

Key Legal and Ethnoecological Components of a Bioprospecting Agenda¹

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Abstract

*Any bioprospecting endeavor has many important legal and ethnoecological ramifications. Frequently, however, these ramifications are subtle, and those involved in a bioprospecting project consequently lose sight of these ramifications amid more prominent scientific, industrial, and commercial objectives of the endeavor. The more that the legal and ethnoecological ramifications can be brought to the surface, placed in context, and thoroughly evaluated for any given bioprospecting project, though, the more likely that a bioprospecting undertaking will have a positive impact on the people and ecosystems affected, which should be an integral objective of any bioprospecting project.*PRIVATE

Defining Bioprospecting

"Bioprospecting" is a shorthand term for either "biodiversity prospecting" or "biogenetic prospecting." "Biodiversity" usually refers to biological diversity--the variety of life in all of its forms, levels, and combinations--and encompasses genetic diversity, species diversity, and ecosystem diversity (Posey and Dutfield 1996:228). The term "biogenetic resources" usually refers more specifically to plants, animals, microorganisms, cells, and genes (Posey and Dutfield 1996:228). "Prospecting" refers to the search for something that has commercial value--for something that can be directly sold or developed for eventual sale. Thus, bioprospecting refers to the search for, identification, collection, extracting, and screening of biological resource samples--usually of plants, animals, microorganisms, cells, or genes--for commercial purposes, probably most commonly for pharmaceutical products, but also for numerous other natural commercial products such as cosmetics, dyes, and foods (Rubin and Fish 1994:26, n. 5). These searches usually occur in places such as tropical forests and coral reefs, because such places are perceived as species rich, biologically rich, or "biodiverse."

Economist Joseph Vogel has observed that "biodiversity" is a "catchy word" (Vogel 1994:17). It has "caught on" with the public and thus makes good rhetoric. He also argues, however, that a penetrating semantic analysis reveals that its meaning is at once both so broad--encompassing all forms of life--and so vague--failing to discriminate between forms of life--that it is ultimately devoid of any logical meaning, and it consequently is a concept that has little scientific utility (Vogel 1994:18-22).

Vogel raises an important red flag for a bioprospector. Even if a bioprospector, or all members of a bioprospecting team, have a firm grasp on what it is they are "prospecting for," other people affected by the bioprospecting endeavor, such as local indigenous communities, governments, other persons in the scientific, pharmaceutical, or medical communities, or the public, including both consumers and environmental watchdogs, may either not have such a clear notion of what is being prospected for or may have a notion that is completely different from that of the bioprospector or the bioprospecting team. It is also likely that even if the bioprospector and the bioprospecting team have a firm grasp on what they are seeking at the start of their prospecting, it may change as the endeavor unfolds.

Accordingly, it is critical that careful thought be given at the outset not only to how a bioprospecting project is going to be carried out but also to how that activity is going to be communicated to local populations, governments, other persons in the scientific community, and the international public.

The Intellectual Property Rights of Indigenous Peoples

The day is long past when bioprospecting can be thought of as taking place in a natural laboratory, or in a "wilderness," that is isolated from human societies, human values, or human ecosystems. The Declaration of Belém, adopted at the First International Congress of Ethnobiology in 1988, accepts as "givens" that: a) the economic, agricultural, and health conditions of many people are dependent on the preservation of tropical forests and other fragile ecosystems that are disappearing; b) that native peoples have been

stewards of 99 percent of the world's genetic resources; and c) "that there is an inextricable link between cultural and biological diversity" (Posey 1996:211). These premises have significant ethical and legal implications for bioprospectors that are reflected in numerous international conventions, declarations, and codes of ethics that have been drafted or adopted in the past decade (Posey 1996:141-220).

Most prominent among these is the notion that indigenous and local communities embodying traditional lifestyles have the right to control access to the resources in their traditional homelands and to equitably share in any benefits derived from the use of the natural resources in those homelands. It is implicit in this notion that indigenous and local communities embodying traditional lifestyles also have the right to equitable compensation for sharing their knowledge with bioprospectors about the kinds and locations of natural resources in their traditional homelands and how those resources can be harnessed for human use (See, e.g., Article 8(j), Convention on Biological Diversity, reprinted in Posey 1996:147).

The cataloging and analysis of such ethnically-based knowledge of biological resources is known as "ethnobiology," sometimes more specifically as "ethnobotany," and sometimes more generally as "ethnoecology." Bioprospecting usually entails ethnobiological or ethnoecological analysis and often utilizes the services, in whole, or in part, of ethnobiologists or ethnoecologists. Ethnobiologists or ethnoecologists may have their primary academic or professional training in a wide variety of fields, but their training inevitably entails a thorough grounding in the study of "ethnology," which is the comparative study of cultures, and which often is more popularly known as "cultural anthropology" (Winick 1972:193).

