POLICY FORUM: GLOBAL GENETIC RESOURCES

Science and the Convention on Biological Diversity

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Since the Convention on Biological Diversity (CBD) opened for signature at the 1992 Earth Summit in Rio de Janeiro, 182 countries and the European Union have ratified it and started work (see Table). In the intervening decade, the parties have made commitments through the Subsidiary Body on Scientific, Technical, and Technological Advice (SBSTTA) and the primary political decision-making body, the biennial Conference of the Parties (COP). The CBD has spawned more than 180 COP decisions and SBSTTA recommendations, two further treaties (on biosafety and on agricultural plant genetic resources), six international programs on economics and on five different ecosystems, and 23 rosters of experts (*1*). The governments have developed a Global Taxonomy Initiative, Guiding Principles on Invasive Alien Species, a draft Global Strategy for Plant Conservation, and other science-based tools. National biodiversity strategies required by the CBD have been undertaken in 150 countries (*2*). Since its inception in 1994, the CBD's financial mechanism, the Global Environment Facility, has allocated U.S.$3.86 billion to biodiversity in developing countries (*3*).

Despite these achievements, the CBD lacks targets and deadlines. Its scope is vast and commitments are not quantified, so progress is difficult to measure. Not even a rich country could act upon every COP decision. Thus, the parties are creating a strategy to describe a vision and to set goals for implementation up to 2010. A draft is to be discussed and adopted at COP6 in The Hague in April. It identifies lack of scientific research capacity as an obstacle to implementation and sets a goal of greater technical and scientific cooperation.

For 183 parties to reach consensus is invariably a challenge. If each country adds its own list of priorities, the "strategy" could descend into a detailed and unprioritized work plan. The delegates will need to be selective and to demonstrate considerable collective restraint if the result is to be truly strategic.

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Potential and Challenges

The CBD's fundamental contribution to science will be to conserve the resource-base for life sciences (and life itself): biological diversity. But it provides other opportunities, as well as constraints. Treaties are agreements between states, but by and large it is organizations, and not governments, that are equipped to do the work. This offers a bargaining chip to universities, research institutes, companies, and communities. In return for helping governments achieve their commitments, scientific organizations can participate in national policy-making, raise their profiles, derive a fresh mandate and renewed legitimacy for their work, and perhaps use the CBD as a lever to help fund their work. As individual countries implement CBD work programs, apply COP guidelines, and execute national strategies, the influence of the CBD on science is likely to grow. One mechanism will be the allocation of public funding, another, the advent of laws and policies that control the direction and methodologies of scientific research.

As a principle example of this, the significance for science of access to genetic resources and benefit-sharing cannot be overestimated. Where none were doing so 7 years ago, some 100 countries—largely those that are home to the bulk of the world's biodiversity—have introduced, or are now considering, laws that regulate access by scientists to genetic resources, biochemicals, and associated traditional knowledge (*4*–*6*). These typically require national and foreign scientists alike to obtain permission for access and to work with partners from the countries providing the genetic resources, in the process, sharing benefits such as royalties, technology, joint research, and information.

As defined in the CBD, "genetic resources" are any material of plant, animal, microbial, or other origin containing functional units of heredity of actual or potential value. Access to this significant chunk of life (humans are excluded) is vital for education and research in the life sciences, as well as for research on the conservation and sustainable use of biodiversity. Access also underpins commercial discovery and development. Global sales of products derived from genetic resources (pharmaceuticals, botanical medicines, major crops, horticulture, crop protection products, cosmetics and personal care products, and a broad range of biotechnologies) lie between U.S.$500 and U.S.$800 billion a year (*7*).

The CBD seeks to balance the sovereignty and the authority of national governments with the obligation for states to facilitate access to genetic resources for environmentally sound purposes. Access is to be subject to governments' prior informed consent on terms, mutually agreed by the provider and recipient, that promote the fair and equitable sharing of benefits. Similarly, subject to national law, access to the knowledge, innovations, and practices of indigenous and local communities requires the prior approval of the holders of that knowledge.

