National Confederation of Industry
Brazil
CNI. THE STRENGTH OF THE BRAZILIAN INDUSTRY




IMPACT STUDY OF THE ADOPTION AND IMPLEMENTATION OF THE NAGOYA PROTOCOL ON THE BRAZILIAN INDUSTRY

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ABBREVIATIONS

ABIFINA – Associação Brasileira das Indústrias de Química Fina, Biotecnologia e suas Especialidades

ABIQUIF – Associação Brasileira da Indústria Farmoquímica

ABIQUIM – Associação Brasileira da Indústria Química

ABS – *Access and Benefit Sharing* (acesso e repartição de benefícios)

APTM – Termo ou Acordo Padrão de Transferência de Material

BRACELPA – Associação Brasileira de Celulose e Papel

BRG – Bens baseados em recursos genéticos

CDB – Convenção sobre Diversidade Biológica

CEPEA/ESALQ/USP – Centro de Estudos Avançados em Economia Aplicada/Escola Superior de Agricultura "Luiz de Queiroz"/Universidade de São Paulo

CGEN – Conselho de Gestão do Patrimônio Genético

CGIAR – Centros Internacionais de Pesquisa Agrícola do Grupo Consultivo sobre Pesquisa Agrícola Internacional

CNAE – Classificação Nacional de Atividades Econômicas

CNI – Confederação Nacional da Indústria

CNPq – Conselho Nacional de Desenvolvimento Científico e Tecnológico

CNUMAD – Conferência das Nações Unidas para o Meio Ambiente e Desenvolvimento

COP – Conferência das Partes

CPI – Consentimento Prévio Informado

CTA – Conhecimento Tradicional Associado aos Recursos Genéticos

CURB – Contrato de Utilização do Patrimônio Genético e de Repartição de Benefícios

EMBRAPA – Empresa Brasileira de Pesquisa Agropecuária

FAO – Organização das Nações Unidas para Alimentação e Agricultura

FUNAI – Fundação Nacional do Índio

GT-ABS – Grupo de Trabalho Aberto *Ad Hoc s*obre Acesso e Repartição de Benefícios

IBAMA – Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis

IBGE – Instituto Brasileiro de Geografia e Estatística

ICNP – Comitê Intergovernamental do Protocolo de Nagoia (sigla em inglês)

ING – Grupo Inter-regional de Negociação (sigla em inglês)

INPI – Instituto Nacional da Propriedade Industria

IPHAN – Instituto do Patrimônio Histórico e Artístico Nacional

IWGIA – *International Work Group for Indigenous Affairs* (Grupo Internacional de Trabalho sobre Assuntos Indígenas)

MMA – Ministério do Meio Ambiente

MOP – *Meeting of Parties* (Reunião das Partes do Protocolo)

MP – Medida Provisória

MSC – Mensagem ao Congresso Nacional

NCM – Nomenclatura Comum do Mercosul

OECD – Organização para a Cooperação e Desenvolvimento Económico (sigla em inglês)

OMC – Organização Mundial de Comércio

OMPI – Organização Mundial de Propriedade Intelectual

OMS – Organização Mundial da Saúde

ONU – Organização das Nações Unidas

P&D – Pesquisa e Desenvolvimento

PAM – Produção Agrícola Municipal

PIA – Pesquisa Industrial Anual

PN – Protocolo de Nagoia

PRODLIST – Lista de Produtos da Indústria

RB – Repartição de Benefícios

RG – Recurso Genético

SCBD – Secretariado da Convenção sobre Diversidade Biológica

SECEX/MDIC – Secretaria Executiva do Ministério do Desenvolvimento, Indústria e Comércio Exterior

SISBIO – Sistema de Autorização e Informação em Biodiversidade

SML – Sistema Multilateral

TIRFAA – Tratado Internacional sobre Recursos Fitogenéticos para a Alimentação e Agricultura

TMA – Termo Mutuamente Acordado

TRIPS – Agreement on Trade-Related Aspects of Intellectual Property Rights (Acordo sobre os Aspectos dos Direitos de Propriedade Intelectual Relacionados ao Comércio)

UNFCCC – *United Nations Framework Convention on Climate Change*

UPOV – Convenção Internacional para Proteção de Novas Variedades de Plantas

VP – Valor de Produção

1. PRESENTATION

This study identifies and analyzes both positive and negative potential impacts of the implementation of the Nagoya Protocol, focusing on the competitiveness of Brazilian industries that use the genetic heritage of biodiversity found in Brazil and in other countries.

A quick review of similar studies carried out in various parts of the world reveals that the state of uncertainty regarding the impacts of the Nagoya Protocol on national economies (and also on the conservation and sustainable use of biodiversity) is such that the best way to analyze the topic is through the use of prospective tools. The studies containing the most grounded information on the subject are precisely those that build different scenarios for national laws and multilateral negotiations, thus simulating different possibilities and seeking the most strategic position.

This is the reason why this study adopts a methodology compatible with the uncertain nature of regulatory frameworks. Particularly, the measuring of impacts is based on previous construction of alternative scenarios focused on the critical uncertainties related to the binding nature of the Protocol, which help to identify significant impacts on the industrial production structure, on production chains that use genetic resources and on Brazil's technological and scientific development.

This study was developed in four stages: literature review and analysis of the main impacts, survey and analysis of information on balance of payments resulting from sale of biological products and their derivatives, building of alternative scenarios and assessment of impacts on different scenarios and recommendations.

In the first part of this document, there is an analysis of the Nagoya Protocol (NP), the process of negotiation and the uncertainties derived from this lengthy negotiation process between countries. This process became even more complex with the participation of social groups directly involved in access and benefit-sharing (ABS) activities, such as indigenous peoples and traditional communities, scientists and company representatives, reflecting positions in the NP text that lead to important decisions for domestic legislations. It should be noted, however, that despite the greater degree of uncertainty over legislation, this active participation of stakeholders - arising from access to citizenship - is a contemporary phenomenon.

The study measured the overall impacts on production of commodities and on the trade balance, using 2010-2012 import and export data. Two sectors were chosen for a deeper analysis of potential impacts: forest industry and fine chemicals industry.

The construction of the scenarios was based on collected and analyzed data, as well as the perceptions of industry representatives who participated in two meetings held by the National Confederation of Industry (CNI).

Due to lack of clarity about the various implications of the NP, the study highlights the main economic impacts that may occur as a result of different effects of the NP on domestic legislations.

2. OVERALL OBJECTIVE

The overall objective of this study is the identification and analysis of positive and negative potential impacts resulting from the implementation of the Nagoya Protocol, focusing on the competitiveness of Brazilian industries that use genetic resources of the Brazilian biodiversity and that of other countries.

2.1. Specific objectives

- Identify and characterize the range of implications of the Nagoya Protocol implementation on productive activities that directly and indirectly make use of biodiversity resources from Brazil or elsewhere.
- Identify key industries that will be impacted by the Nagoya Protocol.
- Build alternative scenarios that allow estimating economic, productive, technological, and strategic impacts and impacts on the legal framework.
- Point out positions for the industries according to the built scenarios and their estimated impacts
- Indicate possible strategies for operating in different scenarios.

2.2. Key issues

Considering the potential impacts arising from the Protocol adoption and implementation on industrial activities that use genetic resources, the study analyzed issues such as:

- Will the Protocol implementation create more bureaucratic restrictions on access to genetic resources?
- How will the Protocol implementation affect MP 2186-16/2001, or influence the process of its review?
- How can the Brazilian industry benefit from the adoption and implementation of the Nagoya Protocol?
- What other negative and positive impacts of the Protocol implementation will affect the Brazilian industry?

- How to prepare the new Brazilian legal framework on access to genetic resources and benefit-sharing by economic exploitation for a possible entry into force of the Nagoya Protocol?
- What are the expectations related to international trade in species and what kind of scenarios are expected for the trade balance of native and exotic species and their derivatives?
- How will the sharing of benefits of transboundary resources (Amazonian genetic resources) be carried out?
- Who are the creditors and debtors of benefit-sharing under the Protocol (government, industry, fund, providers, communities etc.)?
- Under what conditions must Brazil pay royalties for the use of exotic species? And for the use of domesticated species? (e.g. *Eucalyptus spp* and *Pinus spp*)
- Is the use of genetic resources of exotic or domesticated species for agricultural or food purposes provided for under the Nagoya Protocol? Will the use of species listed in Annex I of ITPGRFA for purposes other than agricultural or food production be disciplined by the Nagoya Protocol?

3. INTRODUCTION

The Protocol on Access to Genetic Resources and Benefit-Sharing, or Nagoya Protocol, is a binding protocol adopted on October 29, 2010, during the 10th Conference of Parties (COP 10) to the Convention on Biological Diversity (CBD)[1], held in Nagoya, Japan. Its goal is to establish rules for signatory countries to access genetic resources and their derivatives[2], to traditional knowledge associated with genetic resources and to sharing of benefits arising from sustainable use of biodiversity components at the regional, national and local levels, through appropriate access to genetic resources and appropriate transfer of relevant technologies.

Despite progress toward ratification by more than 50 countries and the expected entry into force in the medium term in these countries, there are currently a number of questions about how the NP should operate effectively. It is clear that domestic legislations will define access and benefit-sharing rules, including territorial issues and issues related to specific communities and associated traditional knowledge.

What is less clear is what direction domestic legislations will take and how multilateral negotiations will move forward during and after the establishment of national regulatory frameworks, in response to the provisions of the Nagoya Protocol.

Thus, any analysis of impacts, whether economic, technological, environmental or any other, can only be quantified and qualified more accurately on the basis of developments in domestic legislations.

The text of the Nagoya Protocol is comprehensive enough to allow different regulatory models to meet its determinations. Ranging from issues such as the definition of the origin of genetic resources that have long been dispersed and used on the planet, to issues related to prior informed consent for the achievement of access, to the equally complex issue of assigning ownership to traditional knowledge, there are many gaps to be filled.

Attention should also be drawn to issues related to the interaction of the NP with other international agreements already in force, such as the ITPGRFA, TRIPs and others in the area of health and rights of the sea. The number of unanswered questions certainly exceeds what is now taken for granted.

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1 Brazil was the first country to sign the Convention on Biological Diversity (CBD) at the UN Conference on Environment and Development (UNCED), on June 5, 1992, in Rio de Janeiro.

2 "Derivative" means 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. (Article 2 of the Nagoya Protocol). Examples: oils, extracts, resin, starch, latex, aroma, poisons, among others.

The Nagoya Protocol was opened for signature between February 2, 2011 to February 1, 2012, when it was signed by 92 Parties to the CBD and, until February 2014, it has already been ratified by 29 Parties (Annex 1). Ninety days after the 50th ratification, acceptance, approval or accession by States or regional economic blocs, pursuant to its Article 33.1, the Protocol will enter into force, and negotiations regarding its details to make it operational will continue.

It is noteworthy that the implementation of the Nagoya Protocol includes target 16 of the Aichi Biodiversity Targets (Decision X/2) for 2011-2020, adopted by the Parties of the CBD at COP 10 in Nagoya. This target is inserted in Strategic Objective D "Increasing the benefits of biodiversity and ecosystem services", and establishes that, by 2015 the Nagoya Protocol will enter into force and will be operational, in compliance with domestic legislation.

Brazil signed the Nagoya Protocol on February 2nd, 2011, and on June 5th, 2012, the President of the Republic forwarded it to Congress for consideration and approval, for subsequent ratification. The text of the Protocol is currently being processed at the House of Representatives as MSC 245/2012 and will be appreciated by a Special Commission, to be constituted, before it is forwarded to the Senate and then sent to the President's Office.

It is important to note that the Nagoya Protocol does not accept any reservation thereto (Article 34 of the Protocol), which means that the ratification process does not allow for discussion of any changes to the text. A country either ratifies it or not. However, the Protocol leaves a series of issues for domestic legislation to decide. It is up to countries to establish as best as possible how access and benefit-sharing will be implemented in their jurisdiction.

In 2011 to 2012, Brazil initiated a series of dialogues with sectors of Brazilian society to define its national biodiversity targets for 2020, based on the Aichi Targets, which were approved by Resolution Conabio N. 6 of September 3, 2013. Regarding target 16, on the ratification of the Nagoya Protocol, Brazil has fully adopted the Aichi Target and pledged to ratify and implement it by 2015.

Brazil is the country with the highest rate of biodiversity in the world, therefore the implementation of the CBD objectives - biodiversity conservation, sustainable use of its components and sharing of the benefits arising from its use - is crucial for its scientific, technological, economic and social development.

Since the entry into force of the CBD in December 1993, the third objective was the one at the lowest level of implementation. Therefore, the decision to negotiate an international regime on access and benefit-sharing was supported by all Parties to the Convention and the UN Assembly. The result was the adoption of the Nagoya Protocol.

4. THE NEGOTIATION PROCESS OF THE NAGOYA PROTOCOL

Before the Convention on Biological Diversity (CBD), biodiversity was considered a common heritage of mankind, and was freely accessible in most parts of the world, although there have always been inequalities associated with economic power that have, to a greater or lesser degree, affected this free access. It was almost common sense to assume that biodiversity should benefit the whole of society, as a source of raw material for products and services (Ferreira & Clementino, 2010). There was virtually no control of access, and the topic of benefit-sharing had not reached the status of international negotiation.

In 1992, the text of the Convention recognized the sovereignty of countries as to their genetic resources and the right to receive benefits from the use of biodiversity components originating in their territories. The rights of local communities and indigenous peoples over their knowledge related to biodiversity were also recognized. The fair and equitable sharing of benefits arising from access to genetic resources and traditional knowledge was so widely discussed that it eventually became one of the three major objectives of the CBD.

In the text of the Convention, Article 15 addresses the terms and conditions for access to genetic resources and benefit-sharing. The article states that access to these resources is subject to prior informed consent (PIC) of the Party that will provide such resources and should be based on mutually agreed terms (MAT) to ensure the sharing of benefits arising from commercial or other uses.

Fair and equitable benefit-sharing has been the most difficult objective to implement, due to the different positions of developing countries rich in biodiversity and economically dominant developed countries that hold technological knowledge. An example of this is lack of consensus on what to do when biodiversity or traditional knowledge is shared by countries and communities respectively, or when no one knows the precise origin of the genetic material.

There is also the problem that domestic legislations have been unable to curb the use of genetic material legally or illegally coming out of their country, since they can only be enforced within their national territories. An international regime to dictate rules for access and benefit-sharing between countries could solve this issue.

It should be noted that the concept of ABS that is gradually being standardized at the international level is aspirational, i.e. it differs in nature from a commercial contract for the purchase of raw materials, even though such contract may be suitable for providers and users of genetic resources.

Until today this theme is one of the most controversial under the Convention, because of its implications in other topics, such as national sovereignty, international policies, economic development, indigenous and local communities, scientific research, biotechnology, intellectual property rights, industries dependent on genetic resources and traditional knowledge associated with genetic resources and the conservation and sustainable use of biological diversity (Greiber *et al.*, 2012; Kohsaka, 2012).

It was only in 1999, with the creation of an expert group to discuss the implementation of Article 15, that the issue of access and benefit-sharing was effectively included in the CBD agenda. In 2000, during the fifth meeting of the Conference of the Parties (COP 5), held in Nairobi, it was decided to officially create the Ad Hoc Open Ended Working Group on Access and Benefit-Sharing (WG - ABS). One of the group's outputs was the adoption of the Bonn Guidelines in 2002 at COP 6 in The Hague. The Bonn Guidelines are intended to guide countries and their governments to create strategies and laws that facilitate access to genetic resources and benefit-sharing nationally. However, as the name implies, they are guidelines, to be adopted voluntarily - no obligations, no commitments, no penalties are involved. It was, however, a first step in the implementation of the Convention's guidelines relating to ABS.

In the same year, in Johannesburg, South Africa, during the World Summit on Sustainable Development, countries were called upon to negotiate an International Regime on Access to Genetic Resources and Benefit-Sharing. In 2004, at COP 7 in Kuala Lumpur, the Parties decided to reconsider the topic in a Working Group, which had a defined mandate and term (Decision VII/19 of the Conference of the Parties to the CBD). Again, attention should be drawn to the aspirational nature of these calls and recommendations, since they point to ABS as an additional tool for poverty eradication.

In 2005, the working group (WG - ABS) effectively began negotiating the international system. At COP 8, held in Curitiba, Brazil, in 2006, the mandate of the WG - ABS was extended to 2010, so that it could conclude the design and negotiation of an international regime on access and benefit-sharing (Baptista, 2009). At the 9th meeting of the WG - ABS in Cali, Colombia, the WG co-chairs presented a draft text for the Protocol, which was considered by the Parties somewhat ambiguous, in addition to lacking consensus on some points (Kohsaka, 2012).

To try to address the deadlock, an Interregional Negotiating Group (ING) was convened, which also failed to settle the main disagreements between countries. In October 2010, a week before starting

the COP 10, there was no consensus on the text of the regime. The general expectation was that the Nagoya Protocol would not be approved at COP 10. But on the last day of the meeting, the text of the Protocol was finally approved. The approved text was not the one proposed by the co-chairs that had been negotiated until then, but a new text presented to them by the Chair of COP 10, the Minister of Environment of Japan, Ruy Matsumoto.

During the negotiation process, there were many disagreements between developed and developing countries. The main one was on the nature of the regime, whether it should be binding[3] or not. Developing countries claimed that the regime should be binding, so as to ensure the distribution of benefits and restriction of patent applications, by means of collection and dispute resolution mechanisms. Developed countries wanted a nonbinding regime, without a mandatory nature or any monitoring mechanisms. They did not want to undertake commitments that could be enforced, because they thought that this would discourage industrial development and academic research, which would result in fewer cases of benefit-sharing (Kohsaka, 2012).

Another point of contention was the scope of the regime. Some Parties wanted access to traditional knowledge to be included in the regime, while other Parties did not, and among the latter was the indigenous movement. The reason why indigenous people did not want traditional knowledge to be included in the international regime was because they believed that before entering a regime, their sovereign rights over their knowledge and over genetic resources in their territories should be recognized. The indigenous populations also wanted the right to prior and informed consent before access occurs, and wanted the repatriation of biological and genetic resources currently in *ex situ* conditions in other countries, as well as of traditional knowledge accessed without consent. Ultimately, the group that supported the inclusion, led by Brazil, won the dispute with the support of indigenous peoples. It was better to ensure inclusion in the international regime than to wait for the sui generis protection regime, heavily dependent on other international laws on human rights and territories. Thus, the two working groups, the ABS and the 8 (j)[4], which address traditional knowledge began to cooperate in order to optimize negotiation efforts.

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3 A binding international agreement is a legally binding instrument that, after being ratified by countries, the countries accept and submit to the obligations and duties as regards certain conducts provided for in that instrument. The opposite are nonbinding agreements, which are voluntary and not mandatory.

4 Article 8(j) of the CBD recommends that the Parties, subject to their domestic legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices.

Within the scope, there was another very controversial issue: whether or not to include the "derivatives" of accessed genetic resources. Again, the group was divided between those in favor and those against it. In general, developed countries wanted benefit-sharing to be limited to access to genetic resources themselves and not their derivatives. The rationale was that the CBD did not mention derivatives, only the use of genetic resources. However, the Bonn Guidelines[5] refers to derivatives.

In turn, developing countries argued that much of the benefits did not occur as a result of using DNA, or the genes themselves, but rather as a result of research and development of biochemical components. Thus, in the text of the Protocol, access to genetic resources was expanded to include products and derivatives (molecules, crude extracts of organisms, elements derived from the metabolism of organisms), synthetic products that mimic a naturally occurring molecule (e.g. biomimicry) and commercial products including medicines. Developing countries also argued that access to herbaria and other collections established before the CBD's implementation should be subject to the Protocol. The rationale was that access is always new, in the sense that it uses new means of research and looks for new types of use. This understanding, in fact, introduces a certain type of retroactivity to the CBD's principles (Aubertin and Filoche, 2011).

The decision on how to negotiate the regime was also full of conflict. Developed countries wanted the WG-ABS to work alongside other international forums related to the topic. The aim was to bring critical issues, such as intellectual property, to more influential forums, such as the WIPO (World Intellectual Property Organization) and WTO (World Trade Organization). However, developing countries rich in biodiversity wanted the CBD to be the supreme body to address themes related to biodiversity, including the sui generis regime. Again, the group that defended the supremacy of the CBD prevailed. In fact, the underlying disagreement was that some countries felt that the topic of access to genetic resources was merely a way to transfer resources between developed and developing countries, and this should be dealt with in forums with an economic focus. Other countries felt that the CBD was the natural forum since it addressed biodiversity and environmental governance, and that the Convention already incorporated the vision of sustainability and dealt with environmental, social and economic issues in a balanced and integrated manner.

Developed countries were for a while reluctant to discuss the adoption of a Protocol, because they believed that, before the States took on new commitments, the ABS issue should be addressed at the

5 In the Bonn Guidelines, the term derivatives of genetic resources appears three times in the text, in paragraphs 36 (l), 44 (i) and in Annex 1. Paragraph 44 refers to "*...sharing of benefits arising from the commercial and other utilization of genetic resources and their derivatives and products* ".

national level, allowing each State to establish a regulatory framework in line with its characteristics and needs, instead of having to fit into a single international framework. For these countries, the obligations already contained in the CBD were sufficient. Before adopting any new legislation at the international level, countries should comply with paragraph 1 of Article 15 of the CBD, i.e. establish domestic legislations that determined rules for access to genetic resources within their jurisdictions. Developed countries also insisted on the fact that the Parties had pledged to create conditions to facilitate access to genetic resources, and not impose restrictions to the other Parties to the CBD (Art 15.2).

Developed countries argued that the regulation and control of ABS issues should be the responsibility of the countries providing genetic resources. However, for developing countries, user countries should also be accountable for the implementation of the international and domestic legal framework in order to monitor and control the legality of access and compliance with established rules, including mechanisms to track the use of genetic resources and control of granting of patents and product registration and marketing (Aubertin and Filoche 2011).

Developing countries and non-governmental organizations (NGOs) also viewed the Protocol as an opportunity to contribute to the reform of intellectual property legislation, particularly through the connection between the ABS system and the patent system. They wanted a legal instrument to prove that the resource has been acquired under the CBD and the domestic legislation of the providing country (consented by the communities and the State, under a benefit-sharing mutually agreed terms) and that this information be included in the patent application. Some States have already implemented their own systems, such as Brazil, which in 2010 included new requirements in its patent legislation. Many countries, however, consider that the international recognition of certificates of origin will require a review of all patent legislation and of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), requiring the introduction of a new patentability criterion.

After this long and contentious negotiation process, the Nagoya Protocol was adopted in 2010 during the 10th Conference of Parties to the Convention on Biological Diversity (Decision X/1). Its approval was considered a victory for biodiversity, even though some issues remained undecided. Countries did not want to repeat the failure of the Copenhagen Conference[6], and did not want to be accused of allowing the continuing erosion of biodiversity. However, the controversies that arose during its negotiations were not settled and are clearly reflected in the Protocol's final text (Aubertin and Filoche, 2011).

6 From December 7 to 18, 2009, the 15th Conference of Parties (COP 15) of the UN Framework Convention on Climate Change (UNFCCC) was held in Copenhagen, capital of Denmark. It became known as the Copenhagen Conference and aimed at defining concrete actions to prevent global warming resulting from human action. It was hoped that countries would undertake commitments to reduce greenhouse gases according to the recommendations of the IPCC, the Intergovernmental Panel on Climate Change. However, the result was a nonbinding agreement without the countries' unanimous support, which basically represented a statement of intent.

The mere observation of the multilateral negotiation practices shows that, often, the delay in decision making, drafting of laws and regulations etc., is not only due to the ineffectiveness of institutions and persons, but also to tactics adopted to extend decision-making while seeking, with or without the best justification, to achieve a new balance of forces in a clash of interests. Consequently, this delay can also reveal the greater priority of the issue in terms of political economy than one or more Parties may indeed be willing to acknowledge. Understanding this is important when choosing the most appropriate strategies at each stage of the negotiation.

Conflicts between UN negotiation agencies, which are constantly sought for support to different interests, such as the World Trade Organization (WTO), the CBD and the United Nations Food and Agriculture Organization (FAO), arise from the very nature of the competition for space between these agencies, as well as the fact that various matters under negotiation are not always completely or satisfactorily settled only in this or that agency.