The Definition of Indigenous Peoples

The term "indigenous peoples" has been defined in various ways (Hitchcock 1994:2-4). It usually refers to those peoples who are descendants of the original populations residing in a country, have a sense of cultural identity or social solidarity, and possess ethnic characteristics that distinguish them from politically dominant groups who are descendants of people who came to the country later in time and subjugated the earlier inhabitants (Hitchcock 1994:24; Posey and Dutfield 1996:230).

It has been estimated that there are 5,290 groups of indigenous peoples in the world totaling 357,000,000 people. Many commentators have argued that these groups that have been indentified as "indigenous peoples" are "the single most disadvantaged set of populations in the world today" (Hitchcock 1994:2). Because many indigenous peoples have been forcibly removed from their traditional homelands and may even be arrested for trespassing on them to hunt, fish, or gather for subsistence, many of them no longer live in a coherent community (Hitchcock 1994:4).

Most bioprospecting projects, though, are focused in relatively confined geographical areas. Consequently, most legal instruments designed to protect indigenous peoples are primarily concerned with not further usurping the control of indigenous peoples over traditional resources within a local geographical area, or community. Therefore, rather than generally referring to the rights of indigenous peoples, most such instruments use more specific referents, such as "indigenous and local communities embodying traditional lifestyles," which is the specific language used in the United Nations Convention on Biological Diversity, and this paper consequently also focuses on the legal rights of such local communities of indigenous peoples (Posey 1996:47). This terminological practice, however, glosses over the fact that probably the most valuable traditional resources are those that are carried around in the heads of indigenous peoples, i.e., their traditional knowledge or "intellectual property" (Greaves 1994; Rubin and Fish 1994:23-24).

The Definition of Intellectual Property

The rights of indigenous peoples to be equitably compensated for the commercial use of their traditional knowledge has, until recently, most commonly been referred to as their "intellectual property rights" ("IPR") (Greaves 1994). "Intellectual property" has been defined as "intangible personal property in creations of the mind" (Dratler 1994:1-2).

There are two general kinds of recognized legal means for protecting intellectual property (Dratler 1994:1-8). The first is represented by such instruments as copyrights, patents, and statutory plant variety protection. This first kind provides strongly exclusive rights for a limited period of time, and its primary purpose is to provide innovation incentives (Dratler 1994:1-8).

The second kind is represented by trademarks, trade secrets, unfair competition law, and, of specific relevance, licensing agreements, including private bioprospecting agreements. This latter category of intellectual property is aimed at protecting the public from confusion and deception from imitations, enhancing competition by encouraging comparison shopping, and preserving investments in reputation and good will.

Intellectual Property Instruments Suitable for Bioprospecting

Of the two general kinds of intellectual property tools, the second is widely considered more compatible with the cultures of traditional societies and indigenous peoples and therefore probably is the most useful for bioprospectors (Posey 1991:32; Rubin and Fish 1994; Soleri et al. 1994:25; Stephenson 1994; Stephenson in press (a)). Licensing agreements are adaptable to communal, evolving knowledge, may be perpetual, and probably are the easiest and least expensive form of intellectual property instruments to implement (Stephenson in press (a)).

Limitations of Intellectual Property Rights in the Bioprospecting Context

The term "intellectual property rights," however, carries a lot of baggage. It is rooted in European and American legal traditions and notions of private property that many indigenous people and members of traditional societies consider inimical to more communal, holistic values and traditions that they espouse. Consequently, many commentators have recently focused on exposing inherent limitations and problems posed by traditional Western IPR in the bioprospecting context and simultaneously have urged alternative, more public trust-oriented approaches toward providing an equitable distribution of bioprospecting dividends (Brush 1993; 1994; 1996a; 1996b; Brush and Stabinsky 1996; Posey 1996; ; Posey and Dutfield 1996; Dove 1996; Gudeman 1996; Nabhan, et al. 1996; Patel 1996; Richards 1996; Soleri, et al. 1994:24-25, and Varese 1996).

Darrell Posey, an Oxford-based anthropologist, entomologist, and ethnobiologist, is in the vanguard of the movement away from IPR. He has argued that it is necessary to "go beyond" IPR and offers the term "traditional resource rights" ("TRR") as a more compatible alternative term for reconciling the values of

indigenous and traditional peoples with those of Western science and law.

Even those who stridently favor using Western IPR and private market approaches to "sell" genes for the benefit of indigenous peoples and traditional societies carefully distinguish between Western legal concepts of IPR, which establish norms, and the more fluid and, it is argued, more appropriate, Western economic notions of IPR, which are rooted in de facto appropriation (Vogel 1994:23-31).

While these concerns about terminology are warranted, this is another instance where rhetoric is outpacing pragmatics. As one of the most vociferous opponents of IPR in the bioprospecting context, Stephen Brush, has himself observed, pitting indigenous societies against Western societies often is misleading, because:

this opposition blurs the fluidity and permeability of knowledge and cultural boundaries. Indigenous knowledge very often includes information that has been adopted from the dominant culture. (1996a:6) (cited and quoted originally in Stephenson 1996:115).

Dismissal of Western IPR tools in the bioprospecting context has frequently been too facile. The effects of human selection and management strategies in creating folk crop varieties of seeds, for example, have too often been ignored, and these, in turn, create the basis for traditional IPR protection (Stephenson in press (a)).

