Bates, *supra* note 20, at 979-80 (asserting bioculture's value and corresponding failure of international and national legislation to protect this information). Under existing international legislation, "the best way to protect native peoples' interests and to provide a means for them to profit from their traditional . . . knowledge . . . remains unclear." *See id.* at 980. "[N]ational efforts to protect biodiversity resources generally have been slower to develop than international recognition that rights to these resources exist." *See id.* at 981.

44. *See* Ryann Beck, Note, *Farmers' Rights and Open Source Licensing*, 1 ARIZ. J. ENVTL. L. & POL'Y 167, 173 (2010) (characterizing common traits of indigenous knowledge). Traditional knowledge is generally derived from "a strong common heritage culture, where knowledge of farming and cultivation techniques and plant varieties have been shared by communities and passed down through generations." *See id.*

45. *See id.* at 172-73 (explaining differences between Western and indigenous models). Individual monopolization of rights runs contrary to traditional farming techniques involving free collection, saving, exchange, and replanting seeds. *See id.* at 173.

46. *See* Kim, *supra* note 8, at 81 (contrasting Western and indigenous conceptions of bioculture).

47. *See* Gillian N. Rattray, iBrief, *The Enola Bean Patent Controversy: Biopiracy, Novelty and Fish-and-Chips*, 2002 DUKE L. & TECH. REV. 0008, paras. 12-13 (June 3, 2002), www.law.duke.edu/journals/dltr/articles/pdf/2002DLTR0008.pdf (explaining disenfranchisement of indigenous farmers). Today, many poor farmers must "pay licensing fees to grow crops native to their regions and grown for generations that have been patented by large biotechnology and seed companies." *See id.* para. 1.

farmers being unable to grow their traditional crops without first paying royalties to the patent holder.[48] Seeds in particular are a source of conflict between developing and developed nations, giving rise to competing ownership rights to plant genetic material and the concurrent risk to developing nations' rights over genetic material within their borders.[49] Corporate monopolization of plant resources that have been developed by indigenous farmers thereby interferes with the farmers' own rights to continue developing their crops and selling them for personal profit.[50] Developing countries lack the economic resources to fully utilize their own biodiversity and thus remain vulnerable to exploitation by wealthier, developed countries.[51] Indigenous communities are therefore frequently at risk for misuse of their natural resources.[52]

B. Biopiracy Case Studies

1. Basmati (Indian rice)

Basmati rice is a species of long-grain rice native to India and known throughout the world for its fragrant aroma and taste.[53] With basmati rice a

48. *See id.* para. 12 (highlighting consequences of changes in ownership). Agriculture is the primary source of employment in poor countries and local livelihoods are severely impacted by the inability to grow indigenous crops without first paying royalties to patent holders. *See id.*; *infra* Part II.B (detailing economic importance of indigenous crops and limiting impact on indigenous farmer livelihood).

49. *See* Erin Donovan, *Beans, Beans, the Patented Fruit: The Growing International Conflict over the Ownership of Life*, 25 LOY. L.A. INT'L & COMP. L. REV. 117, 117 (2002) (explaining seeds as particular source of conflict). The inclusion of agricultural practices and "seed plasm" in protected intellectual property may present valuable international investment opportunities while threatening the indigenous world. *See id.* at 129-30.

50. *See* Beck, *supra* note 44, at 171 (reiterating consequences of corporate takeover of biocultural resources). Plant genetic resources are worth billions of dollars when protected by intellectual property systems "that do not sufficiently account for farmer-developed prior art." *See id.* at 172; *see also* Folkins, *supra* note 23, at 340 (explaining lack of protection for indigenous knowledge in international intellectual property systems).

51. *See* Grebe, *supra* note 32, at 375 (explaining disadvantaged economic status of developing countries in relation to Western nations). "Because developing countries . . . do not have the economic resources to fully utilize their own biodiversity, they are at the mercy of developed countries, who exploit the natural resources to their own benefit." *Id.*

52. *See* Folkins, *supra* note 23, at 341 ("Particularly vulnerable to western appropriation is indigenous cultures' knowledge of local biological resources."). Indigenous peoples are vulnerable to exploitation in several ways, including narrowly defined international intellectual property laws and the lack of enforcement power in treaties governing international intellectual property rights. *See id.* at 349.

53. *See* Philip Schuler, *Biopiracy and Commercialization of Ethnobotanical Knowledge*, *in* POOR PEOPLE'S KNOWLEDGE: PROMOTING INTELLECTUAL PROPERTY IN DEVELOPING COUNTRIES 159, 171 (J. Michael Finger & Philip Schuler eds., 2004) (explaining historical roots of basmati). The word basmati means "queen of fragrance" and has become popular around the world among consumers willing to pay a premium for the product. *See id.*; *see also* Danielle Knight, *Groups Take Legal Action To End US 'Biopiracy'*, THIRD WORLD NETWORK (Apr. 25, 2000), http://www.twnside.org.sg/title/legal.htm (highlighting India's $300 million annual sales in basmati and emphasizing traditional geographic growing regions). In 1998-1999 alone, India exported $425 million worth of basmati rice. *See* MGBEOJI, *supra* note 28, at 15 (noting basmati rice grown for centuries in Greater Punjab region of India and Pakistan).

global commercial success, rice researchers have sought to breed alternative lines of basmati rice capable of growth outside of its native environs, and in 1997, the developer RiceTec, Inc. patented its basmati rice strains in the United States.[54] RiceTec's patent claimed that its rice strains were genetically superior to other basmati strains, citing the rice strains' high yield, photoperiod insensitivity, and superior starch and coloration characteristics.[55] The Indian government challenged this patent, arguing that its claims were overly broad and encompassed basmati rice characteristics already extant.[56] India also objected to the use of the term "basmati" to refer to the rice, arguing that the name should be reserved for rice grown in the Basmati region of India.[57] The USPTO ultimately limited the scope of the patent and RiceTec retained protection over only three of the novel varieties that it had developed.[58]

2. Brinjal (Indian eggplant)

Brinjal is a species of Indian eggplant widely consumed by the Indian people and responsible for the livelihoods of Indian farmers throughout the country.[59] A total of 1.4 million small farmers grow brinjal annually throughout India.[60] Monsanto, a prominent American agribusiness, sought to develop a commercially lucrative version of brinjal resistant to insect destruction by

54. *See* Schuler, *supra* note 53, at 172 (outlining controversy concerning RiceTec patenting of basmati rice); *see also* U.S. Patent No. 5,663,484 (filed Jul. 8, 1994) (claiming novel and desirable rice lines); *Basmati*, TED CASE STUDIES, http://www1.american.edu/ted/basmati.htm (last visited Feb. 22, 2014) (describing RiceTec "Kasmati" and "Texmati" basmati-type rice strains). The original patent claimed a rice breeding process, seeds, and twenty characteristics of the resultant strains. *See* '484 Patent col. 41-44; Schuler, *supra* note 53, at 172.

