Article 15.5 of the CBD raises the issue of prior informed consent. The CBD adopted the Bonn Guidelines[128] in April 2002. The Guidelines provide a voluntary framework that would improve DO requirements. While not binding, the Guidelines are being considered by WTO and WIPO committees.[129] DO requirements are a central feature of contracts that cover prospecting for genetic resources.

VII. *PROSPECTING AGREEMENTS*

There have been several instances where companies have collected TM, both biological material and TK, under a contract with the government of the source country.[130] This in effect acknowledges origin, and compensates the right holder. It is very difficult to estimate the value of biological material, as well as TK, in advance. Given that these contracts will exist between multinational corporations and less developed countries, multinationals have a bargaining advantage that may lead to the undervaluation of TK. In contrast a patent:

> . . . allows its holder to accept the risk that its value will change over time. Patent rights would give LDC's [Less Developed Countries] the freedom to wager that their biodiversity resources will become more valuable over a longer time horizon. Denied this alternative, LDC's will be forced to accept the lower up-front offers a contractual natural-resource exploitation brings.[131]

Despite some pessimistic appraisals, there is no evidence that prospecting agreements led to exploitative agreements. Perhaps the best known prospecting agreement was between Merck and the National Biodiversity Institute, an organ of the Costa Rican government. Merck paid an initial fee of about 1 million US dollars[132] plus an undisclosed royalty fee.[133] The territory explored is limited but within that area both the government and indigenous peoples will assist the company in collection. Merck will hold title to all patents that result in products developed from the agreement. The agreements were concluded before the CBD and the Bonn Guidelines were established, but many of the same concerns were addressed by the Merck agreement. Part of the initial fee was invested in national parks, scientific training, and in conducting a biodiversity inventory. Technology transfer, as provided for in the agreement, made work in the source country more effective. At the same time, royalty payments would encourage further conservation efforts.[134] There was no mention of the rights of indig-

128 Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of Benefits Arising out of their Utilization, http://www.biodiv.org/doc/decisions/COP-06-dec-en.pdf (last visited Sept. 5, 2006).

129 For a general discussion, see Michal Gollin, *Feasibility of National Disclosure of Origin Requirements*, http://www.iucn.org/themes/pbia/documents/trade-docs/gollin.pdf (last visited Sept. 5, 2006).

130 There is also debate if US companies should pay for biological resources taken from public lands. *See* Sandra Bourgasser-Ketterling, *Bioprospecting on Public Lands: Should Private Companies Compensate the Government for their use of Public Land Resources*, 8 J.L. & POL'Y 481 (2000).

131 Shayana Kadidal, *Plants, Poverty, and Pharmaceutical Patents*, 103 YALE L.J. 232 (1993).

132 *See Birds and Bees*, THE ECONOMIST, May 30, 1992, Survey Section at 15.

133 The amount of the royalty has been estimated at 1-3 % of any product that results from the agreement. *See Pharmaceutical Companies Go "Chemical Prospecting" for New Medicines*, PHARMACEUTICAL BUS. NEWS, Aug 21, 1992, available in LEXIS, Nexis Library, PBNWS File.

134 *See* Scott Shahverdian, *Bioprospecting Success, Failures and Viability as a Global Regime*, http://www.colby.edu/personal/s/smshahve/bio%20web%20page%20final.htm (last visited Sept. 5, 2006).

enous communities in the agreement. The assumption would be that there would be a 'trickle down' effect, but this may not be the case in practice. Money given to the central government may stay there.

Later agreements addressed this issue by paying special attention to local needs. The most cited example is Shaman Pharmaceuticals, a company founded in 1989 in California. The name clearly suggests the scope of the company, which aimed to take TK from local communities under fair prospecting agreements. Direct payments were made to support pressing needs such as clean drinking water, roads, and health care. Medium term needs were addressed through technology transfer and training. Long term benefits were regarded as royalty payments. Fifty percent of all royalties apparently went back to indigenous communities and the other half went to the local government.[135] Not all observers were pleased with Shaman's business practices. The Coalition Against Biopiracy has proposed the company to be a "Captain Hook Award Nominee" for, as the name suggests, appropriating indigenous knowledge.