The negotiation of fair and equitable sharing finds a reasonable balance within commercial contracts based on payments related to the market value of the asset or traditional knowledge involved, and that may sound completely foreign from the point of view of benefit-sharing as a tool to support sustainable use of biodiversity and the development of providing communities. Benefit-sharing or mere acquisition of raw material, that is the question, as mentioned above, and the reason why it is important to note that it is about aspirational principles of benefits intrinsically embedded in commercial contracts.

This should be well understood and assimilated, for three reasons:

1. in order not to inflame disputes over principles that do not really fit into commercial contracts;
2. to establish the best strategy for negotiating benefit-sharing agreements;
3. as a lesson about contemporary contract relations and the best balance between different concepts of fair and equitable payments.

5. WHAT THE PROTOCOL IS ABOUT

The Nagoya Protocol is a complementary treaty to the Convention on Biological Diversity (CBD). Its object is the implementation of the third objective of the Convention, in particular Articles 15, 16 and 19, which deal with access to genetic resources, access to technology and technology transfer, and biotechnology management and distribution of its benefits, respectively.

In its preamble, besides referring to certain provisions of the CBD, the Nagoya Protocol recognizes that biodiversity has economic value and the fair and equitable sharing of this economic value with the "guardians of biodiversity" is a way to encourage conservation and sustainable use of biodiversity components, and to contribute to poverty eradication.

The Protocol also aims to ensure legal certainty to users and providers of the resources and equity and fairness in negotiating mutually agreed terms.

The Protocol has 36 items in total and an attachment that includes examples of monetary and non-monetary benefits.

5.1. Objective

The Protocol objective, provided for in **Article 1**, is "the fair and equitable sharing of the benefits arising from the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding, thereby contributing to the conservation of biological diversity and the sustainable use of its components."

Note that access to traditional knowledge associated with genetic resources is not stated as an objective of the Protocol. Nonetheless, this intention is clear throughout the treaty's text, in particular Articles 7 and 12.

Another noteworthy point is that the Protocol has made the direct relationship between access and benefit-sharing with the other two objectives of the Convention - conservation and sustainable use - more apparent. In the Convention this is not so explicit (Greiber *et al.*, 2012).

The objective of the Protocol is essential for interpretation of the terms contained in the rest of the text.

5.2. Use of terms

Article 2, besides reaffirming the application of the terms contained in Article 2 of the Convention, introduces new terms, such as "use of genetic resources" and "derivative".

The Protocol defines "utilization of genetic resources" as "a means to conduct research and development on the genetic and/or biochemical composition of genetic resources, including through the application of biotechnology, as defined in Article 2 of the Convention." And "derivative" means "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." Linking these two concepts is the concept of "biotechnology", imported without modification from the Convention, which means "any technological application that uses biological systems, living organisms or derivatives thereof, to make or modify products or processes for specific use." In practice, the Protocol addresses the sharing of benefits arising from the use of genetic resources and their derivatives, which are the basis for a wide variety of products, from drugs to food to cosmetics ingredients.

Many other important terms used in the Nagoya Protocol have not been defined, such as "access to genetic resource", access to traditional knowledge associated with genetic resources, "research and development" and "use of traditional knowledge associated with genetic resources." In such cases, when there is no definition of a term, the rules of international law apply, as laid down in the Vienna Convention on the Law of Treaties, which states that in the absence of a particular meaning, terms used in a treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty, in the light of the treaty's object and purpose (Oliva and Norman, 2013).

5.3. Scope

The scope of the Protocol is defined in **Article 3**, which states that the Protocol applies to genetic resources included under Article 15 of the Convention and the benefits derived from the use of such resources and the traditional knowledge associated with the genetic resources and benefits derived from the use of such knowledge.

By referring to Article 15 of the CBD, the Nagoya Protocol refers to genetic resources under national jurisdiction. Thus, it is understood that areas not under national jurisdiction, such as international waters, deep ocean floor, Antarctica are not in the scope of the Protocol. There are no property

rights in these areas and therefore there is no one to ask for prior informed consent or with whom to establish mutually agreed terms.

There are understandings that genetic resources used in large volumes as commodities (use of biological resources in the raw, as raw material, i.e. without any research and development activity), and genetic resources accessed before the entry into force of the CBD are also outside the scope of the Nagoya Protocol. The following are outside the scope of the Protocol: human genetic resources; genetic resources for which a Party determines that informed consent is not necessary; genetic resources covered by specific ABS instruments.

The text of the Protocol says that the Protocol applies to genetic resources included under Article 15 of the CBD and the benefits arising out of their use (Article 3). For the CBD, genetic resources means "genetic material of actual or potential value", while genetic material means "any material of plant, animal, microbial or other origin containing functional units of heredity".

In negotiating the text, this provision caused great concern to some countries, because they believed that it could be interpreted as a limitation to genetic material with "functional units of heredity", thus excluding the sharing of benefits from derivatives.

However, reading Article 3 together with Article 2 may result in a different understanding. In Article 2, the two new concepts - "derivative" and "use of genetic resources", in practice, broaden the scope.

Although "derivative" is defined in the Protocol, there is no further mention of it throughout the text, which is viewed by some as absence of obligation in the Protocol as to derivatives (Aubertine and Filoche, 2011). There is another view that derivatives do not include synthetic molecules with a structure similar to a natural substance, even if inspired by a natural molecule, and therefore such molecules are not within the scope of the Protocol. This understanding is debatable, and there is no consensus among countries. However, the fact is that modern metabolic engineering platforms, when providing resources for heterologous synthesis, become increasingly independent from the source of naturally occurring genetic resources, as provided in Article 2 of the Protocol.

One can imagine that a rare naturally occurring plant molecule with limited capacity for scale production that is very important for human health, for example, would be produced in these modern platforms of metabolic engineering in microorganisms; such platforms would be trained in learning and synthesis of a family of non-naturally occurring related molecules.

It is certainly possible to establish the value of the original molecule, and based on this value, to share benefits with its provider. However, this significantly alters the provider's ability to claim payment of benefits on a whole chain of related molecules that do not exist in biodiversity, as well as on a group of innovative industrial processes that are actually responsible for the added value resulting from scale-up production.

Added to this the capacity to "shuffle" and recombine genetic information, as well as optimize gene functions through genomic techniques, which certainly demonstrates that the significant added value will no longer be found only in the "starting value" of the naturally occurring molecule, but in the market value of the functionally optimized molecule, which does not exist naturally in biodiversity.

It should be noted that the possibilities left open by the term "naturally occurring" under Article 2, should correct the exaggerated focus on paying or not paying to providers benefits over genetic resources and derivatives (still a highly political-discretionary dispute), directing it to a "supply chain" approach, where the relative value of the original genetic resource can be established with greater accuracy.

As already mentioned, the combined understanding of the terms "utilization of genetic resources" and "biotechnology" allows the interpretation that the benefits arising from the use of derivatives are within the scope of the Protocol.

The definition of terms is essential to understand the scope of the Protocol, and regarding both terms, "utilization of genetic resources" and "derivative", there is the possibility of different understandings of its coverage. In the case of derivatives, the definition is limited to a naturally occurring biochemical compound, and may allow the understanding, for example, that it would not cover certain synthetic biology products or an artificially synthesized compound.

Thus, the term "naturally occurring" allows new possibilities arising from the disruptive advancement of genetic sciences and technologies, in fact representing a gateways to the claim that certain new molecules as not really natural, but obtained "from scratch" or again, allowing the claim that they are not biodiversity genetic resources.

The scope of the Protocol also does not reach genetic resources that are the objects of specialized international agreements on access and benefit-sharing, consistent with the objectives of the CBD and the Nagoya Protocol (Article 4.4 of the NP).

5.4. Relationship with international agreements and instruments

This issue is addressed in Article 4 of the Protocol, which considers that its provisions should not affect the rights and obligations of any Party deriving from any existing international agreement, except where the exercise of such rights and the fulfillment of such obligations may cause serious injury or threat to biological diversity. The Protocol makes it clear, however, that there is no intention to create any hierarchy between Nagoya and other international instruments, but rather collaboration and complementation.

There is also provision for specialized international instruments on access and benefit-sharing, provided that they are consistent with and not contrary to the objectives of the Convention and the Protocol. Thus, the Nagoya Protocol will not apply to a Party or Parties to the specialized instrument in relation to the specific genetic resource covered by and for the purpose of the specialized instrument.

The Nagoya Protocol interfaces with many other international agreements. The main ones are the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) under the United Nations Food and Agriculture Organization (FAO), the International Convention for the Protection of New Varieties of Plants (UPOV), the Antarctic Treaty, United Nations Convention on the Law of the Sea, Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) within the World Trade Organization (WTO) and the International Health Regulations (2005), under the World Organization (WHO). There is also the interface with WIPO (World Intellectual Property Organization) in relation to debates about "sui generis" protection of associated traditional knowledge, with the FAO Commission on Genetic Resources for Food and Agriculture, among others.

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a. ITPGRFA

Modern global agriculture is based on the paradigm that genetic resources are public commodities, of common use by mankind, and therefore should be exchanged freely between countries. The idea was also to encourage their collection and safekeeping in international centers, so that all countries could have access to these global commodities. With the CBD, this paradigm changed with the reaffirming of countries' sovereignty over their natural resources. In response to this paradigm shift, the same countries that had signed the CBD understood that the issue of plants required a different treatment. In using plant breeding for food and agriculture, due to specific issues related to these sectors, this exchange had to be preserved and had to be as free as possible. Furthermore, the logic of the country of origin being the recipient of benefit-sharing did not make sense for some species. So the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) was created with its scope limited to plants. The ITPGRFA regulates the exchange of plant germplasm, which is important for food security among signatory countries. They can access and use a shared germplasm bank "solely for the purposes of utilization and conservation, for research, breeding and training for food and agriculture, provided that such purpose does not include chemical, pharmaceutical and/or other non-food/feed industrial uses".

The Multilateral System was created to facilitate access to a negotiated list of plant genetic resources for food and agriculture and the fair and equitable sharing of benefits arising from their use. The system was created to operate even if countries did not develop domestic legislation on the topic (Ferreira and Clementino, 2010). The Multilateral System is based on a Standard Material Transfer Agreement (SMTA). The SMTA is a private instrument executed between the provider and receiver of the material and FAO. The sharing of benefits can be: exchange of information; access to technology and technology transfer; capacity building and strengthening in developing countries; and sharing of benefits arising from the commercialization of products. Such products incorporate material obtained under the rules of the multilateral system and are available with restrictions, i.e., when protected by patents. A fixed percentage of the selling price is collected to the Benefit-Sharing Fund. Therefore, the distribution of benefits under the Treaty does not adopt a bilateral approach as does the CBD, but a multilateral one - the Fund's resources are used for programs and projects aimed at conservation and sustainable use of plant genetic resources, particularly in developing countries.

The Multilateral System reaches only a small number of plant species, those that are under the management and control of the Contracting Parties and in the public domain, or genetic resources conserved in *ex situ* collections of the International Agricultural Research Centers of the Consultative Group on International Agricultural Research (CGIAR). Currently, the Multilateral System comprises only 64 species listed in Annex 1 of the Treaty. Many plant species were left out. There are no agreements in place for animal species (such as cattle and fish, for example) or microorganisms.

In Brazil, the ITPGRFA has been in force since 2006 and it is very important for the country, since Brazilian agribusiness is totally dependent on genetic resources from other countries.

The provider of a plant genetic resource, under the ITPGRFA, is the one that conserves genetic material included in the Multilateral System (MLS). The origin of the genetic material and the date of its acquisition are irrelevant. The receiver of the resource, in turn, has many obligations, among which the permission to use the resource only for agricultural uses and for food.

Under the ITPGRFA, FAO is also party to the contract, as the third recipient Party. Its responsibility, among others, is to monitor compliance with the SMTA and benefit-sharing and approve rules of procedure.

The implementation of the ITPGRFA, however, has been slow since its entry into force in 2004, and the benefit-sharing mechanism has proved inadequate. There have been no payments of benefit-sharing yet, whether voluntary or mandatory, showing the need to review the current terms of sharing under the SMTA (Chiarolla 2013).

The adoption of the Protocol and its imminent entry into force sparked heated discussions on how to regulate access to genetic resources from animals and microorganisms, whether under FAO or CBD. Another unresolved issue in the ITPGRFA is the regulation of plant species used for food and agriculture that are not in the multilateral system. The treaty itself says that the material used for agriculture and food has to have a differentiated priority treatment. This will be one of the issues that the Parties to the Protocol (as soon as it enters into force) will have to discuss and propose solutions.

It must be taken into account that the Nagoya Protocol recognizes agriculture as a particular situation, both for the way it is carried out, using many varieties to develop a new plant, and for its importance to mankind. And for this reason the Protocol allows countries to establish specific standards for use of genetic resources in agriculture.

b. TRIPS

In relation to TRIPS, many countries view the Protocol as an opportunity to contribute to the reform of intellectual property legislation, in particular the connection between the ABS system and the patent system.

Currently, in the biotechnology field, patent applications may be submitted for innovations based on a genetic resource without observing the rights generated by the ABS regime, such as indication of the origin of the resource and proof that the resource was obtained under the CBD and domestic legislation of the providing country (prior informed consent of communities and the state, and establishment of mutually agreed terms). Some countries have already implemented their own systems. For example, in Brazil, normative acts of the Management Council of Genetic Heritage - CGEN (Resolution N. 23 dated 10/11/2006) and the National Institute of Industrial Property - INPI (Resolution N. 134/2006) regulate Article 31 of Provisional Measure (MP) 2186-16/2001*, requiring proof of legal compliance and the origin of the genetic material and associated traditional knowledge, where applicable. Internationally, the requirement for a certificate of origin requires a review of all the patent laws of the Parties to the CBD and TRIPS, thus formalizing a new patentability criterion (Aubertine and Filoche, 2011).

c. Other Agreements

Other specialized agreements for access and benefit-sharing should support rather than oppose the objectives of the Convention and the Protocol. If these specialized agreements address access and benefit-sharing in relation to some specific genetic resource, and are consistent with and not contrary to the objectives of the Convention and the Protocol, the Nagoya Protocol shall not apply to the Party or Parties to said specialized instrument.

Note:* Article 31 - The granting of industrial property right by the competent authorities over a process or product obtained from a sample of a genetic resource component is subject to compliance with this Provisional Measure; the applicant must inform the origin of the genetic material and associated traditional knowledge, when appropriate.

5.5. Benefit-sharing

Article 5 is one of the core points of the Protocol. It addresses fair and equitable benefit-sharing. The article states that the benefits to be shared are those derived from the use of genetic resources, as provided for in Article 15, paragraphs 3 and 7 of the Convention, as well as those arising from subsequent applications and commercialization. This sharing will be carried out through mutually agreed terms with the Party providing these resources, whether it is the country of origin or a Party that has acquired the genetic resources in accordance with the Convention. This article also establishes that the Parties shall take legislative, administrative or policy measures in order to ensure that the benefits arising from the utilization of genetic resources, including those held by indigenous and local communities, in accordance with domestic legislation concerning their established rights, are shared fairly and equitably, based on mutually agreed terms. Benefits can be monetary and non-monetary, including but not limited to those listed in the Annex of the Protocol (Table 1).

Table 1. Examples of monetary and non-monetary benefits listed in the Annex of the Nagoya Protocol

MONETARY BENEFITS	NON-MONETARY BENEFITS
• access fees or fee per sample collected or otherwise acquired • prepayments • payments in stages • payment of royalties • license fees in case of commercialization • special fees to be paid to trust funds supporting conservation and sustainable use of biological diversity • wages and preferential terms where mutually agreed • research funding • joint ventures • joint ownership of relevant intellectual property rights	• sharing the results of research and development • collaboration, cooperation and contribution in scientific research and development programs, particularly biotechnological research activities • participation in product development • collaboration, cooperation and contribution to training and capacity building • admission to *ex situ* facilities of genetic resources and databases • knowledge and technology transfer to the provider of genetic resources, under the fairest and most favorable terms • strengthening capacities for technology transfer • institutional capacity building • human and material resources to strengthen capacities for the administration and implementation of the rules of access • social recognition • joint ownership of relevant intellectual property rights • Other

5.6. Access to genetic resources

Article 6 establishes guidelines for **access to genetic resources**. The text reaffirms the sovereign rights over natural resources, and establishes that the rules for access and benefit-sharing must comply with domestic legislations or national regulatory requirements. It reinforces the need for prior informed consent of the providing Party for access to genetic resources and their utilization to be granted. It defines the providing Party as the country of origin of the resources or a Party that has acquired the genetic resources in accordance with the Convention, but it notes the sovereignty of the Parties so that they may determine otherwise, contrary to what is established in the Protocol.

Through domestic legislation, the Parties shall take measures, as appropriate, with the aim of ensuring that the prior informed consent or approval and involvement of indigenous and local communities is obtained for access to genetic resources where they have the established right to grant access to such resources.

This article also contains a number of recommendations for the Parties that request prior informed consent to incorporate legislative, administrative or policy measures on access and benefit-sharing. Recommendations include that each Party should provide for legal certainty; provide for fair and non-arbitrary standards and procedures; provide for clear and transparent rules; provide for the issuance of a clear and transparent written decision by a competent authority within a reasonable period of time; provide for the issuance at the time of access of a permit or its equivalent as evidence of the decision to grant prior informed consent and of the establishment of mutually agreed terms, and notify the Access and Benefit-sharing Clearing-House; where applicable, and subject to domestic legislation, set out criteria and/or processes for obtaining prior informed consent or approval and involvement of indigenous and local communities for access to genetic resources; establish, in writing, clear rules and procedures for requiring and establishing mutually agreed terms (MAT).

In the recommendations on MAT standards and requirements, the Protocol suggests that the Parties consider: (i) a dispute settlement clause; (ii) terms on benefit sharing, including in relation to intellectual property rights; (iii) terms on subsequent third-party use, if any; and (iv) terms on changes of intent, where applicable. These points make it clear that it is the Protocol aim to cover any use of genetic resources and their derivatives that can generate benefits.

5.7. Traditional Knowledge Associated with Genetic Resources

Article 7, on **access to traditional knowledge associated with genetic resources,** complements Article 8 (j) of the CBD. It establishes that users must comply with the domestic legislation of each Party, to ensure that traditional knowledge associated with genetic resources held by indigenous peoples and local communities is accessed with the prior informed consent or approval and involvement of these indigenous and local communities, and that mutually agreed terms have been established. This provision, unlike the CBD which only provided for prior informed consent (PIC) of the providing country, now states that users must abide by domestic legislations, and many of them require the PIC of indigenous peoples and local communities.

Article 12 recommends that Parties, in accordance with domestic law, take into consideration in native indigenous and local communities' customary laws, community protocols and procedures, as applicable, with respect to traditional knowledge associated with genetic resources. Parties should also rely on the effective participation of such communities to establish mechanisms to inform potential users of traditional knowledge associated with genetic resources about their obligations, including measures as made available through the Access and Benefit-Sharing Clearing-House for access to and fair and equitable sharing of benefits arising from the utilization of such knowledge.

To empower communities, the Parties shall support them, including the women within these communities, in the development of: Community protocols for ABS, minimum requirements for mutually agreed terms, and a model contractual clause for benefit-sharing arising from the utilization of traditional knowledge associated with genetic resources.

5.8. Special considerations: Use of GR for non-commercial research, for health emergency and for agriculture and food

Article 8 contains some special considerations that Parties should provide for in their domestic legislation. Firstly, the Parties shall promote and encourage research which contributes to the conservation and sustainable use of biological diversity, particularly in developing countries, including through simplified measures on access for non-commercial research purposes, taking into account the need to address a change of the intent for this research. Secondly, the Parties shall pay due regard to cases of present or imminent emergencies that threaten or damage human, animal or plant health, as determined nationally or internationally. Parties may take into consideration the need for expeditious access to genetic resources and expeditious, fair and equitable sharing of benefits arising from the use of such genetic resources, including access to affordable treatments by those in need, especially in developing countries. This article provides for access to pathogens case of medical emergency, in addition to providing for appropriate compensation. And thirdly, the Parties shall consider the importance of genetic resources for food and agriculture and their special role for food security.

The case of genetic resources for food and agriculture is very instructive as to the need, both internationally and nationally, to employ more scientific and technological knowledge to support the development of legislation. Experience with the CBD's negotiation instances makes it clear that, in fact, the power of positive interference of ABS- related sciences is at most indirect.

Take as an example the uncertainty-provoking case of the Nagoya Protocol scope and even domestic legislation in the case of new varieties. It is clear that the general approach of the CBD, in the case of new agricultural and forest varieties, is strongly influenced by the nature of the ABS process practiced in the areas of cosmetics and pharmaceuticals, in which, most of the time, an extract, a substance or a molecule, once identified and characterized as to its commercial potential, goes through the entire value chain virtually unchanged in its structure-function.

In the case of new varieties, their value is invariably polygenic, i.e., it is not possible to clearly identify one or a few genes that control the expression of quantitative traits such as yield per area. In fact, the genetic contribution to the quantitative trait often occurs in an additive manner, i.e. by means of allelic combinations (variants) of many genes.

Since these favorable allele combinations are obtained by genetic recombination mechanisms – even though traditional and biotechnological methods for probabilistically guiding of this recombination are known – it follows that there is no way to assign an origin and a specific property of an "original allelic arrangement", given the evolutionary dynamics of genetic recombination.

Genomic recombination technologies currently provide very significant opportunities for obtaining new substances and molecules or variants of original molecules, which will impact the interpretation and enforcement of provisions related to the definitions established by Article 2 of the Nagoya Protocol.

5.9. Conservation of biological diversity and sustainable use

In **Article 9**, the Protocol provides for the link between the three objectives of the CBD, suggesting that Parties encourage users and providers to the direct benefits arising from the utilization of genetic resources as per the **conservation of biological diversity and sustainable use of its components.**

5.10. Global multilateral benefit-sharing mechanism and transboundary cooperation

The Protocol proposes, in **Article 10**, that the Parties consider the need for a **global multilateral benefit-sharing mechanism** to address the fair and equitable sharing of benefits arising from the utilization of genetic resources and traditional knowledge associated with genetic resources that occur in transboundary situations or for which it is not possible to grant or obtain prior informed consent. It emphasizes that benefits shared through this mechanism will be used to support the conservation of biological diversity and the sustainable use of its components globally.

In **Article 11**, the Protocol addresses **Transboundary Cooperation,** recommending that in instances where the same genetic resources are found *in situ* within the territory of more than one Party, those parties should endeavor to cooperate, as appropriate, with the involvement of indigenous and local communities concerned, where applicable, with a view to implementing this Protocol. The same is suggested when traditional knowledge associated with genetic resources is shared by one or more indigenous and local communities in several Parties.

5.11. Focal point and competent national authority

For national implementation of the Protocol, each Parties shall designate a **focal point** responsible for liaison with the Secretariat of the CBD and the **competent national authorities,** which shall provide information on how to achieve access and benefit-sharing, obtain prior informed consent and establish mutually agreed terms, including benefit-sharing related to access to genetic resources or traditional knowledge associated with genetic resources. The competent national authorities shall, in accordance with domestic legislation, be responsible for granting access or, as applicable, issuing written evidence that access requirements have been met. The Secretariat shall make available the information received through the Access and Benefit-Sharing Clearing-House. These recommendations are provided for in **Article 13** of the Protocol.

5.12. Intermediation and information sharing

Article 14 refers to the **Access and Benefit-Sharing and Information Sharing Clearing-House**, which is part of the Convention's intermediation mechanism. The Clearing-House will serve as a means to share information concerning access and benefit-sharing. In particular, it will provide access to information by the Parties in relation to the implementation of this Protocol.

Without prejudice to the protection of confidential information, each Party shall make available to the Access and Benefit-Sharing Clearing-House any information required by this Protocol, as well as information required pursuant to the decisions taken by the Conference of the Parties serving as the meeting of the Parties to this Protocol. The information shall include: (a) legislative, administrative or policy measures on access and benefit-sharing; (b) information on the national focal point and competent national authority or authorities; and (c) permits or their equivalent issued at the time of access, as evidence of the decision to grant prior informed consent and of the establishment of mutually agreed terms.

Additional information, if available and as appropriate, may include: (a) relevant competent authorities of indigenous and local communities and information as so decided; (b) model contractual clauses; (c) methods and tools developed to monitor genetic resources; and (d) codes of conduct and best practices.

The modalities of operation of the Access and Benefit-sharing Clearing-House, including reports on its activities, shall be considered and decided upon by the Conference of the Parties serving as the meeting of the Parties to this Protocol at its first meeting, and kept under review thereafter.

5.13. Compliance and monitoring of domestic legislation

Articles 15 to 18 of the Protocol contain provisions on compliance with domestic legislations and monitoring, previously absent in the CBD.