55. *See* '484 Patent col. 41-44 (listing claims substantiating patent); *see also* MGBEOJI, *supra* note 28, at 15 (highlighting patent's claims of allegedly novel methods of breeding, preparing, and cooking basmati rice).

56. *See* Schuler, *supra* note 53, at 172 (underscoring threat to future sales of Indian rice through patent's overly broad claims). "Asian producers will almost certainly suffer lost or lower sales because of competition from new American varieties, which were bred and are marketed explicitly as substitutes for traditional Asian varieties." *Id.* at 173.

57. Anthony Browne, *India Fights US Basmati Rice Patent*, THE GUARDIAN, June 24, 2000, http://www.theguardian.com/world/2000/jun/25/anthonybrowne.theobserver (analogizing "basmati" descriptor to location-specific "Champagne" or "Scotch" whisky descriptors).

58. *See* Schuler, *supra* note 53, at 172 (detailing USPTO's rejection of all but four of original twenty claims).

59. *See* Abdelgawad, *supra* note 36, at 137 (explaining brinjal cultivated by millions of Indian farmers and developed into 2500 varieties); JOSEPH ZACUNE, COMBATTING MONSANTO: GRASSROOTS RESISTANCE TO THE CORPORATE POWER OF AGRIBUSINESS IN THE ERA OF THE 'GREEN ECONOMY' AND A CHANGING CLIMATE 11 (Ronnie Hall ed., 2012), *available at* http://www.viacampesina.org/downloads/pdf/en/Monsanto-Publication-EN-Final-Version.pdf (explaining seed varieties developed by local farmers adapted to local environments).

60. *See generally* BHAGIRATH CHOUDHARY & KADAMBINI GAUR, INT'L SERV. FOR THE ACQUISITION OF AGRI-BIOTECH APPLICATIONS, BRIEF NO. 38: THE DEVELOPMENT AND REGULATION OF BT BRINJAL IN INDIA (EGGPLANT/AUBERGINE) (2009), *available at* http://www.isaaa.org/resources/publications/briefs/38/download/isaaa-brief-38-2009.pdf (emphasizing importance of brinjal to Indian farmers). Brinjal ranks as the second highest consumed vegetable in India and is grown on 550,000 hectares annually in all eight Indian vegetable growing zones. *Id.* at x.

genetically engineering the eggplant to include protein genes derived from *Bacillus thuringiensis*.[61] The National Biodiversity Authority of India (NBA), acting on a complaint made before the Karnataka High Court in 2012, asserted that Monsanto and its Indian partner, Maharashtra Hybrid Seeds Co. Limited (Mahyco), had illegally appropriated six species of brinjal while developing the "Bt brinjal" crop and filed suit against these companies, alleging biopiracy of the native brinjal species.[62] The case is currently pending before the Karnataka High Court in India.[63]

3. Mayacoba (Mexican Bean)

Mexican farmers have been growing beans for personal consumption and commercial sale for thousands of years; these farmers sought protection for their crop and registered one such variety in Sinaloa, Mexico in 1978, naming it "Mayacoba."[64] A Colorado farmer, Larry Proctor, encountered these beans during a visit to Mexico and decided to breed the beans to create what he described as a distinct yellow color, naming this bean "Enola," after his wife.[65] Proctor ultimately patented his Enola bean in the United States, claiming that the bean was a new variety because it produced distinctly colored yellow beans that remained unchanged by season.[66] After receiving his patent, Proctor

61. *See* U.S. Patent No. 6,326,169 col. 1 (filed Mar. 2, 1999) (describing insecticidal activity of *B. thuringiensis* chimeric crystal proteins against coleopteran, dipteran, and lepidopteran insects); Abdelgawad, *supra* note 36, at 137 (explaining Monsanto's commercial plans). "Commercial formulations of naturally occurring *B. thuringiensis* isolates have long been used for the biological control of agricultural insect pests." *See* '169 Patent col. 1.

62. *See* Abdelgawad, *supra* note 36, at 137-39 (explaining legal strategy of Indian government). Mahyco claimed that Indian authorities properly supplied it with local varieties of brinjal to develop the insect-resistant eggplant varieties. *Id.* at 139. The Environmental Support Group, the environmental authorities that lodged the complaint, and the NBA strenuously objected to this claim and argued that Mahyco's actions violated Indian biodiversity law. *Id.* at 137-39; *see also* William Pentland, *India Sues Monsanto over Genetically-Modified Eggplant*, FORBES, Aug. 12, 2011, http://www.forbes.com/sites/williampentland/2011/08/12/india-sues-monsan to-over-genetically-modified-eggplant (explaining NBA's decision to pursue litigation against Monsanto); Nitin Sethi, *Criminal prosecution of Mahyco for biopiracy revived*, THE HINDU, Oct. 18, 2013, http://www.thehindu.com/news/national/criminal-prosecution-of-mahyco-for-biopiracy-revived/article5244950 .ece (explaining actions leading to filing of charges against Mahyco); Anne Sewell, *Bt Brinjal Row: India To Now Sue Monsanto/Mahyco* DIGITAL JOURNAL (Apr. 23, 2012), http://digitaljournal.com/article/323168 (noting allegations Monsanto illegally modified six varieties of native brinjal without consent).

63. *See* Sethi, *supra* note 62 (reporting criminal biopiracy prosecution of Mahyco officials revived by Karnataka High Court on October 11, 2013).

64. *See* Schuler, *supra* note 53, at 174 (explaining beans, including yellow Mayacoba beans, grown in Mexico since Aztecs); Timothy Pratt, *Patent on Small Yellow Bean Provokes Cry of Biopiracy*, N.Y. TIMES, Mar. 20, 2001, http://www.nytimes.com/2001/03/20/science/patent-on-small-yellow-bean-provokes-cry-of-biopiracy.html (detailing historical development and marketing of bean). Mexican farmers subsequently developed an export market for the Mayacoba bean in Southern California worth approximately $50 million. *See* Schuler, *supra* note 53, at 174-75.