Indeed, while dissecting the inherent limitations of numerous tools that are deeply-rooted in Western IPR law, Posey also recognizes that they have some utility in certain contexts (Posey and Dutfield 1996:68-92, 101-118). Such tools discussed by Posey include: material transfer agreements, licensing agreements, letters of intent, memoranda of understanding, model contracts, patents, copyrights, trademarks, industrial designs, trade secrets, plant breeders' rights, geographic appellations of origin, legally binding international agreements, such as the TRIPS (Trade-related Aspects of Intellectual Property Rights) section of GATT (General Agreement of Tariffs and Trade) and the Convention on Biological Diversity, "soft law" such as the Rio Declaration, and nongovernmental instruments, such as professional societies' codes of ethics (Posey and Dutfield 1996:68-92, 101-138).

Moreover, IPR tools are themselves evolving to better adapt to the demands of the new global workplace (Benko 1987 and Weil and Snapper 1990 cited in Brush 1993:657; Dratler 1994:1-8; Rubin and Fish 1994). These adaptations, such as computer software licensing agreements, for example, can, in turn, be adapted to protect evolving, communal indigenous intellectual property and thereby potentially be harnessed to allow indigenous and traditional societies to enter into bioprospecting contracts with Western scientists and entrepreneurs that are mutually beneficial (Rubin and Fish 1994; Stephenson 1994; in press (a); Vogel 1994:29).

In short, while it is important to be sensitive to the connotations and political overtones of terms such as IPR that are bandied about in the bioprospecting context in order to more effectively collaborate with the indigenous peoples and traditional societies who are most immediately affected by bioprospecting enterprises, legal tools--by whatever name they are given--that can bridge gulfs between divergent Western and indigenous political and cultural perspectives and agendas should not be abandoned out of hand. They may be more mutable and adaptable than is apparent from the rhetoric that surrounds them, and they consequently may be able to provide critical, solid bases for collaboration and mutual benefit-sharing.

The Legal Framework

Bioprospecting does not occur in a legal vacuum. It is potentially constrained by multilateral international conventions, bilateral and multilateral international treaties, customary international law, statutory law, common law, local customary law, contracts, memoranda of understanding, and even ethical guidelines having legal ramifications (Anaya 1996; Posey 1996; Posey and Dutfield 1996). The salience of most of these constraints on bioprospecting have emerged only in the past decade, though, and they promise to be even more salient in the near future as indigenous peoples begin increasingly, for the first time in history, to gain a foothold in the international legal arena (Anaya 1996:39-74; Dorsey 1997; Downing and Gushner 1988; Greaves 1994; Hitchcock 1994; Posey 1996; Struell 1997).

Until the past few years, the biological and cultural resources of indigenous peoples living in biodiverse and fragile rainforest, arid land, and island ecosystems in the third and fourth worlds were treated as virtually

free for the taking by bioprospectors, art collectors, archaeologists, and museum curators from Europe and North America (Kloppenborg 1988; 1991; Posey 1990; Rubin and Fish 1994:26-30; Stephenson 1996). Practically the only legal constraints faced by such prospectors, scientists, and collectors were those imposed by conventional Western law. Little, if any, consideration was given in Western law to compensating indigenous peoples for the expropriation of their cultural and biological resources.

Now, however, in stark contrast to the custom that prevailed for generations, anyone in the United States can face stiff criminal sentences for trafficking, or even harboring, the cultural property of Native Americans contrary to the provisions of the recently-enacted Native American Graves Protection and Repatriation Act, 25 USC §3001, et seq. (Stephenson 1996:119, n. 13) or heavily penalized for trafficking or harboring cultural objects that have been improperly imported from other nations contrary to the provisions of the Convention on Cultural Property Implementation Act, 19 USC §2601, et seq., which implements the UNESCO Convention on the Means of Prohibiting and Preventing Illicit Import, Export and Transfer of Ownership of Cultural Property, 823 UNTS 231, 10 I.L.M. 289 (1971) (Struell 1997).

Most indigenous rights' advocates consider the legal instruments in place to protect traditional resource rights as still woefully inadequate, though, particularly with respect to the more intangible intellectual property of indigenous peoples, and, at present, it is unlikely that bioprospectors will face the same heightened penalties that those that traffic in cultural objects can (Greaves 1994; Posey 1996; Stephenson 1996). Nevertheless, the trend toward increasing the legal protection for indigenous peoples' traditional resource rights, including their intellectual property, is clear, and bioprospectors will undoubtedly face ever-increasing legal constraints on their activities.

