Michigan Journal of International Law

Volume 17 | Issue 4

1996

Of Seeds and Shamans: The Appropriation of the Scientific and Technical Knowledge of Indigenous and Local Communities

Naomi Roht-Arriaza
University of California, Hastings College of the Law

OF SEEDS AND SHAMANS: THE APPROPRIATION OF THE SCIENTIFIC AND TECHNICAL KNOWLEDGE OF INDIGENOUS AND LOCAL COMMUNITIES

*Naomi Roht-Arriaza**

* Associate Professor, University of California, Hastings College of the Law; J.D., Boalt Hall, University of California, Berkeley; M.P.P., University of California, Berkeley. Maria Montes and Kathleen Yurchak did extensive research for this paper, and I deeply appreciate their help both with the research and in discussing the issues with me. I also profoundly thank Monica Moore at Pesticide Action Network North America and everyone at Genetic Resources Action International (GRAIN) in Barcelona for their help and support. An earlier version of this article appears in BORROWED POWER: ESSAYS IN CULTURAL APPROPRIATION (B. Ziff & P. Rao eds., forthcoming 1996). The author wishes to thank Bruce Ziff for ideas that helped provide a framework for discussing issues of cultural appropriation.

INTRODUCTION

Indigenous, traditional, and local resource-based peoples and communities[1] have long used intimate knowledge of their surroundings and resources to shape ecosystems, to provide food, medicines, and other useful products, and to breed better crops and livestock. This knowledge has not been recognized as being either "scientific" or valuable to the dominant culture and so has been freely appropriated by others.

The appropriation of the scientific and technical knowledge of indigenous and local peoples, of the products of that knowledge, and even of the genetic characteristics of the people themselves has become both notorious and contested. It forms the heart of current debates about conservation of biological diversity,[2] indigenous rights,[3] and genetic resources in agriculture.[4] In multiple fora, indigenous and local communities are at last finding their own voice on the issue, claiming the right to control access to their knowledge and resources and so put an end to appropriation.

This article recasts the debates over access to, and control over, genetic and biological knowledge and resources in terms of the appropriation of indigenous and local communities' knowledge and resources. It first discusses recent examples of appropriation as currently conducted by global biotechnology, pharmaceutical, and agribusiness corporations

---

1. The definitions of indigenous, traditional, and local communities are problematic. Indigenous or tribal peoples, according to one definition, are "those who share customs and local knowledge of specific geographic territory and are relatively independent of, or have little contact with, the dominant national society of the country in which they live." EDITH BROWN WEISS, IN FAIRNESS TO FUTURE GENERATIONS: INTERNATIONAL LAW, COMMON PATRIMONY, AND INTERGENERATIONAL EQUITY 264 (1990). Traditional peoples "encompass many of the rural and peasant communities that inhabit the countryside . . . [and] live on marginal lands relatively removed from many of the accoutrements of modern life." *Id.* at 265. Many traditional peoples are also indigenous and vice versa. While there are numerous differences between these types of communities, for my purposes both have suffered the appropriation of their knowledge and resources and both are stewards of much knowledge of ecosystems, genetic resources, and the natural world. Local communities are much less well-defined. *See* discussion *infra* Part III. Nonetheless, the usage in treaties and elsewhere refers to "indigenous and local" communities together, and so I have chosen to reproduce that usage here.

2. *See* discussion of the Convention on Biological Diversity *infra* notes 48–50.

3. *See* discussion of the Draft Declaration on the Rights of Indigenous Peoples and of the International Labour Organisation Convention 169 *infra* notes 171–73.

4. *See* discussion of the Food and Agriculture Organization's (FAO) International Undertaking on Plant Genetic Resources *infra* notes 123–24 and accompanying text. In addition, the Fourth International Technical Conference on Plant Genetic Resources, held in Leipzig, Germany from June 17 to June 23, 1996, approved a Global Plan of Action on Plant Genetic Resources for Food and Agriculture *infra* note 209. The FAO is also planning a World Food Summit in November 1996 at which these issues will figure prominently.

and their associates in Northern[5] universities, seed and gene banks, and research centers. Second, it describes and exposes the mechanisms of appropriation by focusing on the limited and culturally determined definitions of what is "wild" as opposed to "cultivated," what is "knowledge" and who can possess it, and what are "innovations" and "inventions." Included in this discussion is an examination of how the "common heritage" principle fosters appropriation through its application in seed banks, gene banks, and other *ex situ* forms of conservation of genetic material.

Third, the article analyzes briefly three possible frameworks for ending appropriation: broadened and redefined intellectual property regimes, private contracts between communities or States and "bioprospectors," and expansion of the concept of "farmers' rights" to provide both compensation and control to indigenous and local communities. Each framework raises the essential problem of defining the holders of the right to patent, sell, or protect the scientific and technical knowledge at issue. Possible holders include individual inventors or breeders, the State where the resource is located, and the indigenous or local community that has protected, developed, and used the resource through the years. Any solution to the issues of cultural appropriation in this area will require profound rethinking of how we define, empower, and protect indigenous and local communities and their historical knowledge base.

I. The Scientific and Technical Knowledge of Indigenous and Local Communities

Indigenous and local communities have a long history of using plants for almost all needs, including food, shelter, clothing, and medicine. Common remedies used today were often first developed by healers prior to contact with industrial societies. Yet, although many of today's drugs and cosmetics originated from the stewardship and knowledge of indigenous and local communities, that knowledge remains unrecognized and unvalued until appropriated from those communities by Western[6] corporations or institutions. To cite a few examples:

— The well-known cure for malaria, quinine, comes from the bark of the Peruvian cinchona tree.[7] Andean indigenous

5. "Northern" and "Southern" refer respectively to the industrialized but gene-poor countries, often called "developed," and the gene-rich but nonindustrialized countries, often called "developing."

6. "Western" refers to colonial or post-colonial industrial societies in their relation to indigenous, traditional, and local communities.

7. Catherine Farley & Daphne Field, *Healing Plants*, Toronto Star, Jan. 8, 1995, at B1.

groups used quinine as a cure for fevers, supposedly learning of the bark's powers while observing feverish jaguars eating it.[8]

— The rosy periwinkle plant, unique to Madagascar, has been found to contain properties that combat certain cancers.[9] The anti-cancer drugs vincristine and vinblastine have been developed from the periwinkle, resulting in $100 million in annual sales for Eli Lilly and virtually nothing for Madagascar.[10]

— For thousands of years, indigenous farmers in India have used the leaves and seeds of the neem tree as a natural insecticide.[11] Juice from the tree has also been used to prevent scabies and other skin disorders.[12] Villagers still scrub their teeth with neem twigs.[13]

Several patents have now been granted in the United States and other industrialized countries for products based on the neem plant.[14] The U.S.-based multinational corporation, W.R. Grace, which received a patent for an insecticide based on the active ingredient in neem, has stated that it does not plan to compensate anyone in India for providing the knowledge that underlies its neem-based product.[15] Corporate Vice-President Martin B. Sherwin has dismissed the Indian people's discovery and development of the plant's uses as "folk medicine."[16]

---

8. *Id.*

9. Elizabeth Pennisi, *Hairy Harvest: Bacteria Turn Roots into Chemical Factories*, 141 SCIENCE NEWS 366 (1992).

10. Shayana Kadidal, *Plants, Poverty, and Pharmaceutical Patents*, 103 YALE L.J. 223, 224 (1993) (citing Diane Jukofsky, *Medicinal Plant Research Leads Scientists to Rain Forests*, DRUG TOPICS, Apr. 22, 1991, at 26).

11. Sandy Tolan, *Against the Grain: Multinational Corporations Peddling Patented Seeds and Chemical Pesticides Are Poised to Revolutionize India's Ancient Agricultural System. But At What Cost?*, L.A. TIMES MAG., July 10, 1994, at 18, 20.

12. *Id.*

13. *Id.*

14. Gurdial Singh Nijar, *A Conceptual Framework and Essential Elements of a Rights Regime for the Protection of Indigenous Rights and Biodiversity*, BIODIVERSITY CONVENTION BRIEFINGS (Third World Network, Penang, Malaysia), 1994, at 4.

15. Tolan, *supra* note 11, at 20.

16. *Id.*

— The endod berry, a member of the soapwort family, has been used for centuries in Ethiopia as a laundry soap and fish intoxicant.[17] Scientists noticed that there were fewer aquatic snails where people used endod berries to wash clothes; just a few pounds of berries easily controlled whole colonies of snails.[18] Endod has also been used medicinally by tropical indigenous groups to treat schistosomiasis, a potentially fatal parasitic disease transmitted by aquatic snails.[19] A patent for endod's crustacean-killing properties has been granted to the University of Toledo after a scant few months of testing.[20] An endod derivative may help stop the zebra mussel invasion in the Great Lakes, an environmental disaster that has crippled water supplies and threatened marine ecosystems.[21] Neither Ethiopia nor the local people who first identified endod's many beneficial uses and then protected the endod plant through the years will receive any of the expected financial rewards.

— The University of California and Lucky Biotech, a Japanese corporation, were recently granted a patent for the sweetening proteins naturally derived from two African plants, katempfe and the serendipity berry.[22] These plants have long been used by African peoples for their sweetening properties.[23] Thaumatin, the substance that makes katempfe sweet, is 2,000 times sweeter than sugar yet calorie-free.[24] Although any transgenic plant containing the derived sweetening proteins would be covered by the patent, no arrangements

---

17. *Endod: A Case Study of the Use of African Indigenous Knowledge to Address Global Health and Environmental Problems*, RAFI COMMUNIQUE (Rural Advancement Found. Int'l, Ottawa, Ont.), Mar. 1993 [hereinafter *Endod*].

18. Linda Yang, *Garden Q&A*, N.Y. TIMES, Nov. 3, 1994, at C13.

19. Uinsionn Mac Dubhghaill, *Now No Life Form Is Safe From the Patent Lawyer*, IRISH TIMES, Oct. 16, 1993, at 4.

20. *Endod*, *supra* note 17, at 3.

21. *See id.* at 3; Rural Advancement Foundation International, [hereinafter RAFI] Conserving Indigenous Knowledge: Integrating Two Systems of Innovation 8 (Sept. 1, 1994) (unpublished study on file with the *Michigan Journal of International Law*) [hereinafter Conserving Indigenous Knowledge].

22. *See* Conserving Indigenous Knowledge, *supra* note 21, at 8.

23. *Intellectual Property Rights for Whom?*, GRAIN BIOBRIEFING (Genetic Resources Action International, Barcelona, Spain), Part 2, June 1994, at 5.

24. *Id.*

have been made to return part of the benefits to the African communities.[25]

— A barley gene that confers resistance to the yellow-dwarf virus is the product of centuries of breeding and cultivation by Ethiopian farmers.[26] U.S. farmers and the scientists who patented this barley variety receive substantial profits from its current cultivation in the U.S., but the Ethiopian farming communities that originally developed the variety receive nothing.[27]

— In 1990, scientist Sally Fox of California received a U.S. patent for colored cotton.[28] This patent is economically significant because multinational corporations, such as Levi Strauss and Esprit, want environmentally friendly materials like naturally colored cotton for their clothes.[29] Unfortunately, credit for the "invention" of colored cotton does not go to its true developers. The seed for Sally Fox's patented cotton came from a United States Department of Agriculture collection obtained by Dr. Gus Hyer during his travels in Latin America.[30] Colored cotton resulted from centuries of breeding and cultivation by Latin American indigenous groups.[31] Even now, 15,000 indigenous farmers grow colored cotton, and over 50,000 indigenous women still spin and weave it.[32] Fox's patent directs all profits to her, not these indigenous inventors and cultivators.[33]

— A Western scientist returned from West Africa with some cowpeas from a seed bank called the Institute of Tropical Agriculture (ITA).[34] The seed bank, in turn, had obtained the

---

25. *Id.*

26. Elizabeth Bryant, *Corporate Patents or Global Piracy? Africans Oppose Privatization of Genetic Innovations*, AFRICAN FARMER, Apr. 1994, at 37.

27. *Id.*

28. Martin Teitel, *Selling Cells: The Thriving Business of Patenting Life*, DOLLARS AND SENSE, Sept.–Oct. 1994, at 24, 38.

29. *Id.*

30. *Id.*

31. *Id.*

32. *Id.*

33. *Id.*; *see also* Conserving Indigenous Knowledge, *supra* note 21, at 9.

34. *Hungoo, Arrogance, and the "Gene" Revolution*, RAFI SPECIAL REPORT (Rural Advancement Found. Int'l, Ottawa, Ont.), 1989, at 4–5.

seeds from local farming communities.[35] Within a decade, the scientist had isolated a specific gene resistant to insect pests which could be inserted into other crops such as soybean and maize.[36] This gene was patented with no credit or royalties given to the ITA or others who had helped develop and preserve the cowpea variety.[37]

— In 1990, the University of Florida patented a Brazilian fungus known to be lethal to a species of fire ant that damages crops in the United States. Brazilian farmers were aware that something in their soil killed the ants, but the patent application did not mention the Brazilian origin of the fungus, much less include provisions for compensating the Brazilian farmers who first noticed and made use of the connection.[38]

— There have been a number of attempts to patent human cell lines of indigenous people without their knowledge or consent. In one notorious episode, the U.S. government in 1993 applied for U.S. and world patents on the cell line of a Guaymi Indian woman from Panama.[39] After international protests from the Guaymi General Congress and others, the U.S. government withdrew its claim.[40] Despite this experience, in 1995 the U.S. Patent Office granted a patent to the National Institutes of Health (NIH) on the T-cell line of a Papua New Guinean and two people from the Solomon Islands.[41] The patent applications indicate that the cell lines may be useful in combating a virus associated with adult leukemia and chronic neurological disease.[42] It is unclear to

---

35. *Id.*

36. *Id.*

37. *Id.*

38. Conserving Indigenous Knowledge, *supra* note 21, at 23. While the communities' healers may not have known the scientific name of the medicinal soil component, they knew of its medicinal qualities. *Id.* For a summary of instances of appropriation of microbial material from indigenous communities by transnational pharmaceutical corporations, see *id.*

39. *The Patenting of Human Genetic Material*, RAFI COMMUNIQUE (Rural Advancement Found. Int'l, Ottawa, Ont.), Jan.–Feb. 1994, at 7.

40. *Id.* at 8.

41. *Id.* at 8–9.

42. *Id.* The patent, U.S. 5,397,696, was granted to NIH on March 14, 1995. *New Questions About Management and Exchange of Human Tissues at NIH: Indigenous Person's Cells Patented*, RAFI COMMUNIQUE (Rural Advancement Found. Int'l, Ottawa, Ont.), Mar.–Apr. 1996, at 2. After RAFI and other nongovernmental organizatoins (NGOs) protested, NIH-related researchers insisted they had obtained the consent of the tribe and had agreed to share royalties

> what degree the people whose DNA has been sampled are aware of the potentially lucrative nature of the research or the intention to patent their cell lines.

