

The Convention on Biological Diversity Access and Benefit Sharing Principles in the Context of Barcoded Genetic Information: The Case of iBOL

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Abstract: In the mind of a policymaker and lawyer, genetic resources, biotechnology and traditional knowledge remit to sovereignty and rights, access and benefit sharing policy and law, intellectual property legislation and the Convention on Biological Diversity. On the other hand, a scientist would associate genetic resources, biotechnology and traditional knowledge almost invariably with taxonomy, databases, genomics, bioinformatics and, rather recently, to the International Barcode for Life Project (iBOL). This paper reviews how, whether, and if connections between these differing perspectives exist or are possible.

Background

Since 1993, the year the Convention on Biological Diversity (CBD) entered into force, many biodiversity-endowed countries have become ever more active in claiming their sovereign rights over biodiversity located within their jurisdictions, including genetic resources (Glowka, 1998; 2003; Carrizosa, 2004). As a result, the “common heritage of mankind” principle has given way to the recognition of sovereignty and laws and regulations in the Andean Region, Brazil, the Philippines, Panama, many African and Asian, etc. They affirm state rights over genetic resources and seek to establish access to genetic resources and fair and equitable access and benefit sharing (ABS) legal regimes (Tvedt and Young, 2007).

These legal frameworks cover mostly animal, plant and microbial genetic resources (as defined by the CBD), except for human genetic resources, which are expressly excluded from the scope of the Convention – given their very special nature and ethical, moral, human rights and cultural considerations surrounding their potential use. Global policy and guidelines in regards to these resources has been left to United Nations bodies and the World Health Organization in particular.

In parallel, over the past two decades or so, advances in modern biotechnology and other technologies as well as their application to biodiversity and genetic resources, have given way to a silent revolution in the way scientists understand and uncover the potential in almost all human activity: from gardening to drug development, from breeding to conservation, from natural product development to taxonomic identification, to name a few (Ten Kate and Laird, 1999).

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The power of genetic engineering, genomics, proteomics and the like, coupled with increasingly important bioinformatics, all based on analysis of biodiversity and its components (genes, proteins, DNA sequences, RNA, etc.), have transformed research and development processes. These technologies and new scientific disciplines, ride ahead of and are practically unaccounted for in policy and legal debates, including ABS discussions in the context of the CBD and the development of an international regime on ABS in particular (Melendez-Ortiz and Sanchez, 2005; Pastor and Ruiz, 2009).

The International Barcode of Life Project (iBOL), run by the Consortium for the Barcode of Life, is one global project which, based on the use of many of these tools, is dramatically altering taxonomy and its scientific process, by generating highly automated and reliable identification methods, through the combination of information technology instruments and DNA related technologies (Ratnasingham and Hebert, 2007; Stoeckle and Hebert, 2008).

From a policy and legal perspective, members of iBOL "...are committed to the regulatory framework established under the CBD" and expressly indicate that "transactions between iBOL members will respect all restrictions with respect to biomaterials transfers". However, it is far from clear what exactly this commitment means and how it will be put into practice.

This brief essay, seeks to identify and highlight some of the implications which the CBD principles and national regulations on access to genetic resources, fair and equitable benefit sharing and intellectual property rights (IPR), may have on iBOL and its own guiding scientific principles and development plans.

The conceptual challenge: genetic resources vis-a-vis genetic information

The CBD defines genetic resources as "genetic material of actual or potential value" and genetic material as "any material of plant, animal, microbial or other origin containing functional units of heredity". These are very broad definitions, that cover the tangible element (materials) as subject matter, though with reference to DNA and genes (as functional units of heredity). The "potential value" of materials and genetic information is rapidly being realized and expressed in many fields, including the pharmaceutical sector, medical diagnosis, the plant-breeding industry and bioinformatics development.

The CBD and its ABS principles were conceived by negotiators based on a well-known paradigm (long since surpassed). This was the idea of a scientist, entering the tropical forest, talking to indigenous people, collecting and identifying specimens of medicinal plants, identifying an active compound, patenting a new miracle drug and becoming rich ... all part of an almost imaginary past and an inspiration to blockbuster films such as *Medicine Man*. Today, technology has advanced to a point where useful compounds from almost any imaginable source can be extracted, screened and used: deep sea hydro thermal vents, hot springs in the Arctic, micro-organisms of all sorts and origins, botanical gardens, closely related or even totally disassociated species found in the marketplace, etc. (Ten Kate and Laird, 1999; Sasson, 2005; Aldridge, 2006).

