

# Sharing the Benefits of Biodiversity: A New International Protocol and its Implications for Research and Development

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## Abstract

Equitable sharing of the benefits of biodiversity is one of the main objectives of the Convention on Biological Diversity (CBD). Yet understanding of the CBD rules and principles on access and benefit sharing, as well as how they apply to biodiversity-based research and development remains limited. In October 2010, the CBD adopted additional rules

on access and benefit sharing. These rules – known as the Nagoya Protocol – provide clarification on several important issues, including the applicability of access and benefit sharing to research on biochemical compounds and processes. As a result, the Nagoya Protocol constitutes an important opportunity for institutions, organizations, and companies committed to ethical practices regarding biodiversity.

## Introduction

Efforts to better understand the variety of life on Earth – genes, species, and ecosystems, as well as the interactions with each other and the rest of the environment – are critical to its conservation. Research on biodiversity is also important as a source of information, inspiration, and concrete inputs for the development of new products in industries such as agriculture, food, medicine, cosmetics, and personal care. Yet though the benefits of research and development, as well as of subsequent commercialization, are well recognized, they are not always equitably shared.

The Convention on Biological Diversity (CBD), an international agreement adopted in 1992 and ratified by over 190 countries, promotes the conservation and sustainable use of biodiversity. It also aims to ensure the fair and equitable sharing of benefits arising from the utilization of biodiversity. The CBD thus acknowledges the need to place the conservation of biodiversity in the context of sustainable development. To be successful, it is clear that the conservation and sustainable use of biodiversity need to make sense as a solution and integral part of socioeconomic needs and strategies. In particular, countries and communities that coexist with biodiversity – who are often poor and whose support is always essential – must be able to harness the benefits of its conservation and sustainable use. As a result, benefit

sharing is a central element in the CBD, serving as the recognition of the rights of biodiversity-rich countries and indigenous and local communities, as an incentive for conservation and sustainable use efforts, and as a source of the technical and financial support needed for such efforts. Yet as not enough progress has been made on the conservation of biodiversity, there has also been limited implementation of the CBD access and benefit-sharing principles. Few countries have the necessary laws and procedures in place. There is no system in place to allow monitoring or enforcement of the implementation of existing requirements across borders. There is little awareness on access and benefit sharing among most companies, organizations, and institutions using biodiversity for their research, development, and commercialization. Such lack of understanding, legal uncertainty, and equivocal requirements are feared to be placing a “chilling effect” on biodiversity-based research and development, as well as hampering an effective implementation of the CBD.

Widespread calls for a new international regime on access and benefit sharing, along with seven years of arduous negotiations, finally came to fruition in October 2010. The tenth meeting of the conference of the Parties to the CBD, which took place in Japan, adopted the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their

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Utilization (Nagoya Protocol). United Nations Secretary General Ban Ki-Moon welcomed the Nagoya Protocol as a “landmark” treaty, providing an innovative approach and an example of pragmatic cooperation for sustainable development [1].

The Nagoya Protocol aims to advance the implementation of access and benefit sharing under the CBD. It builds on the Bonn Guidelines on Access and Benefit Sharing, which were adopted by the CBD in 2002 to provide guidance for developing both policy measures and contracts and other agreements for access and benefit sharing [2]. Unlike the Bonn Guidelines, the Nagoya Protocol is a legally binding instrument, which elaborates on the CBD in terms of when access and benefit sharing applies and how it should take place. In addition, it incorporates much called for provisions on supporting compliance with access and benefit sharing in countries in which the use of biodiversity is actually taking place. As a result, it is set to significantly change the rules of biodiversity-based research, innovation, and development. Academics, scientists, and companies will all have to pay close attention [3].

This article aims to assist in introducing the Nagoya Protocol to those working on plant and natural product research. After a brief explanation of access and benefit sharing as established in the CBD, this article will consider the provisions of the Nagoya Protocol – particularly as they build on existing rules and interpretations and may affect practices in relation to biodiversity-based research and development. Then, this article will conclude with some final thoughts and recommendations.