In these examples, Western researchers and corporations have appropriated from indigenous and local communities their scientific and technical knowledge, the resources developed with that knowledge, and even the cells of the people themselves. Historically, access to the local knowledge of these communities and their biological resources has been free because that knowledge and the related resources have been considered to be a part of anthropological studies and the public domain. This view permits Western corporations to profit from the technological uses made of indigenous knowledge and resources with no benefit given to the indigenous and local communities themselves.

While a few of these examples of appropriation are quite old, most have occurred within the last dozen or so years. The increasing interest in both using and preserving the knowledge and resources of indigenous and local communities stems from the development of a lucrative biotechnology industry dependent on Southern genetic resources. This development coincides with an increasing sense of urgency surrounding the need to preserve genetic resources, with a recognition of the importance of involving local people in conservation efforts, and with the new visibility of indigenous peoples' fight for survival, land rights, and self-determination.

The growth of the biotechnology industry and of the use of genetically engineered materials in pharmaceuticals, agricultural supplies, and many other industries has vastly increased the commercial value of genetic resources in plants, animals, and microorganisms.[43] Changes in the nature of basic science have made it possible to apply research on life forms to a number of different commercial activities, leading to an emerging "genetics supply" or "life" industry that depends on raw genetic material from fields, forests, and communities.[44]

That material is fast disappearing. Species and varieties are becoming extinct at unprecedented rates, due to the use of ever fewer high-yield

---

wih them. *Id.* at 4. However, RAFI insists that a Freedom of Information Act request has turned up no evidence of any direct contact between tribal members and the patent-holders. *Id.* Regarding the patent application on the Solomon Islanders, in the wake of an international outcry, U.S. officials have announced withdrawal of the application, but researchers could not obtain any documentary proof of the withdrawal. *Id.* at 5.

43. Conserving Indigenous Knowledge, *supra* note 21, at 4–5.

44. *Id.* at 6.

commercial varieties in agricultural production, the loss of habitat, and other factors.[45] Much of the world's genetic diversity has been lost; for instance, ninety-seven percent of the vegetable varieties sold by commercial seed houses in the United States at the beginning of the century are now extinct, as are eighty-seven percent of the pear and eighty-six percent of the apple varieties.[46] Half of Europe's domesticated animal species have become extinct in this century.[47] Most of the world's remaining biodiversity is concentrated in "gene-rich" Southern countries where most indigenous and traditional communities are also located. For agricultural crops, the genes necessary to combat new diseases and maintain yields come to a large extent from the South.

The alarming loss of ecosystem, species, and genetic diversity led to negotiation of the 1992 Convention on Biological Diversity,[48] which brought concerns over the use and appropriation of indigenous and local scientific knowledge of natural resources and systems squarely within an international ecological perspective. Among its stated objectives is "the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding."[49] In other words, under the Convention the conservation of, and access to, Southern biodiversity, including its genetic diversity, is to be exchanged for access to Northern biotechnology and funding. To help accomplish this, the Convention vests sovereign rights to biological resources, including genetic resources, in the State.[50]

---

45. Rebecca L. Margulies, Note, *Protecting Biodiversity: Recognizing International Intellectual Property Rights in Plant Genetic Resources*, 14 MICH. J. INT'L L. 322, 323–27 (1993); *see also* CALESTOUS JUMA, THE GENE HUNTERS: BIOTECHNOLOGY AND THE SCRAMBLE FOR SEEDS 100 (1989).

46. CARY FOWLER & PAT MOONEY, SHATTERING: FOOD, POLITICS AND THE LOSS OF GENETIC DIVERSITY 63 (1990).

47. Conserving Indigenous Knowledge, *supra* note 21, at 14. The loss of genetic variation within species leaves species vulnerable to attack by pests and diseases. Jack R. Kloppenburg & Daniel L. Kleinman, *Preface, Plant Genetic Resources: The Common Bowl*, *in* SEEDS AND SOVEREIGNTY: THE USE AND CONTROL OF PLANT GENETIC RESOURCES 6–7 (Jack R. Kloppenburg ed., 1988) [hereinafter SEEDS AND SOVEREIGNTY]. Access to new and unknown varieties of useful plants is essential to strengthening resistance to such plagues. *Id.* at 7.

48. Convention on Biological Diversity, *opened for signature* June 5, 1992, 31 I.L.M. 822 (1992).

49. *Id.* art. 1.

50. The Preamble, Article 3, and Article 15 all reaffirm the sovereignty of States over their natural resources. *Id.* pmbl, art. 3, art. 15. Article 15 specifically recognizes that access to genetic resources is subject to State law. *Id.* art. 15. This marks a change from the prior status of genetic resources as part of the "common heritage" of humanity. *See* discussion *infra* Part II.C.

The concern over biodiversity loss reflected in the Convention has led to increasing recognition that indigenous and local communities preserve much of the world's remaining biodiversity and are thus necessary partners in biodiversity conservation efforts.[51] Indigenous and local communities have long excelled at identifying and classifying the names, properties, and uses of the biodiversity found on their lands,[52] and they have often known how to take better advantage of that biodiversity than Western scientists. For example, by consulting indigenous peoples, bioprospectors can increase the success ratio in trials for useful substances from one in 10,000 samples to one in two.[53]

Coupled with the increasing recognition of indigenous and local communities' crucial role in biodiversity preservation is a general revaluing of the positive role of indigenous and local communities in sustainable development.[54] An emerging view that indigenous and local communities can and must be involved in resource conservation efforts contrasts with the more traditional view of such communities as backwards despoilers who must be removed and excluded from protected nature areas and conservation programs.[55] In part, this shift in views

---

While granting States sovereignty over their resources, the Convention also imposes several restrictions or burdens on that sovereignty. Thus States must facilitate access to genetic resources, must share the results of research and development, and must share the benefits arising from commercial uses of genetic resources. Convention on Biological Diversity, *supra* note 48, art. 15.2, 17.2, 19.2. States must also facilitate access to, and transfer of, biotechnology to developing countries "under fair and most favorable terms." *Id.* art. 16; *see generally* Steven M. Rubin & Standwood C. Fish, *Biodiversity Prospecting: Using Innovative Contractual Provisions to Foster Ethnobotanical Knowledge, Technology, and Conservation*, 5 COLO. J. INT'L ENVTL. LAW & POL'Y 23, 31–36 (1994). The Convention also requires States to inventory, monitor, and preserve biological diversity within their boundaries. Convention on Biological Diversity, *supra* note 48, art. 7.

Much literature exists on the Convention on Biological Diversity and its implications. *See, e.g.*, Symposium, *Biodiversity: Opportunities and Obligations*, 28 VAND. J. TRANSNAT'L L. 613 (1995); Klaus Bosselmann, *Plants and Politics: The International Legal Regime Concerning Biotechnology and Biodiversity*, 7 COLO. J. INT'L ENVTL. LAW & POL'Y 111 (1996); Karen A. Goldman, Note, *Compensation for Use of Biological Resources Under the Convention on Biological Diversity: Compatibility of Conservation Measures and Competitiveness of the Biotechnology Industry*, 25 LAW & POL'Y INT'L BUS. 695 (1994).

51. *See generally*, WALTER V. REID ET AL., BIODIVERSITY PROSPECTING: USING GENETIC RESOURCES FOR SUSTAINABLE DEVELOPMENT (1993).

52. Indigenous and local community members have often developed a far more complex taxonomy of their local flora and fauna and a more complete understanding of local ecosystems than have Western researchers. *See, e.g.*, Michael Howes, *The Uses of Indigenous Knowledge in Development*, *in* INDIGENOUS KNOWLEDGE SYSTEMS AND DEVELOPMENT 341, 343 (D. Brokensha et al. eds., 1980).

53. Conserving Indigenous Knowledge, *supra* note 21, at 22.

54. *See, e.g.*, Agenda 21, para. 3.2, *reprinted in*, AGENDA 21 & THE UNCED PROCEEDINGS at 24 (Nicolas A. Robinson ed., 1993) (concluding that conservation programs will fail to be sustainable unless the basic needs of the people who depend on targeted resources for their livelihoods are satisfied).

55. *See* Lee P. Breckenridge, *Protection of Biological and Cultural Diversity: Emerging Recognition of Local Community Rights in Ecosystems Under International Environmental Law*,

arises from increasing stress on incentives, rather than sanctions, as a key tool in resource conservation.[56] The shift in views is further fueled by a re-evaluation of the lessons indigenous and traditional medicine can provide for Western medicinal practice. Thus the "shaman" is no longer a "witch doctor" but a healer with knowledge of traditional remedies worthy of new respect from Western science.[57] In essence, then, the shift in views reflects a more general appreciation of the special contributions and needs of indigenous and local peoples[58] and of the value of cultural as well as biological diversity in an ever more homogeneous and threatened world.

II. MECHANISMS OF APPROPRIATION: WHAT COUNTS AS VALUABLE KNOWLEDGE?

Perhaps the most prevalent and insidious form of appropriation of indigenous knowledge and resources has been the construction of conceptual and legal categories of valuable knowledge and resources that systematically exclude the knowledge and resources of local communities, farmers, and indigenous peoples. This construction of exclusion takes several forms. First, Western science characterizes certain natural materials that indigenous and local communities have cared for, preserved, improved, and developed as mere "wild" species or, at the most, as "primitive species" (commonly known as "landraces.)" Formal, scientific systems of innovation and research have therefore, at least until recently, denigrated and denied the value of indigenous and subsistence farmers' informal systems of knowledge-transmission and innovation.[59] Second, while the products of formal knowledge systems have been protected as "property," those of informal, traditional systems have been tagged the freely available "common heritage of humanity." In particular, patentability under current intellectual property law is systematically biased against the innovations and knowledge of indigenous and farmers'

---

59 TENN. L. REV. 735, 746–48 (1992); *see also* WORLD RESOURCES INSTITUTE ET AL., GLOBAL BIODIVERSITY STRATEGY: GUIDELINES FOR ACTION TO SAVE, STUDY, AND USE EARTH'S BIOTIC WEALTH SUSTAINABLY AND EQUITABLY 79–96 (1992).

56. *See generally* Jon H. Goldstein, *The Prospects for Using Market Incentives to Conserve Biological Diversity*, 21 ENVT'L. L. 985 (1991).

57. *See generally* S.A. THORPE, SHAMANS, MEDICINE MEN AND TRADITIONAL HEALERS (1993).

58. These contributions include a detailed and sophisticated knowledge of local ecosystems, traditional practices which often prove to be the most sustainable form of resource use, forms of community organization which promote sustainability as well as values of affiliation with a particular place, a concern for future generations, and a commitment to the collective good which Western society has not been able to emulate, let alone surpass. Breckenridge, *supra* note 55, at 746–48.

59. Conserving Indigenous Knowledge, *supra* note 21, at 1.

communities. Finally, the products of indigenous and local communities' knowledge have been detached from their ecological and sociocultural base through removal and preservation in Northern-dominated *ex situ* collections and projects, while the knowledge underlying the products attains merely anthropological interest. Thus Western science and industry treat the living knowledge of existing indigenous and local communities as "quaint," "quackery," or "quits."[60]

In the subsequent discussion, I shall refer both to the *knowledge* of plant, animal, and soil uses — in other words, preparations and applications held by indigenous and traditional communities — and to the *material resources*, like plant varieties, connected to this knowledge. While the law generally distinguishes between tangible and intangible property, here the two are so closely interlinked that the distinction is unhelpful. The tangible resources at issue are commercially valuable mostly because of their intangible genetic information, and the purpose of appropriation is to gain access to this information so that it can then be synthesized in a laboratory.

More importantly, to a large extent these tangible resources exist in their current form thanks to the applied knowledge of indigenous and local communities, a knowledge uniquely gained from conserving and often improving resources for specific purposes.[61] For these communities, the differences between intellectual, cultural, and material property are artificial.[62] All are part of the communities' heritage:

> "Heritage" is everything that belongs to the distinct identity of a people and which is theirs to share, if they wish, with other peoples. It includes all of those things which international law regards as the creative production of human thought and craftsmanship, such as

---

60. *Id.* Even the designation of Northern and Southern innovation, respectively, as "formal" and "informal" reflect the biases of Western science. Until scholars discover better terminology, I will use the conventional terms that frame this debate over appropriation.

61. Indigenous and local resources could easily be considered part of the cultural property of these groups, intimately connected to their definition and survival. Cultural property is understood here as those objects of historical, archeological, artistic, or ethnographic interest that are bound up in a peoples' identity, history, and future sense of self. *See generally*, James A.R. Nafziger, *Protection of Cultural Property*, 17 CAL. W. INT'L L.J. 283 (1987); Peter H. Welsh, *Repatriation and Cultural Preservation: Potent Objects, Potent Pasts*, 25 MICH. J.L. REFORM 837 (1992).

62. The Indigenous Peoples' Biodiversity Network, in a statement to the Conference of Parties of the Convention on Biological Diversity, explained that "[f]or us biodiversity and indigenous knowledge are inseparable. They are a collective, inalienable, and integral part of our cultures, in all ways: at the spiritual, cultural, intellectual, territorial, scientific and economic levels." Indigenous Peoples' Statement on Access and IPRs, Second Conference of the Parties to the Convention of Biological Diversity, Dec. 10, 1995, *reprinted in* SEEDLING Dec. 1995, at 13.

> songs, stories, scientific knowledge and artworks. It also includes inheritances from the past and from nature, such as human remains, the natural features of the landscape, and naturally-occurring species of plants and animals with which a people has long been connected.[63]

Furthermore, for indigenous communities, their heritage does not consist of mere economic rights over things but of a bundle of relationships with the animals, plants, and places involved.[64] One of the main mechanisms of appropriation has been precisely the separation of what is considered knowledge from what is considered a physical resource. Ending appropriation requires viewing them together.

A. *Wildness, Landraces, and the Construction of Agricultural Value*

Indigenous and local farming communities have contributed significantly to the quality and diversity of the germplasm that forms the basis of Western crop production.[65] Genes for fifteen major crops that first grew in the fields of developing countries now contribute more than $50,000,000 in annual sales in the United States alone.[66] Community-based innovation systems develop and maintain this crucial genetic diversity because indigenous farmers breed varieties suited to their specific local needs and microenvironments.

Western science has been largely unable to recognize or value the role of indigenous and local farming communities because the innovators themselves have been invisible, the forms of transmission of knowledge incomprehensible, and the purpose of the work has differed from that of much formal science. Thus the indigenous farmer's work of testing, comparing, and breeding "folk" varieties of seed is usually not recognized as "plant breeding" by Western researchers.[67] Performed in fields over the centuries rather than in laboratories over a few years, the indigenous

---

63. Erica-Irene Daes, *Study on the Protection of the Cultural and Intellectual Property of Indigenous Peoples*, U.N. ESCOR, 45th Sess., Agenda Item 14, at para. 24, U.N. Doc. E/CN.4/Sub.2/1993/28 (1993).