Furthermore, anyone with the requisite scientific skills can also access, screen and transform genetic information into potentially useful innovations, with the aid of a good laptop computer and a reliable Internet connection. Gene libraries and extremely sophisticated and rich databases are also transforming the way scientists undertake their routine daily research. In the biological and biochemical field, technology has become almost as important as the material base (biological materials) on which it is founded or over which it is applied.

As part of this progress, taxonomy—once a slow process, often tedious and downplayed by many—has also been reinvigorated. New theories, tools and technologies are changing the way biological classification takes place. Today, individual morphological and phenotypical descriptions of specimens and their subsequent classification is being transformed through DNA-related classification. But as soon as DNA or genes are involved, the CBD ABS policy and legal principles may become relevant.

Though it is generally accepted that taxonomy (whether classical or more modern versions) is typically a *purely scientific* endeavour (in the sense that no profit or commercial interests are usually at stake), taxonomy results are increasingly required in one way or another to embark on practical, profit-oriented, commercial or industrial activities (Stoeckle and Hebert, 2008). More often than not, taxonomy *is* a precondition for research and development. So should taxonomy remain undisturbed and unaffected by often cumbersome ABS rules, sovereignty claims by states, and even IPR? The response is probably yes and no at the same time. There is also the question of iBOL's position within this context: should it relate more closely to these policy and legal considerations?

Key CBD principles in play

In terms of ABS, the CBD calls for the equitable and fair sharing of benefits derived from access to and use of genetic resources. This is a general principle which seeks to ensure that countries of origin, as providers, participate in the value-adding chain generated from utilization of their genetic resources. In each case the precise benefits, and when these will be realized and shared, will depend on policies, regulations and ultimately, agreements between states, researchers, companies and indigenous people.

Box 1. ABS in the Andean Community

Andean Community Decision 391 on a Common Regime on ABS (1996)

is a legal instrument designed to regulate access to genetic resources (in a *tangible* form). It obviates references to genetic information, which remains, in practice unregulated and freely available when isolated and deciphered. Over the past 10 years, implementation of Decision 391 in Bolivia, Colombia, Ecuador and Peru (Andean Community Member States) has been very limited, not least because it is based on a limited understanding of science and the scientific process in general. Taxonomists have been especially vocal about its deterring and chilling effect, especially due to its complex administrative procedures and provisions. Decision 391 makes no distinction between commercial and non-commercially oriented research (as much as these boundaries may be blurred) nor does it facilitate research in the latter. As a result, it is national scientists who are feeling the pain. On the other hand, it could also be argued that iBOL-related activities *are* under the scope of Decision 391 inasmuch as it applies to all conservation, research and other activities that imply using genetic resources. How Decision 391 rules and principles will be applied to activities under the iBOL framework, is anyone's guess.

Bioprospecting projects, usually involving universities, companies, indigenous people organizations and museums (from source and user countries), are usually governed by these principles and rules. ABS is mainly applied to cases where potential commercial or industrial benefits may be derived from the use of genetic resources. Negotiation clauses dealing with IPR in different agreements of such projects are just one indication of the commercial value of activities (Reid, Laird, et al, 1993).

In regard to intellectual property, the CBD also seeks to ensure that biodiversity- derived innovation in general, including biotechnological processes or products, is appropriately protected. There is, however, a compromise to promote technology transfer to countries of origin and providers of genetic resources. This tense balance between private rights and sovereignty is one of the driving forces behind CBD policy and legal developments, from access legislation to defensive protection measures, including protection of traditional knowledge.

Finally, an often overlooked set of provisions of the CBD refers to conservation *per se* and the need to undertake efforts to understand biodiversity and species at the ecosystem level (through education, capacity building, repatriation of information, etc.). Taxonomy, in this regard, is a critical discipline which serves conservation and may also play an important role in profit, commercial or industrial endeavours. Taxonomy is in essence the starting building block for all types of activities. Historically, taxonomy has usually been a costly effort, mostly driven by the interest and needs of researchers (in developed countries) seeking to understand and classify biodiversity. Thereafter, the results of this research serve may serve different purposes.