In a short description they suggest these activities "brazenly dredge the public domain" for patentable information. Company research on Sangre de Drago, a South American plant, was a particular source of contention. They awarded Shaman "The Forked Tongue Platter" for purchasing fermentation technology from Bayer that would potentially reduce the need to purchase plants from local suppliers.[136]

The value of Sangre de Drago (*Croton lechleri*) was a hotly debated issue. Shaman filed for two US patents, one for Provir, an oral medication against a childhood respiratory disease, and Virend, an anti-herpes medication. The company held that not only would it make a profit, but the local community, as well as biodiversity in general, would benefit. Integrating local ethnobotanical information was critical in finding these drugs. As a general figure cited in Shaman's literature, one pharmaceutical would be identified from 10,000 randomly screened plants. Shaman contended that by using local knowledge they could obtain a drug in one of two plants.[137] Yet these two patents were the heart of the issue. One author has held that:

> . . . the curative powers of Sangre de Drago is in the public domain. While knowledge about many other traditional remedies is strictly guarded, in this case all groups living in the Amazonian area – indigenous peoples, racially-mixed populations, settlers, and even tourists – share it. The plant's chemical composition and ethnobotanical uses have been published several times: hardly a 'trade secret'. This makes Shaman's claim of 'novelty' for the two products it has developed from local knowledge about Sangre de Drago more than questionable.[138]

135 *See* Roger Alex Clapp & Carolyn Crook, *Drowning in the Magic Well: Shaman Pharmaceutical and the Elusive Value of Traditional Knowledge*, 11 JOURNAL OF ENVIRONMENT & DEVELOPMENT 79 (2002).

136 *See Biopiracy: Captain Hook Award Nominees*, http://twm.co.nz/CptHook.htm (last visited Sept. 5, 2006).

137 *See* Steven R. King & J. Carlson Thomas, *Biocultural Diversity, Biomedicine and Ethnobotany: The Experience of Shaman Pharmaceuticals*, 20:3 INTERCIENCIA 134 (1995). While the figure that one in two plants known to 'Shamans' can result in a pharmaceutical appears overly optimistic, particularly as the company did declare bankruptcy, it is clear that the search for drugs is narrowed considerably from the figure of one in 10,000 in a 'blind' screening.

138 Viki Reyes, *Seedling*, QUARTERLY NEWSLETTER OF GENETIC RESOURCES INTERNATIONAL, March, 1996, http://www.grain.org/seedling/index.cfm?id=150&print=yes (last visited Sept. 5, 2006).

This statement does not seem to express any solid reasoning as to why the patents should not be granted, as there is a clear leap between general knowledge and particular application as a drug. The natural substances used in Aspirin had been known for thousands of years before Bayer acquired a patent for their drug. This did not act as a bar to acquiring a patent. There is no requirement that an invention has to be a trade secret in order to be patented.

Shaman declared bankruptcy in 1991; much speculation as to the cause of bankruptcy followed. The business model would at first appear to have so many positive aspects, not least of which is the desire to help protect the environment. Some have suggested that the model, while viable at the time, signals: ". . . the fall of 'ethnobotany' as a viable economic pursuit. As technological advances allow for hundreds of thousands of genetic samples to be screened each day, the indigenous knowledge Shaman worked so hard to protect seems to be becoming obsolete."[139] This statement seems to cast doubts upon the viability of TM to provide useful information. Indeed, genetic information is a discovery and cannot, in itself, be patented, much less turned into a marketable drug. It seems the real reason Shaman lost so much money is that there were unrealistic expectations as to the outcome. Large pharmaceutical companies are prepared to continue to investigate drugs derived from TM, and their budgets can be many times what a smaller firm could organize. It may be that indigenous knowledge remains as important as ever. The failure of one company, and perhaps a particular business model, may not be indicative of the market in general.

The saga of Shaman Pharmaceuticals does highlight one important consideration. Leaving aside accusations of bio-piracy, if the company did indeed have the best interests of all parties involved, the end result is that patents have been filed in the name of a company that no longer exists. These patents will eventually enter the public domain, but before that time, it is likely that the community that assisted in the drug development will not be compensated. No one intended this result. Future agreements must take precautions.

There has been much academic interest in bio-prospecting agreements.[140] However, according to some academic observers, the pharmaceutical industry may be moving away from medicinal plant screening for drug development. Over the past decade there has been little new discovery of commercial products from plants. The continued controversy over the use of national biological resources may have played a role in this shift. In part, this has prompted a shift to marine exploration, where natural products are not subject to IP constraints.[141] Marine exploration can take place within nationally controlled coastlines. If this is the case, there may still be claims to these materials under the CBD. Prospecting agreements could very well extend into the seas.

If current IP constraints makes drug screening difficult, this should be reflected in prospecting agreements, which would offer less up front payment in return for a greater share of profits. Benefit sharing carries with it the risk that profits would be

139 Shahverdian, *supra* note 134.

140 *See* Daniel M. Putterman, *Model Material Transfer Agreements for Equitable Biodiversity Prospecting*, 7 COLO. J. INT'L ENVTL. L. & POL'Y 150 (1996).

141 *See* Bodeker, *supra* note 11 at 794.