### Access and Benefit Sharing: From the CBD to the Nagoya Protocol

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The provisions of the CBD, particularly those regarding access and benefit sharing, represent a turning point in the governance of biodiversity. Prior to the CBD, biodiversity was often seen as accessible without restrictions. Bioprospecting and plant collection were generally not subject to particular regulations. Yet developing countries, which hold much of the world’s biodiversity, were becoming increasingly concerned with technological and legal developments that enabled the appropriation and exploitation of biodiversity, without any benefits reverting to those who have traditionally held and safeguarded these resources [4]. As a result, the CBD determined that the sovereign rights of States over their natural resources extended to “genetic resources,” and that benefits arising out of their utilization needed to be shared in a fair and equitable manner [5].

Article 1 of the CBD establishes “the fair and equitable sharing of the benefits arising out of the utilization of *genetic resources*” (emphasis added) as one of the main goals of the Convention. The CBD defines “genetic resources” as any material of plant, animal, microbial, or other origin containing functional units of heredity, with actual or potential use. The use of the term can be explained by the context at the time of the adoption of the CBD: in 1992, the concerns of developing countries focused on developments in biotechnology, which were seen to significantly enhance the ability of researchers to tap into the value of biodiversity [6].

Yet many countries, experts, and other stakeholders understood access and benefit-sharing principles to be applicable well beyond biotechnology. In addition, the CBD definition of “genetic resources” was considered too ambiguous and difficult to distinguish in practice [7]. The rationale of access and benefit sharing

seemed to have broader relevance – extending clearly to the use of biodiversity as the basis for research and development, regardless of the application of biotechnology or other specific techniques. Indeed, several legislations on access and benefit sharing considered research and development on biochemical substances derived from plants as fitting clearly within requirements for prior informed consent and equitable sharing of benefits. South African legislation on access and benefit sharing, for example, applies to “indigenous biological resources,” defined broadly to include derivatives, chemical compounds, and products obtained through use of biotechnology [8]. As will be seen below, the clarification of the scope of access and benefit sharing is one of the achievements of the Nagoya Protocol.

To advance fair and equitable benefit sharing, the CBD establishes the authority of national governments to determine and regulate access to genetic resources. In particular, the CBD determines that such access must be subject to basic principles: First, access must take place with prior informed consent of the provider country and, second, it must be based on mutually agreed terms, including the sharing of any resulting benefits in a fair and equitable way [9].

Prior informed consent (PIC) is the explicit permission of the authorities of the provider country that may be required before access or use of plant material takes place. National legislation implementing the CBD may thus establish an administrative process for PIC. Institutions, organizations, or companies seeking access to biodiversity generally present an application to the competent authorities in the provider country, which would then grant a permit, license, or accord for such access to take place. In addition, it has been suggested that PIC should be obtained from indigenous and local communities in cases of access to resources or associated traditional knowledge on which there were established rights [10]. In such cases, PIC would be the outcome of a consultative process with these communities.

Mutually agreed terms can be described as the “agreement on access and benefit sharing” – the arrangement reached on the terms and conditions of access and use of genetic resources between the company seeking plant material for research and development, and the collectors, growers, or associations that would be able to supply such material. These contractual agreements are subject to particular procedural and substantive principles. In addition to the parties to the contract, for example, the involvement of other stakeholders – local communities, civil society organizations, and authorities – may be relevant. Some possible elements for such agreements include provisions on how the resources are to be used, by whom, and for what purpose, as well as what benefits are to be shared and how such sharing will take place. In addition, national laws on ABS may require government approval of the terms of the contract.

In terms of the benefit sharing itself, the types, timing, and mechanisms of benefits to be shared will vary depending on what is fair and equitable in the particular circumstances. Possible benefits include the results of research and development carried out on the plant material, the transfer of technologies for conducting relevant research or production, and the monetary benefits arising from the commercialization of the biodiversity-based products. Sharing of such benefits would be appropriate with regards to all those who have contributed to the resource management, scientific, or commercial process.

