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Genetic Resources and the Convention on Biological Diversity

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At a meeting in Brazil in March, the Convention on Biological Diversity moved a step closer to finalizing an international regulatory regime for access to and benefit sharing of genetic resources. Discussions now under way will be influential in determining policies governing biodiversity research and bioprospecting.

Since the Convention on Biological Diversity (CBD) first opened for signature at the 1992 Earth Summit, 188 countries have signed on. Although the United States is one of a small handful of countries that have not ratified the CBD, US scientists are actively engaged in diverse CBD efforts, including the CBD's global taxonomy initiative, its invasive alien species agenda, and its programmatic ecosystem approach to integrated management, all of which figure into the convention's goals of conservation and sustainable use of biodiversity.

However, of all the CBD-associated issues and programs, none has affected US biologists more than the CBD's deliberations concerning access to and benefit sharing of genetic resources. While many scientists point out that changes in the manner of collecting biological samples began before the advent of the CBD, the CBD has clearly emerged as the foremost impetus for regulation on the national level and as the central international forum for discussions on genetic resources for basic and commercial biological research. Moreover, the UN General Assembly and the 2002 World Summit on Sustainable Development have endorsed the CBD as the authority that will set the standards for the cross-boundary access of genetic resources. At the CBD's last major conference, in Curitiba, Brazil, the 188 parties to the CBD mandated 2010 as the final year for negotiating an international regime for access to and benefit sharing of genetic resources.

In many respects, US scientists and genetic resource specialists welcome the central and clarifying role the CBD plays with regard to genetic resources. Additionally, many scientists stress that the new, more consultative way of collecting samples preceded the CBD, and that those scientists and institutions who pay attention to the needs of other nations do best in securing biological research. However, biologists also point out that with the CBD's ascendancy, there have been less positive developments, with many formerly accessible regions now closed for basic biological research, the emergence of burdensome permitting processes, and new worries—along with sheer inexperience—about new intellectual property conditions for research and publishing.

Guiding lights

The Missouri Botanical Garden is one example of a US institution that necessarily tracks CBD genetic resource developments, in large part because of its research interests in biodiversity-rich locales such as Madagascar. James S. Miller, curator and head of the garden's Applied Research Department, says, "Affirming that biological resources are sovereign possessions for the countries where they occur is a necessary step toward ensuring equitable distribution of the benefits that arise from their use." The common impression, Miller acknowledges, is that there has been too much hope for immediate commercial gains. "The unfulfilled expectations of huge royalties from drugs should not overshadow the very positive effect that the convention has had on the ethics of

The International Cooperative Biodiversity Groups (ICBG) program, funded by the National Institutes of Health, National Science Foundation, and US Department of Agriculture, attempts to integrate drug discovery, biodiversity conservation, and sustainable economic growth. Blanca Araúz and Rafael Aizprúa, two Panamanian botanists on the ICBG drug discovery project, collect leaves in a national park in Panama for extraction and testing in disease bioassays. Araúz's research experience on this project enabled her to obtain international funding for a master's abroad program. Photograph: Phyllis D. Coley.

Using high-performance liquid chromatography, Johant Lakey, a Panamanian chemist in the International Cooperative Biodiversity Groups, analyzes compounds from leaves that test positive for activity against certain diseases or agricultural pests. Habitat destruction and the consequent loss of biodiversity have added urgency to the search for medicinal and agricultural plants. Lakey also gained research experience on this project that led to international funding for a master's abroad program. Photograph: Rafael Aizprúa.

international collaboration, with developing country scientists being more full partners and benefiting from training, input of institutional resources, technology transfer, and other support."

The Missouri Botanical Garden has incorporated many of the consent and participatory norms associated with the CBD in its bioprospecting research guidelines (see *www.wlbcenter.org/policy.htm*). Similarly, the leading US biotechnology trade association, Biotechnology Industry Organization (BIO), has published guidelines for its bioprospecting members. Lila Feisee, BIO's director for intellectual property, points out that "BIO's guidelines are based in large part on the Bonn guidelines," which are the CBD's 2002 promulgated, nonbinding rules for access and benefit sharing of genetic resources. They offer guidance on norms and procedures, such as capacity-building incentives and material transfer agreements. Feisee adds, "BIO has gone on record...as supporting the sustainable development and access and benefit-sharing goals of the CBD."

Many scientists, while not belittling the importance of CBD discussions, think that the development of more equitable relationships and specific mechanisms for accessing genetic resources was already in play before the CBD. Todd Capson, associate scientist at the Smithsonian Tropical Research Institute (STRI) in Panama, says, "My perception is that the opening of the CBD for signature in 1992 played a role in enhancing awareness and expectations on the part of the host country participants, but it was part of a larger trend."

The University of Utah's Liz Coley, whose work since 1976 has focused on plant defenses, currently conducts research in Panama, partly in conjunction with STRI. In connection with her work abroad, Coley looks not so much to CBD developments as to building and maintaining a trusting relationship with a host country. "Our bioprospecting project," says Coley, "is primarily conducted by Panamanian scientists in Panama, with collaborations with a number of universities abroad. We have good relationships with the Panamanian government and institutions because our project involves many Panamanian scientists and because we, as foreign collaborators, have established the trust of our Panamanian colleagues, local NGOs, and government officials."