As regards compliance, the Protocol requires Parties to adopt appropriate, effective and proportionate measures to ensure that genetic resources and traditional knowledge utilized within their jurisdiction have been accessed in accordance with prior informed consent (PIC) or with the approval and involvement of local communities and indigenous peoples, and that mutually agreed terms (MAT) have been established, as required by the domestic access and benefit-sharing legislation or regulatory requirements of the providing Party. This also requires Parties to take measures to address situations of non-compliance.

Finally, there is an obligation for Parties to cooperate in cases of alleged violation of domestic ABS legislation or regulatory requirements of the providing Party (Articles 15 and 16). These articles state that user countries also take responsibility for verifying compliance and enforcement of the domestic legislation of providing countries. The responsibility for establishing control measures falls on both sides, i.e. providing countries and user countries.

The effective implementation of the Protocol includes monitoring the use of genetic resources. To this end, Article 17 of the Protocol requests that Parties designate one or more checkpoints at every stage of research, development, innovation, pre-commercialization or commercialization. In this Article, the Protocol introduces the internationally recognized certificate of compliance, stating that the accessed genetic resource has been accessed in compliance with the rules of the Protocol, which may be issued as a permit or its equivalent.

Such certificate shall contain minimum information such as the issuing authority, date of issuance, the provider, the user (person or entity to whom prior informed consent was granted), subject-matter or genetic

resource covered by the certificate, confirmation that mutually agreed terms were established, confirmation that prior informed consent was obtained, and whether the use is commercial and/or non-commercial.

In **Article 18**, the Protocol addresses **compliance with mutually agreed terms**, in which it recommends that each Party should encourage providers and users of genetic resources and/or associated traditional knowledge to include provisions in mutually agreed terms to cover dispute settlement, including the jurisdiction to which they will subject any dispute resolution processes; the applicable law; and/or options for alternative dispute resolution, such as mediation or arbitration. The Parties should also ensure an opportunity to seek remedy under their legal systems and ensure access to justice and the utilization of mechanisms regarding mutual recognition and enforcement of foreign judgments and arbitration awards.

5.14. Model contractual clauses

In order to facilitate the implementation of the Protocol, **Article 19** proposes that Parties encourage the development, update and use of sectoral and cross-sectoral **model contractual clauses** for mutually agreed terms. The proposal for model clauses is intended to guide the parties in the negotiation of ABS agreements according to the requirements of the Convention and the Protocol. Such clauses may decrease transaction costs and may help in cases where there is no clear domestic legislation. The COP/MOP[7] will periodically evaluate the use of these clauses.

5.15. Voluntary measures to support the protocol

As measures to contribute to the fulfillment of Protocol provisions, **Articles 20, 21 and 22** contain recommendations regarding the adoption of codes of conduct, guidelines and best practices and/or standards in relation to access and benefit-sharing (Article 20), measures to increase awareness about the importance of genetic resources and traditional knowledge associated with genetic resources (Article 21), and measures to create and develop capacity (Article 22).

There is a clear recognition that model contractual clauses, codes of conduct, guidelines, best practices and standards facilitate the effective implementation of the provisions of the CBD and

7 COP means Conference of Parties and MOP means Meeting of Parties. The Parties to the CBD are the countries or regional blocks that have signed the Convention, i.e. the Parties that have ratified the Convention. The Parties to the Nagoya Protocol are the countries/regional blocks that have ratified the Protocol.

the Protocol. Therefore, these issues have been discussed at length within the Intergovernmental Committee for the Nagoya Protocol.

5.16. Technology transfer

Article 23, on **technology transfer, collaboration and cooperation,** reinforces the recommendations of Articles 15, 16, 18 and 19 of the CBD, proposing that the Parties to collaborate and cooperate in scientific and technical research and development programs, including biotechnology research activities, as a means to achieve the objective of this Protocol.

Given Brazil's features in terms of its biotechnology competitiveness, it is essential that the country notices the substantive progress of new technologies, so as to establish their counterparts and requirements for their internalization, including through technology transfer agreements and training.

The parties must not be naïve and settle for only some "cooperation" in biotechnology. It is mandatory to have the capacity to qualify well and estimate the value of this biotechnology for the market to which it is intended, otherwise there is a risk of repeating asymmetries concerning the balance between biological resources offered in exchange for countertop biotechnology.

5.17. The Protocol Management

Article 24 recommends that the Parties encourage non-Parties to adhere to this Protocol and to contribute appropriate information to the Access and Benefit-Sharing Clearing-House.

Article 25 is about the financial mechanism of the Protocol, which is the same as that of the Convention. It also addresses the funds needed for implementation of the Protocol. In this case, the Conference of the Parties provides guidance with respect to the financial mechanism, taking into account Article 20 of the Convention and Article 22 of the Protocol, as well as the needs of LDCs, small island developing States and indigenous and local communities. Moreover, this Article also provides for collaboration between developed countries, developing countries and transition economies to implement the provisions of this Protocol through bilateral, regional and multilateral channels.

Article 26 states that the Conference of Parties to the Convention shall serve as the meeting of the Parties to the Protocol and requires that decisions taken under the Protocol will only be taken by

the Parties to the Protocol. Other Parties to the Convention that are not Parties to the Protocol may participate only as observers during the proceedings of any meeting of the Conference of the Parties. **Thus, if Brazil does not ratify the Nagoya Protocol, it will be left out of the negotiations under it. It will be allowed to participate only as an observer.**

Article 27 provides for subsidiary bodies that can act, with a defined function, according to decision taken by the Conference of the Parties serving as the meeting of the Parties to the Protocol (COP/MOP). Again, if Brazil does not ratify, it may only participate as an observer.

Article 28 establishes that the Secretariat of the Convention is the Secretariat of the Protocol.

Article 29 addresses monitoring and reporting by the Parties regarding the implementation of their obligations under the Protocol. The format and frequency of reports will be defined by the Conference of the Parties serving as the meeting of the Parties to the Protocol.

Article 30 establishes that the Conference of the Parties serving as the meeting of the Parties to the Protocol shall, at its first meeting, consider and adopt **cooperative procedures and institutional mechanisms to promote compliance with the provisions of the Protocol** and to address cases of non-compliance. These provisions are different from the ones provided for in Article 27 of the Convention, which deals with dispute resolution mechanisms.

Article 31 establishes that the Conference of the Parties serving as the meeting of the Parties to the Protocol should undertake an assessment of the effectiveness of the Protocol after four years of entry into force. The frequency of subsequent reviews will be defined by the Conference of the Parties.

5.18. For entry into force

Article 32 provides that the Protocol may be signed by the Parties to the Convention at the UN headquarters in New York City, in the period from 2 February 2011 to 1 February 2012. After this period, parties have not signed the Protocol, may take part in it, by means of an instrument of accession.

The entry into force of the Protocol is provided for in **Article 33**, on the ninetieth day after the date of deposit of the 50th ratification, acceptance, approval or accession by States or regional economic integration organizations that are Parties to the Convention.

Countries that ratify the Nagoya Protocol should do so without reservations, i.e. they cannot change it, they will have to accept it fully. This is laid down in **Article 34**.

Article 35 is about the procedure and effectiveness of withdrawal by a Party, which can only do so two years after the entry into force of the Protocol for that Party.

And **Article 36** states that the Arabic, Chinese, Spanish, French, English and Russian texts of the Protocol, adopted on 29 October 2010 in Nagoya, Japan are equally authentic.

Regarding retroactivity, there is nothing explicit in the Protocol.

6. BIODIVERSITY MARKET OVERVIEW

One of the ways to extract economic value from biodiversity is through bioprospecting. It can be defined as the systematic search for organisms, genes, enzymes, compounds, processes and parts from living beings in general (collectively called genetic resources) that may eventually lead to the development of a product. It is relevant for a wide range of sectors and activities, including biotechnology, agriculture, nutrition, pharmaceutical and cosmetics industry, bioremediation, health, among others. For agriculture, for example, the search for genes in wild species can lead to the creation of new varieties of food plants, adaptable to various environmental conditions, contributing to food security in the future.

Biological resources have been marketed since mankind created markets (OECD, 2003). Biodiversity has been used, over time, as a source of food, clothing, energy, health, cleaning and beauty products and others. The use of biodiversity components, whether from plants, animals or microorganisms, can help towards solutions to many problems facing humanity, whether ill health, food security or production of new products, which makes the topic increasingly more strategic in the global political scenario.

Various industries use biodiversity components in industrial processes or in their products, such as the pharmaceutical, biotechnology, food and cosmetics industries. Pharmaceutical companies develop modern drugs using a simple active ingredient derived from plants, microorganisms and other organisms, and produce phytochemicals using natural extracts, in many cases based on traditional knowledge.

The interests in genetic resources are diverse: pharmaceutical companies seek new active principles in organisms, while seed companies are interested in more productive cultivars and thereby increase their efforts in research and development. Cosmetic companies are using natural ingredients with a view to generating marketing value. They are also interested in the marketing of botanical medicines, to cater to consumers who want “natural” products.

The volume of use of genetic resources also varies from sector to sector, and depends on the size of the company. Access to genetic resources may occur directly, *in situ* or in *ex situ* collections, or through commercial brokers, sometimes many of them, until getting to a final product.

Biodiversity is a key asset in global markets. According to CBD Secretariat, in 2006, the estimate of the size of the market that uses genetic resources or its derivates was around USD 800 billion. This

market includes the following sectors: pharmaceuticals, biotechnoloy, agricultural seeds, personal care, botanical and beverage and food industries (Table 2).

Table 2. Market sectors dependent on genetic resources

SECTOR	MARKET SIZE	COMMENT
Pharmaceuticals	USD 640,000 million (2006)	25-50% of the products derived from genetic resources
Biotechnology	USD 70,000 million (2006). from public companies alone	Many products derived from genetic resources (enzymes, microorganisms)
Agricultural seeds	USD 30.000 million (2006)	All products derived from genetic resources
Personal care, botanical and beverage and food industries	USD 22.000 million (2006) industry in plant supplements USD 12,000 million (2006) in personal care USD 31.000 million (2006) in food products	Some products are derived from genetic resources. Represents the "natural" component of the market.

Source: SCBD, 2008 (http://www.cbd.int/doc/speech/2013/sp-2013-09-04-abs-en.pdf) e https://www.cbd.int/doc/side-events/abs/abswg-07/ID1631-scbd.pdf

Despite the great potential for obtaining both monetary and non-monetary benefits arising from the commercial use of genetic resources and their derivatives, their valuation has been quite difficult, even in cases of use in end products. There is little data on the relative importance of genetic resources in a final product and how this is reflected in the prices of marketed products.

It is clear that biodiversity-rich countries are major providers of genetic resources to be used by various business segments and by research institutions. But they are not the only ones. Even countries that do not have specific genetic resources *in situ* conditions may have them in *ex situ* collections, after having acquired them in compliance with the CBD. All these countries are also major users of biodiversity, especially when considering food. Thus, any country can be provider and user at the same time.

6.1. The magnitude of biodiversity

a. Brazil, a provider of genetic resources and associated traditional knowledge

Worldwide there are about 1.75 million known species. In 2011, however, a study by scientists from the Census of Marine Life, published in the PLoS Biology journal, estimated that there are about 8.7

million species on the planet, with a margin of error of 1.3 million to more or less. According to the study, 86% of land or inland water species are not known, nor are 89% of marine species. The study did not take into account bacteria and viruses in his estimation. (Mora *et al.*, 2011).

Seventeen countries are considered megadiverse, including Brazil, which is considered the country with the biggest diversity in the world. Brazil is home to about 13% of the planet's biodiversity (MMA, 2006 Table 3). This wealth represents a great potential for research and development of technology, innovation, products and processes, with high expectations of social and economic returns.

Table 3. Estimated number of known species in Brazil and in the world

KINGDOM/ PHYLUM	ESTIMATED NUMBER OF KNOWN SPECIES	
	Brazil	World
Viruses	310-410	3.600
Monera (Bacteria & Archaea)	800-900	4,310
Fungi	13,090-14,510	70,600-72,000
Protista	7,650-10,320	76,100-81,300
Plantae	43,020-49,520	263,800-279,400
Animalia	103,870-137,080	1,279,300-1,359,400
Invertebrates	96,660-129,840	1,218,500-1,289,600
Vertebrates	7,210-7,240	60,800
TOTAL	**168,730-212,740**	**1,697,600-1,798,500**

Source: Ministry of Environment, 2006 Assessment of the State of Knowledge on Brazilian Biodiversity.

In six Brazilian land biomes (Amazon, Atlantic Forest, Caatinga (Shrub), Pantanal (Wetlands), Cerrado (Savana) and Pampas (Highlands) and three marine ecosystems, there are about 103,870 known animal species and 43,020 plant species (MMA, 2011). To have an idea how little knowledge there is on Brazilian biodiversity, on average 700 new species are discovered every year in the country. It is estimated that about 850 thousand species of animals are yet to be described (MMA, 2006).

Studies on Brazilian biodiversity, coordinated by the Ministry of Environment, have recorded about 200,000 species, but it is estimated that there are about 10 times that number, or about 2 million species (MMA, 2006). Regarding microorganisms, there is little knowledge - it is estimated that only 1% of bacteria and 5% of fungi are known. Due to their relative morphological simplicity and high genetic and metabolic diversity, microorganisms can be found in almost any environment, even in places with extreme environmental conditions and difficult access, such as deserts, bottom of oceans,

hot springs, polar regions, underground, in underground rocks, oil reserves, among others (MMA, 2006). Much remains to be studied and discovered. With the advancement of biotechnology, interest in microorganisms has increased and knowledge in microbial ecology, genomics, metagenomics and bioinformatics becomes a necessity.

As for coastal and marine ecosystems, Brazil has great biological diversity distributed in approximately 4.5 million km2, including mangroves and coral reefs, the latter being mostly endemic to Brazilian waters. The Brazilian coastal zone still harbors a diversity of mammals, birds and turtles. Of these ecosystems, a group that is still very little known is that of marine invertebrates, which comprise 30 to 35 animal phyla (MMA, 2006). Knowledge of the number of species can double or even triple if collection efforts are increased in unexplored environments, such as deep and oceanic plankton environments. But the interest in expanding the knowledge of this group has been increasing, due to potential use in drug development. The Porifera phylum, for example, has received great attention from industry due to its potential for development of marine natural products, from which substances have been isolated that have new antitumor, antiviral and antibiotic characteristics.

Even with the Brazil's development and the growth of its population, in 2009, the country maintained about 70% of its territory with original vegetation at different degrees of conservation. The biomes that had the greatest amount of native vegetation were the Amazon (about 80%), the Pantanal (83.14%), the Cerrado (51.16%) and the Caatinga (53.38%), the Mata Atlântica (about 22.25%) and, finally, Pampa (about 36.06%). http://siscom.ibama.gov.br/monitorabiomas/pantanal/pantanal.htm

Regarding social diversity, it is estimated that there are approximately 5 thousand indigenous peoples worldwide, totaling more than 350 million individuals (IWGIA, 2009). In Brazil, the 2010 IBGE Census showed that there are about 231 indigenous peoples, totaling 817,963 individuals. Of these, 315,180 live in cities and 502,783 in rural areas, representing approximately 0.42% of the country's total population. These indigenous peoples speak over 180 different languages and dialects and hold an immense and diverse traditional knowledge, most of which is not officially documented.

In addition to the indigenous peoples, there is a wide variety of other traditional groups such as quilombolas, rubber tappers, fundo de pasto communities (grazing), faxinais, riparian communities, geraizeiros, Roma, Pomeranians, coconut and babassu crackers, caiçaras, among others. Like the indigenous peoples, these communities retain their original traditional knowledge, including knowledge on the use of biodiversity and natural resources, embedded in their way of life.

As previously mentioned, genetic resources and associated traditional knowledge in Brazil can be obtained directly from nature by means of *in situ* collections in private areas, in public areas (conservation units and other areas of the Federal Union, states or municipalities) or in indigenous territories. They can also be obtained from *ex situ* collections, such as germplasm banks of public or private institutions, e.g. botanical gardens, zoos, research institutions. They can be obtained from intermediaries, such as markets. Information on genetic resources and traditional knowledge can also be obtained from secondary sources, such as databases, books, articles and other publications etc.

One of the difficulties in obtaining access to genetic resources and associated traditional knowledge in Brazil is the definition of right over genetic resources. The Brazilian Constitution, Article 225 on environment, states that "All have the right to an environment that is ecologically in equilibrium and that is **available for shared use by the people**, essential to a healthy quality of life, which imposes on both the Government and society as a whole the duty of protecting it and preserving it for the present and future generations ". In order to enforce this right, the Government shall, among other things, "preserve the diversity and integrity of the Country's genetic heritage and supervise entities engaged in research and manipulation of genetic material" (paragraph 1, item I). Although there is no explicit reference to the ownership of genetic resources, the prevailing legal view is that genetic resources are of common use by the people. However, Provisional Measure MP 2186-16/2001 on access to genetic resources and traditional knowledge and benefit-sharing, conditions access to the prior consent of the landowner or to the right to use, as in the case of indigenous lands, where the genetic material obtained. However, in this case, there is a major complicating factor, namely, the land ownership issue in Brazil. In many areas, there is no title, in others there are no clear boundaries, which creates overlaps and conflicts. Often no one knows who to ask for prior informed consent and who has the right to receive benefits. This uncertainty is worsened as overlaps occur between indigenous and local community lands and protected areas.

The result is an environment of legal uncertainty that repels investment interest for R&D and biotechnology innovation projects in Brazil.

Despite difficulties of all kinds, including lack of knowledge of a significant part of Brazilian biodiversity and its economic value, there is a great interest on the part of academic and business research centers of to expand access to genetic resources and associated traditional knowledge due to its high commercial potential and importance for the country's development.

An example of a Brazilian species of economic importance in the world market is the rubber tree (*Hevea brasiliensis*), which produces natural rubber. Despite being from Brazil, the production of rubber in Brazil today is not economically significant. Seeds and cuttings were taken to Malaysia, Indonesia, Thailand, and other Asian countries, which have implemented larger, more productive and more competitive commercial production, in addition to investing in research and development of improved pest resistant clones. Therefore, Brazil imports technology and improved clones to increase productivity in natural rubber production. As an opposite example, one can mention soybeans. Improved Brazilian soybeans are the most productive in the world and the country is not the center of origin of soy, Asia is. The interdependence between countries is very clear when it comes to products. It is common for the country that is the center of origin of a genetic resource not to have the best technology to use it.

b. Brazil as a user of genetic resources

Brazil, despite being the country with the greatest biodiversity in the world, is also a major user of genetic resources originating from other countries, especially when it comes to genetic resources for food and agriculture.

Soy and orange are originally from China, rice from the Philippines, potatoes from Peru, sugarcane from New Guinea, coffee from Ethiopia, wheat from Asia Minor, and even some cocoa varieties are from Mexico, despite the existing native species. Most livestock activities depend on cattle from India and horses from Central Asia.

Brazil has several breeds of livestock which were developed from breeds brought by the Portuguese at the time of colonization. Since then, through natural selection over five centuries, these breeds gradually adapted to the specific conditions of different Brazilian environments, creating local breeds known as “creole”, “local” or “naturalized”. However, in the late nineteenth century and early twentieth century some more productive foreign breeds were imported and, although they did not have the adaptations and characteristics of resistance to diseases and parasites of the naturalized breeds, through absorbing crossbreeding, they gradually replaced the local breed, which are now endangered.

Exotic species are also used in forming pastures planted for livestock (Brachiaria, genus *Urocloa* from Africa), beekeeping (genus *Apis* from Europe and Tropical Africa), in the commercial production of fish (carp from China and tilapia from East Africa), besides being used for purposes other than agriculture and food, such as in the production of biofuels (sugarcane to produce ethanol and palm oil, soybean and rapeseed for biodiesel), in the production of pulp and paper (for example, eucalyptus from Australia).

To illustrate the importance of these exotic genetic resources, EMBRAPA Genetic Resources and Biotechnology, through the Germplasm Exchange and Quarantine System, processed, from 1996 to 2007, over 500,000 samples, of which 80% were imported from different countries. This system feeds a network of 350 Germplasm Banks and a Base Collection (of long-term conservation) composed of 212 genera, 668 species and more than 107,000 accesses. The Agronomic Institute of Campinas alone, one of the main curators of germplasm of the country, has 32,543 samples of 5,104 plant species. This entire system supports public and private breeding programs developed in Brazil.

Regulation of the use and benefit-sharing of agricultural genetic resources by their countries of origin is a major national concern, since agribusiness accounted for about 22% of the national GDP in 2012. Brazil is a major producer and exporter of commodities based on exotic plant species, as well as a producer of meat from foreign species. Brazil is the largest coffee, sugar and orange juice producer and exporter. It is the second largest soybean producer, and in 2013 it was the largest soybean exporter. It is the largest meat exporter. Its fish production is highly dependent on genetic resources from other countries.

Therefore, it is in the country's interest that new treaties be established on animal genetic resources, forestry, microorganisms used for agriculture and food, which are not covered by the ITPGRFA.

Under the Nagoya Protocol, the solution for sharing of benefits from the utilization of species that occur in more than one Party, in a transboundary situation, or when it is not possible to obtain prior informed consent, may require the creation of a multilateral mechanism modeled on the ITPGRFA multilateral system.

7. ACCESS AND BENEFIT-SHARING MEASURES IN BRAZIL

The Convention on Biological Diversity (CBD) recognizes the sovereign rights of countries over their genetic resources found in their jurisdiction, and therefore can only be accessed according to the rules defined by each country.

In Brazil, the issue of access to genetic resources and associated traditional knowledge is regulated by Provisional Measure 2186-16/2001, and in it the government established the obligation of the party interested in accessing genetic heritage components or associated traditional knowledge to request permit from a government collegiate body chaired by the Ministry of Environment (MMA), the Management Council of Genetic Heritage (CGEN), the competent national authority. However, Article 11, section IV, paragraph "e" of the MP allows the CGEN to accredit a national public institution to authorize access and shipment of samples of genetic heritage components and access to traditional knowledge. Based on this provision, the CGEN accredited the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA), the National Council for Scientific and Technological Development (CNPq) and the National Institute for Historical and Artistic Heritage (Iphan) for this purpose.

For the development of biodiversity research that involves collecting biological material it is necessary to register in Permit and Biodiversity Information System (Sisbio). And if you are conducting research and development with the national genetic heritage component is necessary to request permit to access Management Council of Genetic Heritage (CGEN), at IBAMA, the CNPq, or Iphan, if traditional knowledge involved (Table 4).

Table 4. National authorities competent to authorize access to genetic heritage components and associated traditional knowledge.

COMPETENT AUTHORITY	PERMIT ACCESS	LEGAL INSTRUMENT
Management Council of Genetic Heritage (CGEN)	• Access to genetic heritage components for the purpose of technological development • Access to traditional knowledge for purposes of bioprospecting and technological development • Review and approval of mutually agreed terms • Accreditation of depository institution	MP N. 2186-16/2001 Decree N. 3.945/2001
Brazilian Institute of Environment and Renewable Natural Resources (IBAMA)	• Access to genetic resources for scientific research	Deliberation N. 40/2003
National Council for Scientific and Technological Development (CNPq)	• Access to genetic resources for scientific research, bioprospecting and technological development (mutually agreed terms must be approved CGEN)	Deliberation N. 246/2009 Deliberation N. 268/2010
Institute of National Historical and Artistic Heritage (IPHAN)	• Access to traditional associated knowledge (TAK) for purposes of scientific research	Deliberation N. 279/2011

The Institutions that may request access must be national, public or private, and conduct research and development (R & D). The purposes of access can be threefold: scientific research, bioprospecting and development. The Provisional Measure regulates accesses within the national territory, on the continental shelf and in the exclusive economic zone[8]. If there is a prospect of commercial use, access to samples of genetic heritage components *in situ* and associated traditional knowledge can only occur after signing the Contract for Utilization of Genetic Heritage and Benefit-Sharing (CURB).

8 According to Law N. 8.617/1993, Chapter III, article 6, "The Brazilian **exclusive economic zone** is a belt that extends from twelve to two hundred nautical miles, counted from the baselines used to measure the width of the territorial sea". In this zone, Brazil has sovereign rights for the purpose of exploration and exploitation, conservation and management of living and non-living natural resources in the waters superjacent to the seabed, the seabed and its subsoil, and with regard to other activities aimed at the exploration and exploitation of the area for economic purposes. And Article 11 states that "The continental shelf of Brazil comprises the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural the extension of its land territory to the outer edge of the continental margin, or to a distance of two hundred nautical miles from the baselines from which the width of the territorial sea is measured, where the outer edge of the continental margin does not extend up to that distance."