Another integral element of the access and benefit-sharing system of the CBD is traditional knowledge. The CBD recognizes the important role that tradition-based knowledge systems and prac-

tices have played and continue to play in the conservation and sustainable use of biodiversity. Article 8 (j) of the CBD obliges countries to promote the wider application of “knowledge, innovations, and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity”, with the approval and involvement of the indigenous and local communities, as well as equitable sharing of benefits arising from their use [11]. Such traditional knowledge is commonly referred to as “traditional knowledge associated with genetic resources” and is equally subject to access and benefit-sharing principles. Traditional knowledge has been acknowledged as relevant in this context because, while it may not expressly recognize the value of genetic material, it does often contain useful information on the properties and uses of plants and thus provides leads for the research and development of genetic resources. Indeed, in many sectors, traditional knowledge remains an initial basis for selecting, sampling, and screening biodiversity. Nevertheless, the terminology and application of access and benefit-sharing principles in regards to traditional knowledge is particularly challenging.

In spite of the importance of CBD principles on access and benefit sharing, their implementation remains limited. Few countries have developed and put in practice their national access and benefit-sharing frameworks, partly due to the difficulties of applying the broad and sometimes unclear CBD provisions. Moreover, existing national frameworks have struggled to address issues such as traditional knowledge in the public domain, transboundary biological resources, and research, development, and commercialization of biodiversity-based products beyond their jurisdictions. As a result, institutions and organizations attempting to navigate access and benefit sharing have sometimes found it difficult. A graver problem, perhaps, is the fact that most research on biodiversity is still being conducted with little consideration of the CBD. A report commissioned by the CBD Secretariat on access and benefit-sharing arrangements and practices in different sectors of industry found that, with the exception of a few companies, most industrial sectors working with biodiversity “appear to have incorporated few if any of the lessons and requirements of the CBD into their practices” [12]. The report quotes one example given by an expert involved in the cosmetics sector: “... fragrance and flavor companies actively search out innovative new ingredients in nature, in particular the ingredient supply companies, and – as with many companies in the botanicals sector – they don’t feel any need to sign agreements, pay royalties, or otherwise provide benefits. Most have never even heard of the CBD.” This range of challenges to the implementation of access and benefit sharing led to international negotiations towards a new international regime on access and benefit sharing. Countries had agreed on the need of new international rules for the implementation of access and benefit sharing in the 2002 World Summit for Sustainable Development. Yet there were differing and often opposing views of what the challenges for implementation were, and how they could be best addressed. Groups such as the Like-Minded Megadiverse Countries, a group of biodiversity-rich developing countries, called for the creation of broad and binding international rules that established strong compliance mechanisms, as well as minimum criteria for national requirements for prior informed consent and benefit sharing. For developed countries engaged in biodiversity-based research and development, including the European Union, Canada, and Australia, it was important for the new rules to improve but maintain the CBD approach to access and benefit sharing. These countries called for

the new rules to retain a focus on genetic resources, a balance between facilitating access and ensuring the sharing of benefits, and flexibility for national laws to accommodate their countries’ own characteristics and requirements.

The Nagoya Protocol was adopted, after seven years of negotiations, during the tenth meeting of the conference of the parties to the CBD in October 2010. Necessarily the result of compromising and/or avoiding topics on which countries did not agree, the Protocol has been called a “masterpiece in creative ambiguity” [13]. In addition, it is clear that its adoption is but a starting point, and its effectiveness in advancing fair and equitable sharing of benefits is likely to be largely determined by its implementation. Nevertheless, there is broad recognition that the Nagoya Protocol constitutes an important step towards putting in practice benefit sharing [14].

The Nagoya Protocol addresses some critical gaps and uncertainties in the CBD provisions on access and benefit sharing, also setting in motion formal discussions on other unresolved topics and ideas. In addition, the adoption of the Nagoya Protocol will spur a range of communication, education, and capacity building efforts towards policy-makers, local communities, researchers, companies, and other stakeholders. Finally, the Nagoya Protocol will further promote public awareness and interest in the topic of access and benefit sharing. Indeed, with growing awareness of biodiversity and clearer rules on benefit sharing, the benefits of compliance will increase, as will the risks of not complying and being accused of “biopiracy”. The following paragraphs will identify some of the questions addressed by the Nagoya Protocol that may be of particular interest for those conducting research on plant and natural products. It is not meant to be an exhaustive analysis of these provisions, but will highlight some areas in which there were developments that may have a direct impact on how biodiversity-based research is conducted.