The UNCED Convention on Biological Diversity

In June, 1992, the United Nations Conference on Environment and Development (UNCED) adopted the Convention on Biological Diversity (CBD) at the Earth Summit in Rio de Janeiro, Brazil. Originally 150 countries were signatories to the Convention, and within three years the CBD had been ratified or acceded to by over 125 countries and the European

Economic Community (U.N. Environment Programme 1994). Article 8(j) of the CBD requires that each party, subject to its own 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" (Posey 1996:47). Moreover, where value can be derived from traditional knowledge about biological diversity, the CBD requires that governments, subject to their own national legislation, guarantee the communities the right of prior approval of the wider use of their traditional knowledge and equitable sharing of the benefits of such use (Grifo and Downes 1996:284). This means that "communities must have the right to allow access on their own terms—and they must have the right to forbid access altogether" (Grifo and Downes 1996:284). Although these rights of indigenous communities may be limited by national legislation, and such limitations may be significant, the CBD nevertheless establishes the broad, legal framework for all bioprospecting (Rubin and Fish 1994:31-36; Stephenson, in press (b)).

Private Bioprospecting Agreements

Probably the easiest, least expensive, and most flexible means for reconciling the objectives of bioprospectors with the TRR or IPR of indigenous peoples and traditional communities are written agreements, or contracts, between the bioprospector, or the bioprospecting team, and indigenous communities (Rubin and Fish 1994:37).

Elements of Bioprospecting Agreements. Bioprospecting agreements include both features that are common to ordinary contracts and intellectual property licensing agreements and features that are specific to the bioprospecting context (Laird 1993). These elements include:

1. **Parties:** All contracts represent an agreement, or combination of agreements, between two or more persons or entities. Bioprospecting contracts may be between pharmaceutical companies and collectors (see Downes, et al. 1993) or between collectors and local, indigenous communities, or between all three such groups, or between any combination of such groups and national governments (Laird 1993:102-108; Janzen, et al. 1993:141-4). The discussion in this paper touches on all such permutations but focuses on agreements

between outside collectors and local representatives of indigenous peoples or local communities embodying traditional lifestyles. (For a more thorough discussion of agreements between pharmaceutical companies and collectors, see Downes, et al. 1993).

2. **Consideration:** All contracts require an exchange of value – some "right, interest, profit or benefit accruing to one party, or some forbearance, detriment, loss or responsibility given, suffered, or undertaken by the other" (Black 1979:277). In the bioprospecting context, the profits or benefits to the parties are uncertain, contingent, and usually not realized, if they are realized at all, until several years after the collection of biological specimens and ethnobiological information. Similarly, the forbearance, detriment, loss or responsibility given, suffered, or undertaken by the indigenous or traditional community usually is not readily apparent or easily measured, particularly if it is intangible intellectual property (Laird 1993:122). Accordingly, each bioprospecting contract must be carefully and thoroughly negotiated after thorough disclosure and preliminary exploratory inquiries have been undertaken. It may even be necessary to enter into a series of contingent contracts—each dependent on the outcome of prior research. The initial, preliminary research should include both a thorough ethnoecological and a thorough environmental impact assessment. Thus, biosprospectors should either contract for or have team members who are capable of performing both ethnoecological and environmental scientific investigations. Because of the uncertain and contingent nature of future benefits from bioprospecting, compensation may take many unique forms in the bioprospecting context. It could include advance payments for the simple collection of samples and information, staged future royalties, an agreement to continue an ongoing commercial relationship—such as an agreement to contract all future ethnographic consulting to local, traditional healers, or investments in the local infrastructure such as legal resources, primary health care, medicinal plant nurseries for endangered or overexploited species, or education (Cunningham 1991; King 1994; Laird 1993:122; Moran 1994).

All such compensation must be carefully and thoroughly negotiated with a thorough appreciation for the possible negative impacts of such compensation (Laird 1993:122-3). For example, an agreement to continue to collect samples in the region for the

"profit" of local suppliers may have a long-term detrimental impact on the local ecology, or agreements to pay local informants may encourage "nonsense" answers if preliminary ethnographic homework has not been conducted (Laird 1993:117, 122).

3. Provisions for tracking the use of the samples and knowledge and accounting: Intellectual property licensing agreements typically contain provisions to insure that if the source resource, including especially the source knowledge, or intellectual property, is modified or evolves, that a fair portion of the commercial benefits derived from such modifications or evolution are returned to the original source. The contracts should accordingly have provisions for tracking how the samples and knowledge obtained from the indigenous context is ultimately developed for commercial use, for verifying its performance in the market, and for an independent accounting (Laird 1993:112; Downes, et al. 1993:260-1, 273-4; Stephenson 1994:182-184).

4. Confidentiality provisions: Frequently, indigenous ethnobiological knowledge will only be shared with collectors in exchange for a promise that its secret or sacred nature will not be corrupted by sharing it without permission (Stephenson in press (a); Downes, et al. 1993:274). Similarly, pharmaceutical companies will usually want to assure that any derivatives from the samples collected or the shared ethnobiological knowledge are maintained as trade secrets (Downes, et al. 1993:274). Thus, there should be a mutual agreement to take all reasonable steps to keep both kinds of knowledge secret from third parties and an agreement that disclosure to the other party will not constitute a waiver of the secret or sacred nature of the knowledge (Downes, et al. 1993:274). This kind of trade secret protection is now formally recognized in international law for the first time under the TRIPS provisions of GATT (Downes, et al. 1993:274; Yambrusic 1992:222-3).