The Provisional Measure regulates access to genetic heritage, rather than to genetic resources, as does the CBD. This is a very important difference, because the concept of genetic heritage[9] is broader than the concept of genetic resources of the CBD, since it includes genetic information and derivatives in the scope of regulation.

In order to obtain permit for access and shipment of samples of genetic heritage components, the Provisional Measure requires the user to submit the prior consent (same as prior informed consent) of the owner of the area where the genetic heritage sample was obtained, whether indigenous or local community, government agency, private owner, the National Defense Council, in the case of an area essential to national security, or maritime authority when access occurs in Brazilian waters, on the continental shelf and in the exclusive economic zone.

In the case of access to associated traditional knowledge, prior consent must be obtained from the local community or indigenous people that hold such knowledge. To access the indigenous territory, the interested party must also obtain permit from the National Indigenous Foundation (FUNAI). The legislation requires, in cases where there is potential or prospect for commercial use of the traditional knowledge, the presentation of an anthropological report attesting that the process of obtaining the prior consent respected the social organization and the traditional political representation of the community or indigenous people in question.

The sharing of benefits arising from economic exploitation of the product or process developed from genetic heritage samples or traditional knowledge should be fair and equitable, and may take place by means of profit-sharing, royalty payments, technology access and transfer, free-of-charge licensing of products and processes and human resources training.

For the CURB to be signed, the Provisional Measure (MP) provides for essential provisions, registration and approval of CGEN, for it to become effective. Otherwise, it is void. Regarding industrial property right over a process or product obtained from a genetic heritage component sample, it will only be granted if the provisions of the MP are observed, and the origin of the genetic material or traditional knowledge must be declared in the patent application. In case of non-compliance, the MP provides for administrative fines and penalties.

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9 Genetic heritage is information from a genetic origin, contained in samples from all or part of a plant, fungal, microbial or animal specimen, in the form of molecules and substances from the metabolism of these living beings and extracts from these living or dead organisms found **in situ**, including those that are domesticated or kept in **ex situ** collections, provided they are collected **in situ** in the national territory, on the continental shelf or in the exclusive economic zone (Item I of Article 7 of Provisional Measure 2186-16/2001).

In June 2005, the Brazilian Federal Government issued Decree N. 5459 regulating the administrative offenses (Article 30 of the MP) arising from non-compliance with procedures established by the Provisional Measure. The decree also defined that IBAMA and the Naval Command of the Ministry of Defense are the competent bodies to oversee and provide for sanctions in cases of non-compliance with the rules of the MP.

In July 2009 a new decree, Decree N. 6915, was issued, regulating Article 33 of the MP, determining the distribution of shares of profits and royalties resulting from economic exploitation of processes or products developed from a genetic heritage component sample, when due to the Federal Union.

7.1. Registrations, Permits and Contracts

As mentioned above, CGEN, composed of representatives from federal government institutions, was regulated by Decree N. 3.945 of September 2001, but effectively began to convene only in 2002. As of that date, CGEN has issued technical guidelines and resolutions to guide the implementation of the MP. It issued 41 Resolutions (32 in force), and 8 technical guidelines (7 in force).

Due to vagueness and lack of clarity in some parts of the MP, the permits only began to be granted in 2003. In a little over twelve years, CGEN granted 181 permits (up to 10/02/2014), and of these, 77 were granted to 12 companies with the purpose of bioprospecting and technological development. In 2012, CGEN was more active, granting, in that year alone, 33 permits, of which 30 to companies (Table 5). In 2013, 35 permits were approved and published in the Federal Official Gazette, of which 27 were granted to companies.

Of the total number of permits issued, 43% were granted to companies, and 61% of these were granted to a single company. The intended uses were for the cosmetics, pharmaceutical and herbal medicine, agriculture and food sectors.

It should be noted that in the process of issuing permits for access to genetic resources, CGEN requires complex information, which is often expensive and difficult to obtain including items such as anthropological reports whenever associated traditional knowledge is involved.

Table 5. Permits granted by CGEN to companies with the purpose of bioprospecting and technological development (up to 02/10/2014)

YEAR	TOTAL PERMITS	PERMITS TO COMPANIES	AUTHORIZED COMPANIES
2003	12	0	-
2004	4	2	Extracta Moléculas Naturais S/A Quest International do Brasil Indústria e Comércio Ltda
2005	13	1	Natura Inovação e Tecnologia de Produtos Ltda
2006	19	0	-
2007	18	7	Natura Inovação e Tecnologia de Produtos Ltda(7)
2008	14	0	-
2009	7	1	Natura Inovação e Tecnologia de Produtos Ltda
2010	9	0	-
2011	11	4	Natura Inovação e Tecnologia de Produtos LTDA (2) Solabia Biotecnológica Ltda (2)
2012	33	30	Natura Inovação e Tecnologia de Produtos Ltda (23) Apis Flora Industrial e Comercial Ltda (1) Croda do Brasil Ltda(2) Ciclofarma Indústria Química Ltda (1) IFF Essências e Fragrâncias Ltda (1) Solabia Biotecnológica Ltda (2)
2013	35	27	Natura Inovação e Tecnologia de Produtos LTDA (11) Solabia Biotecnológica Ltda (11) BASF S.A (1) Croda do Brasil Ltda (1) Lychnoflora Pesquisa e Desenvolvimento de Produtos Ltda (1) Plantus Indústria e Comércio de Óleos, Extratos e Sementes Ltda (1) Cristália Produtos Químicos Farmacêuticos Ltda
2014	5	5	Natura Inovação e Tecnologia de Produtos LTDA (2) Solabia Biotecnológica Ltda (2) Lychnoflora Pesquisa e Desenvolvimento de Produtos Ltda (1)
	180	**77**	**12**

Regarding signed Contracts for Utilization of Genetic Heritage and Benefit-Sharing (CURB), according to a study commissioned by the Ministry of Environment[10], from 2004 to 2012, 70 contracts were approved, and in 2013, 33 were under analysis by CGEN. The beneficiaries of such contracts include

10 Project BRA/11/001 - MMA "Avaliação sobre a Repartição de Benefícios no Brasil: contratos anuídos e em tramitação no CGEN. Consultant Dr. Larissa Schmidt (http://www.mma.gov.br/images/arquivo/80043/Apresentacao%20RB%20LARISSA%20SCHMIDT.pdf)

61 associations and cooperatives, 1 indigenous group and 52 private individuals or corporations. Some of the contracts have three or more parties, because consenting or intermediary parties were involved.

In most contracts (89), access was only to a genetic heritage component. Only in 5 of the contracts, access was exclusively to associated traditional knowledge. And in 8 contracts, the user accessed samples of genetic heritage components and associated traditional knowledge.

The purpose of access defined in the contracts is mostly for use in a final product (64), but also for obtaining inputs (20), for developing search (14), for obtaining inputs and for use in a final product (5). About 39% of accesses were in the Amazon and 37% in the Atlantic Forest. Only in 3 contracts were for access in coastal or marine areas.

The accesses occurred in 17 Brazilian states, with the largest number in São Paulo, Paraná, Rondônia, Pará and Minas Gerais. In 86 contracts, access occurred on private land, 16 in conservation units and 1 in indigenous territory.

The cosmetic industry was the most frequent user signing contracts (79). Universities, pharmaceutical industry and others also signed contracts.

The benefits listed in the contracts were of monetary and non-monetary nature, but most of the contracts provided both monetary and non-monetary benefits. Part of these benefits was considered potential, because despite being in contract, the sharing did not happen or could not be identified.

The objective of benefit-sharing, as established in the CBD, is the conservation and sustainable use of biodiversity. However, only 34 contracts provided for this use. Concerning the value of the sharing, there is a wide variation (from 0.05% to 5% of net revenue). But, when comparing with the benchmark adopted by ITPGRFA (0.77% of NR), 53 contracts had values below that of ITPGRFA. The timeframes to obtain benefits established in the contracts range from less than 1 year to the duration of the operation, and 26 contracts defined a timeframe of 3 years, while 9 defined a timeframe of 5 years.

Another guideline provided by the CBD to the Parties is that when access occurs, the user should facilitate the transfer of technology to the providing Party. In Brazil, 97 approved contracts have no provision for technology transfer. Only 6 contracts provide for it.

7.2. CGEN: Permits for Use in Agriculture (2003 to April 2013)

The institution that has the greatest number of permits for agricultural use is Embrapa. From 2003 to April 2013, 19 permits granted by CGEN to Embrapa were published in the Federal Official Gazette, as follows: 7 for access to associated traditional knowledge with the purpose of scientific research with different ethnic groups of indigenous peoples; 1 special permit for access to genetic resources for the purpose of bioprospecting, under which there is a portfolio of projects; 8 permits for access to genetic resources for purposes of technological development and 2 permits for access to genetic resources with the purpose of bioprospecting and technological development (Table 6).

Table 6. Some of Embrapa's projects authorized by CGEN

ACCESS TO ASSOCIATED TRADITIONAL KNOWLEDGE FOR PURPOSES OF SCIENTIFIC RESEARCH
"Ethnobiology, conservation of genetic resources and nutritional well-being of the Krahô indigenous community"
"Ethnobiology, Agriculture and Food Security in Indigenous Communities"
"Food Security and Cultural Strengthening in Communities in the Xingu Indigenous Park, Kayabi Village – Ilha Grande"under the project"Ethnobiology, Agriculture and Food Security in Indigenous Communities"
"Study of the genetic variability of Brazilian germplasm collection of beans (*Phaseolus vulgaris* L.) with emphasis on the eco-geographic aspect"
"Ethnoecology, Economic Botany and Population Ecology of *Caryocar brasiliense* (Camb) in Rio Pardo de Minas/MG"
"Extractivism, Ethnoecology and Sustainable Management of Mangaba (*Hancornia speciosa* Gomez) in Rio Pardo de Minas/MG"
"Ethnobiology and ethnoecology among the Forest peoples of Acre: Kulina (Madija) Upper Rio Envira"
SPECIAL PERMIT - ACCESS TO SAMPLES OF GENETIC HERITAGE COMPONENTS FOR BIOPROSPECTING
"Technology development for functional use of wild passiflora";
"Development biolarvicides based on Bacillus thuringiensis to control of blackflies (*Simulium* spp.)";
"Development of biolarvicide based on *Bacillus thuringiensis* to control agriculture caterpillars pests"
"Cloning and gene expression from strains of *Bacillus thuringiensis* and *Bacillus sphaericus* toxic to insect pests"
"Biological Control of fall armyworm, *Spodoptera frugiperda*, with Baculovirus"
"Assay of distinctness, uniformity and stability of access to forage peanut BRA 040550"
"Research in clonal forestry and quality of yerba mate (*Ilex paraguariensis*)"
ACCESS TO GENETIC RESOURCES FOR PURPOSES OF TECHNOLOGICAL DEVELOPMENT
"Production of genetic seeds of peanut forage BRA 040550 genotype"
"Production, formulation and shelf test of biopesticide based *Baculovirus spodoptera*"
"Development of biolarvicide based on *Bacillus thuringiensis* to control agriculture caterpillar pests"
"Development biolarvicide based on *Bacillus thuringiensis* to control blackflies (*Simulium spp*)

“Genetic improvement of oil palm aimed at increasing productivity, tolerance to fatal yellowing and broadening of the genetic base of commercial varieties”
“Genetic Improvement of guarana”
ACCESS TO GENETIC HERITAGE FOR PURPOSES OF BIOPROSPECTING AND TECHNOLOGICAL DEVELOPMENT
“Genetic Improvement of cupuassu plant”
"Installing blocks for seed production of new cultivars of the cupuassu plant”
“Production of Pitanga tree seedlings by grafting”
“Seed production of *Paspalum reginelli*”

7.3. CGEN: other permits

Other permits for access to genetic resources and associated traditional knowledge with the purpose of technological development and bioprospecting involve projects in the areas of animal health; human health; development of new drugs; phytochemicals; plant domestication; biological pesticides; search for biochemicals derived from bacteria associated with marine sponges; search for anti-inflammatory, antioxidant and antibacterial activity of marine algae and other marine organisms; study of essential oils in Cerrado species; biotechnological potential of venoms of animals from western Amazonia and other Brazilian biomes; identification of new anticancer and antibacterial drugs from Brazilian plants.

7.4. CNPq, IBAMA and Iphan Permits

Since 2010, CNPq authorizes access to genetic heritage for research, bioprospecting and technological development. Until February 2014, 228 permits were granted and only 7 were for companies (2 to Cristália Produtos Químicos e Farmacêuticos, 1 for Al Sukkar Biotechnologia Industrial Ltda. ME, 2 for Bio Controle Métodos de Controle de Pragas Ltd. and 2 for BioCelere Agroindustrial).

IBAMA and Iphan authorize access to genetic heritage and associated traditional knowledge, respectively, for purposes of scientific research. IBAMA has already issued 19 special permits, of which 7 were for private companies. It also issued 24 simple permits, 14 of which were for companies, as shown in table 7 below.

Table 7. Permits for access to genetic heritage components with the purpose of scientific research, issued by IBAMA for private companies

SPECIAL PERMITS (7)	SIMPLE PERMITS (14)
Natura Inovação e Tecnologia de Produtos Ltda	Lychnoflora Pesquisa e Desenvolvimento de Produtos Naturais Ltda (5)
Anidro do Brasil Extrações Ltda	Biocêutica Pesquisa e Desenvolvimento em Biotecnologia (1)
Fermentec Laboratórios de Análises Químicas e Microbiológicas Ltda	Phoneutria Biotecnologia e Serviços Ltda (2)
Solabia Biotecnológica Ltda	Solabia Biotecnológica Ltda (1)
YBIOS S.A	Grupo Farroupilha - Laboratório de Biocontrole Farroupilha (1)
Bioenergia do Brasil S/A	L.M. Farma Indústria e Comércio S.A (1)
Atina Ind. Com. Ativos Naturais Ltda	Atina Ind. Com. Ativos Naturais Ltda (3)

After being accredited by CGEN to authorize access to associated traditional knowledge, Iphan granted, in 2012, 2013 and 2014 (published until February 21), 29 permits, all of which were granted to universities and public science and technology institutions.

8. ABS MEASURES AND EXPERIENCES IN OTHER PARTIES

The first significant breakthrough on the issue of access to genetic resources under the CBD was the adoption of the Bonn Guidelines at COP 6 held in The Hague, Netherlands in 2002. Later, expectations were raised regarding negotiation of an international regime that would address issues of illegal access, misappropriation and lack of benefit-sharing. In 2010, after years of negotiations, COP 10 adopted the Nagoya Protocol. However, under the Protocol, many of the unresolved issues were left to domestic legislations, and will depend on the understanding of how each Party will address these issues in their jurisdiction. This makes it essential for Brazil to have knowledge and to keep track of the access and benefit-sharing legislation of Party- countries with which Brazil has relations, whether commercial or scientific, or in transboundary situations requiring cooperation between countries.

Currently, few countries have ABS legislative, administrative or policy measures that are really efficient. Of the 193 Party-countries to the CBD, less than 50 countries have some form of ABS legislation, including patent laws that require declaration of geographical origin of the genetic material used in/for invention/creation. Of the 17 megadiverse countries, 13 have laws that address access and benefit-sharing in some way. But few are clear and enforceable, which leads to legal uncertainty and lack of incentive to access in these conditions.

For Brazil, it is important to know how the main trading partner countries have been dealing with the ABS issue, as well as neighboring countries that border with Brazil, i.e. that share genetic resources, species and ecosystems with Brazil.

8.1. Neighbor countries

Brazil has an extensive land border. It has more than 16,000 km of borders with several countries in South America, namely French Guiana, Suriname, Guyana, Venezuela, Colombia, Peru, Bolivia, Paraguay, Argentina and Uruguay. It does not border with Chile and Ecuador. Despite not bordering with Ecuador, Brazil shares the rainforest with this country, besides 7 other countries, namely Bolivia, Colombia, Guyana, French Guyana, Peru, Suriname and Venezuela.

These countries are rich in biodiversity: Brazil, Colombia, Ecuador, Peru and Venezuela are in the group of 17 megadiverse countries. Many of the countries in South America have legislation on access to genetic resources and benefit-sharing. Chile, Paraguay, Suriname and Uruguay do not have specific legislation, only National Biodiversity Strategies that include some guidelines on access to genetic resources (http://www.cbd.int/abs/nagoya-protocol/signatories/default.shtml).

All are parties to the CBD (French Guiana is a territory of France, which is party to the CBD), but several of these countries have not signed the Protocol, namely Bolivia, Chile, Guyana, Paraguay, Suriname and Venezuela. No country in South America has ratified it yet.

Bolivia, Peru, Ecuador and Colombia are part of the Andean Pact, now called the Andean Community, which in 1996 published Decision 391 (http://www.comunidadandina.org/Normativa.aspx#). This Decision established the **Common Regime on Access to Genetic Resources**, one of the first regulations establishing the link between access to genetic resources and intellectual property rights (IPR), as follows: "Member Countries do not recognize rights, including intellectual property rights, over genetic resources, products derived or synthesized from genetic resources and associated intangible components, obtained or developed based on an access activity that does not comply with the provisions of this Decision. Additionally, the affected Member Country may request the nullity and take appropriate measures in countries that have conferred rights or granted titles of protection" (second Supplementary Provision) and "the competent national offices in the field of Intellectual Property shall require the applicant to indicate the number of the access contract and copy of it as a prerequisite for the granting of the respective right, when they are certain or when there is reasonable evidence that products or processes whose protection is sought have been obtained or developed from genetic resources or their derivatives originating from any of the Member Countries (third supplementary provision).

Some Member Countries internalized Decision 391/1996 nationally, regulating it, such as Bolivia and Ecuador. Colombia has not yet done so, but intends to publish a decree soon to regulate the Decision, in particular access to genetic resources, derivatives and associated traditional knowledge in the country. Another pillar of this legislation in Colombia is the creation of a National Bioprospecting Company, which is still undergoing a feasibility study.

The implementation of this theme in Colombia faces similar problems as in Brazil, namely lack of clarity, high transaction costs, investor uncertainty, insufficient operational capacity and use of different understandings and criteria by the national authority, lack of regulation on prior consent from

local communities, among others. In 2013, Colombia issued Decree N. 1375 of 27 June 2013, which regulates Biological Collections, and Decree 1776/2013. Both decrees recommend the promotion and facilitation of scientific research without commercial purposes (http://www.cbd.int/abs/measures/group/?code=co).

Peru also uses the Andean Decision as a basis, but has developed its own legal framework. It has several laws on sustainable use of biodiversity (1997, 2001), protection of access to Peruvian Biological Diversity and the collective knowledge of indigenous peoples (2002, 2004, 2006), and access to genetic resources (2009). There are also regional laws, as in Cusco, which in 2009 created his own rule on access to genetic resources and traditional knowledge (http://www.cbd.int/abs/measures/group/?code=pe).

Venezuela also has its own set of laws, focused on protection of cultural heritage of indigenous peoples and communities. In 2009, it created the National Register of Biological Collections to regulate access to *ex situ* biological material (http://www.cbd.int/abs/measures/group/?code=ve).

These countries are important for Brazil because it shares borders with them, therefore international cooperation is essential to decide how to deal with cases of shared genetic resources and/or traditional knowledge, i.e., those who are under the jurisdiction of more than one country besides Brazil.

8.2. Major Trading Partners

In 2012, Brazil's main trading partners, from whom the country imported most, were China (17.44%), United States (12.42%), Argentina (7.79%), Germany (4,47%) and the Netherlands lands (3.75%) (http://www.brasilglobalnet.gov.br/).

Regarding exports, the countries to which Brazil exported most in 2013 were China (20%), United States (10.13%), Argentina (8.27%), Netherlands (6.51%) and Japan (3.34%) (http://www.brasilglobalnet.gov.br/) (table 8).

Table 8. Main products of Brazil's trade balance with its main trading partners (2012), which contain (or may contain) biological material

Country	Main Products – Brazil's Exports	Main Products – Brazil's Imports
China	agricultural commodities, especially soybeans. Other products with biological material that stand out are: hides and skins, pulp, crude soy oil, tobacco leaves, lumber, frozen orange juice, natural and synthetic rubber, sugar, cotton, meat.	high-technology products
USA	beverages, coffee, tea, mate and spices, wood pulp	various chemical products
Argentina	tires, rubber, paper, unroasted coffee beans and instant coffee, cocoa powder and oil, pork, butter and fats	wheat, rice, beans, malt/starches, potatoes, garlic, onion, olives, milk/ eggs/honey, fruit (pear), beef, chocolate and rubber
Germany	coffee, tea, mate and spices (unroasted, not decaffeinated coffee beans, dried "piper" pepper, among others), waste from the food industries, seeds/grains, tobacco, wood pulps, meat products, and pearls	pharmaceuticals, and various chemical products
Netherlands	waste from the food industries (bagasse and cake from soy oil extraction), wood pulp, meat and seeds/grains	pharmaceuticals, food products and vegetables/fruits products
Japan	meats (especially chicken), cereals (corn), coffee/tea, seeds/grains, vegetables/fruit products, wood pulp and pastes	rubber

Source: SECEX/MDIC and http://www.brasilglobalnet.gov.br/

China is a party to the CBD, but has not signed or ratified the Protocol yet. Nationally, it established some measures to control access to genetic resources (http://www.cbd.int/abs/measures/group/?code=cn). In 2008, it adopted a measure for the analysis and approval of entry and exit and of International Cooperation in Research on the Use of Genetic Resources from cattle and poultry (listed in an Annex to the Chinese Law of Livestock). The measure requires submission of the purchase or donation contract, provision for sharing benefits with the State, prior informed consent for research, import and export. The measure further provides, in Article 24, for non-compliance mechanisms, such as fines, withdrawal of approval, confiscation of genetic resources and any illegal gains arising from them, and non-acceptance of applications of the same type for 10 years. If a crime is identified, the entity will be subject to appropriate criminal liability.

In 2009, the new Patent Law of the People's Republic of China included two new provisions directly related to protection of genetic resources. Article 5 (2) established that "no patent right shall be

granted for any invention/creation that depends on genetic resources accessed or used in violation of provisions of relevant laws or administrative regulations", and Article 26 (5) established that "for inventions/creations that rely on genetic resources, the patent applicant must state in the request the direct source and original source of the genetic resources, and shall, in case the applicant does not reveal the original source, provide a reason for not doing so."

The United States is not party to the Convention on Biological Diversity (CBD), nor has it signed the Nagoya Protocol therefore it has no obligation to comply with the provisions of the CBD. It does not have domestic legislation on ABS. Its patent law does not require the declaration of origin of the genetic material used in an invention/creation.

Argentina is a party to the CBD, and signed the Protocol on 15/11/2011, but has not yet ratified it. On April 15, 2010, the Secretariat of Environment and Sustainable Development issued Resolution N. 226 /2010, which regulates access to biodiversity genetic resources, in accordance with Article 15 of the CBD. The Resolution does not apply to cultivars regulated by Law N. 20.247 - Seeds and Phytogenetic Creations (http://www.cbd.int/abs/measures/group/?code=ar).

The Resolution provides that individuals or public or private legal entities, whether Argentine or foreign, that access biodiversity genetic material referred to in the CBD, collected or acquired by any means, for scientific purposes or for research applied to industry or trade, with the purpose of import or export, should seek authorization to access this material. The Secretary of Environment and Sustainable Development grants, pursuant to the rules established in regulation, a permit as certification of legitimacy of origin and legal compliance, creating a registry of granted permits. The resolution defines the minimum requirements for access: prior informed consent about the possible use of the materials and mutually agreed terms; and sharing of benefits arising from the use, in accordance with the domestic and international regulatory framework (Bonn Guidelines). The Registry on Access to Genetic Resources organizes information on submitted applications for access, export or import of genetic material.

Argentina also has sub-national laws. Several provinces have their own laws, such as the Province of Misiones, Neuquen Province and the Province of La Rioja.

Germany is a member of the European Union, is a party to the CBD, and signed the Nagoya Protocol on 23/06/2011, but has not yet ratified it. It is expected that the European Union will soon ratify it, followed by its members. Regarding domestic legislation, Germany published, in 2005, the Amendment

to paragraph 34 of the German Patent Law, which requires declaration of the geographical origin of the plant or animal biological material used in the invention, if the location is known (http://www.cbd.int/abs/measures/group/?code=de). However, inspection of the registration and validity of patent rights are not affected if this provision is not complied with.