64. *Id.* at para. 26.

65. *See* FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, HARVESTING NATURE'S DIVERSITY 8 (1993) [hereinafter HARVESTING DIVERSITY].

66. Conserving Indigenous Knowledge, *supra* note 21, at 19.

67. RAFI cites several examples of informal innovation, including Kayapo women in Brazil who preserve representative crop samples in hillside "gene banks," the Mende farmers of Sierra Leone who conduct field trials testing new seeds against different soil types and then compare notes, and Ethiopian farmers who document the performance of different varieties on doorposts. *Hungoo, Arrogance and the 'Gene' Revolution*, *supra* note 34, at 2.

farmer's plant breeding is necessarily highly specific to the local environment.[68] That the resulting farmers' varieties or landraces are known as "primitive" is perhaps the clearest expression of the cultural biases inherent in the distinctions of Western science.[69]

Western researchers often fail to appreciate innovative indigenous farming practices because the innovators or "plant breeders" are peasant women. Women in many parts of the world play key roles in seed selection, vegetative propagation, and livestock management — all central to preserving and fomenting diversity.[70] Often, their work of breeding and management takes place in kitchen gardens for domestic consumption rather than in outlying fields worked for income.[71] This work may or may not be recognized within the local communities, where women often lack visibility and power, but it is clearly unrecognized by Western-style farmers, extension agents, and researchers visiting from afar.[72]

Western researchers also fail to recognize the role of indigenous and traditional farmers in plant breeding and selection because the farmers share their knowledge in ways incomprehensible to Western science. Indigenous and traditional peoples transmit much knowledge about the qualities and uses of plants, animals, and microorganisms orally, often through stories and songs. Descriptions of uses of plants, animals, or soils for medicinal purposes may also be dismissed because the corresponding maladies or diseases are described in ways that integrate the physical,

---

68. Farmers' varieties or landraces

> are the outcome of a continuous and dynamic development process. They are not stable products which have existed for time immemorial or which have remained static after coming into being . . . [but reflect] adaptation to local agro-ecological production conditions, local sub-optimal production conditions, and to the specific production preferences of different socio-economic, gender and ethnic groupings within farming communities.

Kojo Amanor et al., *Introduction* to CULTIVATING KNOWLEDGE: GENETIC DIVERSITY, FARMER EXPERIMENTATION AND CROP RESEARCH 1, 2 (Walter de Boef et al. eds., 1993) [hereinafter Cultivating Knowledge].

See generally JOINING FARMERS' EXPERIMENTS: EXPERIENCES IN PARTICIPATORY TECHNOLOGY DEVELOPMENT (Bertus Haverkort et al. eds., 1991) and CULTIVATING KNOWLEDGE, *supra*, for numerous examples of the plant breeding experimentation performed by, and in, traditional and local rural communities.

69. *See* SEEDS AND SOVEREIGNTY, *supra* note 47, at 7–8.

70. HARVESTING DIVERSITY, *supra* note 65, at 6 ("Women produce an estimated 80 percent of food in Africa, 60 percent in Asia and the Pacific and 40 percent in Latin America.").

71. *Id.*

72. *Id.*; *see also* Consuelo Quiroz, *Biodiversity, Indigenous Knowledge, Gender and Intellectual Property Rights*, 2 INDIGENOUS KNOWLEDGE & DEV. MONITOR 12 (1994); Maria Fernandez, *Gender and Indigenous Knowledge*, 2 INDIGENOUS KNOWLEDGE & DEV. MONITOR 6 (1994).

mental, and spiritual and so are alien to Western researchers.[73] Such knowledge is easily dismissed as folklore, superstition, old wives' tales, or the quaint remnants of dying cultures. Similarly, questions asked by Western researchers may elicit confusing or meaningless responses because they do not correspond to the classifications of phenomena used by the indigenous or local people. Such responses are therefore discounted and the respondents classified as backwards and ignorant.[74]

Moreover, Western researchers may also overlook traditional farmers' role in plant breeding and selection because many of the useful genetic characteristics of plants are found not in "domesticated" varieties but in those related varieties that are not cultivated.[75] Western researchers label these species, which can be found in the environs of indigenous and traditional farming communities, wild or semi-wild.[76] Western researchers consider these species to have ended up in underdeveloped areas by luck or natural bounty. Yet it is now becoming clear that almost all the different types of species to be found in and around traditional rural communities have been nurtured or developed by local people.[77] Far from being "wild," these partner or "associated" species are often an integrated part of farming or forest/farming systems.[78]

---

73. *See, e.g.*, Linda Green, *Fear as a Way of Life*, 9 CULTURAL ANTHROPOLOGY 227, 247 (1994) (for example, ailments are described as *susto* (fright) or *penas* (grief) in Guatemalan *altiplano* communities). RAFI describes the use of a serpent-wood species in India over the centuries to treat a variety of maladies including hypertension; pharmaceutical companies recently "discovered" the root and it now serves as the basis of a widely used hypertension drug. Conserving Indigenous Knowledge, *supra* note 21, at 22; *see also* Micheal J. Huft, Comment, *Indigenous Peoples and Drug Discovery Research: A Question of Intellectual Property Rights*, 89 NW. U. L. REV. 1678, 1698 (1995) (noting that traditional cultures may interpret various symptoms of malaria as separate diseases), *citing* Nina L. Etkin & Paul J. Ross, *Recasting Malaria, Medicine and Meals: A Perspective on Disease Adaptation*, *in* THE ANTHROPOLOGY OF MEDICINE 230, 235 (Lola Ramanucci-Ross et al. eds., 2d ed. 1991). Appropriation in this case can occur because traditional Indian healers had no category corresponding exactly to the Western concept of hypertension — indeed, a separate disease known as hypertension may not have existed in those communities.

74. Glynn Custred and Deborah Fink have discussed these problems in their works on language and measurement categories among traditional peoples. *See* Glynn Custred, *Ethnosemantic Analysis As a Tool in The Designing and the Realization of Population and Agricultural Censuses*, *in* INDIGENOUS KNOWLEDGE SYSTEMS AND DEVELOPMENT, *supra* note 52, at 233; Deborah Ruth Fink, *The Bono Concept of Measure: An Essential Factor in Formal and Nonformal Educational Programs*, *in* INDIGENOUS KNOWLEDGE SYSTEMS AND DEVELOPMENT, *supra* note 52, at 245.

75. THE CRUCIBLE GROUP, PEOPLE, PLANTS AND PATENTS: THE IMPACT OF INTELLECTUAL PROPERTY ON BIODIVERSITY, CONVERSATION, TRADE AND RURAL SOCIETY 44–45 (1994).

76. *See id.*

77. *Id.* at 44.

78. *Id.* Partner or "associated" species have played a key role in maintaining food production and improving resistance to diseases. HARVESTING DIVERSITY, *supra* note 65, at 9. For example, a kind of rice grown by traditional farmers near Gonda in Utter Pradesh, India,

Many indigenous and local communities draw a significant share of their resources from these partner species and make little distinction between wild and cultivated foods.[79] Similarly, many indigenous and traditional communities have conserved and protected wild plants known to have medicinal qualities without formally cultivating them. These communities also recognized the value of other wild plants and microorganisms and protected them indirectly, through preservation and improvement of the local ecosystems of which they form a part.[80] Yet, because these plants are not cultivated in ways that are obvious to visiting Western researchers, they are deemed to exist independently of human intervention. As such, they are free for the taking.

The plant breeding and selection undertaken by indigenous and traditional farmers also escapes notice because it is not necessarily aimed at producing the highest possible yield for sale. Rather, these farmers, who produce at least in part for their own consumption, may choose lower-yielding varieties for traits including hardiness, flavor, and diversity (as an insurance strategy) or even for religious associations.[81] Western researchers dismiss these varieties as nonproductive, low-yielding cultivars that evidence the farmers' lack of initiative and ability. In addition, these varieties have adapted to particular ecological conditions and socio-ecological practices which cannot be easily replicated. Studies show that traditional farmers aim to increase the diversity of their crop base, encouraging diversity both within each crop and in the mixture of food, forage, medicinal, shelter-related, and other useful plants grown, in order to achieve "maximum complementarity and synergy between different crops, animals, and people."[82]

---

provided the single gene that gave resistance to a grassy-stunt virus which decimated Asian rice fields during the 1970s. *Id.* Partner and associated species can also serve to supplement diets, especially in times of scarcity or famine, and may eventually provide keys to new food sources. *Id.*

79. The Chacoba of Bolivia, for example, use approximately "one-fifth to one-half of all woody species for food and up to one-third for medicinal purposes." THE CRUCIBLE GROUP, *supra* note 75, at 45. In western Kenya, people rely on wild species in gardens and forests for up to one-half of their nutritional needs. *Id.*

80. *See* Michel Pimbert, *The Making of Agricultural Biodiversity in Europe*, *in* REBUILDING COMMUNITIES: EXPERIENCES AND EXPERIMENTS IN EUROPE, 59, 59–61 (Vithal Rajan ed., 1993) [hereinafter REBUILDING COMMUNITIES].

81. *See* Bertus Haverkort & David Millar, *Constructing Diversity: the Active Role of Rural People in Maintaining and Enhancing Biodiversity*, 2 ETNOECOLOGICA 51 (1994). Ecological and genetic diversity provides small farmers some security against pests, diseases, and climactic changes, even at the cost of lower yields. *See id.* at 55; *see also* THE KEYSTONE CENTER FINAL CONSENSUS REPORT: GLOBAL INITIATIVE FOR THE SECURITY AND SUSTAINABLE USE OF PLANT GENETIC RESOURCES, OSLO PLENARY SESSION 4–5 (1991).

82. Haverkort & Millar, *supra* note 81, at 53.

Commercial breeders, in contrast, seek both uniformity and applicability to a wide variety of conditions; maximum yield is generally the criterion of success.[83] Thus commercial breeders relegate what has little commercial applicability to the category of landrace, worthwhile only in its potential for future incorporation into genetically engineered varieties which can then be sold at market rates to a wide variety of farmers.[84] That indigenous and traditional communities might innovate for a different purpose is rarely recognized.

B. *Nonrecognition of Informal Innovation Systems*

Much of the recent debate about appropriation of the scientific and technical knowledge of indigenous and local peoples has centered on the role of intellectual property rights in recognizing formal, but not informal, innovation. Such rights, generally expressed through patents, have historically served to provide financial rewards to those appropriating indigenous knowledge and its products, while denying such rewards to the communities whose knowledge is appropriated. Proposals for using or modifying patent law to accommodate possible claims by these communities will be dealt with in Part III: here I merely wish to summarize the inherent cultural biases of the Western tradition of intellectual property protection. I will often use U.S. law as an example because until recently intellectual property has largely been a creature of national law and because, with a few exceptions, the provisions I discuss are common to Western legal systems.[85]

The aim of the patent system is to encourage innovation by providing an inventor with a time-limited monopoly over her invention. In exchange, she must fully and publicly describe it and thereby make it available to others.[86] Patents may be granted for products or processes.

---

83. *See* FOWLER & MOONEY, *supra* note 46, at 54–63 (describing history of the development of modern, commercial agriculture and its dependence on uniform plant varieties).

84. *See id.* at 60–61.

85. Michael D. Davis presents a concise outline of U.S. patent law in Michael D. Davis, *The Patenting of Products of Nature*, 21 RUTGERS COMPUTER & TECH. L. J. 293, 302–305 (1995). The Paris Convention established the basic requirements for patentability. Paris Convention for the Protection of Industrial Property, March 20, 1883, as last revised in Stockholm, July 14, 1967, 21 U.S.T. 1583, 828 U.N.T.S. 305 [hereinafter the Paris Convention].

86. As patent protection has expanded to cover new categories including drugs, living matter, and plant and animal varieties, debate as to whether the system actually does encourage innovation has grown. *See generally* THE CRUCIBLE GROUP, *supra* note 75, at 55–59 (weighing the view that patents serve interests of the large and powerful, deter innovation, and reward those with the largest legal staffs versus the view that patents are necessary to protect small, fledgling inventors from predatory business practices and to encourage companies to invest in research). This debate is beyond the scope of this article.

They are generally granted on a national level, and each State may usually decide what to exclude from patenting. Under the recently revised General Agreement on Tariffs and Trade (GATT 1994), however, all members of the World Trade Organization (WTO) must provide "effective" protection of intellectual property rights, including those in living matter.[87]

The following provisions of national and international laws governing patentability systematically exclude indigenous and local communities' knowledge from intellectual property protections.

1. Novelty or Newness

Patentable inventions must be novel or new.[88] U.S. law accordingly states that a patent cannot be issued if the invention was known or used by others in the United States, if the invention was described by others in a printed publication, or if the putative patent-holder did not himself invent the subject matter sought to be patented.[89] Thus patents reward the kind of individual, secretive effort epitomized by the lone scientist in his basement laboratory. TRIPS, which recognizes intellectual property rights only as private rights, further reinforces the individual basis of patent law.[90] Rights belonging to the public, or a sector of it, do not fit easily within this conception of a patentable invention.

Most indigenous and local knowledge, however, is collective and is passed down from generation to generation. It builds on prior knowledge in an organic, accretive way that makes it difficult to single out a certain individual inventor or inventive origin in time. In those cases where it is not widely held, as in the case of medicinal knowledge held by shamans,

---

87. GATT's Trade-Related Intellectual Property (TRIPS) provisions mandate patent protection for microorganisms (viruses and fungi, for instance), similar to that now provided in Northern countries. Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, art. 27.3(b), LEGAL INSTRUMENTS — RESULTS OF THE URUGUAY ROUND vol. 31; 33 I.L.M. 81 (1994) [hereinafter TRIPS]. Plants and animals, however, need not be patented under TRIPs, nor must diagnostic, therapeutic, and surgical methods of treatment. *Id.* However, plants must be covered by either patents or an effective *sui generis* system. *Id.*

The European Patent Convention, in contrast, prohibits the patenting of plant and animal varieties. Convention on the Grant of European Patents, Oct. 5, 1973, 13 I.L.M. 270 [hereinafter European Patent Convention]. The European Patent Convention does not, however, make any mention of genetically engineered plants or animals as opposed to plant and animal varieties. *Id.*

88. *See* 35 U.S.C. § 102 (1994); TRIPS, *supra* note 87, art. 27.1.

89. 35 U.S.C. § 102 (1994).