Have developments in this field in the past 10 years achieved the goals of facilitating science, respecting rights, and ensuring fairness? Overall, partnerships are becoming fairer. Biological samples and the rights to use genes and compounds have been exchanged, sometimes under agreements, for decades. In the wake of

KEY PROVISIONS OF THE CONVENTION ON BIOLOGICAL DIVERSITY

Article 1.	Objectives: conservation of biological diversity, sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources
Article 6.	General measures (national strategies)
Article 7.	Identification and monitoring
Article 8.	In situ conservation
Article 9.	Ex situ conservation
Article 10.	Sustainable use of components of biological diversity
Article 12.	Research and training
Article 13.	Public education and awareness
Article 14.	Impact assessment and minimizing adverse impacts
Article 15.	Access to genetic resources
Article 16.	Access to and transfer of technology
Article 17.	Exchange of information
Article 18.	Technical and scientific cooperation (and the clearing-house mechanism)
Article 19.	Handling of biotechnology and distribution of its benefits

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the CBD, benefit-sharing agreements are increasingly common. Most benefits have flowed to scientific institutions, in the form of training and technology (*8*).

Another positive development is that individual companies, professional associations, gene banks such as botanic gardens, indigenous communities' groups, and other sources of genes have adopted corporate policies, codes of conduct, and guidelines to bring their operations into line with the CBD and national laws (*9*).

The story is not one of unalloyed success, however. There is evidence that the anticipated bureaucracy, delay, and expense of compliance with the first wave of access laws have deterred foreign and domestic scientists and thus have unwittingly stifled not only commercial research, but also essential conservation work. Confusion over which government bodies are authorized to grant access has not helped. Encouragingly, there is growing acknowledgement of the need for a more strategic and flexible approach and, following a COP decision, each government is also to nominate a single focal point to streamline access enquiries.

Furthermore, commercial demand for access is unreliable. Over the past 30 years, interest in accessing biodiversity for pharmaceutical development has been cyclical. In many sectors, research dollars are flowing out of natural products and into synthetic chemistry for rational drug design, combinatorial approaches, and genetics that focus largely on human material. A goal in many national biodiversity strategies is to help alleviate poverty, to support sustainable livelihoods, and to raise living standards. Countries might do well to use the untapped potential for research on genetic resources to meet domestic needs, for example, through low-cost botanical medicines, rather than seeking only to supply fickle international markets. They could also ensure that regulations distinguish between commercialization and the more steady demand for access for vital conservation research in fields such as ecology and systematics.

Another challenge is that benefits are not always forthcoming to countries facilitating access to genetic resources. Much genetic material used for R&D is obtained from collections made before the CBD entered into force, for which there are generally no benefit-sharing arrangements. Any benefits that are negotiated rarely "trickle down" to local communities or to conservation. Scientific organizations tend to benefit most. Countries could require a certain proportion of benefits to be dedicated to conservation, as Costa Rica and Western Australia have done. Countries could also adapt growing experience with trust funds and other mechanisms to ensure that local people benefit and have an incentive to support conservation measures.

Two recent developments should help to tackle these problems. At COP6, the parties aim to finalize the draft *Bonn Guidelines on Access and Benefit-Sharing* (*10*). These provide operational guidance for governments on national laws and access and benefit-sharing agreements, with sections on prior informed consent and mutually agreed terms. The Guidelines recognize that all countries are both users and providers of genetic resources, so countries and organizations face responsibilities for their role in the acquisition, use, and supply of genetic resources.

Second, the International Treaty on Plant Genetic Resources for Food and Agriculture (IT) was finalized in Rome in November 2001, in harmony with the CBD. One of the important elements of the IT is a multilateral system for facilitated access to 35 crop genera and 29 forage species in the public domain world-wide for "food and agriculture" and associated benefit-sharing, through the exchange of information, access to and transfer of technology, capacity building and a commercial benefit-sharing package. This will require seed companies to pay royalties on patented products derived from the genes accessed. The International Agricultural Research Centres (IARCs) of the Consultative Group on International Agricultural Research, which hold 6 million accessions, are invited to enter into agreements with the governing body of the IT concerning access to their other collections, too (*11*).