5. Dispute resolution and enforcement provisions. A contract is only of value if can be enforced. Consideration should be given to whether disputes should be settled in court or by arbitration, the location of any dispute resolution forum, which set of laws should control, and, potentially, even what penalties should be imposed for breaches of the contract.

Because court litigation is expensive and problematic in the international context, most bioprospecting

contracts typically provide for binding arbitration (Downes, et al. 1993:278). There are several well-established international arbitration services and well-accepted international rules for resolving disputes between parties from different sovereignties (Downes, et al. 1993:280).

6. Provisions imposed by professional codes of conduct. The International Society of Ethnobiology has drafted an elaborate Code of Ethics and Standards of Practice that includes numerous mandates that should be part of any bioprospecting contract (International Society of Ethnobiology 1996). Some of the most important provisions include:

- a). full disclosure (in the native languages as well as the language of the collectors) that includes the full range of benefits and full extent of foreseeable harm;
- b). full disclosure of all sponsors and affiliations of the bioprospectors;
- c). fully informed, written consent (or tape recorded consent in preliterate societies) for all research;
- d). an agreement that all collection and research will occur only while making efforts to fully understand the cultural context and ramifications of such research to the peoples' affected, i.e., that there should be an ongoing ethnographic impact assessment (see below);
- e). an agreement to translate all provisions of the contract in the native languages and to maintain communications through interpreters;
- f). a provision to allow the local communities access, whenever feasible, to the fruits of the bioprospecting research;
- g). a provision that due credit in the form of authorship, co-authorship, or other appropriate acknowledgment should be provided to the local community in addition to or as part of the other compensation recited in the contract; and
- h). a provision that the local communities should retain: the right to control access to land, sacred places, and traditional resources and traditional knowledge; the right to protect the use of local language, symbols, and modes of expression; and the right retain ownership interests in the use of traditional resources and knowledge.

The Ethnoecological Framework

The foregoing discussion shows that bioprospecting not only has legal constraints but also important ethnoecological constraints and that these two kinds of

constraints are closely intertwined. In order to fully appreciate the potential medicinal value of plant samples and traditional knowledge, it is critical to investigate how the biological or traditional knowledge obtained from bioprospecting efforts has been incorporated into the healing rituals, agricultural routines, ecology, and expressive lives of the local people (Berkes 1993; Calamia 1996; Imperato 1979; Janzen 1978; Johannes 1993; Manning 1987; Romanucci-Ross 1969; Pfaffenberger 1992; Slobin 1996; Turner 1969; Wavey 1993). The value of using the filter of indigenous knowledge, which sometimes is referred to as the "ethnobotanical filter," to significantly enhance the potential for identifying commercially useful samples collected in the field, i.e., to more efficiently separate the "wheat" from the "chaff," is now widely-accepted (Balick 1990 cited in Laird 1993:119; Rubin and Fish 1994:39).

Furthermore, "many of the cultures from which traditional knowledge is collected are more endangered than the ecosystems in which they reside" (Hitchcock 1994:2; Laird 1993:121; Rubin and Fish 1994:23-4). The anthropological literature is replete with documented instances of how the integrity of indigenous societies have been threatened by the intervention of outside technology and of how the traditional resources of indigenous peoples have been rampantly exploited without just compensation for generations (Erasmus 1961; Kloppenburg 1988; Kloppenburg 1991; Niehoff 1966; Posey 1990:15; Rubin and Fish 1994:26-30; Spicer 1952; Stephenson 1994:181, n. 1; Stephenson 1996). If it is also true, as the Declaration of Belém presumes, that indigenous peoples are often the best stewards of the ecosystems that they inhabit, then it is vital for the continued sustainability of the most fragile and biologically diverse ecosystems in the world that bioprospectors comprehend the potential impact on the people residing in those ecosystems of any bioprospecting projects (Posey 1996:211; Rubin and Fish 1994:23-4). Moreover, it would be inhumane and a violation of fundamental human rights to do anything less. International conventions, codes of ethics, and well conceived bioprospecting contracts mandate that an ethnographic impact assessment be conducted prior to, during, and after the completion of any significant bioprospecting undertaking (Downes, et al. 1993; Laird 1993; Rubin and Fish 1994).

The better the ethnoecological framework within which bioprospecting occurs is understood, the more likely that compensation can be tailored to ultimately

benefit indigenous societies and assist in their perpetuation and positive, sustainable development (Chapin 1991; Laird 1993:121; Rubin and Fish 1994; Stephenson 1994). In order to optimize compensation provisions of bioprospecting contracts, at least the following ethnographic characteristics should be understood (Posey 1994:246-7):

- 1). What places, customs, and knowledge are considered sacred and secret?
- 2). What is the traditional knowledge about the preparation, processing, and storage of potentially commercially useful species?
- 3). What is the traditional knowledge about the formulations of native species involving more than one ingredient, including, for example, what the synergistic effects are of traditional medicines?
- 4). What is the traditional knowledge of species' utilization (planting methods, care requirements, and selection criteria, etc.)?
- 5). What is the traditional knowledge of how to conserve the ecosystem (that portion of it that may be of commercial value)?
- 6). What does the indigenous society consider as its physical and cultural property?
- 7). What are the indigenous classificatory or taxonomic systems for understanding the physical and sociocultural environments?