65. *See* Schuler, *supra* note 53, at 175 (explaining provenance of bean name). "Proctor envisioned a huge market for the yellow bean with Latino immigrants in the United States as well as a potential to export to Mexico and the rest of the Western Hemisphere." *Id.*

66. *See* U.S. Patent No. 5,894,079 (filed Nov. 15, 1996) (asserting Enola bean's superiority in color).

sought to enjoin Mexican farmers from importing "Mayacoba" beans into the United States without first paying him royalties.[67] In response, the Asociación del Agricultores del Río Fuerte Sur (AARFS) filed a request with the USPTO to reexamine Proctor's patent, claiming that the Enola patent lacked novelty, and countersued in U.S. federal court.[68] After a nine year dispute, the USPTO reexamined the patent and the United States Court of Appeals for the Federal Circuit ruled the patent invalid, thereby canceling all claims.[69]

These case studies all share a common theme: the theft of an entire species and the subsequent threat to the indigenous creators of the crop through a disregard of their interest in participating in the plant's refinement and marketing.[70] This theft is driven by the demand for biodiverse resources on the international market.[71]

"The field bean cultivar Enola produces a distinct and completely yellow colored seed. The yellow color of the seed remains uniform and stable from season to season." *Id.* col. 1.

67. *See* Sangeeta Shashikant & Asmeret Asghedom, *The 'Enola Bean' Dispute: Patent Failure & Lessons for Developing Countries*, THIRD WORLD NETWORK (Aug. 12, 2009), http://www.twnside.org.sg/title2/wto.info/2009/twninfo20090811.htm (explaining Proctor's charges of Mexican patent infringement resulted in import bar at U.S. border).

68. *See* Schuler, *supra* note 53, at 175 (describing parties to litigation); *Enola Bean Patent Challenged*, ETC GROUP (Jan. 5, 2001), http://www.etcgroup.org/content/enola-bean-patent-challenged (explaining AARFS's representation of 22,000 farmers in northern Mexico). The dispute arose primarily from the importation of yellow beans from Mexico by Tutuli Produce; Proctor sought to enjoin the import as infringing on his patent and AARFS filed a countersuit in United States District Court with the support of the Mexican government. *See* Schuler, *supra* note 53, at 175.

69. *See* U.S. Patent No. 5,894,079 C1 col. 1-2 (memorializing claim cancellation in reexamination certificate); *see also DNA Fingerprinting Identifies Bean in Patent Dispute*, UC DAVIS (May 27, 2008), http://www.news.ucdavis.edu/search/news_detail.lasso?id=8676 (describing resolution of nearly decade long legal dispute through DNA analysis of beans); *Enola Patent Ruled Invalid: Haven't We Bean Here Before? (Yes, Yes, Yes, Yes and Yes.)*, ETC GROUP (July 14, 2009), http://www.etcgroup.org/node/4692 (denouncing Enola bean patent as "predatory on the knowledge . . . of indigenous peoples" and outlining appeal).

70. *See* Doris Schroeder, *Informed Consent: From Medical Research to Traditional Knowledge*, *in* INDIGENOUS PEOPLES, CONSENT AND BENEFIT SHARING: LESSONS FROM THE *SAN-HOODIA* CASE, *supra* note 5, at 27, 40 (explaining common disregard for indigenous values, interests, and rights to participate in economic development).

71. *See* Rosa Cordillera A. Castillo & Fatima Alvarez-Castillo, *The Law Is Not Enough: Protecting Indigenous Peoples' Rights Against Mining Interests in the Philippines*, *in* INDIGENOUS PEOPLES, CONSENT AND BENEFIT SHARING: LESSONS FROM THE *SAN-HOODIA* CASE, *supra* note 5, at 271, 272 (underscoring connection between interest in indigenous knowledge and international demand for products derived from knowledge).

> Increased interest in indigenous peoples' lands and the resources these contain (e.g. mineral resources and biodiversity) is being driven by a high demand internationally for mineral and biodiversity products—a demand fueled in part by the expanding markets for medicines, food and cosmetic products derived from plants that are in many instances found only in indigenous peoples' lands.

Id.

C. Intellectual Property Conventions Pertaining to Biological Resources

1. International Agreements

Traditional agricultural knowledge is most commonly protected through the existing patent regimes available around the globe.[72] Patents are instruments issued by governments to grant protections to an inventor for a limited period of time.[73] These patent regimes reflect an ancient understanding of protection for inventors and originators over their creative accomplishments.[74]

The premier international treaty governing intellectual property rights is TRIPS, agreed upon in 1994 and providing guidelines for the international governance of intellectual property rights.[75] TRIPS sought to balance adequate protection of intellectual property rights with the facilitation of legitimate trade.[76] TRIPS requires all member countries to provide minimum standards for legal recognition of intellectual property rights.[77] The treaty further provides that patents shall be available for all inventions, provided that they are new, involve an inventive step, and are capable of industrial application.[78]

72. *See* Daniel Wüger, *Prevention of Misappropriation of Intangible Cultural Heritage Through Intellectual Property Laws*, *in* POOR PEOPLE'S KNOWLEDGE: PROMOTING INTELLECTUAL PROPERTY IN DEVELOPING COUNTRIES, *supra* note 53, at 183, 192 (highlighting importance of patents as protection of intellectual property). "[T]he administration of traditional 'technical' knowledge, such as plant medicine or agricultural knowledge, can be regulated by customary rules of indigenous or local communities. When examining whether protection through existing IP regimes is available, foremost, one has to look at patents." *Id.*

73. *See* Roger Chennells, *Putting Intellectual Property Rights into Practice: Experiences from the San*, *in* INDIGENOUS PEOPLES, CONSENT AND BENEFIT SHARING: LESSONS FROM THE *SAN-HOODIA* CASE, *supra* note 5, at 211, 214 (providing common definition of patent). In most intellectual property systems, a patent must be useful, novel, and nonobvious. *See id.*

74. *See id.* at 213 (citing examples of 3000-year-old Indian signatures and 2000-year-old Chinese manufacturer marks). For thousands of years, mankind has developed laws to recognize and protect the rights of inventors, innovators, and "originators of all forms of creative and artistic endeavour." *Id.*

75. *See* Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 1869 U.N.T.S. 299 [hereinafter TRIPS] (establishing TRIPS as international requirements and model national legislation). TRIPS recognizes the developmental and technological importance of national systems protecting intellectual property. *Id.* pmbl.

76. *See id.* (balancing patent protection and commercial worth of patented resources); *see also* J. Michael Finger, *Introduction and Overview*, *in* POOR PEOPLE'S KNOWLEDGE: PROMOTING INTELLECTUAL PROPERTY IN DEVELOPING COUNTRIES, *supra* note 53, at 1, 3 (explaining TRIPS requires all member countries to "provide minimum standards for legal recognition of intellectual property rights"). Industrial countries were the force behind TRIPS, recognizing that implementation of their standards internationally would ease access to considerable foreign investment opportunities while protecting their own intellectual property interests abroad. *See* Finger, *supra*, at 4.