90. TRIPS, *supra* note 87, pmbl; *see* Vandana Shiva, *Farmers' Rights and the Convention on Biological Diversity, in* BIODIPLOMACY: GENETIC RESOURCES AND INTERNATIONAL RELATIONS 107, 115 (Vicente Sanchez & Calestous Juma eds., 1994) [hereinafter BIODIPLOMACY].

the accretion and transmission of knowledge from generation to generation would invalidate it on novelty grounds.

The novelty requirement means that inventors must seek a patent at the earliest possible moment; if they do not, they cannot later "catch up." Those whose inventions are now known cannot retroactively apply for patent protection. Indigenous and traditional communities that had no practical opportunity to participate in the development of world intellectual property systems and that are only now beginning to debate and to demand a place in those systems, albeit with much disagreement about that place, are frozen out.

2. Nonobviousness or the Inventive Step

The TRIPS agreement requires that patentable items "involve an inventive step,"[91] while U.S. law expresses the same requirement through the term, nonobvious.[92] The test to determine if an invention is obvious is whether a person skilled in the field would, with all of the prior art available, see the invention as obvious.[93] If the inventor merely examines all prior knowledge and follows the next logical step to solve a problem, then she has not overcome the nonobviousness requirement.[94] In cases dealing with chemical compounds, when the prior art suggests that a compound might display certain properties, applicants for a patent must rebut a presumption of obviousness.[95] One method is to show that the compound displays "unexpectedly improved properties."[96] Since plant-based genetic materials are simply biochemical compounds, the purification or isolation of the genetic material must be accompanied by proof that the transformed product demonstrates "unexpected properties."[97] Clearly, proving the "unexpected properties" of many indigenous and informal innovations would be tremendously difficult; the prior knowledge of a plant's medicinal effects, for instance, would categorize any unprocessed, indigenous use of the plant as obvious. Indigenous and local communities, moreover, possess neither the means nor any inherent reason to "improve" compounds in order to satisfy the nonobviousness requirement.

---

91. TRIPS, *supra* note 87, art. 27.1.

92. 35 U.S.C. § 103 (1994).

93. *See* Graham v. John Deere Co., 383 U.S. 1 (1966).

94. *See id.*

95. *See In re* Dillon, 919 F.2d 688 (Fed. Cir. 1990).

96. 919 F.2d at 692. While this is not the only method, the burden is on the applicant to show nonobviousness. *Id.*

97. *Ex parte* Gray, 10 U.S.P.Q.2d (BNA) 1922, 1924 (Bd. Pat. App. & Int. 1989).

3. Subject Matter

In addition to the novelty and nonobviousness requirements, U.S. law imposes a subject matter requirement that is interpreted to mean that the "products of nature" cannot be patented.[98] The substance of a patent may not be the discovery of some natural phenomenon. Thus medicinal plants in their natural state, or even diluted or otherwise processed, are not patentable. However, if a Western scientist isolates the plant's active substance in a way that does not occur in nature, it becomes patentable.[99] The knowledge gained outside a chemical laboratory is therefore downgraded to a substance "which nature has intended to be equally for the use of all men,"[100] even though there may be no reason for indigenous peoples to isolate or extract the exact chemical compounds which give a substance its utility. Conversely, once a substance has been isolated in a chemically pure or non-naturally occurring state, it becomes patentable even though the knowledge of the substance's qualities may have been widely known in indigenous communities.[101] The inventiveness involved in isolating and identifying a specific gene and non-naturally occurring organism makes genetically engineered plants and animals patentable,[102] while that involved in selecting and preserving the same genetic qualities in the field merely potentiates further development.[103]

---

98. 35 U.S.C. § 101 (1994); Funk Bros. Seed Co. v. Kalo Inoculant Co., 333 U.S. 127 (1948). The difference between the novelty and nonobviousness requirements set forth in §§ 102–103 and the subject matter requirements stemming from § 101 are sometimes confusing. The Federal Circuit addresses this confusion and provides an explanation of the anatomy of the patent statute in *In re* Bergy, 596 F.2d 952, 959–964 (C.C.P.A. 1979).

99. Parke-Davis & Co. v. H.K. Mulford & Co. 189 F. 95, 103 (C.C.S.D.N.Y. 1911) ("[The purified substance] became for every practical purpose a new thing, commercially and therapeutically."), *aff'd in part and rev'd in part*, 196 F. 496 (2d Cir. 1912) (upholding the patentability of purified product); *see also* Merck & Co. v. Olin Mathieson Chem. Corp., 253 F.2d 156, 164 (4th Cir. 1958). For more detailed discussions, see Davis, *supra* note 85, at 320; Kadidal, *supra* note 10, at 238; and Lester I. Yano, Comment, *Protection of the Ethnobotanical Knowledge of Indigenous Peoples*, 41 UCLA L. REV. 443, 454 (1993).

100. *Ex parte* Latimer, 1889 Decs. Comm'r. Patents 123, 126.

101. *See* Davis, *supra* note 85, at 320 n.171; *see also* Kadidal, *supra* note 10. Kadidal frames the issue by examining the way in which pharmaceutical companies have evaded the "product of nature" doctrine through the use of "semi-synthetic" copycat methods. Kadidal then suggests several mechanisms within patent law to protect natural substances from such copying of genetic material. *Id.* at 243–257. Yet as another commentator observes: "[t]he issue is not whether to lower the threshold for patentability to include products of nature, but whether there is a need to reconceptualize the entire idea of 'inventiveness.'" Edgar J. Asebey & Jill D. Kempenaar, *Biodiversity Prospecting: Fulfilling the Mandate of the Biodiversity Convention*, 28 VAND. J. OF TRANSNAT'L L. 703, 711 (1995).

102. Diamond v. Chakrabarty, 447 U.S. 303, 309–10 (1980).

103. James O. Odek, *Bio-Piracy: Creating Proprietary Rights in Plant Genetic Resources*, 2 J. INTELL. PROP. L. 141, 153–56 (1994), criticizes developed countries' arguments that plant genetic resources are of unknown value until they have been evaluated and their traits identified, that they cannot be priced, and that collection of germplasm does not result in deprivation

The case of the neem seed is illustrative.[104] A seed itself would be a "product of nature," and the traditional method of scattering seeds as a pesticide would not be patentable since it was not "invented" by the applicant. Nonetheless, patents have been granted for a process of pretreating the neem bark which results in extracts with a greater degree of purity.[105] Patents have also been issued for the active ingredient in the seed, azadirachtin, and for insecticides derived from it.[106] The derivatives, because they are the product of a laboratory and are slightly modified versions of the original, are no longer considered "products of nature."[107] No recognition, or compensation, is due to the people who discovered the beneficial uses of the seed and nurtured it through the centuries.

4. Industrial Application

A fourth requirement according to TRIPS is that inventions must be "capable of industrial application."[108] Some commentators[109] argue that this requirement excludes anyone who produces and innovates outside the industrial (or agro-industrial) sector, although the assimilation of the phrase to the U.S. requirement of "useful"[110] may allow for broader interpretation. The underlying theory of TRIPS is that the inventor invents in order to sell the invention and obtain economic benefits; however, the less monetized the society, the less validity there is to this assumption. Indeed, the very name of TRIPS — Trade-Related Intellectual Property

---

to the source country because only a few seeds are taken. On this last point, Odek points out that the value of the whole lies in its genetic material, which is present even in minimal amounts of material. *Id.*

104. Singh Nijar, *supra* note 14, at 4.

105. *Id.*

106. *Id.*

107. Kadidal, *supra* note 10, at 239. Kadidal describes the manner in which pharmaceutical companies routinely evade the "product of nature" doctrine through duplicating a natural compound's chemical structure and then introducing slight modifications that create a "new" substance while retaining the beneficial effects of the original. *Id.*

108. TRIPS, *supra* note 87, art. 27.1.

109. *See* Shiva, *supra* note 90, at 107, 115.

110. *See* TRIPS, *supra* note 87, art. 27.1 n.1. Under U.S. Supreme Court precedent, the test of usefulness requires a present beneficial application, which probably does encompass inventions created for noncommercial purposes. *See* Brenner v. Manson, 383 U.S. 519, 533 (1966) (citing Note on the Patent Laws, 3 Wheat. App. 13, 24). *Brenner* discusses in detail, and provides a good overview of, the requirement of utility.

Recent patent applications on sequences of human DNA have caused great controversy. *See "Gene Boutiques" Stake Claim to Human Genome*, RAFI COMMUNIQUE (Rural Advancement Found. Int'l, Ottowa, Ont.), May–June 1994, at 2–3. Although the first applications filed by the NIH were eventually rejected because researchers had no idea what possible usefulness the sequences might have, private companies have continued to file such "driftnet" patent applications despite the "usefulness" rule. *Id.* at 3.

rights — indicates its application to goods potentially involved in international trade, excluding those created for local or national consumption. To the extent that patent systems privilege the protection of commodities, they reflect a limited, Western view of the purposes of intellectual inquiry and knowledge-seeking, one which attributes a profit motive to peoples who may conduct their scientific inquiry for different reasons.

5. Reproducibility

Patent law also requires that the inventor describe the product or process so that others skilled in the industry can reproduce it.[111] In the case of biological materials not easily described in words, patent applicants may deposit a sample of the biological material with a recognized depository.[112] Again, this requirement works against the more site-specific, less stable, and less uniform products of the informal innovation system. By their nature, many inventions of indigenous and traditional communities can be reproduced only in the specific ecological, social, and cultural conditions that gave rise to them. For example, the greater genetic variability of farmers' seeds may mean that they will produce the desired traits only under a certain combination of soils, rainfall, nearby crops, or cultivation practices particular to a place or culture, and that even then they may be less reliable than high-tech hybrid varieties. This characteristic of variability does not make them any less innovative than laboratory creations aimed at wider applicability. Yet to the extent that it becomes more difficult for Western scientists to reproduce the desired traits of indigenous inventions because of the complex combinations of necessary ecological, social, and cultural conditions, the utility of the patent system for such inventions is reduced.

6. Plant Breeders' Rights

Additional criteria apply to the protection of plant genetic resources under intellectual property laws. Under TRIPS, these resources need not be patented, but must be protected "either by patents or by an effective *sui generis* system or by any combination thereof."[113] The most well-

---

111. 35 U.S.C. § 112 (1994).

112. *See In re* Wands, 858 F.2d 731, 735 (Fed. Cir. 1988).

113. TRIPS, *supra* note 87, art. 27.3(b) reads: "Members may exclude from patentability . . . plants and animals other than microorganisms, and essentially biological processes for the production of plants or animals other than non-biological and micro-biological processes. However, Members shall provide for the protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof."

known existing *sui generis* system for plants is the Union for the Protection of Plant Varieties (UPOV).[114] UPOV sets minimum plant breeders' standards and mandates plant breeders' rights for both the discovery and breeding of new species. Protection for plant breeders under UPOV differs from protection under a patent system in two important respects: first, plant breeder rights allow the free use of a protected variety in order to breed and commercialize other new varieties; and, secondly, those systems have historically allowed farmers to save their own seed for the next production cycle without paying royalties.[115] Over time, UPOV has been amended to provide greater protection for breeders and less for farmers.[116] For example, farmers' rights to save seed are no longer guaranteed, rights can be granted for discovery and breeding of new varieties, and breeders' rights to compensation now extend to "essentially derived varieties" which themselves came from protected varieties.[117] All of these changes favor large research and agribusiness concerns over farmers, especially in the traditional farming communities where seed saving and sharing is a way of life.

As with patents, traditional farmers find it difficult to obtain protection for their own innovative breeding work under UPOV. To gain UPOV protection, a plant variety must be: distinguishable from other varieties through "precise recognition and description"; uniform or "sufficiently homogeneous"; and "stable in its essential characteristics."[118] Uniformity and stability are traits usually sought by large agribusiness seed companies interested in selling seed for large-scale monoculture harvesting. Traditional farmers, in contrast, may be more interested in promoting adaptability to many different conditions and may therefore select seeds tailored to many different microenvironments.[119] Landraces may thus be less uniform and less stable

---

114. International Union for the Protection of New Varieties of Plants, Dec. 2, 1961, 33 U.S.T. 2703, 815 U.N.T.S. 89 [hereinafter UPOV]. Almost all developed States and almost no developing ones are parties. *UPOV: Getting a Free TRIPs Ride?*, SEEDLING, June 1996, at 23, 24. UPOV has two versions: a more "farmer-friendly" 1978 version and a more restrictive 1991 version. THE CRUCIBLE GROUP, *supra* note 75, at 63.

115. John H. Barton & Eric Christensen, *Diversity Compensation Systems: Ways to Compensate Developing Nations for Providing Genetic Materials*, *in* SEEDS AND SOVEREIGNTY, *supra* note 47, at 338, 340.

116. Carlos M. Correa, *Biological Resources and Intellectual Property Rights*, 14 EUR. INTELL. PROP. REV. 154, 155–56 (1992).

117. *Id.*

118. UPOV, *supra* note 114, art. 4.

119. *See supra* Part II.A.

than commercial varieties.[120] As a result, UPOV twice disadvantages traditional farmers by making it difficult for them to use the protected varieties of others and by making it difficult for them to use UPOV to protect their own innovations. While the requirements admittedly have a technical rationale,[121] they also reflect a bias in favor of large-scale commercial agriculture.

C. *Ex Situ Conservation and the "Common Heritage"*

Intellectual property laws appropriate indigenous and local scientific knowledge by denying it legitimacy as a protectable interest, thereby allowing others to use it freely. The products of this knowledge are also subject to appropriation. The fruits of indigenous and local knowledge are tagged the "common heritage of humanity," rather than the evolving product of defined living communities. While such "common heritage" resources can be freely collected, those same resources, brought into mostly Northern-controlled seed banks, gene banks, and laboratories, can be "improved" and then given or sold to private interests which treat the results as private property.

Of course, a great uncompensated removal and transport of plants from one area to another commenced with Western exploration. The world's great botanical gardens, Italian cuisine, and Irish potatoes, among others, are products of the plant resource movements that accompanied the colonizations of the sixteenth through nineteenth centuries. The unrestricted movement of plant genetic resources has improved diets and increased sources of food and useful materials throughout the world; toward these ends, farming communities often exchange seeds with other communities.[122] The problem is not with the free use and exchange of resources per se, but with the designation of only some resources as "common."

The fight over the status of plant genetic resources illustrates the selective use of the "common heritage" principle. Under the auspices of the United Nations' Food and Agriculture Organization (FAO), States negotiated a nonbinding International Undertaking on Plant Genetic

120. *Id.*

121. The UPOV requirements clearly attempt to address the need for adequate definition and reproducibility of a new variety. *See* UPOV, *supra* note 114, at art. 4.

122. *See, e.g.*, Mario E. Tapia & Alcides Rosas, *Seed Fairs in the Andes: A Strategy for Local Conservation of Plant Genetic Resources*, *in* CULTIVATING KNOWLEDGE, *supra* note 68, at 111.