Potential implications of the CBD on iBOL

The main concern really is whether and how CBD principles (equity, fairness, benefit sharing, IPR) are pertinent or even relevant to work and activities undertaken by iBOL. Here is a preliminary list of questions and possible responses:

- *Do ABS principles apply to iBOL activities?* Yes, as long as there are biological materials (genetic resources) involved in the process of researching and classifying species. However, there are additional considerations regarding this response, which may give it a slight turn. These include: how and where were samples collected? In countries with ABS legislation in place? Was this prior to the CBD entering into force? Are materials from *ex situ* sources being used? Or are materials from areas outside national jurisdictions being collected? What is the situation with materials that are currently within the US (which has not ratified the CBD) but were collected elsewhere? Responses could indeed vary considerably from country to country.
- *How do developing countries participate in iBOL?* One very obvious way is best expressed by David Schindel, the Executive Secretary of the Consortium, who says developing countries "... have a critical role to play because it is they who bring the wealth of biodiversity to the table." (Masood, 2005). In simple terms, at some point data and information have been discovered, isolated, and produced based on biological samples of some sort. This is one way to envision participation. Another,

relates to the actual involvement in and benefits from iBOL which developing countries can realize in terms of enhancing their own national scientific capacities and supporting conservation and development efforts.

- *Do iBOL activities affect national sovereignty of countries of origin? Yes, provided biological samples being used in barcoding and taxonomic identification of species were legally obtained and the sovereign rights of countries respected. Nevertheless, new technologies and widespread distribution of genetic resources and information (especially among megadiverse countries) challenge the concepts of sovereignty and possibilities of effectively controlling flows and movements of resources based on unilateral action by countries.*
- *Are the rights of countries of origin being affected when genetic information is accessed from Barcode of Life Consortium databases? No, provided the data and information is backed by documents which guarantee that biological samples from which these data were obtained, were accessed legally and the appropriate use of data and information conditions has been determined. At the same time, the problem of shared resources and shared genetic information, brings into question how relevant (in practical terms) sovereignty and ABS regimes may be in regards to samples being evaluated, barcoded or used in any way as part of iBOL (Vogel, 1994). Genes are not discreet, unique entities located in a single specie or location. They are shared across borders and are not bothered by sovereignty considerations (Pastor and Ruiz, 2009).*
- *How might the cultural rights of indigenous people be affected by iBOL? This may happen when specimens for barcoding and taxonomic identification are accessed and obtained from indigenous peoples' land without prior informed consent. All biological samples, and even use of traditional knowledge, in iBOL should be backed by legal documents regarding ABS as much as possible.*
- *How can benefits be shared with countries of origin? The key practical issue here is accessibility and availability of all data and information contained in the database developed by iBOL. Provided the data and information remain a common pool, freely available to developing and developed countries institutions and researchers alike, it could be argued that benefits for conservation are being equitably and fairly realized by simply being in a position of participating in accessing and using iBOL for research purposes.*
- *Are commercially or industrially oriented uses of iBOL services and products envisioned? If so, are there limitations, guidelines or other orienting principles? There may be potentially lucrative markets for iBOL products and services (i.e. in public health and virus identification; certifications of product origin; border inspections and sanitary purposes; CITES species trade; etc.). How benefits derived from these types of activities are shared between iBOL partners, and especially countries, is another area requiring further exploration.*

These questions can be further qualified and broken down, and some become relevant only in specific situations. However, for a global project

such as iBOL it is important to consider and at the very least reflect upon the potential social, cultural and economic, implications—direct and indirect—of its activities. This is of particular concern for developing countries that over the past few years have become extremely sensitive to the use of their biodiversity and its components—even, and more so, at the genetic level.

Recommendations

1. iBOL needs to ensure effective, practical ways in which developing countries can participate in and benefit (very specifically) from iBOL activities at all levels and stages. Further research may be required to determine how iBOL may play an effective role in supporting the realization of the fair and equitable benefit sharing principles enshrined in the CBD. Developing countries (and their research institutions) should become fully involved in planning iBOL activities and in technological and scientific advances.
2. Development of a set of guidelines by iBOL regarding ABS, IPR and traditional knowledge (even if not 100 percent relevant in the context of its present activities) may be one option to stimulate further thinking and reflection regarding the relation of iBOL with these fields, and their implications for iBOL.
3. Specific research should be undertaken regarding potential commercial or industrial use of iBOL products, services, data and information to ensure equity in accessibility and use.
4. An intensive process of awareness-raising and education among the scientific community in developing countries regarding the existence of iBOL and its role is one way in which gaps may be bridged between the industrialized nations promoting and financing iBOL and the developing countries. In most developing countries (at least in the Andean region), iBOL is a distant, “exotic” concept, for all but a very small set of individuals.
5. In the specific context of Peru, monitoring and controls in certain activities such as fisheries, forestry (when and if iBOL moves to plant barcoding), and the export of Andean camelids, with a close connection to conservation concerns, could benefit from barcoding technology, and from iBOL in particular.

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