### What is the Nagoya Protocol on access and benefit sharing?

The Nagoya Protocol is a new international instrument, different but related to the CBD. It aims to implement CBD provisions on access and benefit sharing. Moreover, it will have substantive, institutional, and procedural links to the CBD – for example, the Secretariat to the CBD will also serve as the Secretariat for the Nagoya Protocol, and the CBD dispute settlement procedures will remain applicable. Nevertheless, to enter into force, the Nagoya Protocol will need to be separately signed, ratified, and implemented by countries. It will be open for signature until 1 February 2012 and enter into force 90 days after the date in which the fiftieth country or regional organization ratifies it. In the meantime, countries have established an Intergovernmental Committee for the Nagoya Protocol, generally tasked with making the necessary preparations for when the Protocol enters into force. The Intergovernmental Committee is scheduled to meet in June 2011 and April 2012.

### What activities are covered under access and benefit-sharing requirements?

As mentioned, the exact scope of access and benefit-sharing requirements was not clearly determined under the CBD. For many developing countries, including those in the African Group, as well as many civil society organizations, it was therefore critical to ensure that new rules on access and benefit sharing had a scope expressly broad enough to cover the most important uses of biodiversity for research and development. Proposals included

referring to biological resources and derivatives in the scope of the agreement, and reaching a common understanding of the meaning of “utilization of genetic resources”. On the other hand, some developed countries were concerned about the review and rewording of CBD definitions, as well as about affecting conventional market activities and markets of biological products and commodities.

In the Nagoya Protocol, Article 3, which deals with scope, states that the new rules apply to “genetic resources within the scope of Article 15 of the Convention”. As there is no agreement about the exact definition of the term, this provision does not offer any additional clarification on the activities falling under access and benefit-sharing requirements. The issue of derivatives was often raised in negotiations on scope as an attempt to expressly expand the applicability of access and benefit sharing to activities linked to naturally occurring compounds, such as antibodies, vitamins, enzymes, active compounds, and metabolites [15]. “Derivative” is defined as “a naturally occurring biochemical compound resulting from the genetic expression or metabolism of biological or genetic resources, even if it does not contain functional units of heredity.” Nevertheless, the term is not used in the substantive provisions of the Nagoya Protocol.

The Nagoya Protocol does make headway, however, with the definition of “utilization of genetic resources”, which is mentioned as part of the scope of the new rules, as well as the trigger for access and benefit-sharing requirements. “Utilization of genetic resources” is defined as conducting research and development on “the genetic and/or biochemical composition of genetic material”. This is significant as proponents of strong rules on access and benefit sharing wanted to cover research on naturally occurring biochemical compounds, even if these did not contain functional units of heredity. Indeed, during negotiations, civil society organizations pointed out that the majority of cases of good practices, as well as of alleged biopiracy, focused on the use of biochemical substances rather than the direct use of genes.

The final text of the Nagoya Protocol, though not including any specific examples, does seem to consider activities such as the extraction of nucleic acids, proteins, and metabolites and their subsequent use as covered by access and benefit-sharing requirements. Research on the use of extracts and molecules from plants, as well as the development and production of pharmaceuticals, cosmetics, or nutraceuticals would now thus be clearly subject to prior informed consent and mutually agreed terms, including on fair and equitable sharing of benefits. In this regard, the sometime awkward boundaries between different types of biodiversity-based research and development seem to have been overcome [16].

### When would the use of biodiversity become subject to access and benefit-sharing requirements?

During negotiations of the Nagoya Protocol, there were different positions on whether benefit-sharing requirements should apply solely to material accessed after the entry into force of the new rules, or to any new use of genetic resources, even if access had taken place previously. At stake were concerns about allowing the misappropriation to continue unabated while the new rules on access and benefit sharing are signed and ratified, as well as consternation on the legal uncertainty of giving rules a retroactive effect. To bridge these positions and concerns, the African Group made an informal proposal for the establishment of a benefit sharing fund for the new uses of genetic resources acquired

after the entry into force of the CBD, but before the entry into force of the new rules on access and benefit sharing [17].