Resources (Undertaking) in 1983.[123] The original version of the Undertaking, supported by gene-rich Southern countries, declared that *all* plant germplasm, both raw and elite breeders' lines, was equally part of the "common heritage of mankind" and therefore available to all.[124] The original version of the Undertaking thus represented an attempt by Southern countries to place laboratory-bred varieties on the same legal plane as their own undeveloped plant genetic resources.

Predictably, most Northern countries rejected this version of the Undertaking.[125] By 1989, arguing that the text conflicted with UPOV,[126] FAO members had effectively added protection for breeders' rights.[127] By 1991, amendments to the Undertaking had practically abandoned the "common heritage" principle for improved varieties, while retaining it for farmers' varieties.[128] The inequality inherent in this use of the "common heritage" principle led to its rejection in the 1992 Convention on Biological Diversity, which affirmed sovereign State rights over genetic and other biological resources.[129]

---

123. *International Undertaking on Plant Genetic Resources*, FAO Resolution 8/83, *in* REPORT OF THE CONFERENCE OF FAO, Food and Agriculture Organization of the United Nations, 22d Sess., ¶ 285, U.N. Doc 83/REP (1983) (adopting International Undertaking on Plant Genetic Resources).

124. *See* Margulies, *supra* note 45, at 322, 329–30; *International Undertaking on Plant Genetic Resources*, *supra* note 123, at (a). The "common heritage" principle has been used to describe areas where no one State has jurisdiction, areas such as the moon or the high seas. *Id.* at 330. Developing countries have recently objected strenuously to extending the concept to resources, like forests or genetic diversity, that exist within the sovereign territory of States. *See, e.g.*, discussion of Convention on Biological Diversity, *infra* notes 153–59 and accompanying text.

125. *See* Jack R. Kloppenburg, Jr. & Daniel Lee Kleiman, *Seeds of Controversy: National Property versus Common Heritage*, *in* SEEDS AND SOVEREIGNTY: THE USE AND CONTROL OF PLANT GENETIC RESOURCES, *supra* note 47, at 173, 173–74. Eight States, including the United States and several Western European countries, registered their rejection of the Undertaking. Margulies, *supra* note 45, at 329.

126. UPOV implicitly recognizes free access to the original varieties in article 6. *See* UPOV, *supra* note 114, art. 6. Breeders' rights accrue whether the initial variation from which the protected variety comes is artificial or natural. *Id.*; *see also* Odek, *supra* note 103, at 148.

127. HARVESTING DIVERSITY, *supra* note 65, at 11.

128. The amended Undertaking states that "the concept of mankind's heritage, as applied in the [Undertaking] is subject to the sovereignty of the states over their plant genetic resources." *Annex 3 to the International Undertaking on Plant Genetic Resources*, FAO Resolution 3/91, *in* REPORT OF THE CONFERENCE OF FAO, Food and Agriculture Organization of the United Nations, 26th Sess., ¶ 104, U.N. Doc 91/REP (1991). In exchange for recognition of plant breeders' rights, developed States agreed to the concept of "farmers' rights" arising from farmers' contributions to the conservation and improvement of plant genetic resources. *See infra* notes 163–70 and accompanying text for discussion of the implementation of farmers' rights.

129. *See* Convention on Biological Diversity, *supra* note 48, art. 15. The Preamble affirms that "conservation of biological diversity is a common concern of humankind," but the sovereign rights to negotiate access to such resources "on mutually agreed terms" makes clear that "common concern" is not the same as "common heritage." *Id.* pmbl. & art. 15.4.

The "common heritage" principle has long been applied to the collection and storage of plant germplasm in seed banks. Seed banks are giant iceboxes where seeds are stored under cold, dry conditions and periodically grown out.[130] Many national agricultural institutions maintain extensive seed collections; altogether, seed banks hold some 4.35 million crop accessions.[131] Sixteen International Agricultural Research Centres (IARCs) collect wild and crop germplasm, including varieties of wheat, corn, rice, potatoes, millet, sorghum, barley, and livestock.[132] The Consultative Group on International Agricultural Research (CGIAR), an informal grouping of mostly Northern donor governments, universities, research centers, and individuals, manages the IARCs.[133]

Seed banks and gene banks collect Southern germplasm and distribute it to gene-poor Northern countries; thus a large proportion of commercially used genetic material moves to the Northern countries via the IARCs. Studies estimate, for example, that twenty-one percent of the U.S. wheat crop was derived from material stored at the International Maize and Wheat Improvement Center, the IARC for wheat.[134] Seed companies depend on this germplasm to sustain their genetically engineered and hybrid varieties.

Furthermore, the IARCs have sometimes donated raw materials that are subsequently incorporated into protected varieties by multinational seed companies, even though the IARCs' stated purpose is to protect and develop plant genetic resources for all of humanity.[135] Again, the

---

130. HARVESTING DIVERSITY, *supra* note 65, at 20.

131. *In-Situ, Ex-Situ: Forgetting the Farmers?*, *GRAIN Biobriefing* (Genetic Resources Action International, Barcelona, Spain), June 1994, at 2. For an earlier estimate of 2.5 million samples, see DONALD L. PLUNCKETT ET AL., GENE BANKS AND THE WORLD'S FOOD 110 (1987).

132. For a full description, see FOWLER & MOONEY, *supra* note 46, at 130.

133. For many years, the legal status of the CGIAR Centers was uncertain. CGIAR is headquartered in the World Bank, but it was unclear whether the resources in CGIAR centers belonged to the host countries, the countries where the germplasm was collected, or the researchers. *Id.* at 182.

After considerable debate, CGIAR recently agreed to turn the collections over to the FAO to be held in trust for the international community. *Revision of the International Undertaking on Plant Genetic Resources, Analysis of Some Technical, Economic and Legal Aspects for Consideration in Stage II: Access to Plant Genetic Resources and Farmers' Rights*, Commission on Plant Genetic Resources, 6th Sess., FAO Doc. CPGR-6/95/8 Supp. (June 19–30, 1995).

134. Pat R. Mooney, *Exploiting Local Knowledge: International Policy Implications*, *in* CULTIVATING KNOWLEDGE, *supra* note 68, at 175.

135. *Declaring the Benefits: The North's Annual Profit for International Agricultural Research Is in the Range of $4–5 Billion*, OCCASIONAL PAPER SERIES (Rural Advancement Found. Int'l, Ottawa, Ont.), Oct. 1994, at 1–2. For example, a Pepsico subsidiary, Frito-Lay, screened genebank accessions at the International Potato Centre (CIP) in Peru and is now

germplasm in the banks is free, considered "common heritage," but the products engineered in laboratories on the basis of this germplasm are protected and must be bought. As a result, farmers from the areas where the germplasm was originally protected and selected may end up "paying for the end product of their own genius."[136]

The storage of genetic materials in *ex situ* collections, moreover, makes them practically inaccessible to indigenous and traditional communities. Most genetic materials collected in Southern countries — sixty-eight percent of all crop seed, eighty-five percent of all livestock breeds, and eighty-six percent of microbial culture collections — are held at the IARCs or in Northern countries.[137] Indeed, Northern governments hold by far the largest number of seed accessions.[138] In addition, almost half the accessions held are cereals, which are dominant in international trade, while tubers and roots, which are important for indigenous farmers, comprise only four percent of the accessions.[139]

While these accessions are theoretically available to researchers and farmers upon request, practical knowledge, distance, and cost obstacles mean that the material is inaccessible to informal innovators in indigenous and local farming communities.[140] Once stored, therefore, accessions become functionally extinct for indigenous and local communities. Nor is there any reason to think, moreover, that the improved breeding stock

---

developing proprietary varieties from the accessions screened. *The Benefits of Biodiversity: 100+ Examples of the Contribution by Indigenous and Rural Communities in the South to Development in the North*, OCCASIONAL PAPER SERIES (Rural Advancement Found. Int'l, Ottawa, Ont.), Mar. 1994 at 3. CIP has also provided germplasm for the development of patentable material to EscaGenetics of the United States and to Plant Genetic Systems of Belgium, although in the latter case the patent extends only to Northern countries. *Id.*

136. Mooney, *supra* note 134, at 178.

137. Conserving Indigenous Knowledge, *supra* note 21, at 15.

138. According to the FAO's 1996 Report on the State of the World's Plant Genetic Resources, the North holds 49.2% of all seed accessions, the South holds 41.2%, and CGIAR holds 9.6%. *Report on the State of the World's Plant Genetic Resources*, FAO Doc. CGRFA-EX2/96/2 (1996), *summarized in Ex Situ Conservation: When the Fridge Breaks Down*, SEEDLING, June 1996, at 5, 9. The numbers look less balanced when one considers the predominantly Southern origin of the accessions. *Id.* at 5.

139. *Id.*

140. The alienation of communities from the product of their own knowledge, moreover, continues in recent international treaties: the Convention on Biological Diversity, with extensive provisions concerning sovereign control over biological resources, does not affect the ownership, control, or use of seed banks, thereby leaving the status quo intact. *See generally* Convention on Biological Diversity, *supra* note 48. Article 15.3 excludes *ex situ* collections from the definition of those genetic resources to which States may control access. *Id.* art. 15.3. Resolution 3 of the Conference Adopting the Convention recognizes that this problem will have to be resolved as soon as possible. *The Interrelationship Between the Convention on Biological Diversity and the Promotion of Sustainable Agriculture*, Resolution 3 of Conference for the Adoption of the Agreed Text of the Convention on Biological Diversity, June 1992 *reprinted in* 31 I.L.M. 846.

produced from IARC research will make its way back to farming communities. According to one study, only fifteen percent of samples from research centers connected to the international system, which includes CGIAR and the IARCs, have gone to Southern nations.[141] Additionally, the Convention on Biological Diversity's exclusion of material currently held in seed banks from its provisions on State sovereignty may legitimize the ability of Northern governments and corporations to own and control the valuable germplasm they currently hold.[142]

While seed banks do contribute to the preservation of those genetic resources that cannot otherwise be saved, the current focus on *ex situ* collections has unfortunately established Northern formal scientific control over large genetic stocks and undervalued, even ignored, the role of living communities in the preservation of local biodiversity.[143] *Ex situ* collection strategies assume that living communities that have sustained and developed biological resources in the past are unable or unqualified to do so or are doomed to disappear. Thus these strategies attempt to safeguard as much as possible of the resources formerly under living communities' control without considering any active role for those communities in either conservation or development. As indigenous communities disappear, the response is not to attack the conditions that threaten such communities, but to create *ex situ* knowledge banks that will preserve their wisdom for future generations.[144] No doubt a role exists for such *ex situ* strategies, especially if designed and implemented with the participation of indigenous and local communities themselves. But such strategies can also underestimate the capacity of these communities to live and participate in current history and to use and develop their knowledge and traditions, rather than have them simply preserved in a mummified state.[145]

These limitations on the *ex situ* collection system are most explicit in the collection and attempted patenting of the human cell lines of indige-

---

141. FOWLER & MOONEY, *supra* note 46, at 189.

142. *See* discussion *supra* note 140; *see also* THE CRUCIBLE GROUP, *supra* note 75, at 32.

143. There are additional problems with *ex situ* collections. Besides the sheer number of strains to be stored, some seeds do not store well, others must be grown out frequently, and the storage technology is subject to electricity shortages or other disasters. Moreover, plant evolution cannot continue in seed banks. *See* June Starr & Kenneth C. Hardy, *Not by Seeds Alone: The Biodiversity Treaty and the Role for Native Agriculture*, 12 STAN. ENVTL. L.J. 85, 100 (1993).

144. *See, e.g.*, EDITH BROWN WEISS, *supra* note 1, at 270–78.

145. Many NGOs and associations of indigenous peoples have stressed the need to incorporate, and consult with, indigenous and traditional communities in on-farm or territorially-based conservation efforts. *See, e.g.*, WORLD RESOURCES INSTITUTE ET AL., *supra* note 55, at 79–86.

nous peoples themselves. The Human Genome Diversity Project (Diversity Project), an informal consortium of universities and scientists in Europe and North America, plans to collect samples of the DNA of some 700 indigenous communities.[146] The Diversity Project's purpose is to preserve the genetic map of disappearing ethnic groups because the peculiar genetic characteristics of such groups could someday prove invaluable to medicine. The underlying premise of the Diversity Project, therefore, is that these indigenous groups will *inevitably* disappear; they are accordingly referred to as "Isolates of Historic Interest" "that should be sampled before they disappear as integral units so that their role in human history can be preserved."[147] The Diversity Project aims to spend $23 to $35 million over a period of five years to collect blood samples to be stored at the American Type Culture Collection in Rockville, Maryland. Until recently, little effort had been made to consult with, or include, indigenous people in the design of the Diversity Project.[148] Yet under this type of project, the very being of indigenous peoples becomes part of the "common heritage," to be collected and stored outside their control.

III. ANSWERS TO APPROPRIATION

The last several years have witnessed a lively and complex debate on the mechanisms needed to reverse the appropriation of indigenous and local scientific and technical knowledge. As a result, there is general agreement that Northern countries should acknowledge the role of Southern countries and societies in preserving and enhancing such knowledge and the associated resources, but this consensus extends to little else. Pervasive throughout this debate is a difference in the scope of

---

146. Christine Toomey, *Gene Pirates Bleed Indians for Aids Cure*, TIMES OF LONDON, June 4, 1995, at 22 [hereinafter *Gene Pirates*].

147. *Patents, Indigenous Peoples, and Human Genetic Diversity*, RAFI COMMUNIQUE (Rural Advancement Found. Int'l, Ottawa, Ont.), May 1993, at 3, *citing* Draft Proceedings of the Second Human Genome Diversity Workshop, Oct. 29–31, 1991 (Pa. St. U., State College, Pa.).

148. Guaymi Indians protested that blood samples were taken from them under false pretenses. *Gene Pirates*, *supra* note 146. Researchers who patented the human "T-lymphotropic virus" of a member of the Hagahai tribe of Papua New Guinea insist that they discussed the possible patenting of the cell line and stated that half of any resulting royalties would be given to the tribe. Reginald Rhein, *Canadian Group Is 'Mouse that Roared' on Gene Patents*, BIOTECHNOLOGY NEWSWATCH, Dec. 4, 1995, at 1, 3. Nonetheless, at the November 1995 meeting of the Conference of Parties of the Biodiversity Convention, some South Pacific governments expressed concern over the patents. *Id.* In the wake of considerable controversy, the Human Diversity Genome Project researchers have begun talking to representatives of indigenous peoples' groups about their concerns. *Gene Pirates*, *supra* note 146. However, even if "informed consent" for research were to be granted, it is unclear what truly informed consent would mean in a vastly different cultural context and where the consent of entire groups and communities, not individuals, is at stake.

the goals pursued: some schemes stress compensation for past and future contributions while assuming unrestricted access, while other schemes focus on control over access and stress the right of communities, as well as States, to decide when and whether their knowledge and resources are to be used.