77. *See* TRIPS, *surpa* note 75, pmbl. (explaining basic protections afforded by TRIPS). In particular, TRIPS attempts "to promote effective and adequate protection of intellectual property rights, and to ensure that measures and procedures to enforce intellectual property rights do not themselves become barriers to legitimate trade." *Id.*

78. *See id.* art. 27 (explaining basic requirements for patentability under TRIPS). Furthermore, "patents shall be available and patent rights enjoyable without discrimination as to the place of invention, the field of technology and whether products are imported or locally produced." *Id.* art. 27(1).

TRIPS signatories may, however, elect to exclude plants and animals from patentability, provided that an effective *sui generis* system is implemented through national legislation.[79] Under TRIPS, a patent confers exclusive rights on the patent owner to exclude others from making, using, offering for sale, selling, or importing the patented product.[80]

The international community narrowed its plant focus in 1991 with the amendment of the International Convention for the Protection of New Varieties of Plants (UPOV).[81] The UPOV focuses particularly on the rights of plant breeders, granting protection when the species is new, distinct, uniform, and stable.[82] A plant variety's distinctness may explicitly be ascertained through official registers of varieties in any country.[83] The UPOV provides ownership protections that are similar to the dictates of TRIPS.[84] Finally, the UPOV provides an additional, optional exception permitting UPOV signatories to restrict breeders' rights in relation to farmers' rights in specific circumstances.[85]

79. *See id.* art. 27(3) (permitting exclusion of TRIPS language). Of particular importance to this Note are the provisions that allow members to exclude from patentability "plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes." *Id.*

80. *Id.* art. 28(1) (explaining exclusionary properties of TRIPS protection). In addition to the rights of exclusion, patent owners also have the right to assign the patent, transfer it by succession, and conclude licensing contracts. *Id.* art. 28(2).

81. *See* International Convention for the Protection of New Varieties of Plants, Dec. 2, 1961, 33 U.S.T. 2703, 815 U.N.T.S. 89 (revised Nov. 10, 1972, Oct. 23, 1978, and Mar. 19, 1991) [hereinafter UPOV], *available at* http://www.upov.int/export/sites/upov/upovlex/en/conventions/1991/pdf/act1991.pdf (providing particular intellectual property protections to plants). The UPOV protects the breeders' rights over newly discovered or developed plant varieties and the varieties themselves, as defined by the expression of their characteristics resulting from a given genotype. *Id.* art. 1.

82. *See id.* art. 5(1) (explaining characteristics giving rise to protection under UPOV). Novelty is met if, "at the date of filing of the application for a breeder's right, propagating or harvested material of the variety has not been sold or otherwise disposed of to others, by or with the consent of the breeder, for purposes of exploitation of the variety." *Id.* art. 6(1). Distinctness is met if the matter is "clearly distinguishable from any other variety whose existence is a matter of common knowledge at the time of the filing of the application." *Id.* art. 7. "The variety shall be deemed uniform if, subject to the variation that may be expected from the particular features of its propagation, it is sufficiently uniform in its relevant characteristics." *Id.* art. 8. Stability is met if the variety's "relevant characteristics remain unchanged after repeated propagation or, in the case of a particular cycle of propagation, at the end of each such cycle." *Id.* art. 9.

83. *See id.* art. 7 (providing crop registry provision for adoption by national legislation); *see also* MAHOP, *supra* note 35, at 26 (clarifying UPOV provides only internationally recognized *sui generis* system for protection of new plant varieties). The UPOV has been revised several times, however, and the revisions have weakened the farmers' rights while expanding protections for the plant varieties. *See* MAHOP, *supra* note 35, at 26.

84. *See* UPOV, *supra* note 81, art. 14(1) (enumerating retained rights of plant breeder). These rights include breeder authorization for production or reproduction of the variety, conditioning for the purpose of propagation, offering for sale, selling or other marketing, exporting, and importing. *Id.*

85. *See id.* art. 15(2) (restricting breeders' rights to permit farmers to plant seeds harvested from protected plants). Breeders' rights do not extend to acts done privately, for noncommercial purposes, experimentally, or for the purpose of breeding other varieties. *See id.* art. 15(1). Notwithstanding Article 14, contracting parties may "restrict the breeder's right in relation to any variety in order to permit farmers to use

In 1992, the United Nations issued the CBD to address concerns over the deterioration of biological resources.[86] The CBD aims to achieve three objectives: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits from the use of genetic resources.[87] Its implementation took the unprecedented international step of recognizing the value of indigenous knowledge, innovations, and practices, as well as the need to ensure fair benefit sharing of indigenous resources.[88] It also explicitly recommends that nations pass their own legislation governing the protection and usage of traditional knowledge and resources by indigenous communities.[89] The CBD further recognizes the sovereign rights of nations over their own natural resources, and grants the authority to determine access to genetic resources to the nations themselves.[90]

Finally, the mandates of the CBD are echoed in the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), which seeks to explicitly protect farmers' rights through the national implementation of equitable benefit sharing schemes.[91] The ITPGRFA sought to promote or support, as appropriate, the farmers' and local communities' efforts to manage

for propagating purposes, on their own holdings, the product of the harvest which they have obtained by planting, on their own holdings, the protected variety or a variety covered by Article 14(5)(a)(i) or (ii)." *Id.* art. 15(2).

86. *See* Convention on Biological Diversity pmbl., *opened for signature* June 5, 1992, 1760 U.N.T.S. 79 (entered into force Dec. 29, 1993) [hereinafter CBD] (providing general, suggested treaty provisions governing protection of international biological diversity). The CBD specifically focuses on "the intrinsic value of biological diversity and of the ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values of biological diversity and its components." *Id.*

87. *See* Doris Schroeder, *Justice and Benefit Sharing*, *in* INDIGENOUS PEOPLES, CONSENT AND BENEFIT SHARING: LESSONS FROM THE *SAN-HOODIA* CASE, *supra* note 5, at 11, 12 (explaining objectives behind CBD legislation). "The CBD was the first international treaty to recognize that the conservation of biodiversity is a 'common concern of humankind'" and its 190 signatories "cooperate to stop the destruction of biodiversity by attempting to ensure its sustainable use, and by requiring users of this natural wealth to share the benefits with those who provide knowledge of and access to genetic resources." *Id.*

88. *See* CBD, *supra* note 86, pmbl. (providing new scheme for protection of indigenous knowledge by highlighting value to indigenous communities).

89. *See id.* art. 8(j) (calling for implementation of domestic legislation to protect indigenous biocultural knowledge); *see also* Kerry ten Kate and Sarah A. Laird, *Bioprospecting Agreements and Benefit Sharing with Local Communities*, *in* POOR PEOPLE'S KNOWLEDGE: PROMOTING INTELLECTUAL PROPERTY IN DEVELOPING COUNTRIES, *supra* note 53, at 133, 138 (explaining CBD permits tremendous discretion in how countries should regulate access to biogenetic resources).