Finally, biosprospecting agreements require the prior identification of the individuals or groups who should properly be compensated for the extraction of traditional resources and knowledge (Brush 1993:663; McGowan and Ukeinya 1994; Stephenson in press (a)). This is often very difficult and usually cannot be reasonably done without a prior, thorough understanding of the ethnoecological landscape (McGowan and Ukeinya 1994; Stephenson in press (a)).

An ethnoecological portrait of a local ecosystem cannot be efficiently and reliably be provided by amateurs any more than law or medicine can be competently practiced by persons who are not professionally trained in those fields. Consequently, any significant biosprospecting undertaking should involve one or more trained cultural anthropologists or ethnographers, preferably with specific training in ethnoecology. For the foregoing reasons, the importance of such services cannot be underestimated.

Summary and Conclusion

The adage, "if you do not know what you are aiming at, you will surely miss it," is particularly apt for bioprospecting. The term "biodiversity," from which "bioprospecting" is derived, has rhetorical flourish, but it also is so broad and vague that its scientific utility is dubious, and it may create counterproductive misperceptions. One of the first priorities of bioprospectors, therefore, should be to carefully articulate the objectives of their work and then carefully communicate those objectives to all institutions, communities, and peoples who are potentially affected by the work. Such communication should be both in the bioprospectors' language and in native languages and use easily understood, lay, terminology alongside scientific terminology, whenever practical.

The legal framework and ethnoecological context in which most bioprospecting occurs dictates that communication of project objectives also include thoroughly disclosing the impact of the project to potentially affected indigenous peoples and local communities embodying traditional lifestyles. Therefore, a thorough prior, contemporaneous, and post assessment of the impact of any bioprospecting project on such societies and peoples and their local ecologies must be conducted by competent professionals, including competent cultural anthropologists, ethnographers, or ethnoecologists, and the results of such assessments must be made available to persons involved in or potentially affected in some significant way by the project. This assessment should include a thorough survey of pertinent traditional resources, including traditional knowledge, and any bioprospecting contract should include an express agreement about how such knowledge is to be shared with the bioprospectors and third persons as well as any compensation that is to be provided for such sharing of traditional resources and knowledge.

Bioprospecting conducted in such a responsible manner should contribute positively to the lives of the indigenous peoples and traditional societies whose cultures are frequently as endangered as the ecosystems that have served as their traditional homelands (Rubin and Fish 1994:23-4). The biodiversity in those ecosystems, upon which all bioprospecting ultimately depends, will also stand a greater chance of surviving, because the people indigenous to those ecosystems have been their principal stewards.

Notes

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References

- Anaya, S.J.
1996 *Indigenous Peoples in International Law*. New York: Oxford University Press.
- Benko, R.P.
1987 *Protecting Intellectual Property Rights: Issues and Controversies*. Washington, D.C.: American Enterprise Institute for Public Policy Research.
- Balick, M.
1990 "Ethnobotany and the identification of therapeutic agents from the rainforest." In *Bioactive Compounds from Plants*. Edited by D.J. Chadwick and J. Marsh. New York, NY: John Wiley and Sons.
- Berkes, F.
1993 "Traditional Ecological Knowledge in Perspective." In *Traditional Ecological Knowledge Concepts and Cases*. Edited by J.T. Inglis. Ottawa: International Program on Traditional Ecological Knowledge and International Development Research Center.
- Black, H.C.
1979 *Black's Law Dictionary*. St. Paul, MN: West Publishing Co.