Article 3 of the Nagoya Protocol finally makes no reference to temporal scope. Nevertheless, Article 10 calls on countries to consider the need and modalities for a “Global Multilateral Benefit Sharing Mechanism” to address the sharing of benefits derived from the utilization of genetic resources and traditional knowledge “for which it is not possible to grant or obtain prior informed consent”. The Intergovernmental Committee, established to make preparations for the Nagoya Protocol entering into force, will examine whether and how such a mechanism would function. Given the background of the provision, however, it is likely that such a benefit-sharing fund will seek to address new uses of previously accessed resources (for example, the novel use of a fruit extract as a cosmetic ingredient). In addition, Article 3 refers to cases of transboundary resources and traditional knowledge, and it is possible the fund will cover other instances, such as the use of resources coming from *ex situ* collections, unknown countries, or areas beyond national jurisdiction. It might also receive voluntary contributions, such as part of the benefits derived from existing uses.

### Are there any changes to existing access and benefit-sharing requirements?

The Nagoya Protocol maintains the CBD approach to access and benefit sharing, based on the principles of prior informed consent and mutually agreed terms. Notwithstanding, in developing these principles, the Nagoya Protocol contains significant innovations. On the access side, the Nagoya Protocol requires countries to provide for legal certainty, clarity, and transparency in their relevant legislation or regulatory requirements. Countries now also are obliged, at the time of granting access, to issue a permit or its equivalent as evidence of the decision to grant prior informed consent and of the establishment of mutually agreed terms. This permit must be notified to an Access and Benefit-Sharing Clearing House, which allows for internationally recognized certificates that serve as evidence that the genetic resources have been accessed in accordance with prior informed consent and that mutually agreed terms have been established, as required by the national legislation. On the benefit-sharing side, the idea for a possible Global Multilateral Benefit-Sharing Mechanism may allow the sharing of benefits derived from the utilization of genetic resources even when the origin of such resources cannot be determined.

Another new provision refers to the utilization of genetic resources held by indigenous and local communities. The Nagoya Protocol states that the use of genetic resources should take place with the prior informed consent of indigenous and local communities, in cases where they have the right to grant access to such resources. Similarly, benefits resulting from the use of genetic resources rightfully held by indigenous and local communities should be shared with those communities. Such measures, though required already by some national laws, had not been expressly foreseen by the CBD. With the Nagoya Protocol, such an approach clearly becomes part of best practices on access and benefit sharing.

Like the CBD, the Nagoya Protocol also contains access and benefit-sharing requirements for the utilization of traditional knowledge. The Nagoya Protocol also reinforces access and benefit sharing linked to traditional knowledge by requiring countries to establish mechanisms to support the development of community protocols and other community-based procedures and tools. In



addition, the Nagoya Protocol requires countries to preserve customary use and exchange of genetic resources and traditional knowledge amongst indigenous and local communities.

### **Is there a difference in the requirements for commercial and noncommercial research?**

Research on biodiversity ranges from commercial bioprospecting efforts to basic research conducted in universities, museums, and herbaria. Between these two poles, there are a number of research projects in which it is more difficult to draw the line between commercial and noncommercial goals and uses. In negotiations towards the Nagoya Protocol, there was general agreement that access and benefit-sharing requirements should not stifle basic or academic research on biodiversity. At the same time, biodiversity-rich countries stressed that these facilitated access and benefit-sharing requirements would only be acceptable with measures to ensure that these resources do not end up being used commercially. Some of the suggested approaches included the creation of simple access procedures for noncommercial publicly funded research, balanced with control measures put in place by countries in which the use of biodiversity is taking place [18].

Article 8 of the Nagoya Protocol, which deals with “Special Considerations”, requires countries, in the development and implementation of access and benefit-sharing legislation, to “create conditions to promote and encourage research which contributes to the conservation and sustainable use of biodiversity”. Interestingly, this initial distinction does not focus on the commercial-noncommercial dichotomy, but rather on the general objectives of the research (research conducted by companies to develop resource management plans, for example, is in fact destined towards contributing to sustainable use). Article 8 goes on to say, nevertheless, that such conditions should include “simplified measures on access to noncommercial research purposes, taking into account the need to address a change of intent for such research”. The functionality of these provisions will, of course, largely depend on national implementation.