Conclusions

The principles of the CBD are finding their way into national laws and policies. Scientists can—and do—participate in the development of this international and national law. But there is room for more input to the treaty from scientists, by lobbying or joining national government delegates, participating as nongovernmental organizations at meetings, and serving on expert panels. Details on how scientific organizations can become accredited and attend meetings of the CBD's COP and SBSTTA can be found on the Internet (*10*). Such participation is vital to ensure that the treaty is based on sound science and promotes, rather than hinders, conservation. Scientific organizations can can participate in the finalization of the Bonn Guidelines, so that regulations on access to genetic resources world-wide facilitate science and support fair benefit-sharing partnerships. Their voices can be heard on other priority issues, such as guiding principles on invasive alien species and a program of work on forest biological diversity.

Scientific organizations should also work with federal, state, and local governments to ensure a coordinated approach and should push for consistent decisions in the range of other multilateral environmental agreements under the auspices of the United Nations, as well as with trade issues in the World Trade Organization. Companies and individuals—acting as investors, employers, and consumers—can exercise choices that influence capital markets. Currently, just U.S.$3 billion of estimated global private equity of U.S.$30 trillion may be qualified as a "socially responsible investment." A modest change for the better, taking into consideration the CBD objectives of biodiversity conservation, sustainable use, and equity, would create a safer and better world and a more enabling environment for science.

References

1. See www.biodiv.org
2. *Global Biodiversity Outlook, 2001* (Secretariat of the Convention on Biological Diversity, Montreal, 2001).
3. Available at www.getweb.org/Replenishment/Reple_Documents/R.3.19.pdf.
4. Regional groups, national governments, or state governments already regulating access to genetic resources to ensure prior informed consent and benefit-sharing include the following: the Andean Pact (Bolivia, Colombia, Ecuador, Peru, Venezuela); Australia (the states of Western Australia and Queensland); Brazil (at the federal level and the states of Acre and Amapa); Cameroon; Costa Rica; the Republic of Korea; Malaysia (the state of Sarawak); Mexico; Nicaragua; the United States of America (within Yellowstone and other national parks), and the Philippines. Those planning to regulate access to genetic resources to ensure prior informed consent and benefit-sharing include the member countries of the Association of South-East Asian Nations (ASEAN—10 members), Australia (the Commonwealth), Ivory Coast, Cuba, Ethiopia, Eritrea, Fiji, the Gambia, Guatemala, India, Indonesia, Kenya, Lao PDR, Lesotho, Malawi, Malaysia (at the national level and the state of Sabah), Mozambique, Namibia, Nepal, Nigeria, the African Union (53 members), Pakistan, Papua New Guinea, Samoa, the Seychelles, the Solomon Islands, South Africa, Sri Lanka, Tanzania, Thailand, Uganda, Vanuatu, Vietnam, and Yemen. Belize, China, El Salvador, Ghana, Guyana, Hungary, Iceland, Panama, the Russian Federation and Zimbabwe may also be planning to regulate access to genetic resources in the near future.
5. K. ten Kate, paper presented at a conference of the Commission on Intellectual Property Rights, Royal Society, London, 14 to 15 February 2002.
6. L. Glowka, personal communication.
7. K. ten Kate, S. Laird, *The Commercial Use of Biodiversity: Access to Genetic Resources and Benefit-Sharing* (Commission of the European Communities and Earthscan Publications Ltd. London, 1999), 398 pp.
8. See www.biodiv.org/programmes/socio-eco/benefit/case-studies.asp.
9. For sources of such guidelines see, for example, S. A. Laird, Ed., *Biodiversity and Traditional Knowledge: Equitable Partnerships in Practice* (People and Plants Conservation Series, Earthscan Publications Ltd. London, 2002); available at www.rbgkew.org.uk/peopleplants/manuals/biological/contents.htm; and http://users.ox.ac.uk/~wgtrr/decin.htm.
10. See www.biodiv.org/doc/meetings/cop/cop-06/official/cop-06-06-en.pdf.
11. See ftp://ext-ftp.fao.org/waicent/pub/cgrfa8/iu/ITPGRe.pdf; and www.fao.org/ag/cgrfa/News.htm

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