The Netherlands (Holland) are also a member of the European Union, party to the CBD and signed the Nagoya Protocol on 23/06/2011, but has not yet ratified it. They have no specific legislation on ABS.

Japan is party to the CBD, and signed the Nagoya Protocol on 11/05/2011, but has not yet ratified it. Japan has no specific legislation on the subject. However, to guide users, the Ministry of Economy, Trade and Industry (METI) and the Japanese Association for Bio-industries (JBA) published a guide on access to genetic resources for users (http://www.cbd.int/abs/ measures/group/?code=jp).

9. CRITICAL UNCERTAINTIES FOR THE ENFORCEMENT OF THE PROTOCOL

The objective of the Nagoya Protocol is to implement the third objective of the Convention on Biological Diversity (CBD), namely the fair and equitable sharing of benefits derived from the sustainable use of genetic resources. Despite all the acknowledgement and intentions to collaborate, support, promote, provide, cooperate, guarantee, ensure, establish, described in the preamble to Protocol, many uncertainties remain in its text.

The Nagoya Protocol leaves the vast majority of decisions to be addressed through domestic legislation, which allows some certainties and many uncertainties.

Among the certainties are the obligations of countries which have ratified the Protocol to comply with the provisions contained in the Protocol, including adoption of the Prior Informed Consent (PIC) and Mutually Agreed Terms (MAT). However, the way each Party will move forward may vary according to internal decisions.

The critical uncertainties are mostly related to the rules that each signatory country will establish in their domestic legislation regarding access and benefit-sharing conditions, understanding of whom the provider is, and alignment with other international treaties. There are also uncertainties in some of the Protocol provisions, such as Article 2, on definitions, and Article 10, which deals with the global multilateral benefit-sharing mechanism.

Below are listed some of the Protocol's major uncertainties. The Protocol implementation will depend on clarification of doubts, definition of uncertainties and detailing of certain provisions. Some of these unresolved issues are being discussed in the Intergovernmental Committee for the Nagoya Protocol, but will be decided in the Meeting of the Parties to the Protocol (MOP), after the Protocol enters into force. Others depend on measures that the Parties will take internally.

With so many uncertainties, some representatives of the countries have voiced their concerns regarding the ratification of the Protocol at the 3rd meeting of the Intergovernmental Committee for the Nagoya Protocol. For them, to ratify the Protocol before national measures are implemented can be hasty, since the existence of the nation al measures is essential for countries to benefit from the international architecture created by the Protocol on ABS. And implementing appropriate measures

is a task that requires time, considering that many of the complex issues must be addressed at the national and sub-national levels, such as the implications of the Protocol for various sectors of government and industry, in addition to the need to conduct effective consultation with indigenous peoples and local communities (http://www.iisd.ca/biodiv/icnp3/).

9.1. Scope of the Protocol

The scope of the Protocol is the first point that is not clear in the Protocol, because it is not only directly related to the definitions contained in Article 15 of the Convention, but also to the definitions of the Protocol (Article 2) and of Articl 2 of the Convention.

Article 15 of CBD refers to genetic resources under national jurisdiction, which can give rise to interpretations that all the genetic resources that are under no national jurisdicion should not be under the scope of the Protocol, as for example the genetic resources that are found in international waters or in the Antartic. Another possible interpretaton could be that all genetic resource occurring in a determined country, that is, under national jurisdiction, that particular country should have the authority to allow for the access. This would mean that the country would have sovereignty over all genetic resources in its territory, be the genetic resource native or exotic. However, this is not a consensual interpretation.

Another uncertainty of the Protocol is whether or not it considers that the genetic resources comercialized as commodities should share benefits. This understanding assumes that the use of biological resources in large volumes in its raw state, as raw material, which has not been subject of any research and development activity, are not covered by the definitions in the Protocol.

The time scope of the Protocol also leaves doubt: which will be the starting point for the ABS rules to enter into force internationally (as from the entry into force of the Nagoya Protocol or from the date of entry into force of the CBD)? This may be questioned if genetic resources that were obtained before CBD entered into force will be under the scopo of the ABS rules, such as genetic material that are part of *ex situ* colleticions and that were obtained (legally or not). Another uncertainty in this regard is when the genetic resource was acquired before CBD entered into force, but the access activity or its utilization only started after its entry into force.

To make the issue even more complex, the definitions contained in CBD and in the Protocol allow for more than one interpretation. Furthermore, the Protocol introduced two new concepts - “utilization of genetic resources” and “derivative” - which, in practice, extends the scope of ABS to that of CBD.

The Protocol dictates that its rules don't reach the genetic resources of specialized international agreements on access and benefits sharing that are compatible to CBD and Nagoya Protocol objetctives (Nagoya Protocol Article 4.4), such as genetic resources under ITPGRFA. However, it is not known how the countries will internilize this guideline of the Protocol. The diversity of understandings among the countries is large and is greatly related to their own interests, be they environmental interests (biodiversity conservation), social or economical (commercial).

9.2. Definition of Provider of Genetic Resources and of Associated Traditional Knowledge

a. Definition of Provider

The Protocol, as the CBD, considers that the providing Party is the country of origin of the resources or a Party that has acquired the genetic resources in accordance with the Convention, **unless otherwise determined by the Party that is the country of origin** (Article 6 of the Protocol). To the CBD, Parties that are countries of origin of genetic resources have these resources *in situ* (Articles 2 and 15.3 of the CBD).

However, the Protocol does not establish clear criteria for a country that produces exotic genetic resource to be considered a provider of such resource (e.g. coffee in Brazil and rubber in Thailand), it only establishes that it may be considered a provider if it has acquired the genetic resources in accordance with the CBD. These conditions can result in significant differences when assessing the Protocol impacts, thus affecting countries' positions. This issue has implications for relations between countries regarding genetic resource-based products marketed today. In relation to legacy (genetic resource-based products already marketed), the definition of a provider that has acquired the genetic resource in accordance with the CBD is crucial. With regard to new commercial uses of genetic resources, the definition of who may become a provider in the future, not being a provider today, will indicate the conditions under which a country that is currently a user will define its strategy to eventually become a provider.

Since the Protocol considers that a Party can be a provider of genetic resources if it acquired the genetic resources in accordance with the Convention, but allows the country of origin to determine otherwise, it is uncertain how the Parties will deal with this situation. It is not clear if the genetic resources obtained by the Parties before the Convention, when there were no rules on access, will be considered as obtained in legal compliance, and therefore, whether such Parties could be considered providers.

The CBD and the Protocol do not address ownership of genetic resources, nor the proprietary rights over genetic resources. Although they consider a Party State a provider, they do not ensure the same ownership right of over such resources. These rights are subject to national or sub-domestic legislation (Greibel *et al.*, 2011). The ownership of genetic resources may belong to the State (which can be organized at different levels, for example, federal, state, county, province, etc.), to a private owner, to indigenous peoples. In the case of genetic resources from *ex situ* collections, they may or may not be considered as property of the institution that has them under its charge.

b. Provider of Associated Traditional Knowledge (ATK)

Regarding traditional knowledge, the Protocol recognizes the right of indigenous peoples and local communities over their knowledge, and therefore, the right to give prior consent for access to their traditional knowledge. However, traditional knowledge may have different origins and generate conflicts over property rights. Different groups of more than one Party can claim ownership of that knowledge. In these cases, the Protocol suggests that the Parties consider the relevance of the global multilateral mechanism that could cover cases such as shared traditional knowledge.

The CBD recognized the value of traditional knowledge for modern society, the right of local communities and indigenous peoples to provide or refuse consent for access to traditional knowledge, innovations and practices, and that the equitable sharing of benefits arising from the use of such knowledge, innovations or practice should be encouraged by the State (Article 8 (j)).

This traditional knowledge on biological diversity can lead to bioprospecting and isolation of properties of genetic resources found in nature, allowing companies to develop new products.

c. Definition of the origin of the genetic resource

The identification of the territorial origin of a genetic resource, both in the definition of proof of territorial origin of a genetic resource disseminated over time, as in the definition of the time when the genetic resource begins to belong to a territory such as it exists today (there are several territories in the world that in a not so remote past belonged to other parties, different from those that occupy them today). Questions regarding transboundary resources are related to the territorial issue.

In the case of genetic resources that occur in transboundary situations, the Protocol proposes that the Parties consider the need for a global multilateral benefit-sharing mechanism (Article 10). This mechanism would also be used in cases when it is not possible to grant or obtain prior informed consent.

However, it remains unclear what transboundary situations are or what are the situations when it is not possible to obtain prior informed consent. The adoption of a multilateral mechanism requires that many questions be clarified, ranging from the definition of transboundary situations to the format of the governance mechanism.

Article 10 was not negotiated before the adoption of the Nagoya Protocol, so a lot of discussion between the Parties will have to take place for consensus to be achieved on several key points for the Protocol implementation. This article was included on the last day of negotiation, in the text presented by the President of the COP, the Minister of the Environment of Japan, as a major global bargaining, which was intended to create incentives for conservation.

Article 10 concentrates a great number of uncertainties regarding the Protocol, starting with the question of whether a global mechanism for benefit-sharing is really necessary, and if it is, in what situations and how it would operate. There is strong disagreement regarding this item, because some believe that discussing it will reopen the discussion on the Protocol spatial and temporal scope, in addition to its relationship with other multilateral processes. The main question is the scope of the mechanism, whether it will be applied to genetic resources in *ex situ* collections, whether it will be applied to genetic resources in areas without national jurisdiction, such as international or Antarctic marine waters, whether it will be applied to genetic resources accessed prior to the CBD and the Nagoya Protocol's entering into force. Another question is whether the mechanism would apply in the case of transboundary traditional knowledge and to public domain knowledge. If the scope is determined, the question is what kind of benefits will be provided and to whom, and what are the criteria for sharing them.

However, there is agreement that the mechanism should not undermine national sovereignty and should not compete with, but rather complement the bilateral approach to ABS, which is supported by other provisions of the Protocol. Many countries that have transboundary situations have already taken a stand as regards their sovereign rights over their resources and the right to receive benefits from the use of the resources in their jurisdiction. However, there are several areas that cannot be resolved through a bilateral approach, such as shared genetic resources or shared traditional knowledge, which actually represent the rule rather than the exception. But for now, this mechanism is undecided. It will depend on negotiations under the Protocol.

9.3. The user of genetic resources: who should request access and share benefits. whoever accesses and/or whoever directly uses genetic resources; or the chain as a whole (other points in the chain)

The ABS concept of the CBD is based on a bilateral relationship between a genetic resource provider and a user of such resource. However, in practice this relationship does not happen this way. The activity of access to genetic resources, whether for research purposes or for commercial purposes, may involve many intermediary users until reaching the end user that makes a product available on the market. The development of much of the research on access to genetic resources involves an intricate network of researchers and scientific institutions more complex than a "simple" bilateral relationship. This non-linear arrangement complicates the definition of who is the user of genetic resources within a supply chain or research network, and should therefore share benefits.

The Nagoya Protocol says that all users of an accessed genetic resource should share benefits through the establishment of Mutually Agreed Terms (MAT).

The MAT should be the result of negotiation between the Party that will grant access to the genetic resource and an entity that wishes to use such resource, which can be an individual, a company or a research institution. The MAT can be materialized as a transfer agreement, a research agreement or a contract (Greiber *et al.*, 2011).

In this case, the key issue is the traceability of supply chains and value chains to measure the contribution of the genetic resource to the trade value of commodities. The broader the spectrum of uses of a particular genetic resource and the more diverse the productive and value chains that use it, the higher the number of benefit sharing points and, therefore, contracting, monitoring and charging points. The parties may resort to a sharing mechanism based on approximate calculations of the contribution of the genetic resource to the value of the product that uses it, charging percentages at various points in the chain; or they may agree on simplified mechanisms involving a fee charged at a single point in the chain. This type of uncertainty will significantly alter the amounts involved and the direct and indirect costs (monitoring, charging etc.).

9.4. Access conditions

Access to genetic resources is addressed throughout the Protocol, specifically in Article 6. In it, the Protocol states that access to genetic resources for their utilization shall be subject to the prior informed consent (PIC) of the Party providing such resources that is the country of origin of such resources or a Party that has acquired the genetic resources in accordance with the Convention, unless otherwise determined by the country of origin. Thus, the CBD and the Protocol leave it to the Parties, in the exercise of their sovereignty, to decide whether or not to request the PIC for access to their genetic resources, as determined in their domestic legislation.

The Protocol stresses that each Party shall take measures, as appropriate, with the aim of ensuring that the prior informed consent or approval and involvement of indigenous and local communities is obtained for access to genetic resources where they have the established right to grant access to such resources. Such consent must therefore be provided through an affirmative act by the provider, based on information on the intended use by the potential user of the genetic resources.

Besides the PIC, for access to take place, Mutually Agreed Terms (MAT) must be established between the providing Party of the genetic resource and the potential user (Article 15.4 of the CBD). In practice, the PIC and the MAT mean prior authorization for access to genetic resources, the control of their subsequent use and fair and equitable sharing of the proceeds of this subsequent use. The exact procedures that the potential user must follow to obtain the PIC and the establishment of the MAT will depend on the domestic legislation of each providing Party.

Also in Article 6, the Protocol states that Parties requiring prior informed consent shall take the necessary legislative, administrative or policy measures to provide for legal certainty, clarity and transparency; provide for fair and non-arbitrary rules and; provide information on how to apply for prior informed consent; provide for a clear and transparent written decision within a reasonable period of time; provide for the issuance at the time of access of a permit or its equivalent as evidence of the decision to grant prior informed consent and of the establishment of mutually agreed terms, and notify the Access and Benefit-sharing Clearing-House accordingly; set out criteria and/or processes for obtaining prior informed consent or approval and involvement of indigenous and local communities for access to genetic resources; and establish clear rules and procedures for requiring and establishing mutually agreed terms.

As to **access to traditional knowledge associated with genetic resources**, **Article 7** of the Protocol once more leaves it to the domestic legislation of each Party, stating that each Party shall take measures, as appropriate, with the aim of ensuring that traditional knowledge associated with genetic resources that is held by indigenous and local communities is accessed with the prior and informed consent or approval and involvement of these indigenous and local communities, and that mutually agreed terms have been established.

The CBD also provides for "prior informed consent" and "mutually agreed terms", but the difference is that the Protocol allocates to indigenous and local communities, not only to the Parties, the power to grant or approve prior consent and to participate in mutually agreed terms in case access to associated traditional knowledge.

It is very convenient that users of genetic resources and associated traditional knowledge are informed about the latest advances in molecular and genomic biology, which have shown it to be possible to detect "selection signatures" in genomes of species that have been subjected to artificial selection, even in past times. Scientific discoveries show that often the interference of these past selectors was more intense than all the actions taken by modern selectors.

Also on access, **Article 8** deals with 3 special considerations that Parties should observe when developing and implementing their access and benefit sharing legislation. They are: establishment of simplified measures on access for the purpose of **non-commercial research** that contributes to the conservation and sustainable use of biological diversity, particularly in developing countries; the need for expeditious access to genetic resources and sharing of benefits in the case of **present or imminent emergencies that threaten or damage human, animal or plant health**, as determined nationally or internationally, including access to affordable treatments to those in need, especially in developing countries; **access to genetic resources for food and agriculture** due to their special role for food security.

There may be large variations in conditions of access in different domestic legislations. In fact, this variation already exists at present. Some countries have access and benefit-sharing legislation, but the vast majority does not. Some of them do not require prior informed consent, others require prior informed consent from the provider of the genetic resource or associated traditional knowledge, in addition to authorization from the competent national authority. Still others do not regulate access at all. In these cases, the transfer and exchange of genetic material takes place through Material Transfer Terms and contracts.

a. Who authorizes access

Article 15.1 of the CBD reaffirms the authority of governments to regulate physical access to genetic resources in areas under their jurisdiction. The same article, however, does not grant to the State the right of ownership over these resources. The ownership of the genetic resource is not defined by the CBD or the Nagoya Protocol, but is subject to the domestic legislation of the Parties. The CBD also recommends that Parties facilitate access and do not to impose restrictions that hinder the achievement of the objectives of the Convention (Article 15.2). Thus, access within the jurisdiction of Parties is encouraged, increasing the likelihood of obtaining benefits that may be shared between the Contracting Parties.

Under the Protocol, the Party must designate one or more authorities competent to inform about the requirements and procedures necessary for the fulfillment of access. Within countries, in their jurisdictions, the definition of how to obtain access and who may authorize access will vary according to the organization of each Country, i.e. who to request access from, beyond the competent authority. It can be private owners, local communities, indigenous peoples, central government, state governments, or other entities.

The key aspect here refers to the identification of the entities that authorize access and negotiate the sharing of benefits. It is understood that if such entities within countries are not unified or are composed of different players with authority to grant access and benefit-sharing mutually agreed terms, transaction costs will be different from situations in which there is unification in a single entity (possibly a government entity or an entity with connections with the government). It is therefore important to ensure clarity regarding the entities and levels of negotiation within countries.

9.5. Benefit-sharing

a. Who should share and what should be shared

The fair and equitable sharing of benefits is addressed in Article 5 of the Protocol, which says that the benefits arising from the utilization of genetic resources, as well as subsequent applications and commercialization, will be shared in a fair and equitable way with the Party providing such resources is the country of origin of such resources or a Party that has acquired the genetic resources in accordance with the Convention. Such sharing should occur upon mutually agreed terms negotiated case by case. This article refers to the text of Article 15, paragraphs 3 and 7 in the CBD.

Therefore, in practice, in order for benefits to be shared fairly and equitably, the Parties should identify providers under their national jurisdiction, i.e., those entitled to receive the benefits arising from the utilization of genetic resources and their subsequent applications and marketing (Oliva and Normand, 2013). In Brazil, for example, beyond the need for a permit issued by the competent authorities, those interested in becoming a user must obtain prior consent (prior informed consent) from the owner of the land, whether private owner, federal, state or local government in the case of public areas, local community or indigenous people, the National Defense Council, in areas of national security and the maritime authority if the access occurs in Brazilian waters, continental shelf and exclusive economic zone.

The Convention and the Protocol link benefit-sharing to access to a genetic resource, its derivative or associated traditional knowledge. Thus, in principle, whoever applied for the access permit is responsible for sharing the benefits. But it is not so simple, since there are several arrangements in which the use of genetic resources involves more than one user. This is the case of most research projects that are carried out by researchers from different universities or marketing of products using biodiversity components. There are other cases in which the person/company who has applied for the permit to access the GR is not the same that will use it. This can happen, for example, in the case of export of genetic resource samples (Oliva and Normand, 2013).

Also in relation to benefit-sharing, the Protocol introduces the term “derivatives” (Article 2), expanding the scope thereof, which rather than considering only the use of genetic resources that have functional units of heredity, it includes sharing of benefits arising from the use of their derivatives.

Another point that needs to be clarified is that in a value chain in which several institutions/persons/companies access the same genetic resource until reaching a final product, who must request a permit for access and benefit-sharing. Users along the value chain are concerned about potential liabilities arising in the product development process, which can be a problem for commercial interests. In this context, the question of who should share the benefits and with whom needs to be answered, as well as which link in the chain should share in order not to encumber the entire chain.

There are many different circumstances and situations surrounding the use of genetic resources, which often makes it impossible for each providing State to specify, a priori, what benefits should be shared and the modalities to be adopted to implement sharing. This will occur through a negotiation process between provider and user and it certainly depends on several factors, among them, whether the genetic resource was obtained from *ex situ* collection or *in situ* conditions, the location where it was found (State land, private owner, local community, indigenous territory, protected area, or other), type

of intended subsequent use (scientific research, education and/or commercial development), whether the genetic resource was obtained from a single provider or multiple providers, whether it was used to create a specific end product or the product to be developed has not been determined yet.

One cannot lose sight that there is no clear line between provider and user. In general, all States are providers and users simultaneously. This may have implications for trade relations and for scientific and technological cooperation.

b. **Timeframe** (whether it is being marketed presently will be considered - legacy (products marketed today); not legacy (abs from now on).

According to rules of the Vienna Convention on the Law of Treaties, the Protocol will only cover access and benefit-sharing as of its entry into force. However, there is an understanding that the development of new crop varieties, new drugs, or other products that use genetic resources obtained before the Nagoya Protocol enters into force, will be within the scope of the Protocol.

This point, depending on how it is addressed, settles some of the previous points. It is supposed that after ratification and during the implementation phase the Parties will agree that the Nagoya Protocol will apply from then onwards and will not consider products already being marketed, which eliminates all possible conflicts related to ABS. This situation will resolve the problems of commodities and non-commodities based on genetic resources that are marketed today. There is another type of understanding that everything that is already known and genetic resources that are already in the "possession" of Party countries, such as *ex situ* collections, would not be under the scope of the Protocol, only what is yet to be obtained and discovered. If so, those who will "benefit" most from this Protocol are countries rich in biodiversity, such as Brazil, because very little is known about such biodiversity, and even less about its potential uses.

c. **Other commodities**

There is no clear understanding regarding what the Protocol will cover commodities. Some think it will, others say it will not.

Both the CBD and the Protocol establish that benefit-sharing should happen when there is access to the genetic resource or when the genetic resource is utilized and research and development occur. Thus, the use of a crude substance does not involve access to genetic resource, nor biological resources marketed as commodities (raw materials). However, the Protocol also establishes that the sharing of benefits must come from the utilization of genetic resources and their subsequent

applications and commercialization. Thus, there is the question whether the use and subsequent marketing of commodities will be considered for sharing. Different understandings may be reflected in the domestic legislations of countries.

Uncertainties surrounding commodities are related to the definition of provider, intended use and timeframe.

Commodities based on genetic resources presently produced and marketed worldwide are largely being produced in non-originating countries of the genetic resource (e.g. Brazil, Argentina, Russia, and Thailand). The inclusion of this material as a candidate for benefit-sharing would mobilize sizeable amounts between countries and could somehow change part of the markets and the division of labor in the world. This point is related to the first uncertainty, since the definition of what is considered a providing Party may or may not settle this point. As an example, suppose that Brazil and Argentina, after many years of domestication, breeding and production of sugarcane, are considered providers. This would eliminate the sharing of benefits with India and New Guinea, which are considered countries of origin for sugarcane.

As for the intended use, most commodities involving genetic resources are utilized in agriculture and food. The Protocol provides for differentiated treatment in these cases, which may be subject to specific agreements and remain outside the scope of the Protocol. However, the question remains whether the commodities that are not used for other purposes will be in the scope of the Protocol or not, such as rubber (*Hevea brasiliensis*).

Regarding the temporal scope, i.e. products derived from commodities developed before the Protocol enters into force, there is an understanding that they will be outside the scope of Nagoya. The question in this case is whether the commodity derivatives developed after the Protocol enters into force, but with material obtained before, will be within the scope of the Protocol. This is the case, for example, of pulp and paper companies that acquired genetic resource before the Protocol, and even the CBD, enters into force, but use such materials to develop new varieties for use in commercial plantations for the production of pulp and paper.

d. **modes and amounts of benefit-sharing** (setting values: percentages previously defined by countries; percentages negotiated on a case by case basis, other types)

The Nagoya Protocol does not specify how benefits are to be shared, or the amount to be shared, it only recognizes that the provider of the genetic resources or holder of the associated traditional knowledge should be remunerated. The decision of how the sharing will be carried out, therefore, rests with the countries.

The Protocol says, in **Article 5, that the fair and equitable sharing of benefits** can include, and not limited to, monetary and non-monetary benefits, as set out in Annex 1 of the Protocol. Therefore, the sharing may not necessarily involve money, but can involve exchange of seeds, plant varieties, technology, and training, among others.

Countries may decide that the sharing of benefits should be established case by case, freely negotiated between the provider and the user, or may establish a fixed percentage to be paid to the provider that represents a fair and equitable amount, or may establish an amount to be paid to a government or private fund. There are many possibilities that are still being studied and defined by countries.

The arguments against the establishment of a fund with a fixed percentage are that it is based more on the obligation of the user to share benefits than the right of providers to receive such benefits; it is a mechanism based on monetary benefit, and does not include other benefits; it does not recognize and reward those involved in the transaction. Those who defend the choice of the fund argue that the funds deposited in the mechanism can be used to promote conservation and sustainable use, education and training, in addition to decreasing transaction costs. One must consider, however, the burden on the State and the effective application of the fund's resources, management costs and arbitrariness in defining the amount to be collected.

Moreover, a bilateral relationship through contracts also has its problems, namely, information asymmetry, transaction costs, legal uncertainty and doubts about the targeting resources towards conservation and sustainable use.