- Brush, S.B.
 1993 Indigenous Knowledge of Biological Resources and Intellectual Property Rights: The Role of Anthropology. *American Anthropologist* 95:653-686.
- 1994 A Non-Market Approach to Protecting Biological Resources. In *Intellectual Property Rights for Indigenous Peoples, A Sourcebook*. Edited by T. Greaves. Oklahoma City: Society for Applied Anthropology.
- 1996a Whose Knowledge, Whose Genes, Whose Rights? In *Valuing Local Knowledge: Indigenous People and Intellectual Property Rights*. Edited by S.B. Brush and D. Stabinsky. New York: Island Press.
- 1996b Is Common Heritage Outmoded? In *Valuing Local Knowledge: Indigenous People and Intellectual Property Rights*. Edited by S.B. Brush and D. Stabinsky. New York: Island Press.
- Brush, S.B. and D. Stabinsky
 1996 *Valuing Local Knowledge: Indigenous People and Intellectual Property Rights*. Edited by S.B. Brush and D. Stabinsky. New York: Island Press.
- Calamia, M.
 1996 Traditional Ecological Knowledge and Geographic Information Systems in the Use and Management of Hawaii's Coral Reefs and Fishponds. *High Plains Applied Anthropologist* 16:144-164.
- Chapin, M.
 1991 How the Kuna Keep Scientists in Line. *Cultural Survival Quarterly* 15:17.
- Cunningham, A.B.
 1991 Indigenous Knowledge and Biodiversity. *Cultural Survival Quarterly* 15:4-8.
- Dorsey, J.E.
 1997 International Human Rights. *The International Lawyer* 31:659-669.
- Dove, M.R.
 1996 Center, Periphery, and Biodiversity: A Paradox of Governance and a Development Challenge. In *Valuing Local Knowledge: Indigenous People and Intellectual Property Rights* Edited by S.B. Brush and D. Stabinsky. New York: Island Press.
- Downes, D., et al.
 1993 Biodiversity Prospecting Contract. In *Biodiversity Prospecting: Using Genetic Resources for Sustainable Development*. Edited by W.V. Reid, et al. Washington, D.C.: World Resources Institute.
- Downing, T.E., and G. Gushner. eds.
 1988 *Human Rights and Anthropology*. Cambridge, MA: Cultural Survival, Inc.
- Dratler, J.
 1994 *Licensing of Intellectual Property*. New York: Law Journal Seminars-Press.
- Erasmus, C.J.
 1961 *Man Takes Control: Cultural Development and American Aid*. Indianapolis, IN: The Bobbs-Merrill Company, Inc.
- Greaves, T. ed.
 1994 *Intellectual Property Rights for Indigenous Peoples: A Sourcebook*. Oklahoma City: Society for Applied Anthropology.
- Grifo, F.T. and D.R. Downes
 1996 Agreements to Collect Biodiversity for Pharmaceutical Research: Major Issues and Proposed Principles. In *Valuing Local Knowledge: Indigenous People and Intellectual Property Rights*. Edited by S.B. Brush and D. Stabinsky. New York: Island Press.
- Gudeman, S.
 1996 Sketches, Qualms, and Other Thoughts on Intellectual Property Rights. In *Valuing Local Knowledge: Indigenous People and Intellectual Property Rights*. Edited S.B. Brush and D. Stabinsky. New York: Island Press.

- Hitchcock, R.K.
1994 International Human Rights, the Environment, and Indigenous Peoples. *Colorado Journal of International Environmental Law and Policy* 5:1-22.
- Imperato, Pascal J.
1979 Traditional Medical Practitioners among the Bambara of Mali and Their Role in the Modern Health Care Delivery System. In *African Therapeutic Systems*. Edited by Z.A. Ademuwagun, et al. Waltham, MA: African Studies Association.
- International Society of Ethnobiology
1996 Draft Code of Ethics and Standards of Practice of the International Society of Ethnobiology. Nairobi: unpublished manuscript.
- Janzen, D.H., et al.
1993 Research Management Policies: Permits for Collecting and Research in the Tropics. In *Biodiversity Prospecting: Using Genetic Resources for Sustainable Development*. Edited by W.V. Reid, et al. Washington, D.C.: World Resources Institute.
- Janzen, John M.
1978 *The Quest for Therapy: Medical Pluralism in Lower Zaire*. Berkeley, CA: University of California Press.
- Johannes, R.E.
1993 Integrating Traditional Ecological Knowledge and Management with Environmental Impact Assessment. In *Traditional Ecological Knowledge Concepts and Cases*. Edited by J.T. Inglis. Ottawa: International Program on Traditional Ecological Knowledge and International Development Research Center.
- King, S.
1994 Establishing Reciprocity: Biodiversity, Conservation and New Models for Cooperation between Forest-Dwelling Peoples and the Pharmaceutical Industry. In *Intellectual Property Rights for Indigenous Peoples, A Sourcebook*. Edited by T. Greaves. Oklahoma City: Society for Applied Anthropology.
- Kloppenburg, J.
1988 *First the Seed: The Political Economy of Plant Biotechnology*. Cambridge, MA: Cultural Survival, Inc.
1991 No Hunting: Biodiversity, Indigenous Rights, and Scientific Poaching. *Cultural Survival Quarterly* 15:14-18.
- Laird, S.A.
1993 Contracts for Biodiversity Prospecting. In *Biodiversity Prospecting: Using Genetic Resources for Sustainable Development*. Edited by W.V. Reid, et al. Washington, D.C.: World Resources Institute.
- Manning, P.K.
1987 *Semiotics and Fieldwork*. Beverly Hills, CA: Sage Publications.
- McGowan, J. And I. Udeinya
1994 Collecting Traditional Medicines in Nigeria: A Proposal for IPR Compensation. In *Intellectual Property Rights for Indigenous Peoples, A Sourcebook*. Edited by T. Greaves. Oklahoma City: Society for Applied Anthropology.
- Moran, K.
1994 Biocultural Diversity Conservation through the Healing Forest Conservancy. In *Intellectual Property Rights for Indigenous Peoples, A Sourcebook*. Edited by T. Greaves. Oklahoma City: Society for Applied Anthropology.
- Nabhan, G.A., et al.
1996 Sharing the Benefits of Plant Resources and Indigenous Scientific Knowledge. In *Valuing Local Knowledge: Indigenous People and Intellectual Property Rights*. Edited by S.B. Brush and D. Stabinsky. New York: Island Press.
- Niehoff, A.H., editor
1966 *A Casebook of Social Change: critical evaluations of attempts to introduce change in the five major developing areas of the world*. Chicago: Aldine Publishing Company.