Panamanian botanist Nayda Flores collects leaves for extraction and testing and maps their location using GPS (global positioning system). Panama's plant biodiversity and accessible, intact forests make it highly suitable for conservation and bioprospecting. The goal of the International Cooperative Biodiversity Groups is to share the benefits of drug discovery and stimulate scientific and economic activity in developing countries. It also helps educate the next generation of resource managers, and Flores's experience on this project led to work on a master's abroad program. Photograph: Rafael Aizprúa.

Panama is a case in point of US biological research contributing to the scientific capacity of the host country. Like the Missouri Botanical Garden and other US institutions working around the world, the STRI program in Panama has built up that country's physical research capacities and has served, in Capson's words, as "a springboard to graduate school" for numerous local participants. Capson adds that the Panama International Cooperative Biodiversity Group, which receives US funding and is directed by the National Institutes of Health, has as one of its major emphases "the training of Panamanian scientists."

"I think it is a privilege to work in other countries, so we should not only obtain all appropriate permits for research and export," Coley says, "but we should feel a moral obligation to help train, transfer technology [to], and collaborate with host-country students and faculty. Thus they receive a benefit for keeping their doors open."

When it comes to biodiversity research, however, not every country is like Panama. Many specialists comment that during this period when international biodiversity access policy is still being formulated, regulations are often burdensome and some areas are closed off to researchers. In fact, Coley points out, in Panama the laws regarding access to biological diversity are being rewritten, and "one concern is that they will restrict both basic and applied research."

Sarah Laird of People and Plants International has worked and written extensively on access and benefit-sharing policy for the past 15 years. She is concerned about the inhibitory policies frequently found in biodiverse nations. "Development of access and benefit-sharing measures has varied enormously by country and region, with only a small number of countries having put in place coherent and comprehensive frameworks.... Even in those countries with well-developed measures, however, confusion often dominates. For example, researchers regularly report difficulties working in Brazil, India, and the Philippines, despite well-developed ABS [access and benefit-sharing] measures."

As a result, Laird continues, "international researchers appear to be consolidating research programs into smaller numbers of countries with clear and efficient research regulations. Unfortunately, however, this increasingly excludes a large number of the most biologically diverse countries."

Miller concurs: "The CBD is a treaty that leaves it up to individual countries to adopt enabling legislation that regulates access. From a desire to capture benefits, many countries have adopted rather cumbersome systems so that it now takes lots of time, energy, and money to get permits to conduct even basic research....

The systems in most countries really need to be simplified."

Intellectual property

Scientists who write about biodiversity found outside their home country also confront very real and complex intellectual property rights issues. Concerns in this area have grown, in part because of the furtherance of intellectual property assertions within the CBD forum, but also because the exploration of intellectual property has bearing on traditional knowledge and biodiscovery in other international fora, such as the World Intellectual Property Organization and the World Trade Organization, both of which are currently clarifying their relationship with the CBD.

Whether with regard to "certificate of origin," which verifies the country in which a type of knowledge or resource was found—a central element in current genetic resource discussions—or more general intellectual property issues, scientists need to be aware of present and future intellectual property considerations that may apply to their publications. "Academic publications are the primary vehicle," Laird explains, "through which information from genetic resources research, including traditional knowledge, makes its way into the public domain, and from there to the private sector. Publications are obviously an important way for researchers to communicate with each other, share their findings with wider audiences, and advance our understanding of biological and cultural diversity.... But as indigenous peoples' groups, governments, and others seek greater control over their knowledge and resources, there is increasing pressure to limit or restrict publication of certain types of data, or at the very least [require] informed consent before doing so."

"Academics are front-line researchers in natural product research and development," Lila Feisee adds. "They should take care to meet the national requirements of individual countries. Research institutions and academics should also take into consideration the elements of the Bonn guidelines as they move forward with their research."

Distinct purposes

These CBD-related considerations of access to genetic resources are complex and evolving. Yet scientists and specialists do have concrete suggestions that may shape the discourse on genetic resources. One consistent suggestion is to establish a clear regulatory distinction between basic scientific research and commercially driven research. "ABS regulations must distinguish between academic and commercial research," Laird explains, "with different levels of complexity in agreements and different expectations associated with benefit sharing. Although academic research is increasingly funded by or linked to commercial interests, and it is necessary to block transfer of data collected under academic research agreements to commercial parties without negotiating a commercial research agreement, academic research has very different objectives and more limited funding than commercial research projects. It is critical that academic research not be discouraged or shut down altogether by expensive or extremely time-consuming bureaucratic requirements put in place out of fears of commercial exploitation."

There is a call for scientists to enter the general dialogue and participate in CBD and other discussions. "We are rapidly losing the world's most biologically diverse ecosystems," Capson says, "the same ecosystems that are most likely to yield natural products with disease-fighting properties.... What do we need? More substantive and frank dialogue between policymakers in the developing world and scientists who participate in biodiscovery research."

Jim Miller likewise calls for more dialogue and offers his estimation of the importance of the CBD in this era of biodiversity loss: "I think the important message is that the world following the CBD is a better, more equitable world than it was before, but there are still numerous problems that need to be addressed. The improvement in ethics for international collaboration will help, but excessive regulation and complication of procedures to have basic research approved is an impediment.... We need communication between different communities of folks—research talking to government—in order to solve the problems we face."

For more information on the CDB's access and benefit-sharing proposals, see *www.biodiv.org/programmes/socio-eco/benefit/default.asp*. The Missouri Botanical Garden's plant genetic resources policy is at *www.wlbcenter.org/policy.htm*. See *www.bio.org/ip/international/200507guide.asp* for BIO's guidelines for members engaging in bioprospecting.

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