### **Are measures on access and benefit sharing required only in countries providing plants or plant materials?**

Access and benefit sharing provisions in the CBD do not focus solely on controlling access. The CBD also establishes obligations for countries to take measures “to ensure fair and equitable benefit sharing with the country providing genetic resources”. Nevertheless, there has been little progress in developing legislative, administrative, and policy measures to promote compliance by the users of genetic resources and traditional knowledge with their prior informed consent and benefit-sharing obligations [19]. To a large degree, the call for new international rules on access and benefit sharing responded to these gaps, and the perception that access regimes would never be effective without corresponding measures in user countries.

At the core of the Nagoya Protocol, therefore, are the measures on compliance. Among the articles dealing with compliance, Articles 15 and 16 address measures ensuring compliance with requirements on access and benefit sharing regarding genetic resources and traditional knowledge. Article 17 refers to the monitoring and transparency in the utilization of genetic resources. Discussions on these issues were amongst the most difficult during negotiations. Countries differ on whether measures should be mandatory or voluntary, on the degree to which these measures should be incorporated into existing administrative structures,

and on the adequate balance between transparency, confidentiality, and practicability.

Articles 15 and 16 establish that countries must establish “appropriate, effective and proportionate” measures to provide that genetic resources utilized within its jurisdiction have been accessed on the basis of prior informed consent and mutually agreed terms, as required by the national laws or regulations of the country of origin of the genetic resources and traditional knowledge. The goal is to ensure that only legally acquired genetic resources and traditional knowledge can be used in countries in which research, development, and commercialization are taking place. Yet, it will be up to each country to determine what is “appropriate, effective and proportionate,” with some guidance from other articles in the Nagoya Protocol.

In order to support compliance, for example, Article 17 requires countries to take measures to monitor and enhance transparency about the utilization of genetic resources. In particular, this provision foresees the designation of one or more “checkpoints”. The idea is taking advantage of existing monitoring systems at the national level to examine compliance with access and benefit sharing. In negotiations, applications for patents, market approval for products, and public funding or grants were discussed as potential checkpoints. Yet there were different views as to whether these checks should be mandatory, whether they should be expressly determined, and where and how they should be established. The use of intellectual property offices as checkpoints for access and benefit sharing was particularly controversial – and was finally not included in the text of the Nagoya Protocol.

Article 17 does require the use of checkpoints as measures to monitor the use of genetic resources. These checkpoints would collect information on access and benefit-sharing requirements and send it to the relevant national authorities. There is no list of checkpoints that could or should be established. Nevertheless, Article 17 mentions that checkpoints must be “effective” and “relevant” – though, again, these will be notions most likely interpreted at a national level. Internationally recognized certificates could be used in the context of checkpoints, as a type of “passport” to accompany genetic resources for certain transactions [20].

### **What are access and benefit-sharing requirements for traditional knowledge?**

Indigenous people were active participants in negotiations towards new international rules on access and benefit sharing. Their concerns included ensuring substantive and procedural recognition of their rights over genetic resources and traditional knowledge, as well as addressing traditional knowledge associated with genetic resources as a crosscutting issue [21]. Some countries, however, were concerned about moving towards recognition of rights of indigenous people over genetic resources. There were also questions as to whether detailed requirements on access and benefit sharing would be practicable given some of the complexities involved, such as knowledge that expands across communities or borders or is already in the public domain. The final text of the Nagoya Protocol was deemed “a fairly big win” for the position of indigenous people [22]. Traditional knowledge is mentioned across the text of the Nagoya Protocol, including in reference to scope, access, multilateral benefit sharing, transboundary cooperation and compliance (though it is not considered in the objective or in the monitoring provisions, for example). In terms of access to traditional knowledge associated with genetic resources, countries must take measures, in accor-

dance with national laws, to ensure that access takes place with prior informed consent of relevant indigenous and local communities, and that mutually agreed terms have been established [23]. In implementing their obligations, moreover, countries must take into consideration the customary laws and community protocols of indigenous and local communities, for which they must also, as may be appropriate, provide support to develop. A provision relating to the sharing of benefits derived from the use of publicly available traditional knowledge was debated throughout negotiations, but the provision was ultimately excluded from the final text.