The definition of the amount to be shared is not a simple task. It may depend on how many users along the chain will have the responsibility to share the benefits, risks and investments of each link, and the importance of genetic resources in their products or services and the resulting benefits (Oliva and Normand, 2013)

There is also the case of genetic resources that occur in transboundary situations or for which it is not possible to grant or obtain prior informed consent. These cases are covered in Article 10 of the Protocol, which considers the need to adopt a **global multilateral benefit-sharing mechanism** to address the sharing of benefits derived from genetic resources and associated traditional knowledge in these conditions. In this case, benefits shared by users of genetic resources and associated traditional knowledge through this mechanism will be used to support the conservation of biological diversity and the sustainable use of its components globally. But it has not been decided yet what will be considered

a transboundary situation, or what are the cases when it is not possible to grant or obtain consent. These issues should be decided under the Protocol, as soon as it enters into force.

The Parties shall establish clear standards and procedures for requesting and establishing mutually agreed terms. Such terms should be written down, and may contain provisions, among others, on dispute settlement; on the sharing of benefits, including intellectual property rights; on subsequent use by third parties, if any; and on changes of intent, where applicable. This is explicit in **Article 6 on access to genetic resources**.

e. **Calculation and timing of the payment** (deadline for payment of the benefit: from less than 1 year to the duration of the operation)

The Nagoya Protocol does not contain provisions on the forms of calculation and the amounts for benefit-sharing, or on the transfer mechanisms (payment). There is also uncertainty about the creation of funds in countries or a global fund (multilateral mechanism).

Regarding the deadline for payment of the benefit, the Protocol also provides no guidance, leaving the question of the benefit-sharing timeframe for open.

What the Protocol establishes is that access to and fair and equitable sharing of benefits should occur through a Mutually Agreed Term, it leaves it to domestic legislation to define how this term will be drafted and the required conditions.

Thus, whether it will be a fixed percentage, the frequency of payment, whether it is charged on sales, will depend on the decision of each signatory Party.

In the case of the situations referred to in **Article 10**, genetic resources that occur in transboundary situations or for which it is not possible to grant or obtain prior informed consent, the Protocol provides for the adoption of a **global multilateral benefit-sharing mechanism**, and in this case, the amount to be allocated to this mechanism, as well as the timeframe for sharing of benefits derived from genetic resources and associated traditional knowledge in these conditions should be defined by the Parties to the Protocol after its entry into force.

Another relevant aspect regarding the payment and defining of a fixed percentage or not, is that the Protocol establishes in **Article 5** and **Annex 1** a variety of monetary and non-monetary benefit-sharing options.

9.6. Alignment with other international agreements

The Nagoya Protocol interfaces with many other international agreements. The main ones are the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) under the United Nations Food and Agriculture Organization (FAO), the International Convention for the Protection of New Varieties of Plants (UPOV), the Antarctic Treaty, United Nations Convention on the Law of the Sea, Working Group of the UN General Assembly on marine biological diversity in areas beyond national jurisdiction, the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) within the World Trade Organization (WTO) and the International Health Regulations (2005), under the World Organization (WHO). There is also the interface with WIPO (World Intellectual Property Organization) in relation to debates about "sui generis" protection of associated traditional knowledge, with the FAO Commission on Genetic Resources for Food and Agriculture, among others.

This interface can be critical in many cases, when there is a fine line between such agreements. It is necessary to decide how to harmonize issues such as genetic resources for food and agriculture that are outside the scope of Annex 1 of the ITPGRFA, and animal genetic resources and microorganisms used for food and agriculture. Today, there is no international agreement that addresses these issues.

The adoption of the Protocol and its imminent entry into force sparked heated discussions on how to regulate access to genetic resources from animals and microorganisms, within the framework of FAO and the CBD. Another open question in the ITPGRFA is the regulation of plant species used for food and agriculture, but that are not included in the multilateral system. This will be one of the issues that the Parties to the Protocol should discuss and propose solutions for, as soon as it enters into force.

One must take into account that the Nagoya Protocol recognizes agriculture as a particular situation, both for its dynamics, since it uses many varieties to develop a new plant, and for its importance to mankind. And for this reason, the Protocol allows countries to establish specific standards for the use of genetic resources in agriculture.

Thus, the critical uncertainty regarding the alignment of the Nagoya Protocol will depend on negotiations and the existence of such specialized agreements, in particular with regard to agricultural genetic resources and those for which expeditious access to and sharing of benefits are needed in case of emergencies that threaten or damage to human, animal or plant health, as determined nationally or internationally.

It is still unclear how Brazil will address this issue in its legislation and what its international position will be. Whether it will observe the Nagoya Protocol in its internal regulations and whether it will grant special treatment to genetic resources used for food and agriculture, as suggested by the Protocol.

Brazil is expected to address the issue of use of agricultural genetic resources that contain associated traditional knowledge, such as creole varieties, as well as the use of such agricultural resources for purposes other than food.

10. INDICATORS ON THE ECONOMY OF GENETIC RESOURCES-BASED (GRB) COMMODITIES IN BRAZIL

In this section we present the study of economic data highlighting the value of production and trade balance of Genetic Resource-based (GRB) commodities in Brazil. The item presents a study on the situation of the trade balance and the production value of GRB in the last 3-4 years in Brazil.

The data presented will be critical to measure the economic impacts arising from the implementation of the Nagoya Protocol in the proposed alternative scenarios, whether Brazil is considered a provider of genetic resources and therefore, recipient of benefit-sharing, or if it is considered a user of genetic resources from other countries, and therefore has to pay the sharing of benefits.

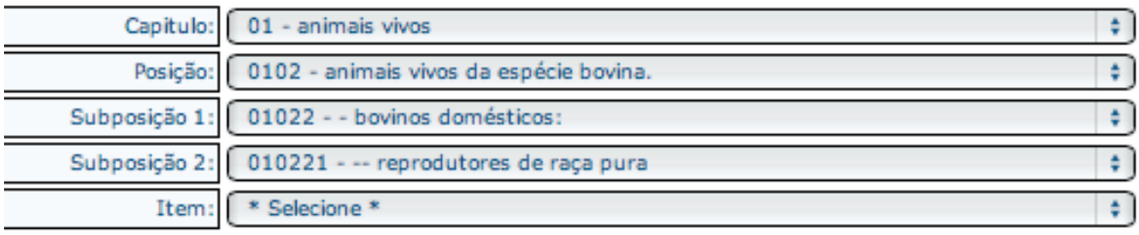
10.1. Trade balance of Genetic Resources-Based (GRB) Commodities

Measuring the economic value of genetic resource-based (GRB) commodities traded around the world is, by nature, an approximate measure. This is due to the occurrence of several types of derivations in process chains, which make it difficult to measure precisely the contribution of genetic resources to the value of the commodities based on such resources. However, it is always possible to create some estimates based on production and trade data.

In the case of international trade in genetic resource-based commodities it is possible, through the Mercosur Common Nomenclature (MCN), to arrive at approximate figures. The data presented in this document is based on information extracted from the Alice Web system of the Ministry of Development, Industry and Trade (MDIC).

The structure of the MCN reaches 8 digits. Figure 1 shows the structure of the MCN. In selecting GRB, entire chapters were used (as is the example in Figure 1, where the chapter “livestock” was used), as well as more disaggregated levels, especially in the chemicals and pharmaceuticals, where only some items are of the type sought in this study.

Figure 1. Structure of the Mercosur Common Nomenclature



MCN items based on genetic resources were selected. Annexes 1 and 2 show the list of codes used and their respective descriptions and industry classifications that allow higher levels of aggregation and understanding of the data.

Obviously this is an analysis of raw data on biodiversity foreign trade. However, it serves as an initial approximation to a measurement that, in the future, may be carried out by identifying the added value of the various production chains and processes, and thus more accurately quantify how much of the value of a product is directly and indirectly due to genetic resources present in biological diversity.

This initial analysis will later be complemented by more detailed analyzes of the cases of pulp and paper and rubber, which are two major commodities not related to food (therefore not part of the issues raised by agreements such as ITPGRFA).

10.1.1. Aggregate Results

The first part shows aggregated data of the balance, with values and participation in Brazilian foreign trade, in addition to aggregate industry data. Then, a brief analysis of exchange relations through the unit prices of imports and exports is presented. Finally, there is a sectoral analysis of the trade balance of GRB commodities.

10.1.1.1. Import, export and general balance

Tables 9 and 10 show the average values of the last three years of imports and exports of products that use biodiversity resources, classified by sector. As seen, the values are significant.

Table 9. Average values of imports of GRB commodities by sector (USD million; 2010-2012) Figures

SECTORS	AVERAGE VALUE (2010-2012)	AVERAGE PARTICIPATION (2010-2012)
Agriculture	4,561.1	20%
Agriculture and agroindustry*	401.7	2%
Agroindustry**	7,569.1	32%
Aquiculture	1,102.0	5%
Pharmaceuticals	3,508.1	15%
Hemotherapy pharmaceuticals	2,662.2	12%
Organotherapeutic pharmaceuticals	87.9	0%
Livestock raising except meat	715.4	3%
Chemical	2,601.4	11%
Others	33.1	0%
TOTAL	**23,242.0**	**100%**

* These are segments such as tobacco, silk, cocoa and wool, which are recorded along with their processed products, hence the separation at an intermediate level between agriculture and agroindustry.

** Includes all meats

Table 10. Average values of exports of GRB commodities by sector (USD million; 2010-2012)

SECTORS	AVERAGE VALUE (2010-2012)	AVERAGE PARTICIPATION (2010-2012)
Agriculture	28,734.3	32%
Agriculture and agroindustry	3,462.0	4%
Agroindustry	53,456.4	60%
Aquiculture	196.4	0%
Pharmaceuticals	1,028.9	1%
Hemotherapy pharmaceuticals	68.6	0%
Organotherapy pharmaceuticals	43.0	0%
Livestock raising except meat	1,404.0	2%
Chemical	584.4	1%
TOTAL	**88,978.1**	**100%**

In total, the average volume of Brazilian international trade in GRB commodities reached about USD 113 billion, or the equivalent of 5.5% of average GDP between 2010 and 2012.

With average import of USD 23.2 billion in the period, the GRB economic segments accounted for approximately 11% of Brazil's total imports during the period. In turn, exports reached USD 90 billion on average in the same period, representing 38.5% of the country's total exports and about 3.5% of Brazilian GDP.

The GRB trade balance in Brazil was USD 65.7 billion on average, for the 2010-2012 period (Table 11).

Compared to the average balance of all products of Brazil's trade balance, which was USD 23.1 billion in the same period, it should be noted that the GRB is the main segment supporting the Brazilian trade balance.

Table 11. Imports, exports and GRB balance (2010-2012, USD million)

SECTORS	IMPORTS AVERAGE VALUE (2010-2012)	EXPORTS AVERAGE VALUE (2010-2012)	AVERAGE BALANCE (2010-2012)
Agriculture	4,561.10	28,734.30	24,173.20
Agriculture and agroindustry	401.7	3,462.00	3,060.30
Agroindustry	7,569.10	53,456.40	45,887.30
Aquiculture	1,102.00	196.4	-905.6
Pharmaceuticals	3,508.10	1,028.90	-2,479.20
Hemotherapy pharmaceuticals	2,662.20	68.6	-2,593.60
Organotherapy pharmaceuticals	87.9	43	-44.9
Livestock raising except meat	715.4	1,404.00	688.6
Chemical	2,601.40	584.4	-2,017.00
TOTAL	**23,208.90**	**88,978.00**	**65,769.10**

10.1.1.2. Unit value of GRB in international trade

Brazil is therefore a net exporter of GRB commodities. However, it is a net exporter of exotic GRB with low unit value.

Table 12 shows that the segments in which the country is more competitive are precisely those of lower unit value.

Table 12. Average values of exports and imports per Kg of GRB by sector (2010-2012)

SECTORS	AVERAGE VALUE EXPORTS USD/KG (A)	AVERAGE VALUE IMPORTS USD/KG (B)	A-B
Agriculture	1.8	2.7	-0.9
Agriculture and agroindustry	16.5	25.6	-9.1
Agroindustry and meat	5.6	4.4	1.2
Aquiculture	6.1	36.1	-30
Pharmaceuticals	56.2	94.3	-38.1
Hemotherapy pharmaceuticals	69.7	289.9	-220.2
Organotherapy pharmaceuticals	574	1,359.7	-785.7
Livestock raising except meat	2.6	5.2	-2.6
Chemical	3.6	6.6	-3

The exception is the agribusiness, which presents lower import unit values than those of exports, demonstrating that our foreign trade in agroindustry transfers value to the country.

However, unit values are relatively low, meaning that the best performing sector is based on relatively low value-added commodities. The separation made in Table 12 for "agriculture and agribusiness" (both are present in their respective MCN classifications, see Annexes) shows segments with high unit value in which the country has disadvantages.

In the pharmaceutical sector (the 3 segments of Table 12) and chemical sector, the country has clear disadvantages in trade relations.

10.1.1.3. Highlights of the sector analysis[11]

Agribusiness

Agribusiness, which here includes the following sectors: agriculture; agriculture and agroindustry; agroindustry; livestock; and aquaculture, accounts for over 65% of imports and 92% of exports of GRB.

The highlights of agriculture are:

11 For further details as regards each sector grouping, please see Annex 1.

a. Oilseeds, including plants for industrial use and medicinal plants, with exports in the order of USD 15 billion

b. Coffee and other plants such as tea and mate, adding up to USD 6.6 billion in exports

c. Cereals, accounting for half of all imports in the segment, amounting to an average 2 billion dollars in the period, half of which is represented by wheat alone. Cereals account for USD 4.4 billion of GRB exports.

The highlights of agroindustry are:

d. The trade balance surplus of agroindustry is USD 42.1 billion (almost half of the GRB surplus)

e. It presents the most favorable export/import ratio: 7.7 times

f. Three agroindustry segments accounted for approximately 70% of exports in the 2010-2012 period:

- Sugar and congeneric products, with average exports of USD 13.7 billion
- Meat and offal, with exports of USD 13.1 billion
- Timber, paper and cellulose, with exports of USD 6.7 billion

g. Tobacco, in the agriculture + agroindustry segment, is the highlight, with a share of exports of nearly USD 3 billion.

The highlight in the aquaculture segment is represented by crafted natural and cultured pearls, with over one billion dollars in imports. It should also be underscored that Brazil has no export activity in this segment.

By and large, even though agribusiness is primarily responsible for the trade balance in general, and particularly for genetic resource-based commodities, it is noteworthy that the country is not home to any of the important items of the trade balance. In a strict analysis of the Nagoya Protocol, the country would be, at least at first, considered a user party and not a provider, and may be demanded to pay benefit sharing.

In a rough calculation using a 1% benefit sharing rate, agribusiness exports alone, not considering all links of all production chains, not considering domestic consumption, depending on the developments of the Protocol (please see the section below on the Nagoya Protocol's uncertainties and possible scenarios for the country), Brazil might have to pay a yearly amount of approximately USD 870 million in benefit sharing.

Pharmaceutical and chemical sectors

The highlights of the genetic resource-based pharmaceutical sector are:

h. Negative balances in all segments, totaling USD 7.6 billion, or one third of imports of genetic resource-based commodities (GRB).

i. Especially in the hemotherapy segment, exports are around 40 times lower than imports.

The highlights of the genetic resource-based chemical sector are:

j. The negative balance of approximately USD 680 million and the relatively low volume of international trade: an average USD 2.5 billion in the period.

k. The near absence of natural rubber exports in the period and the average deficit of over USD 850 million.

l. Together, the chemical and pharmaceutical segments show a USD 8.4 billion deficit and account for 36% of GRB imports. Therefore, they are the critical segments impacting GRB imports today.

m. The GRB categorized as chemical and pharmaceutical account for 4% of imports and 0.7% of exports in Brazil.

The trade balance of the genetic resource-based pharmaceutical and chemical segments is in deficit, however, the final balance of genetic resource-based commodities is highly positive. Among the most relevant genetic resource-based products for the Brazilian foreign trade and for the national production agenda, the vast majority derives from exotic resources and, therefore, depending on the scenario to unfold after the Nagoya Protocol enters into force, is liable to benefit sharing.

10.2. Value of Domestic Production of Genetic Resource-based (GRB) commodities

This section presents the production value of genetic resource-based (GRB) commodities. No single database gathers all the information related to GRB production. To that effect, a specific database

related to the products addressed in the study on trade balance was prepared, supported by different IBGE data sources. Thus, it is a first draft of what one might refer to as the domestic production of genetic resource-based commodities.

In order to assemble the databases, one used data on the value of the country's total production available for the three most recent years – i.e., 2009, 2010 and 2011. The following bases were accessed:

- Industry: Yearly Industrial Survey - PIA (Product)
- Agriculture: Municipal Agricultural Production - PAM (Temporary Crops, Perennial Crops, Animal Production, Forestry, and Plant Extraction)

The PIA – Product provided information on production values that constitute one of the survey's collection units, organized according to the categories of activities defined in the National Classification of Economic Activities - CNAE. The registry of information on products and services uses the Industry Product List - PRODLIST - Industry, which indicates the relationship between CNAE and MCN (Mercosur Common Nomenclature) code, based on which we prepared the database. [12]

Having made these methodological clarifications, it should be stressed that the measure of GRB production is still approximate. In addition to varied differences in processing chains, as already stated previously, the adjustments required for the reclassification of the production value may eventually lead to over or underestimation. However, as an estimate, we have a first draft of what could become a standardized process in the future.

10.2.1. Outcomes

Aggregate data on GRB production value in Brazil (Table 13) are set out below:

12 In PRODLIST we find which MCN products comprise each NCEA product. For this work, we adopted the inverse relationship, i.e., to which NCEA product each MCN was related. Thus, we maintain preliminary analysis of the economic value of biodiversity indexed by MCN. However, there is no direct correlation between the two indexing codes. Some items are aggregated and some are disaggregated. Others simply do not find a match, especially when the MCN is related to agricultural and livestock raising products. In part, this is expected, since the PRODLIST focuses on industrial products. In this case, the data on value of production (yield multiplied by the weighted average price) were sought for in other IBGE sources, such as the Municipal Agricultural Production, which allows for a country aggregate analysis of temporary crops, perennial crops, animal production, forestry, and plant extraction. Although it has been sought in many different IBGE sources, no data on production value were found for two items: live animals and live plants; and flower farming products. For the former, the data available relate to the number of animals and not to value, and for the latter, data are outdated for the purposes of this research (the most recent are for 2006).

Table 13. Average values of production of genetic resource-based commodities by sector (in thousand R$, 2009-2011)

SECTOR	AVERAGE THOUSAND R$ (2009-2011)	AVERAGE SHARE (2009-2011)
Agroindustry	216,570,260.00	61.2%
Agriculture	100,285,915.33	28.4%
Livestock Raising	27,706,552.00	7.8%
Pharmaceuticals	8,497,065.33	2.4%
Personal Care	2,974,525.67	0.8%
Chemical	2,830,771.00	0.8%
Aquaculture	1,949,695.67	0.6%
TOTAL	**360,814,785.00**	**100.0%**

Agribusiness

As in the analysis of the trade balance of genetic resource-based commodities, Agribusiness stands out with more than 97% of all of the production value of genetic resource-based commodities in Brazil.

As regards Agriculture alone, the highlight is cereal production, with almost 74% of the sector's total production (see Annex 2).

In Agroindustry, the production of meat and offal, followed by sugars and vegetable preparations account for almost 50% of the production value of this sector (Annex 2).

Livestock-raising, as in the trade balance analysis, is underrepresented, not only because meat and meat products are under agribusinesses, but also because it does not show live animal transactions. The highlights are milk and dairy products; poultry eggs; honey; and foodstuffs of animal origin, with USD 27.7 billion (Annex 2).

Eventual benefit-sharing on products marketed today, as discussed below in Beta Scenario, would bring considerable costs to these two segments; if a 1% rate were to be used, the costs would be somewhere between USD 450 and 550 million. Evidently, even in a Scenario that includes commodities in benefit-sharing, these values would be negotiated on bases that are currently unknown and unlikely to achieve the above amount.

Pharmaceutical and chemical sectors

Table 14 below shows the production values of genetic resource-based products of the pharmaceutical industry. As in the analysis of the trade balance, it is divided into the following segments: pharmaceuticals, hemotherapy pharmaceuticals, and organotherapy pharmaceuticals. The main contribution comes from the first category, especially: other hormone-based drugs (but not containing antibiotics or insulin), drugs not specified based on nucleic acids, their salts or other heterocyclic products (except ketoconazole), and parenteral solutions (saline and others). Together, these three products represent just over a third of this category.

Table 14. Average values of production of genetic resource-based commodities in the pharmaceutical sector (in thousand R$, 2009-2011)

SECTOR	AVERAGE IN THOUSAND R$ (2009-2011)
Pharmaceuticals	2,018,524.67
Hemotherapy pharmaceuticals	530,387.00
Organotherapy pharmaceuticals	125,593.67
TOTAL	**2,674,505.33**

In the chemical sector, the highlight is the production value of odoriferous substances mixtures, which represents 50% of the total value (Annex 2).

11. SCENARIOS AND THEIR IMPACTS

11.1 Scenario Definition

There are two positions that can be adopted by countries as regards the Protocol: to ratify or not ratify it. There is no way to make changes to the text of the international agreement approved by the countries in Nagoya, in 2010. However, there are intermediate scenarios that derive from the decision of ratification e from the way parties shall incorporate it into their domestic legislations. Thus, this study proposes the construction of three alternative scenarios.

Scenario-building is an exercise of prospecting possible situations, even those that are not so likely to materialize. It serves to warn and prepare players to different future possibilities that are impossible to be foreseen at present, allowing for the definition of strategies able to address a broad range of possibilities.

The ratification scenario includes a set of uncertainties that cannot be resolved at present. Some of them may be resolved by the Meeting of the Parties (MOPs) of the Nagoya Protocol and multilateral negotiation *fora* that will follow the Protocol's entry into force; others will remain at the discretion of countries, since the protocol itself refers to some crucial decisions by countries that may have an economic impact. Thus, three alternative scenarios were defined, two related to ratification and one to non-ratification.

The scenarios proposed here are based on combinations of the critical abovementioned uncertainties. With different combinations of these uncertainties one can build several scenarios. Here, we chose a kind of combination that resulted in three scenarios. The combination of uncertainties sought to cover a broad spectrum of possibilities.

It is important to make clear that the scenarios should not be considered from a perspective of probability of occurrence. The only intention is to allow broader reflection on the consequences of the Protocol's entry into force.

Before describing the scenarios and their consequences, it is worth making a brief summary of the critical uncertainties previously described and discussed.

Among the major uncertainties previously mentioned, two have decisive consequences for scenario-building and need to be resolved under the protocol itself, e.g. within the MOPs. The others will most likely have developments in domestic legislation.

The two critical uncertainties for the future of the Protocol are:

1. **Scope. The uncertainty about what will be regarded as subject to benefit-sharing upon the entry into force of the Nagoya Protocol. There are two possible scopes for the Protocol that totally change the expected impacts: Expanded Scope and Limited Scope.**

    a. The **expanded scope** of the Nagoya Protocol will be applicable to any genetic resource-based product, including products currently being produced and marketed such as natural rubber tires, eucalyptus paper and pulp, pilocarpine-based glaucoma medication, cotton fabrics, to name a few. It also includes genetic resources for food and also synthetic products essentially derived from genetic resources. Commodities would also be considered, including those genetic resource-based for food and agriculture.

    b. The **limited scope** of the Nagoya Protocol will be applicable only to new products and there will be no consequences for products currently being produced and marketed. It will not include products derived from synthetic molecules and substances. It will not include genetic resources for food. No commodities would be considered.

    c. This second situation contains three variations that will also affect expectation of impacts:

        I. Any new genetic resource-based product, including: variations (differentiations) of currently known and marketed products (for example, new types of tires produced with natural rubber, new types of eye drops produced with pilocarpine, or new types of paper produced from eucalyptus).

        II. Only entirely new products based on genetic resources known today (new products made of rubber, pulp, pilocarpine, cotton etc.), or unknown.

        III. Only unexplored biodiversity products (which would exclude new products made of rubber, pulp, pilocarpine etc., as proposed in item “ii” above).