90. *See* CBD, *supra* note 86, art. 15(1) (asserting supremacy of nation-states over biological resources within their borders).

91. *See* International Treaty on Plant Genetic Resources for Food and Agriculture pmbl., *opened for signature* Nov. 3, 2001, 2400 U.N.T.S. 303 (entered into force June 29, 2004) [hereinafter ITPGRFA], *available at* https://treaties.un.org/doc/Publication/UNTS/Volume%202400/v2400.pdf (providing suggested international legislative protections for agricultural products). The ITPGRFA recognizes the special nature of plant genetic resources for food and agriculture and seeks to affirm the contributions of indigenous farmers by protecting their right "to save, use, exchange and sell farm-saved seed and other propagating material, and to participate in decision-making" regarding the sharing of benefits arising from their crops. *Id.*

their own plant genetic resources for food and agriculture.[92] Furthermore, the ITPGRFA asserts that protecting the rights of indigenous farmers lies with national governments and must be enforced through national legislation.[93]

2. National Legislation

a. United States

The United States first granted intellectual property rights to inventors in the text of the Constitution and through the Patent Acts of 1790 and 1836.[94] Through this legislation, Congress is authorized to "promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."[95] Patents are therefore specifically available for anyone who invents or discovers any new and useful process or product.[96] In 1930, Congress enacted the first American legislation granting patents to plants produced through asexual reproduction.[97] As technology advanced, Congress evolved to recognize the

92. *See id.* art. 5.1 (recognizing role of indigenous farmer in plant protection process of agricultural crops). Contracting parties are called to recognize this protection process subject to national legislation and to promote cooperation with other contracting parties through an "integrated approach to the exploration, conservation and sustainable use of plant genetic resources for food and agriculture." *Id.*

93. *See id.* art. 9.2 (underscoring necessity of indigenous people's participation in decisions regarding conservation and use of agricultural crops). Farmers' rights can be promoted through

> protection of traditional knowledge relevant to plant genetic resources for food and agriculture; [] the right to equitably participate in sharing benefits arising from the utilization of plant genetic resources for food and agriculture; and [] the right to participate in making decisions, at the national level, on matters related to the conservation and sustainable use of plant genetic resources for food and agriculture.

Id.

94. *See* U.S. CONST. art. I, § 8, cl. 8 (promoting "Progress of Science and useful Arts" by granting limited, exclusive rights); *see also* S. REP. NO. 82-1979, at 2-3 (1952), *reprinted in* 1952 U.S.C.C.A.N. 2394, 2396 (elucidating subsequent legislation). The Senate report notes that the original legislation of 1790 continued in force until 1836, when the dissatisfaction with the granting of patents without any examination as to novelty or other matters led to the enactment of a newer patent law that contained the fundamental principles of patent law through the present day. *See* S. REP. NO. 82-1979, at 3-4.

95. U.S. CONST. art. I, § 8, cl. 8 (emphasizing constitutional protections for inventor rights).

96. *See* 35 U.S.C. § 101 (2012) (defining products and processes deemed patentable by United States). The 112th Congress determined that U.S. patent law required fundamental changes in order to continue promoting the progress of science and useful arts in a global economy, and enacted the Leahy-Smith America Invents Act to amend the existing law. *See* Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (codified in scattered sections of 35 U.S.C.). Among other changes, the United States has shifted from a first-to-invent to a first-to-file system, aligning itself with the predominant international patent method, and now includes international prior art in its novelty search. *See* 35 U.S.C. § 102(a)-(b).

97. *See* Plant Patent Act of 1930, ch. 312, 46 Stat. 376 (codified amended at 35 U.S.C. §§ 161-164 (2012)) (providing protection to inventor and asexual reproducer of any "distinct and new variety of plant"); *see also* Jeter, *supra* note 13, at 6 (noting PPA applied only to certain asexually reproduced plants). "The PPA afforded the agricultural industry the opportunity to participate in the benefits of the patent system, which had previously only been enjoyed in the industrial field." Jeter, *supra* note 13, at 2.

patentability of sexually reproduced plants under the Plant Variety Protection Act (PVPA) of 1970.[98]

The United States Supreme Court expanded the scope of patent and patent-like protections afforded by these statutes to microorganisms in 1980 in the landmark case of *Diamond v. Chakrabarty*.[99] *Chakrabarty* established an expansive definition of patentable items, noting that the patentee's discovery was "not nature's handiwork, but his own; accordingly it [was] patentable subject matter under § 101."[100] The mere discovery of a biological organism, however, does not automatically render the organism patentable; substances naturally occurring in nature and lacking further purification, isolation, or other scientific treatment are not eligible for patent protections.[101]

98. *See* Plant Variety Protection Act of 1970, Pub. L. No. 91-577, 84 Stat. 1542 (codified as amended at 7 U.S.C. §§ 2321-2582 (2012)) (providing protection to sexually reproduced plants through certificates of protection); *see also* Jeter, *supra* note 13, at 6-10 (explaining protections offered under PVPA certificate). The federal statute echoes the UPOV and authorizes plant variety protection to the breeder of any sexually reproduced or tuber-propagated plant variety other than fungi or bacteria, provided that the variety is new, distinct, uniform, and stable. *See* 7 U.S.C. § 2402(a).

99. *See* 447 U.S. 303, 309 (1980) (permitting patenting of any item, including biological organisms, provided item meets patent criteria). The Court cited the legislative history of the patent statutes of 1793, 1836, 1870, and 1874 as supporting a broad construction of the patent terminology. *See id.* at 308-09. "A person may have 'invented' a machine or a manufacture, which may include anything under the sun that is made by man, but it is not necessarily patentable under section 101 unless the conditions of the title are fulfilled." *See* S. REP. NO. 82-1979, at 6.

100. *See Chakrabarty*, 447 U.S. at 309-10 (underscoring role of human intervention in creating patentable biological product).