In conclusion, it might be said that the Nagoya Protocol reaffirms that there is no greater service than a useful plant. Identifying useful applications for plant compounds is indeed significant as a step in research and development of food, medicine, and a range of other products that enrich our lives. Recognizing and harnessing the value of biodiversity in public policies, business strategies, and research programs has also shown to have the potential to improve ecological infrastructure and enhance economic activity and social well-being, as well as to support poverty alleviation [24].

The importance of creating ecological, social, and economic benefits from biological resources, and of sharing these benefits in a fair and equitable way, underpins global efforts to protect biodiversity. Yet lack of clarity about some of the basic concepts and approaches in access and benefit sharing have meant limited practical implementation. There are currently few functional regulatory frameworks in place, and research and development still takes place with limited awareness or understanding of the need or requirements of access and benefit-sharing practices. As a result, governments and civil society organizations view biodiversity-based research and development with trepidation, with concerns about possible allegations of “biopiracy” shadowing such research, development, and commercialization efforts.

The Nagoya Protocol on access and benefit sharing is not a perfect document. It was only achieved as a result of creative gaps and gray areas that will require additional elucidation at the national and international levels. However, the achievement of the Nagoya Protocol asserts the importance given by the international community to a balance between the use of biological resources as a basis for new products and processes, and the recognition of rights of biodiversity-rich countries and communities. In this regard, the focus should not be on the ambiguities but rather on the clarifications that were made and the emphases that were given. The new definition of “utilization of genetic resources”, for example, is an undisputable signal of the range of activities considered to fall within the scope of access and benefit-sharing principles.

With growing public awareness of biodiversity, the institutions and companies engaged in biodiversity-based research and development should view the new access and benefit-sharing provisions as an opportunity. A 2010 international survey showed that 60% of consumers in Europe and the United States indicated they had heard of biodiversity, and the number of people who understand biodiversity seems to be increasing [25]. Around the world, even more people are aware of biodiversity. In South Korea, the percentage of consumers who had heard of biodiversity was 76%, and in Brazil, the figure climbed to 94%. These numbers are likely to significantly increase with the communication efforts around the International Year of Biodiversity.

The adoption of the Nagoya Protocol will also trigger substantial efforts to build capacity, provide technical training and raise public awareness on access and benefit sharing. In addition to the es-

tablishment of an Access and Benefit-Sharing Clearing House, the Nagoya Protocol contains requirements for countries to engage and invest in awareness-raising (Article 21), capacity-building (Article 22), and technical collaboration (Article 23). The decision adopting the Nagoya Protocol, moreover, requests the Secretariat to the CBD to carry out awareness-raising activities among relevant stakeholder groups – including the business community, the scientific community, and others – to support implementation. Finally, the Global Environment Facility and others are invited to provide financial support to countries in the early ratification and implementation of the Nagoya Protocol. Japan has already pledged US \$ 2 billion in aid for biodiversity-related projects in developing countries [26].

The opportunity is there to acknowledge and provide an early and determined response to these trends and these efforts to put in practice access and benefit sharing. The complexities of negotiating across cultural lines, determining what is equitable in different circumstances and managing expectations remain. Nevertheless, more and more tools are available to guide and support the implementation of access and benefit-sharing principles. For example, access and benefit-sharing principles are included in the Ethical BioTrade standard, managed by the Union for Ethical BioTrade (UEBT). Its third-party verification assesses organizational policies and their implementation and determines any changes that need to be gradually implemented to comply with Ethical BioTrade practices, including access and benefit sharing. In addition, UEBT provides technical advice on access and benefit issues, including support through practical tools and workshops. No existing guideline can provide the “perfect solution”, but such efforts do show and evaluate the commitment to implement access and benefit sharing, as well as providing useful support.

Plant and natural product research and development have an important role in advancing the conservation and sustainable use of biodiversity. With the recent adoption of the Nagoya Protocol to the CBD, there are particular opportunities, as well as responsibilities, in engaging and contributing their expertise to the implementation of adequate practices on access and benefit sharing. Only through such practices can effective and sustainable ways of protecting biodiversity be found. In this regard, perhaps the highest value of plants, as well as the search for the information they garner, is still to come.

### Conflict of Interest



No conflict of interest.

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