A second issue also permeates the debate: whether the rights to knowledge and resources should be vested in individuals, States, and/or communities. Vesting rights only in individuals, as described above in Part II, marginalizes the interests and contributions of indigenous and traditional communities. Vesting rights in the State alone as representative of its communities also has several drawbacks.[149] First, States have not generally been protective of the rights or interests of indigenous and traditional communities and have, in fact, often been among the primary forces facilitating their destruction. Second, there is little reason to conclude that resources obtained by the State on behalf of communities will actually be used for their benefit, as a history of misguided "development" projects demonstrates.[150] Third, State ownership of resources often results in a centralized bureaucracy that is inimical to both continuing innovation and appropriate preservation of natural resources.[151] Fourth, from a resource conservation perspective, resources are more likely to be effectively protected if local communities are invested and involved in their use and stewardship.[152] While there may be a role for the State as a mediating device or as a translator of rights into domestic law, this need not mean that the State is the exclusive holder of rights over the resource.

The final approach would posit international recognition of, and support for, a direct role for communities themselves as subjects as well as objects of the law. Several international instruments already recognize to some extent the special role of indigenous and local communities. For example, the Convention on Biological Diversity makes explicit the link between community resources and conservation. Its Preamble recognizes "the close and traditional dependence of many indigenous and local communities embodying traditional lifestyles on biological resources, and

---

149. Vesting rights in the State could take several forms: direct ownership of resources, residual ownership of only those resources or knowledge that cannot be clearly traced to particular communities or individuals, or a trust on behalf of groups or communities. While I believe a trust relationship is the most viable option, a trust without effective input and participation by beneficiaries would be simply another form of appropriation.

150. *See generally* BRUCE RICH, MORTGAGING THE EARTH (1994) (criticizing internationally financed development projects for exacerbating the gap between rich and poor, displacing millions, and wreaking ecological disaster).

151. *See* Odek, *supra* note 103, at 176.

152. *See* Fulai Sheng, *Integrating Economic Development with Conservation*, *in* REBUILDING COMMUNITIES, *supra* note 80, at 35–37.

the desirability of sharing equitably benefits arising from the use of traditional knowledge, innovations and practices relevant to the conservation of biological diversity and the sustainable use of its components."[153]

The Convention commits States to take measures, "as far as possible and as appropriate," to establish *in situ* conservation measures.[154] As part of that effort, each State party shall:

> Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices.[155]

This provision recognizes for the first time in a global treaty the special function of indigenous and local communities in the innovation and preservation of biological knowledge. It also commits other treaty parties to overseeing the relationship between States and the indigenous and local communities within their territory, although it leaves implementation squarely in the hands of national governments. The exact reach of the provision is presently unclear, and it admittedly leaves the extent and manner in which benefits are to be shared to the discretion of each State.

Indeed, the reference to national legislation and the lack of concrete obligations weaken the provision. Other Convention articles committing States to guaranteed access to genetic resources may reduce the ability of indigenous and local communities to control their knowledge and resources.[156] The Second Conference of the Parties of the Convention in November 1995 touched on the need to develop mechanisms to recognize the rights of indigenous and local communities separate from current intellectual property rights. Several delegates, especially those from developing countries, have been quite vocal about the need for incentives to be given to indigenous and local communities and for compensation to be given to farmers.[157] The implementation of article 8(j)

---

153. Convention on Biological Diversity, *supra* note 48, pmbl.

154. *Id.* art. 9.

155. *Id.* art. 8(j). Furthermore, the Convention commits States to "protect and encourage customary use of biological resources in accordance with traditional cultural practices . . ." *Id.* art.10(c). Articles 17.2 and 18.4 refer to indigenous and traditional knowledge and technologies. *Id.* art. 17.2, 18.4.

156. *See* discussion *infra* notes 180–82 and accompanying text.

157. *See, e.g.*, comments of India, Malaysia and others during the Second Conference of the Parties to the CBD, *as reported in Report of the Second Session, Protocol*, 9(17) EARTH

will be one of the central agenda points of the Third Conference of the Parties in 1996.[158]

Other declarations arising from the 1992 United Nations' Conference on Environment and Development also reference the need for indigenous and local community involvement in decisionmaking on environmental and resource issues. The Rio Declaration in Principle 22 reads:

> Indigenous people and their communities, and other local communities, have a vital role in environmental management and development because of their knowledge and traditional practices. States should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development.[159]

The Forest Principles statement also contains several similar statements, as does Agenda 21, the action plan arising from the 1992 Conference.[160]

The 1994 Convention on Desertification obligates signatory countries to promote awareness and encourage participation amongst local populations in the battle against drought and desertification and so acknowledges the value of drawing on their expertise.[161] The Convention also specifically provides for compensation to the members of local popula-

---

NEGOTIATIONS BULLETIN (visited Sept. 15, 1996) <http://www.mbnet.mb.ca/linkages/vol09/0917000e.html> at <http://www.mbnet.mb.ca/linkages/vol09/0917023e.html to /0917024e.html>. See also the excellent report by the Convention on Biological Diversity Secretariat: *Ownership Of, and Access to, Ex-Situ Genetic Resources, Farmers' Rights and Rights of Similar Groups*, May 3, 1994, U.N. Doc. UNEP/CBD/IC/2/13.

158. *See Consideration of Articles 6 and 8 of the Convention*, Final Conference Report of Second Meeting of the Conference of the Parties to the Convention on Biological Diversity, Decision II/7, Annex II, Nov. 30, 1995, U.N. Doc. UNEP/CBD/COP/2/19.

159. Rio Declaration on Environment and Development, June 14, 1992, Principle 22, 31 I.L.M. 874 (1992).

160. The *Non-Legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests (Forest Principles)*, U.N. Conference on Environmental Development, Provisional Agenda Item 9, at paras. 2(d) & 5(a), U.N. Doc. A/CONF.151/6 (1992) states that "[g]overnments should promote and provide opportunities for the participation of interested parties, including local communities and indigenous people . . . in the development, implementation and planning of national forest policies" and that "[n]ational forest policies should recognize and duly support the identity, culture and rights of indigenous people, their communities and other communities and forest dwellers." Agenda 21, the Conference's action plan, calls for participation of indigenous communities in the "economic and commercial benefits derived from the use of . . . traditional methods and knowledge." AGENDA 21: THE UNITED NATIONS PROGRAMME OF ACTION FROM RIO at 7, U.N. Doc. A/CONF.151/5, U.N. Sales No. E.93.I.11 (1993), para. 15.4(g). Other sections speak more generally about the need for community involvement. *See, e.g., id.* para. 18.9(c) (advocating "full public participation, including that of women, youth, indigenous people, local communities in water management policy-making and decision-making"); *id.* para. 3.5(a) (calling for "empowerment of local and community groups").

161. United Nations Convention to Combat Desertification In Those Countries Experiencing Serious Drought and/or Desertification, Particularly In Africa, U.N. GAOR 5th Sess., Agenda Item 2, U.N. Doc. A/AC.241/15/Rev.7 (1994), *reprinted in* 33 I.L.M. 1328 (1994), arts. 17, 19.

tions who convey knowledge that is ultimately commercially utilized or incorporated into technology to combat drought or desertification.[162]

The FAO's Undertaking[163] balances recognition of elite variety plant breeders' rights with the concept of farmers' rights. Farmers' rights are defined as "rights arising from the past, present and future contributions of farmers in conserving, improving and making available plant genetic resources."[164] Although the current language recognizes the collective nature of farmers' contributions, farmers' rights are not vested in farmers or farming communities directly but in "the International Community, as trustee for present and future generations of farmers."[165] Farmers' rights are to ensure that "farmers, farming communities and their countries receive a just share of the benefits derived from plant genetic resources" in order to encourage conservation and further development of these resources.[166]

To implement farmers' rights, the FAO set up a fund to support future research by farmers as well as conservation and utilization programs.[167] Contributions to the fund, unlike intellectual property royalty payments, are voluntary and thus are likely to be meager. The renegotiation of the funding scheme has awaited the creation of a Global Plan of Action and the renegotiation of the Undertaking.[168] Thus the Undertaking recognizes the contributions of farmers, but provides for neither ownership of these contributions nor direct compensation for their use.[169]

Human rights instruments also have recognized the interests of indigenous peoples in traditional knowledge and its fruits.[170] The Inter-

---

162. *Id.* at arts. 17(1)(c), 18(1)(e). For an overview of the Convention, see William C. Burns, *The International Convention to Combat Desertification: Drawing a Line in the Sand?*, 16 MICH. J. INT'L L. 831 (1995).

163. *See* the discussion of the Undertaking *supra* notes 123–24.

164. *Farmers' Rights*, FAO Resolution 5/89, *in* REPORT OF THE CONFERENCE OF FAO, Food and Agriculture Organization of the United Nations, 25th Sess., ¶ 108, U.N. Doc 89/REP (1989).

165. *Id.*

166. *Id.*

167. HARVESTING DIVERSITY, *supra* note 65, at 21.

168. The Global Plan of Action was completed and approved at the Fourth International Technical Conference on Plant Genetic Resources in Leipzig, Germany in June 1996. *See infra* note 209. That conference produced significant debate, with the U.S. and other countries insisting that farmers' rights was merely a concept and not a legal right. *Id.* The resulting text deferred all discussion of farmers' rights to renegotiation of the Undertaking. *Id.* Funding sources and requirements were also left deliberately vague. *Id.* The Undertaking renegotiation process will next be taken up in a meeting of FAO's Commission on Genetic Resources in Food and agriculture in December 1996. *Things To Look For*, 9(47) EARTH NEGOTIATIONS BULLETIN <http://www.mbnet.mb.ca/linkages/vol09/0947022e.html>.

169. *See Intellectual Property Rights for Whom?*, *supra* note 23.

170. General human rights instruments protect intellectual property rights, albeit in a limited way. For example, Article 27 of the Universal Declaration of Human Rights provides

national Labour Organization's Convention Concerning Indigenous and Tribal Peoples in Independent Countries requires special measures to safeguard the property, labor, environment, and cultures of indigenous peoples.[171] Moreover, where the State retains the ownership of resources related to lands, it must consult with indigenous peoples before permitting exploration or exploitation of such resources on their lands.[172]

The Draft Declaration on the Rights of Indigenous Peoples, approved by the United Nations' Human Rights Subcommission on Prevention of Discrimination and Protection of Minorities in 1994, calls for a "right to restitution of cultural, intellectual, religious and spiritual property taken without th[e] free and informed consent [of indigenous peoples] or in violation of their laws, traditions and customs."[173] More specifically, article 29 states:

> Indigenous peoples are entitled to the recognition of the full ownership, control and protection of their cultural and intellectual property.
>
> They have the right to special measures to control, develop and protect their sciences, technologies and cultural manifestations,

---

that "[e]veryone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author." G.A. Res. 217 (III), U.N. GAOR, 3d Sess., art. 27.2 U.N. Doc. A/810 (1948). The singular pronoun, if strictly interpreted, would limit the usefulness of this Article to informal innovation. The same right appears in the International Covenant on Economic, Social and Cultural Rights, Dec. 16, 1966, art. 15.1(c), 993 U.N.T.S. 3, 9.

171. Convention concerning Indigenous and Tribal Peoples in Independent Countries, ILO Conv. 169, June 7, 1989, art. 4, *reprinted in* ILO, INTERNATIONAL LABOR CONVENTIONS AND RECOMMENDATIONS: 1919–1991 at 1436 (1992).

172. *Id.* art. 15.2. The provision was obviously aimed at oil exploration rather than biological resources, but its language is inclusive:

> In cases in which the State retains the ownership of mineral or sub-surface resources or rights to other resources pertaining to lands, governments shall establish or maintain procedures through which they shall consult these [indigenous] peoples, with a view to ascertaining whether and to what degree their interests would be prejudiced, before undertaking or permitting any programmes for the exploration or exploitation of such resources pertaining to their lands. The peoples concerned shall wherever possible participate in the benefits of such activities, and shall receive fair compensation for any damages which they may sustain as a result of such activities.

Id.

173. *Draft Declaration on the Rights of Indigenous Peoples*, U.N. Subcommission for the Prevention of Discrimination and Protection of Minorities, U.N. ESCOR, 46th Sess., art. 12, U.N. Doc. E/CN.4/Sub.2/1994/56 (1994) *reprinted in* 34 I.L.M. 546 [hereinafter *Draft Declaration*]. The U.N. Human Rights Commission received the Draft Declaration in February 1995 and referred it to a working group to prepare a draft for submission to the General Assembly. Resolution 1995/32 of the U.N. Commission on Human Rights, 53rd meeting, U.N. Doc. E/CN.4/1995/L.11/Add.2 (1995) *reprinted in* 34 I.L.M. 535. Negotiations over the Draft Declaration in the Human Rights Commission are likely to be difficult and protracted.

> including human and other genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs and visual and performing arts.[174]

The Draft Declaration raises squarely the question of what kinds of "special measures" will best serve these goals. Indigenous peoples themselves, in conjunction with others, have begun to discuss ways to structure regimes to protect their knowledge and resources that reflect their priorities, interests, and concerns. The regimes can be grouped into three options: one, expand the definition of intellectual property rights in national and international law to include collective innovators and informal innovations; two, encourage, and impose standards on, private contracts between communities and corporate or government "bioprospectors"; or, three, focus more broadly on mechanisms to promote indigenous and local community rights to use, manage, and control their local livelihood systems, including both their tangible and intangible resources. This last, most ambitious, option would privilege elements of resource control and management over compensation.

A. *Expansion of Intellectual Property Rights*

One obvious response to the appropriation of indigenous and traditional knowledge and its fruits is to modify existing national and international intellectual property protection regimes to encompass the informal innovations of indigenous and traditional communities. In general, such changes would allow for patenting by collective entities, would protect cumulative or accretive knowledge, and would extend protection to those innovations involving traditional or nonlaboratory technologies.

Changes in patent law would require, in the first instance, national legislation. National rules on patents vary widely; however, the completion of the Uruguay Round of the GATT as well as the Convention on the Biological Diversity have introduced international constraints. The TRIPS provisions of GATT 1994 require States to implement patent systems that utilize the traditional criteria of novelty, nonobviousness, subject matter, and utility and that extend some form of intellectual property protection to plant breeders.[175]

The nature of such *sui generis* systems for plant protection is a great controversy facing many national legislatures. States may, but need not,

---

174. *Draft Declaration*, *supra* note 173, art. 29.