2. **The characterization of the genetic resource provider - the definition of who is considered provider involves two possibilities which strongly alter the expectations of impacts:**

a. In **limited characterization**, only the party (country) originating the GR (native GR) will be considered a provider.

b. In **expanded characterization**, both the originating party and the producing parties of exotic resources that would acquire such resources in compliance with the CBD (e.g., sugarcane and eucalyptus in Brazil, rubber in Thailand, Indonesia and Malaysia, cotton in China etc.) will be considered providers.

c. **Unlimited**: the originating party, and producers of exotic genetic resources qualified as providers and holders of *ex-situ* collections (the *ex-situ* collections of countries would make them providers of the genetic resource existing there) will be considered providers.

Due to their characteristics, such uncertainties (scope and provider) need to be resolved multilaterally under the Nagoya Protocol itself. If these issues are to be resolved by domestic legislation, all the other uncertainties identified here are intensified. Without a reasonable definition of the scope and the provider, the consequences of the entry into force of the Nagoya Protocol will be difficult to ascertain.

The following scenarios aim to outline alternatives for us to think about the nature and intensity of impacts.

The remaining critical uncertainties affecting the assessment of impacts and that most likely will be resolved in domestic legislation are the following:

3. Regulation of the allocation of property rights over genetic resources and over associated traditional knowledge.

4. Regulation of how benefit-sharing will be addressed along a supply chain, whether *ad-hoc*, a in parts of the chain, or in the whole chain (e.g. natural rubber in their basic state of primary processing, rubber in tire production, in production of medical supplies and other artifacts; soy in the form of soy beans, meal, oil, lecithin and other products that use soy and derivatives).

5. Definition of what is considered fair and equitable sharing of benefits and values .

6. Regulation of access to genetic resources and their derivatives and to the associated traditional knowledge.

7. Definition of formal entities (national authorities) to authorize access and do the accreditation and vouching of access and benefit-sharing agreements.

These four uncertainties are different in nature from the two other mentioned before because they dependent on national laws (no multilateral definitions are expected, although they can occur,

especially on the topic of property rights and the creation of a multilateral benefit-sharing mechanism for resources in cross-border situations), and thus, generate contract insecurity among providers and users, since many countries still do not have legislation regulating the matter, and other countries are reviewing their legislation and administrative measures, currently impossible to predict.

The reflection about these uncertainties through the form of scenarios helps in the task of assessing the impact of the Nagoya Protocol, since the scenarios allow the examination, even if aggregate, of the extent of impacts in different situations.

Three scenarios were designed: two based on ratification by Brazil and one on non-ratification.

Given the combination of uncertainties, the two ratification scenarios are described as follows:

11.2 Alpha Scenario

Main feature of the Scenario: ratification by Brazil with multilateral solutions for the issues of scope and provider and with domestic legislation that is relatively clear and with converging purposes.

In this scenario providers will be considered as the parties with sovereign rights over native genetic resources and parties with exotic genetic resources that are already being adapted, genetically enhanced and produced in their territories in a stable and regular manner. This scenario will not accept the thesis that holders of *ex-situ* collections are considered providers for the purposes of benefit-sharing.

In this scenario it is considered that genetic resources for food and agriculture will not be treated under the Nagoya Protocol, but by FAO, which will expand the list of Annex 1 of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) and create new treaties to include animal species and microorganisms.

This scenario will exclude from the Protocol products based on synthetic molecules and substances, as well as synthetic biology products.

Therefore, the scenario combines a situation of “limited scope” and “expanded” characterization of the provider, as described above.

This condition removes from sight the “threat” that hangs over countries producers of exotic genetic resources, such as Brazil. Products such as soy and derivatives, sugar and ethanol, beef, coffee and derivatives, paper and pulp, rubber, among others, would not be subject to benefits-sharing because of the Nagoya Protocol ratification. At least not in the way they are produced and marketed today.

However, it is possible that new products made of these resources will go into future benefit-sharing (limited scope, but permeable to the consideration of new products).

Among the other uncertainties described above, in most countries, this scenario will include clear assignment of property rights over genetic resources and associated traditional knowledge, whether by international agreement on the matter, or by well devised domestic legislation.

The values related to benefits-sharing will be calculated on a percentage basis (or other similar form of calculation) and applied at two points of the production chain: the first at the access point and the second at a point in the chain that generates products that combine higher unit value with higher trading volume, using the chain link that represents the highest total value.

This possibility is a simplified way out to regulate the Nagoya Protocol provision on benefits-sharing across the links in the chain that use genetic resources and/or associated traditional knowledge, as well as subsequent applications and commercialization, which in some cases makes charging impractical, given the contract complexities related to calculation as well as oversight and control. For example, in the case of plant extracts and their higher value products, the charge will be made on the production and marketing of the extract (intermediate or pre-processing product) and on the marketing of higher value products that use the extract (e.g., a drug or cosmetic).

The parties shall tend to rely on negotiation entities (national authorities) centralized and formally recognized (few and known negotiation entities between providers and users). The rights and duties of the actors involved in the access authorization process shall be clearly specified in domestic legislation (private owner, communities, government bodies etc.). The rules and requirements for obtaining access and for benefit-sharing shall be well defined, maximizing legal security.

Consequences

In this scenario, the immediate economic impacts for Brazil and its industry would be the costs of regulation and adjustment of public and private actors to Protocol rules, but there would be no immediate payment of benefit-sharing over exotic genetic resources products in production and marketing in the country today.

As the greatest legacy of the use of exotic genetic resources is in agriculture and food production, this Alpha Scenario would not entail costs or revenues associated with the benefit-sharing of commodities. Negotiations would be for new products, including differentiations and diversifications of products. However, in this scenario Brazil would be considered provider of traditional exotic genetic resources, such as eucalyptus, sugarcane and cotton (like other countries), and may come to receive or pay benefit-sharing in the future.

From the perspective of transaction costs involved in the introduction of the Nagoya Protocol, the Alpha Scenario, through the occurrence of a process of multilateral definitions and the more or less convergent evolution of national laws, presents a path of declining costs over time, precisely due to a converging vision of domestic legislation in the long run and the clear identification of competent authorities in the countries.

In the short-run (e.g.: a decade) the Brazilian trade balance would not be significantly affected; it may be so in the future if there is significant growth of new genetic resource-based products of which Brazil is considered a user.

Moreover, the trade balance may benefit from the development of new genetic resource-based products found on acquired biodiversity (exotic genetic resources of which Brazil would be considered a provider - eucalyptus, sugarcane etc.) and native biodiversity, especially high added-value resources. These impacts depend on domestic investments in taxonomy, conservation, and especially, sustainable biodiversity use.

Both as an unprocessed genetic resource provider (or with no substantive value addition) and as a developer of new products using genetic resources, in this scenario Brazil would benefit from the consequences of the Nagoya Protocol. Obviously, these gains will be associated to the construction of a simple and efficient regulatory framework, so as to guarantee property under a legal security regime and reasonable transaction costs. Above all, the gains will come from the ability of industry to explore the sustainable use of genetic resources in the form of products and processes with high added value.

In summary, in the Alpha Scenario ratification occurs under lower levels of uncertainty about the most critical issues raised in this paper, particularly the definition of the provider and temporality, also comprising the exclusion of commodities and foods. This is the scenario that values investment in innovation and training in the country for the conservation and sustainable use of biodiversity.

11.3 Beta Scenario

Main feature of the Scenario: ratification by Brazil without multilateral solutions about the uncertainties of scope and provider, and with non-convergent domestic legislation.

In this scenario the **scope** is broad and the characterization of **providers** is limited. This means it includes genetic resource-based products in production and commercialization today, includes commodities, includes genetic resources for food and agriculture, and that providers will be only those originating genetic resources.

The issue of food products would be considered in this scenario, as well as non-food commodities, impacting industries such as textiles, pulp and paper, rubber, among other commodities.

Countries like Brazil, which produce exotic genetic resources today, will be considered users. In this situation it is possible that several originating countries cover the benefit sharing of non-originating producers (users), depending on domestic legislation uncertain today. Brazil would be affected, along with several other countries that are major producers of genetic resource-based commodities, such as Argentina, Canada, Indonesia, and Russia.

Associated traditional knowledge will be regulated heterogeneously and each country will have its own legislation and procedures. The negotiation entities (national competent authorities) for access and benefit-sharing will also be heterogeneous and may be distributed across multiple government levels in addition to including the communities concerned.

The production of genetic resource-based commodities will depend on the legal restrictions imposed by domestic legislation and the legislation of countries from which Brazil uses genetic material. The existence of such legal restrictions shall stimulate investments in countries with clearer, flexible and less bureaucratic laws.

Therefore, transaction costs involved in access and benefit sharing shall be varied, tending to be higher than in Alpha Scenario and likely to influence investment decisions by users.

The values and calculation of benefit-sharing will be mutually agreed terms, defined on a case by case basis, and will tend to be charged throughout the chain and in all products and by-products (at all points which access genetic resources and their subsequent use, application and marketing). In this scenario, synthetic products as well as synthetic biology products (essentially derived or not), may be subject to benefit-sharing, depending on domestic legislation.

Consequences

In this scenario, Brazil will be in the position of a user party of much of its genetic resource-based commodities. Foods, products such as pulp and paper, ethanol, cotton and natural rubber should involve benefit-sharing negotiations. As seen in the trade balance analysis, given the values and volumes of foreign trade of genetic resources, even considering native products produced by other countries, such negotiations shall place the country in a position of net payer of benefits in amounts which may vary according to the legislation and stand adopted by countries originating the genetic resources.

From the viewpoint of industrial production, this scenario signals additional costs that may vary greatly (from a few million to several billion dollars as discussed below, in the section on estimated economic impacts).

From the point of view of sustainable use of biodiversity this new scenario will bring heterogeneous negotiation conditions with countries, tending to increase transaction costs when compared to Alpha Scenario.

Investment in knowledge, technology and sustainable use is vital to reverse unfavorable situations like the abovementioned ones, expanding the range of products of which the country will be a provider.

Likewise, the institutionalization of regulatory frameworks should take into account a heterogeneous situation of negotiations with user and provider parties. The associated transaction costs tend to be higher than in Alpha Scenario and will require further bilateral negotiations. This is a scenario of higher costs in all senses.

11.4. Gama Scenario

Main feature of the Scenario: Brazil does not ratify the Nagoya Protocol

In this scenario Brazil would not ratify the Nagoya Protocol. The country would still have to negotiate according to the rules of signatory countries and this involves the need for considerable bargaining power not only in the biodiversity area, but also and especially regarding the transactions of commodities, services and capital with other countries. Non-ratification shall bring about stalemates to trade relations between Brazil and signatory countries that are impossible to be foreseen at present. Brazil may suffer trade barrier, boycott, or retaliation. This will depend on the commercial interests between countries.

The sustainable use of biodiversity through biotechnology may be impacted if there is some sort of restriction on technological cooperation with countries Parties to the Protocol, as opportunities for partnership and cooperation may be reduced.

Countries Parties to the Nagoya Protocol shall not commit to control and monitor compliance with access rules in providing countries not party to the protocol, which may imply non-recognition of the condition of genetic resource provider when this is necessary.

Thus, non-ratification shall not make the construction of domestic regulatory frameworks any simpler. Instead, it will bring difficulties to defining such framework since Brazil should be prepared to face the most diverse situations of bilateral and multilateral negotiations.

The argument that non-ratification would provide more freedom to the country to negotiate loses sense for three reasons:

a. one must have bargaining power for heterogeneous bilateral understandings;

b. with ratification the country may adopt the legislation it sees fit, being more or less flexible regarding aspects of access and benefit sharing (even because today Brazil already exercises ABS rules that should still be improved);

c. with ratification the country will be able to participate in the Protocol's Meeting of the Parties (MOPs) and in meetings of subsidiary bodies under the Protocol with decision-making power, which would not occur otherwise. The condition Party to the Protocol will confer Brazil with greater power to influence future negotiation processes.

However, this scenario cannot be ruled out. From a strategic standpoint, the country should observe the evolution of ratifications. While Brazil's main trading partners do not ratify the Nagoya Protocol, non-ratification by Brazil should not result in major problems.

As seen in this study, of the 193 signatory countries to the CBD, around 50 have some form of ABS legislation, and 29 have already ratified the Nagoya Protocol. Among Brazil's major trading partners, India, Norway, Mexico, Egypt and South Africa have ratified the Protocol, and European Union countries, South Korea, and probably China shall do so briefly. The only important partner which shall not ratify the Nagoya Protocol is the USA.

12. IMPACTS

The very existence of the Protocol, by itself, regardless of whether or not Brazil will ratify it, will impact the national economy and production in some industrial sectors. The novelty is the need for benefit-sharing arising from the utilization of genetic resources, either in research and development activities or in subsequent applications and commercialization. Before the protocol, there was no clear commitment among countries to ensure benefit-sharing. The magnitude of impact is what may vary according to the decisions under the Protocol (when in force) and countries' internal developments regarding their national laws.

The measurement of economic and financial impacts of the Nagoya Protocol ratification can only be approximate, since many of the parameters required for the calculations are not defined. This document adopted some methodological principles for the measurement.

The first is the analysis of commodities. Two paradigmatic cases were chosen: natural rubber and pulp and paper. They are particularly interesting cases because they are not foodstuffs (so they stay out of a debate that is precisely one of the Protocol's uncertainties), one is a native genetic resource (rubber) and the other an exotic one (eucalyptus). These two cases involving commodities allow the evaluation of impacts of benefit-sharing in both directions: Brazil as a provider and Brazil as a user.

Besides these two cases, an aggregate analysis is carried out of major genetic resource-based commodities: soybeans, cotton, cereals, sugar and coffee.

Finally, another case is presented linked to specialty chemistry: pilocarpine, a product of the Brazilian flora used to produce ophthalmic drugs.

This set of products was treated with aggregate data on value of production, imports and exports (where applicable) focusing on the 2010-2012 period (may vary depending on data availability).

The calculated values were analyzed under two ratification scenarios: Alpha and Beta. For obvious reasons related to the construction of these scenarios, only the Beta scenario presents calculations of impact. All cases used a rate of 1% as a reference for generating impact values. This percentage is justified by two points: it is already present in benefit-sharing mutually agreed terms practiced in Brazil today and is referenced in an ABS bill under discussion by government today. Moreover, it is often suggested as a reasonable value by several studies.

12.1. The case of rubber

The tree from which latex is extracted, *Hevea brasiliensis*, a plant originating in the Amazon, was taken by the English, studied in Kew Gardens, and taken to cultivation in Southeast Asia in the late nineteenth century. As known, it was successful in the region, which today produces more than three -quarters of all natural rubber in the world.

Hypothetically, one could think of benefit-sharing for the use of a native genetic resource by other countries. Although access may not have been informed and consented (it would require historical research), it is possible to support the thesis that it is a genetic resource originating in Brazil (although it would be difficult to define whether it could have originated in territories of other Amazon countries, such as Venezuela, Colombia, Peru, Suriname, Guyana and French Guiana). In this case, Brazil could be considered a providing Party and the countries exporting it today (in Southeast Asia) as user Parties.

A curious question could then emerge: Venezuela, the country to which Brazil exports most of its natural rubber today, can claim to be a provider, further complicating this issue, given the cross-border nature of the genetic resource.

12.1.1. General data on the economics of natural rubber

Global production of natural rubber is today in the range of 11 million tons/year, and four countries -Thailand, Indonesia, Malaysia and Vietnam - account for around 75% of world production.

The average price of natural rubber is traded at USD 2.4/kg, resulting in a global market of approximately USD 26.4 billion. These values relate to the marketing of processed rubber as intermediate commodities, thus corresponding to the beginning of the chain.

Brazil is a net importer of natural rubber. In the 2002 to 2012 period, the country imported a total of around USD 4.6 billion corresponding to 1.8 million metric tons, or something like 460 million dollars and 180 thousand tons per year.

Brazilian exports of natural rubber, although they are growing, are not significant as compared to the main producers. Venezuela, the country to which Brazil exports the largest volume, purchases approximately USD 9.5 million a year from Brazil. For all the countries to which Brazil exports, sales reached about USD 11 million/year.

Among the products that use natural rubber, tires show the largest trading volumes and absorb most of the world production. The tire market is somewhere around 70% of the entire market of natural rubber.

For the year 2014 it is expected that approximately 2.6 billion units will be traded totaling a value of approximately USD 215 billion (http://www.rubbernews.com/article/20140123/NEWS /140129990/study-tire-demand-to-grow-annually-through-2017). Considering that natural rubber contributes with about 40% of the average price of a lightweight tire (http://in.reuters.com/article/2013/10/31/india-rubber-idINDEE99U0DN20131031), the manufacturing value of natural rubber in tires would be around USD 86 billion per year (in fact, it would be greater, since truck and airplane tires use more natural rubber than synthetic rubber, thus increasing the participation of rubber to more than 40%, but we will maintain a conservative approach here).

Knowing that tires account for just over 70% of natural rubber applications, the value of natural rubber traded globally before industrial processing for tires would be around USD 18.5 billion (70% of USD 26.4 billion). Thus, the value added to rubber in tire production could be estimated at approximately USD 67.5 billion (USD 86 billion minus USD 18.5 billion).

12.1.2. Rubber benefit-sharing in the NP Scenarios

12.1.2.1. Natural rubber in the Alpha Scenario

In the Alpha Scenario, commodities such as natural rubber would not be considered eligible for benefit-sharing. Furthermore, the major producing countries today could be considered providers in case of future accesses aimed at commercial use. The immediate impact on the financial point of view would be null, except for new accesses in the country.

However, for new *Hevea* species which may be accessed and processed industrially, or even *Hevea brasiliensis* accessed to obtain new products, the NP would impact both access and benefit-sharing. In this scenario Brazil could be both a receiver and a payer of benefit-sharing, since South and Southeast Asia countries would be considered providers, like ourselves.

The greatest impact of the Nagoya Protocol would be the need for new investments in increased knowledge (inventories, botanic and ethnobotanic characterization, identification of the economic potential of new species and new products) on the species, the places of occurrence, and mechanisms to control access and monitor the results of access by users of other parties.

In cases of a genetic resource of high economic value, it is possible that new developments coming out of the same species or closely related species will be explored. Without investments, in the future Brazil could be in a position of not receiving benefit-sharing and being a net payer to the "new providers" (in case they develop new products linked to the genetic resources of the genus *Hevea*).

12.1.2.2. Rubber in the Beta Scenario

Assuming that *Hevea brasiliensis* is unique to Brazil (not shared with other Amazonian countries) and that South and Southeast Asia countries - major producers today - are considered users, Brazil could claim benefit-sharing. Considering a percentage of 1% (as mentioned, a percentage already practiced in mutually agreed terms in Brazil and suggested in one of the bills under discussion) and the economic data presented above for rubber production and trade, we would have the following situation:

- Considering the trading of natural rubber in semi-processed presentations, Brazil would be able to charge user countries somewhere around USD 260 million/year, if we consider only natural rubber in its different forms, not including in the calculation products of the rubber supply chain, including tires.
- Extending the supply chain a little further, if we include in the calculation the value added to natural rubber in tire production, 1% of USD 67.5 billion would be added to the abovementioned value (approximate calculation of the value added to rubber in the tire chain). Thus, USD 670 million would be added to USD 260 million, which would generate a benefit-sharing with the country in the order of USD 930 million/year.
- Roughly speaking, in this scenario, revenues from benefit-sharing deriving from *Hevea brasiliensis*, would reach over a billion dollars (considering the other products of the rubber chain, in addition to tires).
- Regarding semi-processed natural rubber, Brazil would have to negotiate the sharing of benefits with:
    - Indonesia
    - Thailand
    - Vietnam
    - Malaysia

- Regarding tire production, the first 10 producers are:

    1. Bridgestone - Japan
    2. Michelin - France
    3. Goodyear - USA
    4. Continental - Germany
    5. Sumitomo - Japan
    6. Pirelli - Italy
    7. Yokohama - Japan
    8. Hankook Tire – South Korea
    9. Cooper Tire & Rubber Company - USA
    10. ChengShin Rubber Ind - Taiwan

Even though values are approximate, it is possible to observe that in this case - and in the case of most genetic resource-based commodities – most of the value will be in the processing steps and raw material differentiation.

In the 2010 to 2012 period, Brazil imported about USD 780 million per year in natural rubber products (considering only pre-processed rubber). In this amount, compensation on account of being a genetic resource originating country would be somewhere around USD 6 million.

In the international tire trade Brazil enjoyed surpluses until 2010. Since then, especially last year (2013), the country has experienced deficits in values that became significant (over USD 350 million) in 2013, because of China imports. Between 2011 and 2012 the deficit was less than five times smaller. Thus, one should not attempt any calculation here, given the indefinite situation of the segment.

The values are significant. Over USD 1 billion per year in a market that is growing at rates close to 5% a year represents considerable resources, which the country could use for conservation and sustainable use of biodiversity, following CBD guidelines.

However, rubber is the only known case of a commodity whose genetic resource originates in Brazil. If the country seeks this type of negotiation, it will probably find other countries willing to introduce

benefit-sharing over commodities we produce in large volumes today. Cotton, pulp and paper are often cited as examples of this issue and that would be included in this scenario.

Another implication of this scenario is that it requires continued investment in botanical knowledge, sustainable use, collections, and control and inspection, as in Alpha Scenario, so that the country be not only the genetic resource provider, but also developer of new products and processes able to increase the economics of such biodiversity.

Please see below Box 1 with a summary of estimated impacts for rubber in Beta Scenario (Brazil recipient of benefit-sharing).

BRAZIL AS A PROVIDER (RECEIVING BS) NATURAL RUBBER BENEFIT-SHARING (1% RATE OVER INTERNATIONAL PRODUCTION AND TRADE OF NATURAL RUBBER AND TIRES, YEARLY AMOUNTS BASED ON AVERAGE DATA OF THE 2010-2012 PERIOD	
Natural rubber	USD 260 million
Tires	USD 670 million
Total	USD 930 million
Main providing countries with which to negotiate (receive)	Indonesia
	Thailand
	Vietnam
	Malaysia
Main companies with which to negotiate (receive)	Bridgestone - Japan
	Michelin - France
	Goodyear - USA
	Continental - Germany
	Sumitomo - Japan
	Pirelli - Italy
	Yokohama - Japan
	Hankook Tire – South Korea
	Cooper Tire & Rubber Company - USA
	ChengShin Rubber Ind - Taiwan

Source: imp and exp Aliceweb
Other data on tires: varied – see text

12.2. The case of pulp and paper

Pulp and paper production in Brazil is predominantly based on eucalyptus. The species cultivated in the national territory are of the genus *Eucalyptus* and originate from Australia.

Unlike rubber, we are net exporters of pulp and paper and the main producer of eucalyptus pulp in the world. Introduced in Brazil in the early nineteenth century, eucalyptus became significant as a raw material for the pulp and paper industry since the 1950s, having been a major factor in the competitiveness of this industry in the country.

12.2.1. General data on the economics of pulp and paper

Among the major cellulose producing countries, Brazil is the world's fourth largest producer and the first if only eucalyptus pulp is considered. Over the past three years production has fluctuated in the range of 14 million tons per year. Over 85% of this volume (around 12 million tons) is produced from eucalyptus. Assuming an average value of USD 670 a ton, the national production of eucalyptus pulp today would amount to around USD 8 billion. [13]

Given that fiber corresponds to about 40% of the pulp production, the value added to wood in the cellulose production process is approximately USD 4.8 billion, with wood representing the remaining USD 3.2 billion.

In the case of paper, considering all categories, in the 2010 - 2012 triennium, Brazil ranks between the ninth and tenth place among the largest producers, with around 10 million tons/year. The first five positions are China, USA, Japan, Germany and Sweden, responsible for almost 60% of world production. In terms of paper produced from eucalyptus, again the country ranks first.

Considering the category entitled "paper and paperboard"[14], which excludes boxes, books and the like, the average value per ton of paper in the 2010 – 2012 period was about USD 950. With a production of around 10 million tons - 9 million for eucalyptus - the total value of production of paper produced from eucalyptus fiber in Brazil was approximately USD 8.5 billion.

Considering that the fiber corresponds on average to around 16% of paper production, the value added to the eucalyptus fiber in paper production would be about USD 7.1 billion.

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13 For further detail on production and trade of paper and cellulose, please see Annex x.

14 According to FAOStat: The paper and paperboard category is an aggregate category. In the production and trade statistics, it represents the sum of graphic papers; sanitary and household papers; packaging materials and other paper and paperboard. It excludes manufactured paper products such as boxes, cartons, books and magazines etc. It is reported in metric tons.

