

The Journal of Environment & Development

<http://jed.sagepub.com>

Preserving Biodiversity in Costa Rica: The Case of the Merck-INBio Agreement

Michele Zebich-Knos

The Journal of Environment Development 1997; 6; 180

DOI: 10.1177/107049659700600206

The online version of this article can be found at:

<http://jed.sagepub.com/cgi/content/abstract/6/2/180>

Published by:

 SAGE Publications

<http://www.sagepublications.com>

Additional services and information for *The Journal of Environment & Development* can be found at:

Email Alerts: <http://jed.sagepub.com/cgi/alerts>

Subscriptions: <http://jed.sagepub.com/subscriptions>

Reprints: <http://www.sagepub.com/journalsReprints.nav>

Permissions: <http://www.sagepub.com/journalsPermissions.nav>

Preserving Biodiversity in Costa Rica: The Case of the Merck-INBio Agreement

MICHELE ZEBICH-KNOS

Compensation for biological samples and information obtained from developing countries is now embodied in contractual relationships between nongovernmental organizations such as Costa Rica's National Biodiversity Institute (INBio) and the Merck pharmaceutical company. This article discusses the innovative partnership between INBio and Merck. This agreement may serve as a model for sustainable development and preserving biodiversity in Costa Rica and elsewhere.

Countries such as Costa Rica traditionally have received little remuneration and minimal benefit from the chemical compounds derived from their own biological resources. Instead, pharmaceutical companies, almost exclusively from the developed world, have reaped financial benefits from such medicinally useful biodiversity.

The shift toward compensation for biological samples and information about these samples is part of what has come to be called biodiversity prospecting. The term, coined by Cornell University professor Thomas Eisner (1989-1990) as *chemical prospecting*, currently is defined as "the exploration of biodiversity for commercially valuable genetic and biochemical resources" (Park, 1995, p. 52). Eisner took prospecting a step further by advocating that species samples and related information be compensated for in a systematic manner (Eisner, 1989-1990; 1994).

If Costa Rica's biodiversity is to be conserved, it has to earn its keep through more diverse commercial ventures than ecotourism can provide. Although profitable for Costa Rica, ecotourism has the potential for disturbing the environment once parks exceed their human carrying capacity. It was Daniel Janzen, the University of Pennsylvania entomologist and Costa Rica advocate, who urged Costa Ricans and foreigners alike to start thinking about Costa Rica's biodiversity in concrete business terms. Janzen referred to Costa Rica as a "fifty thousand square kilometer corporation" that would benefit from joint ventures with

developed world corporations (Janzen, 1991, p. 169). Partnerships would provide benefits, some of which could be allocated for maintenance costs in public reserves and conservation areas.

This article examines the agreement between Merck and Co., Inc. (Merck) and the Costa Rican National Biodiversity Institute (INBio) for supplying biological samples and information that could contribute to the development of pharmaceuticals derived from Costa Rica's biological resources. This innovative and mutually beneficial arrangement between Merck, the world's largest pharmaceutical manufacturer, and INBio was the first of its kind in 1991 and is referred to as the Merck-INBio agreement (Joyce, 1994).

To date, no drugs have been formulated as a result of Merck's biodiversity acquisitions. If successful, however, this agreement can serve other developing countries as a model for creating sustainable cash value from biological patrimony. The Merck-INBio agreement commences the process in Costa Rica, where samples are extracted, and not in the United States, where Merck's primary facilities are located. Traditionally, significant monetary value accrued once a marketable sample reached a laboratory outside the country in which the sample was collected.

To be sure that the Merck-INBio agreement is generalizable to other countries, one must consider the following questions. First, were Costa Rica's scientific and sociopolitical structures a prime reason for creation of the agreement, or did Merck focus solely on Costa Rica's biodiversity? Second, can other developing countries hope to negotiate similar agreements if the existing sociopolitical and scientific structures do not parallel those of Costa Rica?

Costa Rica and INBio: Private-Public Cooperation

Costa Rica benefits from rich tropical biodiversity and is estimated to house approximately 500,000 species of flora and fauna (Sittenfeld & Villers, 1995). These are thought to comprise 5% to 7% of the world's total species (Merck & Co., 1991). Economic benefits attached to this biodiversity derive mainly from ecotourism, which is now Costa Rica's primary source of foreign currency.