101. *See* Funk Bros. Seed Co. v. Kalo Inoculant Co., 333 U.S. 127, 131 (1948) (explaining discovery of naturally occurring phenomenon, without further novel intervention, lacks patentability); Parke-Davis & Co. v. H. K. Mulford Co., 189 F. 95, 114 (C.C.S.D.N.Y. 1911) (holding novel combination of previously known salts could be patentable), *aff'd in part, rev'd in part*, 196 F. 496 (2d Cir. 1912). Patentability of *human* genes garnered recent attention from the United States Supreme Court of in *Association for Molecular Pathology v. U.S. Patent and Trademark Office*, in which a coalition of medical professionals and patients filed a lawsuit alleging that patents held by Myriad on two human genes associated with breast and ovarian cancer were unconstitutional and invalid because the genes are products of nature. *See* 653 F.3d 1329 (Fed. Cir. 2011), *vacated and remanded sub nom.* Ass'n for Molecular Pathology v. Myriad Genetics, Inc., 132 S. Ct. 1794 (2012). The Court vacated and remanded the *Myriad* judgment for further consideration in light of its decision in *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, holding invalid any patents that effectively claim an underlying law of nature. *See* 132 S. Ct. at 1794. In August 2012, the United States Court of Appeals for the Federal Circuit held that patents on isolated deoxyribonucleic acid (DNA) sequences were eligible for patent protection but declined to rule on patentability of entire genes. *See* Ass'n for Molecular Pathology v. U.S. Patent & Trademark Office, 689 F.3d 1303, 1325 (Fed. Cir. 2012), *aff'd in part, rev'd in part*, 133 S. Ct. 2107 (2013). The court specifically noted, "[t]he isolated DNA molecules before us are not found in nature. They are obtained in the laboratory and are man-made, the product of human ingenuity." *Id.* In September 2012, the plaintiffs again petitioned the Court for certiorari, which the Court granted on November 30, 2012. *See* Ass'n for Molecular Pathology v. Myriad Genetics, Inc., 133 S. Ct. 694 (2012); *see also Association for Molecular Pathology v. Myriad Genetics*, AM. C.L. UNION (Feb. 19, 2013), http://www.aclu.org/free-speech-technology-and-liberty-womens-rights/association-molecular-pathology-v-myriad-genetics (explaining procedural history of *Myriad*). The Court limited this writ to the issue of whether human genes were patentable under United States law. *See Myriad*, 133 S. Ct. at 695 (granting certiorari as to Question One of petition); *see also* Petition for Writ of Certiorari, *Myriad*, 133 S. Ct. 694 (No. 12-398), 2012 WL 4502947, at *i (phrasing Question One as "Are human genes patentable?"). In June 2013, the Court held that *naturally* occurring DNA

b. Mexico

Mexico affords protection to its plant varieties through several pieces of national legislation; one form includes the Federal Law on Plant Varieties (LFVV), enacted in conformance with UPOV.[102] The LFVV aims to protect the biological diversity of plants "that are in the public domain and which communities have the right to continue to exploit rationally as they have by tradition," though the specific guidelines for such permitted use are not enumerated.[103] It also provides rights to plant breeders for a set period of years, depending on the plant species, but stipulates that the consent of the breeder shall not be required for the use of the plant as a "source or research material for the genetic improvement of other plant varieties."[104] The LFVV further echoes the UPOV in its enumerated categories required to obtain a plant breeder certificate, which recognizes and protects the breeder's rights in a plant variety that is "new, distinct, stable and uniform."[105] Finally, the LFVV creates a plant variety certification committee, composed of several enumerated positions but lacking any representative specifically focused on the rights of indigenous communities.[106] The regulations of the LFVV provide that whoever attempts to attain protection for a plant variety must demonstrate that they developed and obtained it through an improvement process; a certificate may

segments were not patent eligible but synthetically created DNA was. *See* Ass'n for Molecular Pathology v. Myriad Genetics, Inc., 133 S. Ct. 2107, 2116-19 (2013). In denying patent protection to naturally occurring DNA segments, the Court discussed *Funk Bros. Seed Co.* and explained, "Myriad did not create or alter any of the genetic information encoded in the [breast and ovarian cancer] genes. The location and order of the nucleotides existed in nature before Myriad found them. Nor did Myriad create or alter the genetic structure of DNA." *Id.* at 2116. Although the Court did not expressly rule on *plant* genes, the Court's discussion of *Funk Bros. Seed Co.* and its refusal to extend patent protection to naturally occurring DNA fragments bodes ill for future biopirate litigants. *See id.* at 2117.

102. *See* Ley Federal de Variedades Vegetales [LFVV] [Federal Law on Plant Varieties], art. 1, Diario Oficial de la Federación [DO], 25 de Octubre de 1996 (Mex.) (providing as purpose for legislation protection of Mexican plant varieties). The LFVV created foundational procedures for the protection of plant breeders' rights. *Id.*

103. *Id.* art. 3 (explaining traditional use rights will be specified in law but failing to enumerate such specifications).

104. *See id.* arts. 4-5 (describing breeders' rights and declaring biological research and innovation as exceptions).

105. *See id.* arts. 2, 7 (reiterating UPOV criteria of new, distinct, stable, and uniform). The novelty requirement contained in Article 7 runs counter to the practical realities of indigenous knowledge: the LFVV requires that new varieties not be "the subject of disposal on the national territory" at least one year "prior to the filing date of the application for a breeder's certificate," but indigenous knowledge has, by definition, been at the disposal of indigenous communities for generations. *Id.*

106. *See* Ley Federal de Variedades Vegetales [LFVV] [Federal Law on Plant Varieties], arts. 29-30, Diario Oficial de la Federación [DO], 25 de Octubre de 1996 (Mex.) (detailing identities and functions of various committee members). Given the scope of roles enumerated for the committee members, including representatives from the Mexican Institute of Industrial Property, the Secretariat of the Environment, Natural Resources and Fisheries, and the Government Agricultural Research Institutes, the absence of an indigenous representative of the plant variety originators is conspicuous. *See id.* art. 29.

be nullified if the variety does not meet the certification requirements.[107]

Mexico also affords specific protection to the production, certification, and sale of seeds produced within its borders.[108] The Ley Federal de Producción, Certificación y Comercio de Semillas (LFPCCS) relies upon the national catalog of plant varieties to create a centralized location for Mexican biodiversity and further sorts seed varieties according to four characteristic categories: Basic, Registered, Certified, and Qualified.[109] The LFPCCS similarly creates a National Seed System to oversee the protection of seed resources and, like the LFVV, creates a committee to supervise this process.[110]

c. India

Indian legislation provides extensive protections to its national biodiversity and the originators of these species; such protections are clearly demonstrated through the Protection of Plant Varieties and Farmers' Rights Act of 2001 (PPVFRA).[111] The PPVFRA explicitly identifies and defines indigenous crops, or "farmers' variety," as distinct agricultural species that either have been traditionally cultivated by farmers or are wild relatives of species about which farmers possess traditional knowledge.[112] The PPVFRA, like Mexico's LFVV, creates a committee to safeguard its agricultural biodiversity; unlike the LFVV, however, the Indian legislation requires the inclusion of a representative from a farmers' organization to represent indigenous concerns.[113] As in previous

107. *See* Reglamento de la Ley Federal de Variedades Vegetales [Regulations of the Federal Plant Variety Law], arts. 11, 56, Diario Oficial de la Federación [DO], 24 de Septiembre de 1998 (Mex.) (clarifying application and nullity processes). "Whosoever attempts to make use of and exploit a new plant variety and its propagation material must prove that they developed and obtained it by means of an improvement process inherent to the genus and species in question." *Id.* art. 11.