175. TRIPS, *supra* note 87, art. 27. Several such *sui generis* systems for plant breeders' rights exist on a national level; UPOV is one international example of such a system.

adopt UPOV in either its 1978 or 1991 version in order to comply with their obligations under TRIPS.[176] While the drafters of TRIPS clearly intended plant breeders' rights as defined by UPOV to qualify as the *sui generis* system adopted, there is no reason why States cannot develop their own *sui generis* systems, which could be more friendly to the claims of indigenous and traditional communities. Some States are moving to adopt UPOV.[177] But in a number of States, including Thailand, the Philippines, India, and Colombia, coalitions of farmers, indigenous peoples groups, and nongovernmental organizations (NGOs) have introduced legislative proposals that would enshrine some version of farmers' rights (Thailand, Colombia) or community rights (India) as alternative forms of intellectual property protection that recognize communities as holders of rights to both resources and innovations.[178] The limit to how far such *sui generis* systems can depart from traditional plant breeders' rights is a function both of the interpretation of the word "effective" in TRIPS and the dispute resolution machinery of the WTO.

The Convention on Biological Diversity deals with intellectual property protection in a vague and contradictory manner.[179] The Convention states that, "[i]n the case of technology subject to patents and other intellectual property rights," access to, and transfer of, that technology "shall be provided on terms which recognize and are consistent with the adequate and effective protection of intellectual property rights."[180] Parties then agree to ensure, through appropriate legislation affecting both public and private researchers, that those developing countries providing access to genetic resources will in turn have access to the biotechnology that uses those resources "on mutually agreed" terms and "in accordance with international law" — presumably including trade

176. *See* TRIPS, *supra* note 87, art. 27.3(b) (requiring at least "an effective *sui generis* system").

177. See list in *UPOV: Getting a Free TRIPs Ride?*, SEEDLING, *supra* note 114, at 24. UPOV 1991 is much less favorable to the interests of farmers. *Id.* 23–25; *see also supra* note 114. Because that version has not yet come into force, UPOV advocates argue that States should sign onto UPOV 1978 while it is still valid and thus avoid being pressured to sign onto the more onerous 1991 version once it comes into force. *See UPOV: Getting a Free TRIPs Ride?*, *supra* note 114, at 24–25.

178. *UPOV: Getting a Free TRIPs Ride?*, *supra* note 114, at 28.

179. *See, e.g.*, Abdulqawi Yusuf, *Technology and Genetic Resources: Is Mutually-Beneficial Access Still Possible?*, *in* BIODIPLOMACY, *supra* note 90, at 237 (provisions of Article 16 are ambiguous, confusing, and sometimes contradictory); *see also* Margulies, *supra* note 45, at 334–35.

180. Convention on Biological Diversity, *supra* note 48, art. 16.2.

laws.[181] However, at the same time, the contracting parties are also to ensure that intellectual property rights are supportive of, and do not run counter to, the Convention's objectives.[182] Taken *in toto*, the provisions leave the protection of industrial intellectual property rights intact and impose few substantive obligations beyond a commitment not to restrict access completely to either raw materials or technology.

Proposals seeking to address the concerns of indigenous peoples' groups and NGOs stress control over compensation.[183] The goal is not simply to receive money in exchange for access to knowledge and resources, but to control whether, and how, such knowledge is commercialized, while also leaving it available for noncommercial uses. Thus several international gatherings of indigenous peoples have demanded control over their own intellectual property rights.[184] Indigenous peoples

---

181. *Id.*

182. Article 16.5 reads:

> The Contracting Parties, recognizing that patents and other intellectual property rights may have an influence on the implementation of this Convention, shall cooperate in this regard subject to national legislation and international law in order to ensure that such rights are supportive of and do not run counter to its objectives.

Convention on Biological Diversity, *supra* note 48, art. 16.5. This provision may be worthless. The international law embodied in TRIPS, for example, would not permit a State to deny patent protection to otherwise patentable materials when that State alleges that such a patent would harm local or global biodiversity. *See* TRIPS, *supra* note 87.

183. Some proposals simply expand existing concepts such as "joint inventorship" to cover cases where indigenous knowledge leads to patentable drugs or other substances, while also recognizing that current law fits uneasily with indigenous forms of knowledge. *See generally* Huft, *supra* note 73.

Several authors have proposed expanding and adapting the 1985 UNESCO/WIPO "Model Provisions for National Laws on the Protection of Expressions of Folklore Against Illicit Exploitation and other Prejudicial Actions," which recognize both collective and non-written expressions. *See* Darrell Addison Posey et al., A Handbook for Indigenous, Traditional, and Local Communities on Traditional Resource Rights: Protection, Compensation and Conservation 10 (July 1994) (unpublished manuscript on file with the *Michigan Journal of International Law*). Others have proposed some version of "traditional resource rights" as *sui generis* systems providing protection of, and compensation for, both tangible and intangible resources. *Id.* at 4.

See also the discussion of defensive publication in THE CRUCIBLE GROUP, *supra* note 75, at 78–80. To summarize, U.S. law provides a procedure for publication of inventions such that any subsequent attempt to patent them can be challenged. These "defensive" schemes could defeat, for example, the corporate appropriation of communal knowledge. *Id.* One problem with such a scheme, however, would be defining and registering the enormous amounts of knowledge, and the myriad varieties of products of that knowledge, now held by indigenous and local communities. A similar option is that of inventors' certificates, which provide for recognition or compensation without monopoly control. *See* Conserving Indigenous Knowledge, *supra* note 21, at 32.

184. The Indigenous Peoples' Statement on Access and IPRs, *supra* note 62, demands "[r]ights to control, rights to decide, rights to manage, maintain and benefit from a living heritage." It further calls for a moratorium on the collection of biological materials until indigenous and local communities can assert their rights and opposes intellectual property rights on life forms and processes. *Id.*

The Charter of the Indigenous-Tribal Peoples of the Tropical Forests postulates that "[s]ince we highly value our traditional technologies and believe that our biotechnologies can

especially demand the ability, through modified intellectual property schemes, to deny others the ability to commoditize their knowledge. As one recent report noted, "[t]he first concern of indigenous peoples is their right NOT to sell, commoditize, or have expropriated from them certain domains of knowledge and certain sacred places, plants, animals, and objects."[185]

The emphasis on control raises a fundamental question about the adoption of modified or expanded intellectual property rights: should indigenous and traditional people try to modify existing systems to suit their needs or are such systems irredeemably inappropriate? Both philosophical and practical concerns arise.

On a philosophical level, the concept of private intellectual property rights is foreign to many indigenous peoples. While some indigenous knowledge may be restricted or secret, the reasons for the restrictions are usually not commercial in nature. For some indigenous groups, the privatization and commoditization of knowledge and of living resources is both incomprehensible and reprehensible.[186] Indeed, according to Dr. Darrell Posey, indigenous people "are more concerned about the misuse or misinterpretation of their knowledge, culture and cultural expressions."[187] By attempting to manipulate the prevailing Western paradigm to suit their needs, will indigenous peoples accelerate the very commodification of knowledge and of living things that many find so objectionable? Worse, will they be forced to adopt foreign categories as

---

make important contributions to humanity, including 'developed' countries, we demand guaranteed rights to our intellectual property, and control over the development and manipulation of this knowledge." *Charter of the Indigenous-Tribal Peoples of the Tropical Forests*, art. 44 (Malaysia, 1992) *quoted in* Marcus Colchester, Some Dilemmas in Asserting Indigenous Intellectual Property Rights (October 1994) (unpublished document on file with the *Michigan Journal of International Law*). Similarly the Mataatua Declaration on Cultural and Intellectual Property Rights of Indigenous Peoples, the result of a 1993 conference convened by indigenous groups in New Zealand, demands that the fundamental right of indigenous peoples to define and control traditional knowledge be protected by the international community. Posey, *supra* note 183, at 6.

185. Posey, *supra* note 183, at 7.

186. Many NGOs similarly reject the idea of patenting living matter on both ethical grounds and out of a fear of private control over the very building blocks of life. *See, e.g*, *Patenting Life Forms in Europe*, SEEDLING, Mar. 1995, at 4 (noting NGO opposition to recent European effort to patent living matter). After a debate of many years, the European Parliament rejected in May 1995 a proposed European Union Directive on Biotechnological Inventions that would have, among other objectionable items, permitted the patenting of plant, animal, and human genes. *Id.* at 4–9 (summarizing debate and veto of the proposed Directive); *see also* PATENTING LIFE FORMS IN EUROPE: PROCEEDINGS OF AN INTERNATIONAL CONFERENCE AT THE EUROPEAN PARLIAMENT (International Coalition for Development Action 1989) (a conference discussing the Directive).

187. Posey, *supra* note 183, at 5 (comparing indigenous peoples' views of knowledge with Western and anthropocentric concepts of intellectual property rights).

their own, to shoehorn their world views and values into an alien set of concepts and laws? After all, indigenous peoples have much experience with the disastrous effects on their communities of imposing Western-style individual property rights in land.

On the other hand, will refraining from answering pressing demands for indigenous intellectual property rights merely maintain the status quo or reify a museum-like vision of unchanging, ahistorical "noble savages?" Some have argued that it is utopian to expect Northern countries to retreat on imposing ever broader intellectual property protections and that indigenous and local communities have no choice but to make a foreign system work for them.

Even if an emphasis on control over access and noncommercialization, rather than mere compensation, resolves some of these philosophical issues, practical problems remain. In numerous cases, more than one community makes similar use of the same resources, sometimes even using the same processes. In these cases, which community is to receive the intellectual property rights: the first to invent, the first to file, or any community showing that they have long used the process or product at issue? Often, resources taken from local communities find a slightly different use in developed countries than the traditional use; for example, endod may be important for killing zebra mussels, not as a soap or fish intoxicant. How these cases will be resolved remains an open question.[188]

Furthermore, the current intellectual property system is heavily stacked against indigenous and traditional communities, which are overwhelmingly poor and far from the centers of Northern legal power. Expanding intellectual property regimes to cover indigenous and traditional innovation could require communities to challenge patent applications or to sue for patent infringement in many countries simultaneously against some of the world's most sophisticated corporations and governments. Indigenous and traditional communities may end up spending scarce resources on investigators and attorneys to protect their newly won intellectual property rights. Even if NGOs representing or aligned with these groups will do the work, is this the best use of their time and resources? And does the choice of forum necessarily mean that communities will be beholden to others, or even to a few of their own, to protect their interests? Expansion of intellectual property rights under such

188. Under existing patent law, a new use of a known substance is patentable if that use involves overcoming practical difficulties. *See* Rohm & Haas v. Roberts Chem. Co., 245 F.2d 693 (4th Cir. 1957); 1 DONALD S. CHISUM, PATENTS § 1.03[8] (1978 & Supp. 1995); *see also* Odek, *supra* note 103, at 146 n.29 (discussing European "second use" patents). These "second use" patent problems might apply to many traditional plants.

unfavorable conditions may disempower communities, rather than empower them. Suggestions for special ombudsmen, tribunals, and financial support for community legal work might alleviate, but will not eliminate, some of these problems.[189]

B. *Private "Bioprospector" Contracts*

Interest in biological resources from biotechnology, pharmaceutical, and other corporations has opened the possibility of direct contractual relationships between purveyors and buyers of indigenous and traditional knowledge. Under the typical terms of exchange, a company or research institute obtains a temporary monopoly over indigenous knowledge or resources from a delimited area in return for initial and/or royalty payments.[190]

Merck Pharmaceuticals and INBio, a private nonprofit biodiversity institute created by the Costa Rican government, negotiated one of the first such contracts. According to what is known about the contract, Merck provides $1.135 million initially, plus a share of any royalties on commercial products developed from the accessions,[191] in exchange for 2,000–10,000 extracts from Costa Rican plants, insects, and microorganisms and Costa Rican screening and research services.[192] INBio must contribute a portion of the funds to the Costa Rican government for park conservation, and Merck must provide technical assistance and training of Costa Ricans.[193]

In December 1993, the United States National Institute of Health (NIH), Conservation International, Bristol-Myers Squibb, Virginia Polytechnic Institute and State University, and the Missouri Botanical Garden contracted with the country of Suriname to study medicinal

---

189. *See* Conserving Indigenous Knowledge, *supra* note 21, at 30–32.

190. The International Plant Genetics Resources Institute is developing Materials Transfer Agreements that would prohibit recipients of germplasm from claiming ownership or intellectual property rights over the germplasm used for breeding, research purposes, or related information. *Genetic Advisory Group Favors Global Germplasm Conservation Plan*, [Current Reports] 18 INT'L ENVTL. REP. (BNA) 417 (May 31, 1995); *see also* THE CRUCIBLE GROUP, *supra* note 75, at 70–72.

191. *Bioprospecting/Biopiracy and Indigenous Peoples*, RAFI COMMUNIQUE (Rural Advancement Fund. Int'l, Ottawa, Ont.), Nov. 1994, at 3; Asebey & Kempenaar, *supra* note 101, at 725. The royalty rate is not known because many provisions of the agreement are secret. However, several commentators estimate it at one to three percent, which roughly equals the costs of sample collection and extraction as a percentage of total drug discovery cost. *Id.* at 726.

192. Walter V. Reid, *Biodiversity Prospecting: Strategies for Sharing Benefits*, *in* BIODIPLOMACY *supra*, note 90, at 241.

193. Asebey & Kempenaar, *supra* note 101, at 727.

plants.[194] Under the contract, Bristol-Myers pays royalties to the indigenous people of Suriname for drugs derived from local plants.[195] Shamans and other traditional healers will be eligible to share patent rights to these compounds.[196]

Other initiatives sponsored by the NIH include: an agreement between Monsanto and the Cayetano Peruvian University to study medicinal plants from Andean rain forests; one among Walter Reed Army Institute of Research, the University of Yaounde in Cameroon, and several U.S.-based conservation groups and pharmaceutical companies to search for parasitic drugs in the African rainforest; and another involving American Cyanamid and various universities of Argentina, Chile, Mexico, and the United States to study medicinal properties of plants from arid regions.[197] The National Cancer Institute also awards collection contracts for natural substances.[198]

One U.S.-based company, Shaman Pharmaceuticals, uses ethnobotanical science as a drug discovery technique.[199] It has several patent claims already pending and has pledged to return a portion of its sales from drugs derived from community-based knowledge to the communities involved through its nonprofit arm, the Healing Forest Conservancy.[200] However, the company's pharmaceutical industry partner, Eli Lilly, did not renew its research contract with Shaman in 1994, which caused the company to lay off staff and downsize its screening programs and raised doubts about the feasibility of this approach given the demands of venture capitalists for short-term returns.[201]

Scholars, activists, and indigenous peoples' representatives disagree on the potential of such private contracts. On the one hand, contracts have the advantage of allowing indigenous and local communities to bypass the State, albeit within a State regulatory framework, and negotiate on

---

194. Rick Weiss, *Scientists Try to Turn Weeds into Wonder Drugs*, WASHINGTON POST, May 10, 1994, at Z12.

195. *Id.*

196. *Id.*

197. *Id.*

198. Asebey & Kempenaar, *supra* note 101, at 721. The Letter of Collection stipulates that "permission of the traditional healer or community will be sought before publication of their [sic] information, and proper acknowledgment will be made of their [sic] contribution." *Id.* at 722. No provision exists, however, for the sharing of any financial rewards from the information. *See id.*

199. Rubin & Fish, *supra* note 50, at 30 (citing David Riggle, *Pharmaceuticals From the Rainforest*, IN BUSINESS, Feb. 1992, at 26).