- Patel, S.J.
1996 Can the Intellectual Property Rights System Serve the Interests of Indigenous Knowledge? In *Valuing Local Knowledge: Indigenous People and Intellectual Property Rights*. Edited by S.B. Brush and D. Stabinsky. New York: Island Press.
- Pfaffenberger, B.
1992 Social Anthropology of Technology. *Annual Review of Anthropology* 21:491-516.
- Posey, D.A.
1990 Intellectual Property Rights and Just Compensation for Indigenous Knowledge. *Anthropology Today* 6,4:13-16.
1994 International Agreements and Intellectual Property Right Protection for Indigenous Peoples. In *Intellectual Property Rights for Indigenous Peoples, A Sourcebook*. Edited by T. Greaves. Oklahoma City: Society for Applied Anthropology.
1996 *Traditional Resource Rights: International Instruments for Protection and Compensation for Indigenous Peoples and Local Communities*. Gland, Switzerland: IUCN.
- Posey, D.A. and G. Dutfield
1996 *Beyond Intellectual Property*. Ottawa: International Development Research Centre.
- Richards, P.
1996 Culture and Community Values in the Selection and Maintenance of African Rice. In *Valuing Local Knowledge: Indigenous People and Intellectual Property Rights*. Edited by S.B. Brush and D. Stabinsky. New York: Island Press.
- Romanucci-Ross, L.
1969 The Hierarchy of Resort in Curative Practices: The Admiralty Islands, Melanesia. *Journal of Health and Social Behavior* 10:201-209.
- Rubin, S.M., and S.C. Fish
1994 Biodiversity Prospecting: Using Innovative Contractual Provisions to Foster Ethnobotanical Knowledge, Technology, and Conservation. *Colorado Journal of*
- International Environmental Law and Policy* 5:23-58.
- Soleri, D., et al.
1994 Gifts from the Creator: Intellectual Property Rights and Folk Crop Varieties. In *Intellectual Property Rights for Indigenous Peoples, A Sourcebook*. Edited by T. Greaves. Oklahoma City: Society for Applied Anthropology.
- Slobin, K.
1996 Healing Through the Use of Symbolic Technologies among the Dogon of Mali. *High Plains Applied Anthropologist* 16:136-143.
- Spicer, E.H.
1952 *Human Problems in Technological Change: the social and cultural dynamics involved in technological change*. New York: John Wiley & Sons, Inc.
- Stephenson, D.J., Jr.
1994 A Legal Paradigm for Protecting Traditional Knowledge. In *Intellectual Property Rights for Indigenous Peoples, A Sourcebook*. Edited by T. Greaves. Oklahoma City: Society for Applied Anthropology.
1996 A Comment on Recent Developments in the Legal Protection of Traditional Resource Rights. *High Plains Applied Anthropologist* 16:114-121.
- in press (a) A Practical Primer on Intellectual Property Rights in a Contemporary Ethnoecological Context. In *Ethnoecology: Situated Knowledge/Located Lives*. Edited by V. D. Nazarea. Tucson: University of Arizona Press.
- in press (b) The Importance of the UNCED Convention on Biological Diversity to the Loita Maasai of Kenya. In *Human Values of Biodiversity*. Edited by G. Dutfield and D.A. Posey. Cambridge, UK: Cambridge University Press.

- Struell, F.D.
1997 Cultural Property. *The International Lawyer* 31:691-4.
- Turner, V.W.
1969 *The Ritual Process: Structure and Anti-Structure*. Ithaca, NY: Cornell University Press.
- Varese, Stefano
1996 The New Environmental Movement of Latin American Indigenous People. In *Valuing Local Knowledge: Indigenous People and Intellectual Property Rights*. Edited by S.B. Brush and D. Stabinsky. New York: Island Press.
- Wavey, C.R.
1993 International Workshop on Indigenous Knowledge and Community-based Resource Management: Keynote Address. In *Traditional Ecological Knowledge Concepts and Cases*. Edited by J.T. Inglis. Ottawa: International Program on Traditional Ecological Knowledge and International Development Research Center.
- Weil, V., and J. Snapper
1990 *Owning Scientific and Technical Information*. New Brunswick: Rutgers University Press.
- Vogel, J.H.
1994 *Genes for Sale: Privatization as a Conservation Policy*. New York: Oxford University Press.
- Winick, C.
1972 *Dictionary of Anthropology*. Totowa, N.J.: Littlefield, Adams & Co.
- Yambrusic, E.S.
1992 *Trade-Based Approaches to the Protection of Intellectual Property*. New York: Oceana Publications, Inc.