Private and public institutions alike had been conducting biodiversity research in Costa Rica for many years prior to 1989. In June of 1989, President Oscar Arias created the INBio Planning Commission. The commission, comprising members from various governmental agencies, academic institutions, and private conservation organizations, recommended that a nonprofit organization be formed. On October 26, 1989, INBio became a legal entity (Sittenfeld & Lovejoy, in press) with the mission to preserve, scientifically classify, and integrate Costa Rica's biodiversity into an overall strategy for sustainable development.

INBio operates in a stable developing country. Levels of political violence and economic disparities are low, government efficiency and organization is adequate, and social development is substantial. Consequently, INBio is able to deliver scientific samples and information in a continuous manner by trained scientists without domestic instability hindering its work.

INBio has a public mission yet remains in the private sector. As a nonprofit private organization, INBio must generate adequate income for survival. This explains its reliance on prospecting agreements. INBio also maintains a close relationship with the Ministry of Natural Resources, Energy and Mines (MIRENEM). A portion of revenues acquired from INBio's biological prospecting agreements goes to Costa Rica's conservation areas. MIRENEM receives 10% of such revenues and 50% of any royalties received from biodiversity prospecting agreements and, in turn, funds conservation areas (Merck & Co., 1993). Conservation areas include national parks and reserves in which biological prospectors often gather samples (INBio, 1994). INBio contributed 10% of the U.S. \$1 million earned from the Merck-INBio agreement to the Island of Coco National Park (Sittenfeld, 1994).

Biodiversity's Price Tag

The Merck-INBio agreement is not a contract based on the mere purchase of plant, insect, or animal samples. Rather, INBio's part of the agreement is to sell processed information as well as biological samples. Samples are gathered with the help of INBio's field personnel, known as parataxonomists. Parataxonomists are lay persons, often from rural areas, who frequently have less than a high school education (Janzen, Hallwachs, Jimenez, & Gamez, 1993). They collect, catalog, and provide data for input into INBio's National Biodiversity Inventory and National Biodiversity Information Management System.

The processed biological package approach is useful to companies like Merck because it provides scientists with greater experimental flexibility. For example, if Merck found a particular beetle that proved interesting, but not extraordinary, the company might want to pursue experiments on related beetles (Caporale, 1992). The inventory and databases managed by INBio make it possible to locate related beetles and conduct additional experiments in Costa Rica using personnel paid at local rates.

Finally, negotiating agreements and advanced chemical research are coordinated by the Biodiversity Prospecting Program. The Biodiversity Prospecting Program is responsible for coordinating higher end tests conducted at the University of Costa Rica that may yield important compounds for Merck. Scientific refinement added at each step is really

what Merck is purchasing. Although identical species samples possibly could be collected across Costa Rica's border in Nicaragua, Merck would not necessarily benefit from detailed taxonomic knowledge, testing, and coordination provided by an INBio-type organization.

An initial 2-year contract was signed in September, 1991. The agreement stipulated that INBio will provide Merck with a "limited number of plant, insect and environmental samples . . . and the right to evaluate these samples for pharmaceutical and agricultural applications for a defined period of time" (Merck & Co., 1993, p. 1). For its part, INBio agreed to establish facilities for the collection and processing of biological samples, hire and train adequate staff for sample collection and processing, and process plant and insect samples at the University of Costa Rica (INBio, 1991).

In turn, Merck agreed to provide (a) training of INBio staff at Merck facilities, (b) U.S. \$1 million during the agreement's 2 year period for research, (c) laboratory equipment worth U.S. \$130,000 for use at the University of Costa Rica, and (d) royalties on the sale of any pharmaceutical products that Merck brings to market as a result of an INBio sample or compound (INBio, 1991; Merck, 1993). Although it appears to be a small sum, U.S. \$1 million is nearly ten times the traditional amount paid for biological samples (Reid, 1993-1994).

Royalties from future drugs could be significant. Although the royalty rate is confidential, typical rates range from 1% to 15% (Watson, 1994). INBio's director, Rodrigo Gamez, put the royalty potential into perspective when he stated that a 2% or 3% royalty on 10 commercially marketed products would generate more income than do bananas and coffee together (Coughlin, 1993). This optimism assumes that 10 products could be developed from Costa Rican samples to generate approximately U.S. \$600,000,000 in royalties. Earning this much in royalties is overly optimistic given the fact that between 10,000 and 35,000 plant or animal samples must be assessed to yield one clinically useful drug (Reid, 1993-1994).