200. *Id.*

201. Asebey & Kempenaar, *supra* note 101, at 733–34.

their own behalf. The benefits of any such arrangements may go directly to the local community, not the State treasury. Contracts also decentralize controls over the use of resources and offer flexibility in the ability to designate individual or collective owners of different kinds of knowledge and to tailor provisions to a given situation. Moreover, parties to a contract may stipulate to protective conditions.[202]

Skeptics point to several potential problems with private contracts, even those regulated by codes of conduct or including protective provisions. First, of course, the two parties to the deal have vastly different resources, abilities to bargain, and abilities to enforce the provisions of any agreement. One proposed answer is to stipulate an initial escrow fund, paid by the buyer, to cover the legal fees of the community in any case of dispute. Yet the question is not simply one of money, but also of access to information: for example, information about the potential commercial value of a certain product. A network of advisors and the training of indigenous and local people themselves would ameliorate the problem, but in any case the community would still lose direct control over a portion of its resource base. Of the possible options, bilateral contracts provide, in practice, the least opportunity for control over access; the whole point is facilitating access in exchange for compensation and so any controls on access limit the attractiveness of the deal.

In addition, contracts may exacerbate divisions among indigenous and local communities as parts of the community seek to capitalize on lucrative opportunities to the exclusion of others.[203] Often the same plant or microorganism is found in several different communities that span national borders; corporations and scientists could therefore play one community against another for the most favorable terms.

---

202. Such provisions might include patent protection of indigenous knowledge, adequate documentation of the origin of the knowledge, creation of a legal fund and/or ombudsman to assist indigenous or local communities in the necessary legal arrangements, training of local people in collection and processing of specimens, joint planning, and some type of liability for infringements of the patent. *See* Rubin & Fish, *supra* note 50, at 47–48; Conserving Indigenous Knowledge, *supra* note 21, at 30–31. Third World Network has developed model provisions for bioprospecting contracts. *See* Community Intellectual Rights Act, *reprinted in* Singh Nijar, *supra* note 14. The FAO has also developed a voluntary *International Code of Conduct for Plant Germplasm Collecting and Transfer*, FAO Resolution 8/93, *in* REPORT OF THE CONFERENCE OF FAO, Food and Agriculture Organization of the United Nations, 27th Sess., ¶ 113, U.N. Doc 93/REP (1993). The Traditional Resource Rights group has also developed a model Covenant including provisions for indigenous groups to decline commercialization of some knowledge, to keep information confidential, and to require independent monitoring of agreements. *See* Posey, *supra* note 183, at 19–21.

203. See Jack Kloppenburg, Jr., W(h)ither Farmers' Rights? (Oct. 7, 1994) (unpublished manuscript on file with the *Michigan Journal of International Law*) for a discussion of the drawbacks of bilateral approaches. *See also Bioprospecting/Biopiracy and Indigenous Peoples*, *supra* note 193, at 3.

Contracts may also limit community control over the amount and distribution of whatever benefits accrue. For example, Shaman Pharmaceuticals does not plan to return royalties directly to source communities but to a Northern-run NGO that will distribute the proceeds as it sees fit. In a recent consortium deal, Searle Pharmaceutical (Monsanto) agreed to pay $15,000 per year "for the benefit of local inhabitants of the Collection Area," but the money will be paid to, and distributed by, Washington University, an institution located in the United States. Any royalty payments, ranging from two-tenths of a percent to one percent of any licensed product, will also be distributed through Washington University after deducting costs for research, development, and management by the Northern scientific institutions involved. The amount of money that actually reaches indigenous communities under these terms may be much less than expected, amounting to little more than the employment of local people as cheap labor in the collection process. And Northern environmental NGOs and research institutes, not indigenous communities, may control the use of any funds that do materialize. Moreover, so long as communities in Southern countries continue to act as mere providers of raw materials for processing elsewhere, they forfeit the value-adding possibilities of in-country processing of such materials and reproduce the cycles of dependency that have characterized South-North relationships since colonial times.

C. *Multilateral Agreements and Funds*

Given the drawbacks of private frameworks, the best option may be a public, multilateral set of agreements among States and communities governing access to indigenous and local knowledge and its products. Such agreements could cover at least the majority of cases where it is impossible to associate a certain material or technique with a unique ethnic or geographic group, as well as cover those resources already collected and held in *ex situ* collections where the exact provenance is unknown.[204]

The most frequently discussed multilateral framework would incorporate a revised FAO Undertaking either as a separate binding treaty or

---

204. Often the documentation of materials collected in gene banks is incomplete. PLUNKNETT ET AL., *supra* note 131, at 187. To account for this reality, Kathleen Yurchak has advocated a three-tier scheme involving an expanded definition of patents to cover community-specific medicinal or similar knowledge, modified plant breeders' rights for agricultural innovation, and a residual "national resource" licensing regime. Kathleen Yurchak, *IPRs for LDCs under the GATT's TRIPs Code: Alphabet Soup or Community Empowerment?* 3 (Spring 1995) (unpublished manuscript on file with the *Michigan Journal of International Law*).

as a protocol to the Convention on Biological Diversity.[205] The most promising part of the current Undertaking is its reference to farmers' rights, which could be redefined to provide for participation of indigenous and local communities in the control and compensation of genetic knowledge. Direct participation of indigenous and local communities is not now part of the Undertaking: farmers' rights are vested in the international community as trustee.[206] FAO officials, moreover, have tended to equate farmers' rights with the rights of sovereign States.[207] The Leipzig Declaration on Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture, the most recent intergovernmental statement on the issue, recognizes the desirability of fairly and equitably sharing benefits arising from the use of knowledge, innovations, and practices developed by generations of men and women farmers, plant breeders, and indigenous and local communities, but stops far short of implementing farmers' rights.[208]

Similarly, the Undertaking fund currently set up to compensate farmers for their past, present, and future contributions is both inoperative and functionally State-centered. Any replacement fund would have to be mandatory and include participatory mechanisms in order for funds to reach communities directly. The main drawback to a fund is the declining ability and willingness of resource-using Northern countries to contribute to international funds and organizations; the Leipzig conference only confirmed that any attempt to secure "new and additional funds" will meet with strong opposition.[209] Perhaps mechanisms for directly taxing

---

205. *See, e.g.*, Kloppenburg, *supra* note 203, at 7–12. Another central element of many proposals for multilateral proposals is the elaboration of the Prior Informed Consent (PIC) procedure envisioned in Article 15.5 of the Convention on Biological Diversity, whereby communities and/or governments would have to consent to the removal of genetic resources from their territory and could, therefore, impose conditions on any removal. *See* Convention on Biological Diversity, *supra* note 48, art. 15.5. For a discussion of a PIC model applied to genetic resources, see Frederic Hendricks et al., *Access to Genetic Resources: A Legal Analysis*, *in* BIODIPLOMACY, *supra* note 90, at 139, 142.

206. *See* discussion *supra* note 165.

207. *See* Kloppenburg, *supra* note 203, at 7–8.

208. Leipzig Declaration on Conservation and Sustainable Utilization of Plant Genetic Resources for Food And Agriculture, Fourth International Technical Conference on Plant Genetic Resources, Leipzig, Germany, June 17–23, 1996, paras. 1, 4, reproduced at <http://web.icppgr.fao.org/itcpgr/96.6/96.6html>. The Declaration and the Global Plan of Action on Plant Genetic Resources did contain some promising language on the need for *in situ* and on-farm conservation and for programs to stimulate farmers to grow landraces, obsolete, and traditional varieties. *See* International Institute on Sustainable Development, No. 47 Summary of the Fourth International Conference on Plant Genetic Resources at <http://www.iisd.ca/linkages/vol09/094700e.html>. However, the United States especially opposed any concrete steps towards implementing farmers' rights, although Latin American, Asian, and African nations strongly supported them in some form. *Id.*

209. Delegates to the Global Plan of Action on Plant Genetic Resources, adopted in June 1996 at the Leipzig Conference, were unable to agree on appropriate language on funding. *See*

the users of genetic materials – pharmaceutical, agrochemical, seed, and the like industries — would have more success. Such a tax would be both compensatory and a precondition of continued access to resources and knowledge.

CONCLUSION

Any of these three options presents drawbacks as well as advantages, and the emerging regime may combine a number of modalities. In any event, developments in biotechnology may make the need for germplasm from Southern countries and communities merely a temporary phenomenon. If such resources do not prove as lucrative as they once appeared, any incentive for Northern corporations and governments to renegotiate the terms of access to them may dissipate. Under these conditions, the fight against appropriation will be limited to seeking compensation for past uses, a far more problematic exercise in the absence of continuing incentives.

Second, mechanisms for structuring community control over access to resources may founder on the elusive definitions of who speaks for the community. Communities are usually not homogeneous, harmonic entities but include "formal and informal power structures" reflecting "social, economic, and political relationships among the members of the community as well as with the outside world."[210] Mechanisms for resolving disputes over ownership of knowledge and resources within each community would have to evolve simultaneously with any viable system of local control over resources. Moreover, often it is not clear that the knowledge or resources at issue originated in any single community. Especially problematic are cases where a similar technique or variety exists in several different areas. Some system of self-declaration or registration of communities wishing to protect their innovations, combined with a mechanism for resolving conflicts and sharing benefits among different communities claiming ownership of the same knowledge, might be required to manage these problems.[211] Where multiple ownership is claimed, a fund approach might become more workable.

Fourth International Technical Conference on Plant Genetic Resources, Leipzig, Germany, June 17–23, 1996 at <http://web.icppgr.fao.org/ITCPGR/Leipzig.html>. They agreed to postpone discussion of funding options until the December 1996 meeting of the FAO to revise the Undertaking. *Id.*

210. STAN BURKEY, PEOPLE FIRST: A GUIDE TO SELF-RELIANT, PARTICIPATORY RURAL DEVELOPMENT 207 (1993).

211. I am indebted to Kathleen Yurchak for this idea. Of course, these problems might make a trust idea more attractive, in that it would tie benefits less directly to a showing that the particular community was the sole source of any particular knowledge or resource.

Under any regime, three issues will be key: defining and ensuring the participation of different kinds of indigenous, traditional, and local communities; recognizing the multiple roles such communities play; and framing solutions that link the issues of appropriation of knowledge and resources to the larger agenda of community protection and development.

Some communities are easier to define than others. Indigenous peoples, while often divided along gender, power, or philosophical lines, are relatively well-defined internationally, and their existence as distinct groups, if not as peoples, is finally becoming more accepted.[212] Their demand for intellectual property rights is part of a larger fight for control over their land and resources and for self-determination. Indigenous peoples now have an effective and growing network of local, national, regional, and global organizations able to represent them.

This is not true of local communities. Local communities overlap somewhat with indigenous peoples; indeed, one possible explanation of the introduction of the term "local" into official international discourse is simply that it avoids endless debates over which people qualify as "indigenous" or "tribal." The term is broad enough to include subsistence farmers or those who produce for regional markets, in-shore fisherpeople, nomadic herders, hunter-gatherers, forest peoples, artisan communities, or others who derive a large part of their livelihood from the natural world. These communities, long the stewards of local biodiversity, often exist precariously on the edge of, and are threatened by, the industrialized, high-input systems of agribusiness, long-distance factory trawler fishing, large-scale cattle-ranching, and mass tourism. Although many such communities have some type of local organization, for example, a peasant or farmers' league or a development association, few have an effective political voice at the national or international level. While some are closely bound by ties of ancestry, language, or other cultural characteristics, others share no bond other than their use of, and dependence on, natural resources for a livelihood, their relative remove from the centers of power, and some sense of themselves as a community, although not by any means a united or homogeneous one.

How are local communities to be adequately defined and represented for purposes of controlling, and receiving the benefits of, their knowledge and resources within either a national or multilateral framework? Some

---

212. A common definition includes elements of shared control of territory or resources, self-definition as a member of the group, nondominant status within the larger society, continuous governing structures, and, perhaps, continuity with pre-colonial societies. *See generally* J. Martinez Cobo, *Study of the Problem of Discrimination Against Indigenous Populations*, U.N. Sub-Commission on Prevention of Discrimination and Protection of Minorities, *reissued as* U.N. Doc. E/CN.4/Sub.2/1986/7 and Adds. 1–4.

general characteristics of such communities — a natural resource base, a form of social organization, and a sense of membership — may serve as guideposts.[213] Beyond that, both the similarities of local communities with indigenous peoples, and the very important legal differences between them, will need recognition to ensure that the linguistic union of the two groups in international discourse leads to alliances and not competition. Effective mechanisms to allow for community participation and control over decisionmaking, especially by the poorest sectors of the community, who may be most closely tied to the preservation of resources, will be key. In this regard, the use of arguments against appropriation for the purpose of reallocating resources from transnational corporations and Northern governments and institutions to Southern elites — bypassing the landless farmers, fishers, artisans, and other poor yet again — is a real danger.

An end to appropriation requires recognition of the role of indigenous and local communities as stewards of scientific and ecological knowledge and resources, as innovators of that knowledge and the associated resources, and as practitioners of sustainable production and life systems.[214] For these communities, the right to control their scientific knowledge and the associated resources is inseparable from rights to the communities' communal heritage, including its tangible and intangible elements. Heritage rights may encompass land and resource rights, secure land tenure, measures to defend local artisanry and agriculture from the destructive effects of global commerce, and, in the case of indigenous peoples, more broadly defined rights to self-determination.

In the long run, the ability of indigenous, traditional, and local peoples to obtain a say in the use of their knowledge and the products of that knowledge will depend on the vibrancy, visibility, and agency of those communities. Ending the appropriation of this knowledge is only one part of a larger agenda of community empowerment.

---

213. Gurdial Singh Nijar of Third World Network suggests as a working definition "a group of people having a longstanding social organization that binds them together whether in a defined area or howsoever otherwise." Singh Nijar, *supra* note 14, at 6. This definition would include both indigenous peoples and local farming communities.

214. *See* Genetic Resources Action International, Framework for Full Articulation of Farmers' Rights ¶ 2.1 (June 1995) (unpublished document on file with the *Michigan Journal of International Law*).