108. *See* Ley Federal de Producción, Certificación y Comercio de Semillas [LFPCCS] [Federal Law on the Production, Certification and Sale of Seeds], Diario Oficial de la Federación [DO], 15 de Junio de 2007 (Mex.) (defining seed categorization process and protection). "[The] National Seed System is created in order to coordinate the attendance, participation, cooperation and complementarity between the public, social and private sectors involved in conservation, research, production, certification, marketing, promotion, procurement and use [of] seed." *Id.* art. 7.

109. *See id.* art. 3 (requiring national seed catalog "to ensure their genetic identity and distinction"). The law is specifically aimed at the production and qualification of certified seeds and their subsequent sale to the public. *See id.* art. 2.

110. *See id.* art. 9 (explaining "[t]he system shall comprise 16 principal representatives"). As with the LFVV, no indigenous representative is created through this legislation. *See id.*

111. *See* The Protection of Plant Varieties and Farmers' Rights Act, pmbl., No. 53 of 2001, INDIA CODE (2001), vol. 64, *available at* http://indiacode.nic.in (recognizing necessity of noting and protecting farmers' rights and their contributions to plant development). The Protection of Plant Varieties and Farmers' Rights Act (PPVFRA) explicitly acknowledges the need to "recognise and protect the rights of the farmers in respect of their contribution made at any time in conserving, improving and making available plant genetic resources for the development of new plant varieties." *Id.*

112. *See id.* cl. 2 (defining "farmers' variety" for purposes of PPVFRA application).

113. *See id.* cl. 3(7) (highlighting farmer representative's role in advising on all issues pertaining to farmers' rights). The farmers' representative thus has an integral role in helping to promote the measures required to encourage development of new varieties of plants while protecting the rights of farmers and

national legislative schemes, a new variety is considered registrable if it conforms to the criteria of novelty, distinctiveness, uniformity, and stability.[114] Finally, the PPVFRA authorizes the indigenous communities to file claims for such varieties; these filings can be made either by the communities themselves or by any individuals or organizations acting on their behalf.[115] The rules associated with this Act further protect the rights of the indigenous communities and farmers by providing specific guidelines for direct compensation to these individuals through a "gene fund," with priority being made to farmers and communities of farmers, with a particular focus on the tribal and rural communities engaged in conservation, improvement, and preservation of genetic resources.[116]

India also provides legislative protection for its biological diversity through the Biological Diversity Act of 2002 (BDA).[117] The NBA implements the BDA's requirements that entities defined by the statute must receive prior approval before obtaining any biological resource or knowledge associated with such resource in India.[118] Furthermore, the NBA may take any measure necessary to oppose the grant of intellectual property rights in any foreign country on any biological resource obtained from India, or from knowledge associated with such biologically Indian resources.[119]

breeders. *See id.* cl. 8.

114. *See id.* cl. 15 (providing guidelines for applying to register new plant variety). "A new variety shall be registered under this Act if it conforms to the criteria of novelty, distinctiveness, uniformity and stability." *Id.*

115. *See* The Protection of Plant Varieties and Farmers' Rights Act, cl. 41, No. 53 of 2001, INDIA CODE (2001), vol. 64, *available at* http://indiacode.nic.in (highlighting right to file claims attributable to contributions of people or community as whole). This provision, which recognizes long-standing and thus arguably nonnovel claims as protectable, overcomes the novelty bar that previously prevented indigenous communities from obtaining patent protection over their knowledge. *See id.*

116. *See* The Protection of Plant Varieties and Farmers' Rights Rules, 2003, Gazette of India, section III(41) (Sept. 12, 2003) (explaining alternative compensation guidelines for indigenous farmers). The Protection of Plant Varieties and Farmers' Rights Rules (PPVFRR) provides for publication of the contents of a certificate inviting claims for benefit sharing. *See id.* section III(40).

117. *See generally* Biological Diversity Act, 2002, No. 18, Acts of Parliament, 2003 (India) (providing for conservation of biological diversity). India enacted the BDA to conform to the CBD's requirements and its main objectives of conservation, sustainable use, and equitable sharing of benefits that arises from genetic resource use. *See id.* pmbl.

118. *See id.* cl. 3(1) (limiting accessibility of biological resources and knowledge). The BDA elaborates on the entities requiring approval from the NBA prior to using Indian genetic resources; these entities include anyone who is not a citizen of India, nonresident Indian citizens, and corporate bodies not incorporated or registered in India or "incorporated or registered in India under any law for the time being in force which has any non-Indian participation in its share capital or management." *Id.* cl. 3(2).

119. *See id.* cl. 18(4) (underscoring Indian supremacy over Indian natural resources).

III. ANALYSIS

A. Inadequacy of Existing International Patent Regimes as Applied to Traditional Knowledge

The international models for patent protection highlight glaring shortfalls of international protection for indigenous knowledge.[120] The international intellectual property community relies in great part on TRIPS, a treaty influenced by the U.S. model and which is overwhelmingly tailored toward Western conceptions of intellectual property protection.[121] These models permit patents to be issued with incredible ease and with minimal regard for the origin of the patents' knowledge, frequently resulting in subsequent invalidation after years of commercial use.[122] Novelty in particular is repeatedly utilized in determining patentability: traditional knowledge, by definition, is an ancient, communal heritage that automatically fails this requirement.[123] Indeed, TRIPS' regard for agricultural indigenous knowledge falls so low as to permit complete exclusion of their protection in any national model governed by its dictates.[124] Thus, under the existing international guidelines heavily influenced by TRIPS, the protections provided to the products of indigenous knowledge are insufficient where present, and frequently absent altogether.[125]

Furthermore, the existing options for compensation available to indigenous communities highlight the disconnect between notions of Western and indigenous value.[126] The protections for indigenous breeders' rights are

120. *See supra* notes 59-60 and accompanying text (highlighting theft of brinjal and lack of legal resources to combat theft); *see also* Abdelgawad, *supra* note 36, at 138-39 (outlining corporate plans for plant patent protection and exclusion of use rights). The lawsuit against Monsanto and Mahyco originated from violations of the BDA, with plaintiffs alleging that these two companies accessed six local varieties of brinjal without prior approval from the NBA. *See id.* at 138.

121. *See supra* note 78 and accompanying text (explaining novelty and utility as necessary requirements to patenting invention); *see also* 35 U.S.C. § 101 (2012) (reiterating novelty and utility as required elements of patentable product).

122. *See generally* U.S. Patent No. 5,894,079 (filed Nov. 15, 1996) (granting expansive and erroneous patent protection over Enola bean). The reexamination certificate cancelling the claims of the original patent finally issued in May 2011, permitting Proctor to effectively retain patent rights over his pirated bean for nearly five years from the date of filing. *See generally* U.S. Patent No. 5,894,079 C1 (filed May 22, 2001).