The agreement's value for Costa Rica lies only partially in the gamble to receive royalties. The utility is clearly in collection of up-front fees, not in royalty payments.

For Merck, the initial agreement provided invaluable publicity and goodwill, which came at a cost of slightly more than U.S. \$1 million. For a company with annual sales of more than U.S. \$8 billion, this was a cost-effective campaign (Merck & Co., 1993). Merck also expanded its pharmaceutical research base by including a workforce paid at lower Costa Rican rates. One also must not lose sight of Merck's primary objective—to develop marketable drugs. Once publicity from renewed agreements diminishes, the latter two benefits remain.

The Merck-INBio agreement stipulated that, during an initial 2-year exclusive evaluation period, INBio would not give to any other party

samples that were provided to Merck. This gave Merck time to assess whether it wanted to extend the evaluation period to ensure continued exclusivity. If the evaluation period elapsed and was not renewed, INBio would be able to offer biological samples that were supplied to Merck to other interested parties (INBio, 1991). INBio also was free to provide other species samples not requested by Merck to its other contractual partners.

In 1994, both parties agreed to renew the agreement for another 2 years (Merck & Co., 1994). An additional U.S. \$1 million in research funding is part of the renewal, as are royalties on the sale of any Merck products developed from INBio samples. The renewed agreement also includes transfer of technology and equipment that are Costa Rica's to keep even if no drugs are marketed. Training Costa Rican scientists at Merck's New Jersey laboratory remains in the renewed agreement. As a result of these benefits, Costa Ricans will be better equipped to contribute their expertise to other projects such as the development of Costa Rican biotechnology and/or pharmaceutical firms. Merck is aware of this and agreed that benefits from its biodiversity prospecting agreement far outweigh any future competition from Costa Rica.

A Model Agreement?

The reasons for building a Costa Rican connection were given by Lynn Caporale and Robert Bisset (Caporale, 1992), Merck representatives involved in Merck-INBio negotiations. First, scientific appeal resulted from Costa Rica's rich biodiversity, solid scientific tradition, adequate technical expertise, and a pre-existing organization (INBio) that already had established a biodiversity inventory system. Second, Costa Rica has a strong national commitment to education and conservation, stable democracy, established conflict resolution traditions, and adequately regulated public conservation areas. Finally, Merck found Costa Rica's transportation infrastructure adequate (Caporale, 1992; Merck & Co., 1991).

Pamela Demain, who replaced Robert Bisset as Merck's Senior Director of Corporate Licensing, reinforced the notion that Costa Rica's scientific expertise and sociopolitical factors influenced Merck's decision as much as, if not more than, its biodiversity (personal communication, August 22, 1995). Demain noted that INBio offered attractive levels of expertise. Merck also liked what Demain termed "secondary factors." That is, Costa Ricans conveyed a sense of orderliness, organization, and trustworthiness that Merck felt was necessary for establishing a business venture.

From what Merck representatives reveal, the factors most instrumental in the decision to collaborate with developing countries preclude

species-rich but developmentally poor countries, such as Nicaragua or Guyana. These countries lack many of the requisite scientific and sociopolitical factors paramount in attracting such ventures.

Why, then, have scholars and journalists devoted so much attention to the Merck-INBio agreement, which is portrayed as a model for others to emulate? The answer lies in the fact that, with modification, it is a viable starting point for other countries. Variations of the Merck-INBio model should include a multicollaborative rather than bilateral emphasis. The scope of inquiry also should be broadened to include ethnobotanists and traditional healers.

Multicollaborative efforts, such as the INBio-Cornell University/Bristol Myers agreement, have been undertaken by INBio but have received less media attention than Merck-INBio. Multicollaborative agreements spread costs to more partners, thereby reducing risk and increasing attractiveness to foreign corporations. Funds also may be sought through a United States initiative known as International Cooperative Biodiversity Groups (ICBG). ICBG assistance further reduces corporate operating costs. This is especially helpful in countries less developed than Costa Rica and should be pursued actively while funding is still available.

Biodiversity prospecting is a method that includes the collection of samples almost at random. Where traditional healing knowledge is available, it should be touted as a vital asset in the quest to isolate chemical compounds. Shaman Pharmaceuticals, for example, uses traditional healers' knowledge in its search for new compounds (Reid et al., 1993). Intellectual property rights for community-based knowledge, traditional healers, and shamans must be refined so that indigenous peoples' time-honored knowledge is not placed in legal limbo and subject to exploitation.

To conclude, developing countries whose resources greatly exceed that of Costa Rica will find such agreements very attractive. With creative modification, the Merck-INBio model also can be useful to countries less developed than Costa Rica.

Manuscript received October 22, 1996; revised manuscript accepted for publication January 31, 1997.

References

- Caporale, L. H. (1992, January). *The Merck-INBio agreement: A pharmaceutical company perspective*. Paper presented to the Symposium on Tropical Forests, Medicinal Resources, and the Conservation of Biodiversity, New York.
- Coughlin, M. (1993). Using the Merck-INBio agreement to clarify the Convention on Biological Diversity. *Columbia Journal of Transnational Law*, 31(2), 337-375.

- Eisner, T. (1989-1990, Winter). Prospecting for nature's chemical riches. *Issues in Science and Technology*, pp. 31-34.
- Eisner, T. (1994). Chemical prospecting: A global imperative. *Proceedings of the American Philosophical Society*, 138(3), 385-394.
- INBio. (1991). *Summary of terms—Collaboration agreement: INBio-Merck & Co., Inc.* San Jose, Costa Rica: Instituto Nacional de Biodiversidad.
- INBio. (1994). *Memoria anual, 1993*. San Jose, Costa Rica: Instituto Nacional de Biodiversidad.
- Janzen, D. H. (1991). How to save tropical biodiversity. *American Entomologist*, 37(3), 159-169.
- Janzen, D. H., Hallwachs, W., Jimenez, J., & Gamez, R. (1993). The role of parataxonomists, inventory managers, and Costa Rica's national biodiversity inventory. In W. V. Reid, S. A. Laird, C. A. Meyer, R. Gamez, A. Sittenfeld, D. H. Janzen, M. A. Gollin, & C. Juma (Eds.), *Biodiversity prospecting: Using genetic resources for sustainable development* (pp. 223-254). Washington, DC: World Resources Institute.
- Joyce, C. (1994). *Earthly goods: Medicine hunting in the rainforest*. New York: Little, Brown.
- Merck & Co., Inc. (1991). A modern day Noah's Ark. *Merck World*, 12(5), 6-7.
- Merck & Co., Inc. (1993, February 16). *Searching for medicines while preserving the rainforest: The INBio-Merck agreement*. Unpublished manuscript.
- Merck & Co., Inc. (1994, July 28). *Merck & Co., Inc. and Costa Rica's National Institute of Biodiversity renew innovative agreement to search for new drugs in biological samples*. (Press release)
- Park, S. (1995). Biodiversity prospecting: Pharmaceutical investment in Costa Rica. *Harvard International Review*, 17(2), 52-53, 70.
- Reid, W. V. (1993-1994). The economic realities of biodiversity. *Issues in Science and Technology*, 10(2), 48-55.
- Reid, W. V., Laird, S. A., Meyer, C. A., Gamez, R., Sittenfeld, A., Janzen, D. H., Gollin, M. A., & Juma, C. (1993). A new lease on life. In W. V. Reid, S. A. Laird, C. A. Meyer, R. Gamez, A. Sittenfeld, D. H. Janzen, M. A. Gollin, & C. Juma (Eds.), *Biodiversity prospecting: Using genetic resources for sustainable development* (pp. 1-52). Washington, DC: World Resources Institute.
- Sittenfeld, A. (1994). Biodiversity prospecting. *Our Planet*, 6(4), 20-21.
- Sittenfeld, A., & Lovejoy, A. (in press). Biodiversity prospecting frameworks: The INBio experience in Costa Rica. In L. Guruswamy & J. McNeely (Eds.), *Protection of global biodiversity: Strategies from science, politics, economics, philosophy and law*. Chapel Hill, NC: Duke University Press.
- Sittenfeld, A., & Villers, R. (1993). Exploring and preserving biodiversity in the tropics: The Costa Rican case. *Current Biology*, 4, 280-285.
- Watson, S. (1994, June 14). Are licensing agreements key to technology transfer? An intellectual property mechanism for access to biological resources. *Legal Intelligencer*, pp. 13+.

Michele Zebich-Knos is an associate professor at Kennesaw State University in Georgia. Her research includes public-private linkages and the impact of ecotourism on the environment.