123. *See supra* note 23 and accompanying text (emphasizing nonnovel, historical roots of traditional knowledge); *see also supra* notes 44-46 and accompanying text (underscoring lack of Western novelty in traditional knowledge).

124. *See supra* notes 79-80 and accompanying text (underscoring lack of mandatory support for indigenous rights in TRIPS).

125. *See supra* note 86 and accompanying text (explaining CBD provisions); *see also supra* note 17 and accompanying text (explaining LFVV provisions); *supra* note 91 and accompanying text (explaining ITPGRFA provisions).

126. *See supra* note 23 and accompanying text (elaborating on nonmonetary value of indigenous knowledge); *see also supra* note 34 and accompanying text (examining global market for indigenous biological knowledge); *supra* note 43 and accompanying text (asserting legal failure to protect indigenous knowledge at national and international levels).

minimally present and not mandatory.[127] A preference for expansion of commercially viable patents drowns the voice of the true inventors of that knowledge.[128] The CBD and ITPGRFA provide the best international models for protection of indigenous knowledge.[129] Even these regimes are merely guidelines, however, possessing no real teeth in the protection of indigenous interests.[130]

B. The India-Mexico Model

Contrary to established scholarly belief, current international regimes have failed to adequately administer and protect the rights of the indigenous community.[131] Rather than rely on the insufficient protection currently afforded by international patent law, nation states should seek to protect indigenous rights through a new amalgamation of existing international law.[132] The proposed model would combine the strengths of the Mexican and Indian patent regimes, which are both notable for their incorporation of relevant international protections directly into their national legislation while providing for extensive domestic legislation governing the national protection of local species.[133] By expressly reserving ownership of their own biological resources, countries provide the legal foundation for any subsequent litigation involving the protected species.[134] Only through locally enacted regulations that specifically target the protection of indigenous species and their associated knowledge can countries adequately protect their patent interests.[135] Both

127. *See supra* notes 84-85 and accompanying text (explaining presence of nonmandatory breeder rights); *supra* note 104 and accompanying text (limiting breeders' rights for biological research and innovation).

128. *See supra* note 8 and accompanying text (explaining commercial value of patents); *supra* note 41 and accompanying text (linking ownership and commercial rewards).

129. *See supra* notes 88-90 and accompanying text (describing CBD legislative measures to protect indigenous knowledge); *see also supra* notes 91-93 and accompanying text (reviewing ITPGRFA protections for indigenous farmers and agricultural products).

130. *See supra* notes 88-91 and accompanying text (highlighting CBD's inability to enact provisions of treaties). Without explicitly requiring that nations legislate the objectives of international treaties, nation states possess little overt incentive to legislate beyond the requirements. *See supra* notes 88-91 and accompanying text.

131. *See supra* note 10 and accompanying text (emphasizing the frequent absence of credit accorded to indigenous breeder); *supra* note 23 and accompanying text (underscoring lack of compensation to indigenous communities); *see also* Bates, *supra* note 20, at 979-80 (summarizing treaty failure to protect indigenous knowledge from exploitation).

132. *See supra* Part III.A (explaining deficiencies in current international regulation).

133. *See supra* notes 102-15 and accompanying text (providing overview of extensive domestic legislation in Mexico and India). The various Mexican and Indian legislative enactments, considered together, provide one of the most complete regimes for biodiversity protection around the globe. *See supra* notes 102-15 and accompanying text.

134. *See* Plant Patent Act of 1930, 35 U.S.C. §§ 161-164 (2012) (providing statutory basis for patent infringement action); *see also* Plant Variety Protection Act of 1970, 7 U.S.C. §§ 2321-2582 (2012) (providing statutory basis for plant patent protection specifically).

135. *See supra* Part II.C.2.b-c (supporting notion that Mexican and Indian legislation provide best protections for indigenous knowledge as plants).

Mexico and India explicitly provide for national genetic catalogs, strong oversight of patented claims, and acknowledgement for indigenous rights.[136]

The model would recognize traditional knowledge as worthy of patent claims in spite of its untraditional notion of novelty.[137] Thus, in spite of the ancient nature of the knowledge manifested through the protected species, the protection would recognize the contributions of indigenous communities to the realm of patentable products.[138] This protection could also be recognized through the obtainment of explicit indigenous protection for use of indigenously developed crops.[139] Only through implementation of such strong, domestic legislation can nations adequately protect the agricultural byproducts of their indigenous heritage.[140]

IV. CONCLUSION

The protection of indigenous biodiversity is at an international crossroad. Without the intervention of substantial national legislation, the agricultural crops and their associated traditional, indigenous knowledge face extinction at the hands of a richer, more legally savvy world. Extinction of biodiversity anywhere threatens agriculture everywhere. Current international legislation fails to accommodate the unique nature of indigenous crop development and the indigenous innovators have subsequently suffered from the gap.

From an American perspective, lacking strong national regulation over biodiverse resources exposes the United States to biopiracy from global competitors. By implementing the provisions of the model, the United States and its developed counterparts could more adequately protect its own

136. *See supra* note 135 and accompanying text (relaying expansive protections afforded by Mexico and India to plants and their accompanying patent considerations). The combination of the Mexican and Indian legislative models provides the most comprehensive coverage available through currently extant patent regimes. *See id.*

137. *See supra* note 44 and accompanying text (underscoring nonnovel aspect of communal indigenous, agricultural heritage); *see also supra* note 23 and accompanying text (defining communal indigenous knowledge in context of ancient character).

> Developing nations and farmers' rights groups have spearheaded multiple treaties aiming to curtail plant monopoly rights; however, the treaties have been ineffective and the growing strength of plant monopolies in developed countries is unlikely to wane. Meanwhile, farmers need a solution that allows them to maintain control over their farming practices, preserve traditional cross-breeding methods, and receive compensation for their contribution to the state of the art of crop varieties.

Beck, *supra* note 44, at 167.

138. *See supra* notes 44-45 and accompanying text (highlighting unique contributions of indigenous communities to development of biological traditional knowledge).

139. *See supra* note 107 and accompanying text (creating application process for protecting seed species and accompanying nullification procedure under Mexican law); *see also supra* note 108 and accompanying text (providing legislative guidelines for production, certification, and sale of seeds under Mexican law).

140. *See supra* text accompanying note 135; Part II.C.2.b-c (offering examples of Mexican and Indian legislation).

indigenous resources and ensure their sustainable growth and development for generations to come. From an indigenous perspective, enhanced national legislation explicitly tailored toward indigenous concerns will protect their rights over developed biodiversity and its traditional knowledge, ensuring its continued existence into the future.

Katherine A. Kelter