Australia, the country of origin of eucalyptus, participates with less than 1% of world production of paper and pulp. It accounts for 1.5% of paper imports and exports do not reach 1%. As regards cellulose, Australia exports small volumes (0.02% of world exports). The country of origin for eucalyptus is, therefore, a net importer of pulp and potential receiver of benefit-sharing, as is the case of Brazil in relation to natural rubber.

12.2.2. Pulp and paper benefit-sharing in the Nagoya Protocol scenarios

12.2.2.1. Pulp and paper in Alpha Scenario

In Alpha Scenario, as seen, commodities such as pulp and paper, just like rubber, would not enter in the sharing of benefits with the country of origin. The immediate impact in the financial point of view would also be null. We would continue producing pulp and paper without needing to share benefits with Australia and its suppliers. As in the case of natural rubber, in which Asian countries would be providers, Brazil would also be considered a provider of eucalyptus.

The impacts of the Nagoya Protocol would be related to new accesses and new product development. The country would be subject to access and benefits-sharing rules, which implies investment (unlike the *Hevea*, eucalyptus is well studied and inventoried in Brazil) in characterizing and finding new uses.

Future impact depends on how the country will create knowledge and collection control mechanisms, as well as on property over product and process technologies associated with genetic resources. Given they are genetic resources of high economic value, new developments coming out of the same main species grown today or close species are to be expected.[15]

12.2.2.2. Pulp and paper in the Beta Scenario

In this scenario, Brazil would be a net payer of benefit-sharing to Australia and possibly to other countries claiming the origin of the genetic resource, such as Indonesia.

Considering the same percentage of 1% and the economic data presented above, we would have the following situation:

15 In the case of pulp and paper genetic improvement represents around 1% of the wood production costs.

- Considering the production and trade of pulp, providing countries could claim around USD 80 million/year to Brazil as cellulose benefit-sharing.
- In the paper market, the value would be in the order of USD 71 million/year (1% of the average value added in paper production)
- The total value of benefit-sharing paid by the country would be just over USD 150 million/year
- From the point of view of negotiation, Brazil would have to negotiate benefit-sharing with Australia and perhaps Indonesia.

As in the case of rubber, both in this Scenario and in the Alpha Scenario, the ratification and entry into force of the Nagoya Protocol would bring about the need for new investments in knowledge, control and inspection of the genetic resource aiming not only at the possibility of Brazil being regarded as a provider in the future, but also to have better negotiation conditions with the parties that hold the origin of the genetic resource.

Today, for example, the pulp and paper companies in Brazil negotiate contracts for the transfer of genetic material with Australian suppliers. These contracts directly involve companies and may well be considered in bilateral negotiations between providers and users.

Please see Box 2 below with a summary of estimated impacts for pulp and paper in Beta Scenario (Brazil pays for benefit-sharing).

BRAZIL AS A USER (PAYING BS) PULP AND PAPER BENEFIT-SHARING (1% RATE OVER BRAZILIAN PRODUCTION AND EXPORTS, YEARLY AMOUNTS BASED ON AVERAGE DATA OF THE 2010-2012 PERIOD	
Eucalyptus cellulose	USD 80 million
Paper	USD 71 million
TOTAL	**USD 151 MILLION**
Main providing countries with which to negotiate (pay) Australia	Other countries possible providers Indonesi
	Other Oceania and Southeast Asia

Source: *IBGE PAM and PIA; Bracelpa*
Imp and Exp data Aliceweb

12.3. Other commodities based on exotic genetic resources

Although this is not intended as a detailed breakdown of all genetic resource-based products currently in production in Brazil and being traded internationally by the country, it is worth taking some more examples of large-volume commodities for a general assessment considering the figures for rubber. The question that remains is: in general terms, from the point of view of immediate financial economic impact, where would Scenarios Alpha and Beta lead us?

In a rough estimation and using the data presented on the value of domestic production of genetic resources in Brazil, we have the following situation: Considering the Value of Production (VP) of agricultural products such as cereals, coffee and cotton in the 2009-2011 period, the average yearly values amount to about USD 45 billion. Applying the same 1% rate used for the other cases, we would have a yearly payment of benefit-sharing in the order of USD 450 million.

Taking the case of soybeans separately, according to *CEPEA/ESALQ/USP* data, the soybean chain had an average Gross Domestic Product (GDP) in the 2007 to 2009 period of 36.6 billion (2007 values). Considering the average dollar exchange in 2007 as 1.95 Reals, in that period the average GDP for soy was USD 18.8 billion. Taking into account only agricultural production (excluding agroindustry), the average GDP for soy in the period was USD 8.1 billion.

Using the 1% rate for benefit-sharing, we would have around USD 80 million/year just for the agricultural part of the chain; considering the links of inputs and industrial processing, that amount would rise to USD 120 million.[16]

Thus, in Beta Scenario, adding cotton, soybeans, sugar and cereals, Brazil would have yearly benefit-sharing in order of USD 530 million payable to a large group of countries.

If we were to add to the calculation all exotic genetic resource-based products produced today by Brazil, total amounts would reach somewhere around USD 2 and 3 billion, or about 0.1% of GDP if we focus on the average.

It is worthy of note that with only one genetic resource-based commodity originating in Brazil - natural rubber – benefit-sharing comes to about USD 1 billion. This indicates that being a providing

16 Not considered here the value of services involved in the chain, which alone represent one third of the total value of the supply chain.

party of genetic resources in products of wide application and global use is a good deal. In the final computation, rubber alone would generate about a third of the total benefit-sharing, considering current genetic resource-based products.

Again, it seems to be good business being a genetic resource provider, on both sides: the passive side, receiving the benefits generated elsewhere, as shown in the potential case of rubber; and the active side, of sustainable use of biodiversity itself adding knowledge, technology and value. The possibility of Brazil becoming provider of other genetic resource-based products entails significant amounts in the economic and financial perspectives, as well as good business models for the industry.

However, as in any business model, it will only bring benefits if investments are made that transform potential assets into real assets. Investments are needed to expand knowledge (taxonomy, conservation, sustainable use), infrastructure, skills training, establishment of regulatory frameworks and efficient operational structures, marketing, among others.

Please see Box 3 with a summary of estimated impacts for other commodities in Beta Scenario (Brazil pays BS).

BRAZIL AS A USER (PAYING BS) BENEFIT-SHARING OF OTHER COMMODITIES BASED ON EXOTIC GENETIC RESOURCES (1% RATE OVER BRAZILIAN PRODUCTION AND EXPORTS, YEARLY AMOUNTS BASED ON AVERAGE DATA OF THE 2010-2012 OR 2009 – 2011 PERIODS	
Cereals, coffee, cotton (only agricultural part)	USD 450 million
Sugar and associated products	USD 310 million
Soybean + processing	USD 120 million
Soybean	USD 80 million
Processed soy	USD 40 million
TOTAL	**USD 880 MILLION**
Main providing countries with which to negotiate (pay)	India
	Ethiopia and other NE African countries
	Egypt, Mexico and USA
	China
	Other countries possible providers – several others

Source: *IBGE PAM and PIA;*
Imp and Exp data Aliceweb

12.4. The case of pilocarpine

Pilocarpine is an alkaloid extracted from the *Jaborandi* plant (*Pilocarpus microphyllus*), native of Brazil, with widespread occurrence in the national territory. The state of Maranhão is the leading producer, with plant extraction and cultivation activities, both aimed at pilocarpine production.

Pilocarpine's main pharmaceutical application is for ophthalmic use. It is a pupil constricting agent, it is used in glaucoma treatment, and its production is exploited by the pharmaceutical industry in Brazil. The main investment is in the state of Maranhão in a farm owned by Merck (Germany), where Jaborandi is cultivated for industrial production of pilocarpine, in 2300 ha which partially replaced the extractive process that still occurs in the country.

12.4.1. General data on the economics of pilocarpine

Brazil exports pilocarpine. Between 1997 and 2013, exports[17] reached 33.7 tons at a total value of USD 68.4 million, averaging almost 2 thou kg and USD 4 million/year were exported. Taking the period between 2010 and 2012, the average trading volume remained in the range of 2400 kg/year, with an average yearly value of USD 6.4 million. The average price of the product during this period was in the range of USD 2.6 thou/kg (median of USD 2,4 thou).

The main destination of international trade is Germany, receiving 70% of Brazilian exports. The USA comes second, with around 17%. In Germany, the company Boehringer-Ingelheim holds a virtual monopoly on the distribution of pilocarpine.

The productivity of jaborandi is about 1.8 t/ha/harvest. Considering between 5 and 8 annual crops, between 9 and 15 tons are produced per year. [18]

Data on the value of the pilocarpine extracted from the jaborandi vary. Values obtained from different sources that produce and market pilocarpine show the following situation:

- 1 ton of jaborandi leaves for extraction is sold for about USD 320019
- 1 ton of leaves produces between 5kg and 10kg of pilocarpine (0.5% to 1%)

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17 8-digit MCN: 29399931 - Pilocarpine, its nitrate and its hydrochloride up to 29399939 - Other pilocarpine salts
18 Pinheiro, C. U. B. *Extrativismo, cultivo e privatização do jaborandi* (pilocarpus microphyllus Stapf ex Holm.; rutaceae) *no Maranhão, Brasil*. Acta Bot. Bras. vol.16 no.2 São Paulo Apr. 2002.
19 http://forumcarajas.org.br

- 1 kg of pilocarpine was exported at a median value of USD 2.4 billion in the 2010 to 2012 period (average USD 2,6 thou, maximum value of USD 4,6 thou; minimum value of USD 1, 6 thou) 20
- Considering a conservative yield ratio (5 kg/t) and the median export value (USD 2.4 thou/kg), the value-added to the processing of *jaborandi* leaves for pilocarpine exportation is about 3.7 times. If we adopt the minimum and maximum values this value would be between 2.5 and 7.2 times.
- The sale price of pilocarpine eye drops at 1% (10 mg/ml, 10 ml vial) in Brazil in February 2014 is between USD 5.0 and 7.0.21
- Considering the lower price of USD 5 and that the active ingredient accounts for around 70% of the value of the vial (in this case no patent in force, and the price, though far from being competitive, is not monopolistic), then the value added in eye drops is around 15 times the value of exported pilocarpine and around 55 times per ton of *jaborandi* leaves (considering a yield of 5kg/t). [22]

12.4.2. The benefit-sharing of pilocarpine in NP Scenarios

Working with relatively limited data due to diffuse information on markets and prices, it is possible to estimate the impacts of benefit-sharing in pilocarpine trade.

12.4.2.1. Pilocarpine in the Alpha Scenario

As in the other analyzes above, this scenario would not bring immediate impacts, precisely because it is a known genetic resource-based good (pilocarpine) and a known pharmaceutical product (eye drops for treating glaucoma) and therefore would not be subjected to immediate benefit-sharing. However, in this scenario it is expected that new products based on known genetic resources should be under the scope of the Nagoya Protocol, which is entirely possible with pilocarpine, as it has multiple applications in the pharmaceutical, health and personal care segments.

In the short term Brazil would have to map out, invest and promote pilocarpine's possible new uses, with the possibility of becoming a net receiver of benefits, as it is the genetic resource provider.

20 Aliceweb for the above MCNs.
21 http://remediobarato.com/#/pilocarpina-2-colirio-frasco-com-10-ml.html
22 This estimate requires some assumptions. The main one is that the values practiced in pilocarpine exports are the same practiced in the commercialization the eye drop in Brazil; the prices are in the mentioned website.

12.4.2.2. Pilocarpine in the Beta Scenario

This scenario would be favorable to Brazil as regards benefit-sharing. Assuming the sharing of benefits would be at two points in the chain: extraction of pilocarpine from jaborandi leaves; trading of pilocarpine eye drops. In the first link of the chain, and considering only exported values (therefore underestimated, given there is domestic consumption of the product), the first link would pay annually somewhere around USD 65 thousand. Even though absolute values are quite low as compared to the commodities we analyzed, it is a significant amount when it comes to communities or a few companies.

Just as in the other cases examined here, if we take the higher value link in the pilocarpine production chain, the numbers become greater.

For the purposes of an approximate and conservative estimate, we consider here that all pilocarpine produced is exported and targeted to manufacturing glaucoma eye drops, and that the average price in Brazil is representative of the world average prices (those assumptions underestimate the volumes, applications and amounts involved). In this situation, the values of the benefit-sharing of the highest value link (eye drop production and sales) would be approximately 15 times higher than those on the first link, or about USD 1 million.

Again, although the totals are modest (besides being underestimated), they may be important for local businesses or communities, and can support investments in research and sustainable use.

Please see below Box 4 with a summary of impacts estimated for pilocarpine in Beta Scenario (Brazil receiving benefit-sharing).

BRAZIL AS A PROVIDER (RECEIVING BS) BENEFIT-SHARING OF PILOCARPINE (1% RATE OVER INTERNATIONAL PRODUCTION AND TRADE OF PILOCARPINE, YEARLY AMOUNTS BASED ON AVERAGE DATA OF THE 2010-2012 PERIOD)	
Pilocarpine hydrochloride and its salts	USD 65 thousand
Pilocarpine -based eye drops (estimate)	USD 1 million
Total around	1 million
Main providing countries with which to negotiate (receive)	Germany
	EUA
Main companies with which to negotiate (receive)	Merck (German)
	Boehringer-Ingelheim

Source: exp and imp: Aliceweb
Different data on production, yield, prices (see text)

Main user countries

13. CONCLUSION

The uncertainties related to the format of the Nagoya Protocol, especially as regards the definition of its scope and of providers, not to mention the other uncertainties described herein, lead to doubts regarding the balance between threats and opportunities.

The proposition of the two ratification scenarios (Alpha and Beta) described herein should be viewed as a backdrop for thinking about the future and not as categorical situations. Scenarios are, by definition, idealizations that help prepare actions and reactions that will be needed within a certain timeframe.

Most likely, the future will be a combination of elements of the two scenarios, as is to be expected in this methodology.

Anyway, there are reasons to see the Nagoya Protocol more as an opportunity than a threat. Even the scenario that appears to be the most costly from an economic standpoint, which is the Beta Scenario, may, in the medium and long term, become a favorable scenario.

The reason is simple: Brazil belongs to the select group of megadiverse countries, with close to 13% of the planet's biodiversity in its territory. Either as a provider or as a user of its own diversity of genetic resources, having rich and diverse biomes is an advantage, although still in a potential and relatively unknown way. We need to learn about it and use it.

In practice, the future depends on at least four interrelated factors:

a. building of national regulatory frameworks (which we do not control);

b. development of bilateral and multi negotiation strategies (which we partially control);

c. the paths of scientific and technological development directly and indirectly aimed at the use of GR (which we do not control but where we can be active players); and d) business strategies for the development of commodities and services based on GR and biodiversity (ditto).

It is a key strategy, even before the Nagoya Protocol enters into force, to work for genetic resources for food and agriculture to be addressed within the United Nations Food and Agriculture Organization (FAO),

for us to be recognized as providers of a large share of genetic resources that are being developed, improved and diversified over decades (sometimes more than a century, as in the case of sugarcane, eucalyptus and cotton, to name three exotic products that have extraordinary collections in Brazil, at the same level as those of their countries of origin).

Working for the sustainable use of the "new" biodiversity is also necessary, an opportunity that can have positive effects on the country's productive structure, involving innovative models for businesses of all sizes.

Robust paths

Robust paths are those that enable the organization to choose a path, but in a way that allows it to correct its course if the imagined path does not materialize in the future. This is a set of strategies that have a focus, but allow navigating in different directions if the winds change direction.

Thus, in view of what was analyzed up to here, it is suggested that the CNI should adopt the following points with respect to the Nagoya Protocol.

1. Support to the ratification of the Nagoya Protocol for 3 complementary reasons:
    a. Brazil is a megadiverse country and may have future advantages in access and benefit-sharing;
    b. non-ratification implies being left out of the key stages of negotiations after the Protocol enters into force, such as the definitions of scope and of provider;
    c. internally the country already faces a complex regulatory framework and relatively high transaction costs, and it would probably be more difficult to improve this framework without having ratified the Nagoya Protocol.
2. Support to ratification should seek the conditions under the Alpha Scenario. In every sense, from the point of view of industry, this Scenario opens up future opportunities and does not impose high costs at first. In this Scenario the negative (and positive) economic and financial short-term impacts are smaller than in the Beta Scenario. It does not impose high transaction costs arising from benefit-sharing negotiations, whether contract or institutional (supervisory, contracting and payment structures, in addition to generally costly bilateral negotiations).

3. The pursuit of the Alpha Scenario should be systematic in both internal and external forums.

4. Efforts should be directed to the construction of a regulatory framework that defines:

   a. Restricted scope: rules of the Nagoya Protocol apply after entry into force only for new products based on genetic resources that are already known and that will be known. No legacy.

   b. Extended Providers: including as such Parties with territorial origin of the genetic resource, as well as those with tradition in adaptation, production, sustainable use and marketing of the good based on exotic genetic resource.

   c. Regulation of BS charged at two points of the production chain: access point and the point where more value is created (unit value and in terms of volume).

   d. Establishment of industry standards in the definition of benefit-sharing

   e. Alternative for institution of a fund (at national and multilateral levels) for conservation and sustainable use fed by ABS proceeds. Domestically, resources would be shared regionally, according to the location of the source of traditional knowledge.

   f. Non-inclusion in the Nagoya Protocol and the national regulatory framework of genetic resources for food and agriculture, which would be covered by the TPGRFA.

   g. Establishment, under the national regulatory framework, of only one instance of permit (online registration) and benefit-sharing, with operational capacity to issue access permits expeditiously.

At the same time, to be able to perform in adverse situations, the CNI should:

1. Monitor progress in Protocol ratifications, the discussions and negotiations at the Meeting of the Parties (MOPs), and other forums related to the Protocol, and the progress of the domestic legislation of the Parties to the CBD and the Protocol.

2. Prepare and disseminate protocols on how the industry should act if elements of the Beta Scenario prevail, especially the notion of restricted provider and expanded scope and payment of benefit-sharing at all points of the supply chains and value chains.

3. Also prepare protocols on how to act in case of benefit-sharing through contracts negotiated party-to-party. Brazil already has experience in this and should study it and draw lessons and recommendations.

4. Increase investment efforts in sustainable use of biodiversity through research and innovation, and strengthening of domestic companies, including, and especially, those with the capacity to compete in foreign markets.

5. Develop studies that express more clearly the values of biodiversity and how such value can be translated into monetary benefits

6. Support the government's efforts to defend the expansion of the International Treaty on Plant Genetic Resources for Food and Agriculture under FAO.

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Annex 1 – Status of ratification of Nagoya Protocol

Table: Status of countries regarding Nagoya Protocolo (up to 30/01/2014)

Nagoya Protocol: 0 Parties/29 ratifications/92 signatures

rtf = Ratification, acs = Accession, acp = Acceptance, apv = Approval, scs = Succession

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
ASIA				
Afghanistan				Environment Act (18/12/2005)
Saudi Arabia				NBSAP
Armenia				NBSAP
Azerbaijain				NBSAP
Bahrain				4th National Report
Bangladesh	2011-09-06			4th National Report
Myammar		2014-01-08	acs	NBSAP
Bhutan	2011-09-20	2013-09-30	rtf	Biodiversity Act of Bhutan 2003
Brunei Darussalan				4th National Report
Camboja	2012-02-01			NBSAP
Kazakhstan				NBSAP
China				• Measures for the Examination and Approval of Entry and Exit and the Foreign Cooperative Research on the Application of Genetic Resources of Livestock and Poultry • Patent Law of the People's Republic of China

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
Democratic People's Republic of Korea				NBSAP
Republic of Korea	2011-09-20			NBSAP
United Arab Emirates				4th National Report
Philippines				• Executive Order 247 Guidelines on Bioprospecting • Guidelines for Bioprospecting Activities in the Philippines • Implementing Rules and Regulation (IRR) of Republic Act N. 9147 - Wildlife Resources Conservation and Protection Act • Republic Act N. 8371: The Indigenous Peoples Rights Act of 1997 • Republic Act N. 9147: Wildlife Resources Conservation and Protection Act • Rules and Regulations Implementing Republic Act N. 8371, otherwise known as the "Indigenous Peoples' Rights Act of 1997"
Yemen	2011-02-02			NBSAP
India	2011-05-11	2012-10-09	rtf	• Biological Diversity Rules 2004 • The Biological Diversity Act, 2002 • The Patent (Amendment) Act N. 15, 2005 • The Patent (Amendment) Act N. 38, 2002
Indonesia	2011-05-11	2013-09-24	rtf	NBSAP
Iran (Islamic Republic of)				NBSAP
Iraq				4o Relatório Nacional
Israel				NBSAP

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
Japan	2011-05-11			• 2012 Update of Guidelines on Access to Genetic Resources for Users, based on Nagoya Protocol (Japanese) • Guidelines on Access to genetic Resources for Users
Jordan	2012-01-10	2012-01-10	rtf	NBSAP
Kuwait				NBSAP
Lao People's Democratic Republic		2012-09-26	acs	NBSAP
Lebanon	2012-02-01			NBSAP
Malasya				• Sabah Biodiversity Enactment 2000 • Sarawak Biodiversity Centre Ordinance of 1997, and amendment of 2003. • The Sarawak Biodiversity Regulations 2004
Maldives				NBSAP
Mongolia	2012-01-26	2013-05-21	rtf	NBSAP
Nepal				NBSAP
Oman				NBSAP
Pakistan				NBSAP
Qatar				NBSAP
Kyrgystan				NBSAP
Russia Federation				NBSAP
Singapore				NBSAP
Sri Lanka				NBSAP
Syrian Arab Republic		2013-04-05	acs	NBSAP
Thailand	2012-01-31			National Policy, Strategies and Action Plan on Conservation and Sustainable Use of Biodiversity, 2003-2007
Tajikistan	2011-09-20	2013-09-04	acs	NBSAP
Timor-Leste				NBSAP
Turkey				NBSAP
Turkmenistan				NBSAP

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
Uzbekistan				3rd National Report
Viet Nam				Biodiversity Law N. 20/2008/QH12
EUROPE				
Albania		29-01-2013	acs	NBSAP Law N. 9587 on biodiversity protection
Germany	23-06-2011			• Amendment to the German Patent Act (§ 34a) • Guidelines for Funding Proposals Concerning Research Projects within the Scope of the Convention on Biological Diversity (CBD) • National Strategy on Biological Diversity
Andorra	Não Parte CDB			Non-Party
Austria	23-06-2011			NBSAP
Belgium	20-09-2011			Loi du 28 avril 2005 en modifiant la Loi du 1984 sur les brevets d'invention, en ce qui concerne la brevetabilité des inventions biotechnologiques
Bielorussia				NBSAP
Bosnia e Herzegovina				NBSAP
Bulgaria	23-06-2011			Biological Diversity Act 2002
Cyprus	29-12-2011			4th National Report
Croatia				Nature Protection Act
Denmark	23-06-2011			• Greenland Home Rule Parliament Act N. 20 of November 20th 2006 on Commercial and Research-Related Use of Biological Resources • Order N. 93 on Patents and Supplementary Protection Certificate
Slovakia				NBSAP
Slovenia	27-09-2011			NBSAP
Spain	21-07-2011			NBSAP
Estonia				NBSAP
Finland	23-06-2011			NBSAP

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
France	20-09-2011			Code de l'environnement tel que modifié para la Loi No 2006-436 du 14 avril 2006, relative aux parcs nationaux, aux parcs naturels marins et aux parcs régionaux.
Georgia				NBSAP
Greece	20-09-2011			3rd National Report
Hungary	23-06-2011			NBSAP
Ireland	01-02-2012			NBSAP
Iceland				2nd National Report
Italy	23-06-2011			NBSAP
Letônia				NBSAP
Liechtenstein				4th National Report
Lithuania	29-12-2011			NBSAP
Luxembourg	23-06-2011			NBSAP
The former Yugoslav Reoublic of Macedonia				NBSAP
Malta				• Convention on Biological Diversity (Incorporation) Regulations, 2002, Legal notice 160 of 2002. • Flora, Fauna and Natural Habitats Protection Regulations, 2006, Legal Notice 311 of 2006, as amended.
Moldávia	25-01-2012			NBSAP
Monaco				4th National Report
Montenegro				NBSAP
Norway	11-05-2011	01-10-2013	rtf	• Act N. 100 relating to the management of biological, geological and landscape diversity (Nature Diversity Act) • Act N. 37 relating to the management of wild living marine resources (Marine Resources Act) • Act N. 9 on patents (Norwegian Patent Act), as amended in 2004 and 2009.
Netherlands	23-06-2011			NBSAP

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
Poland	20-09-2011			NBSAP
Portugal	20-09-2011			Decree-Law N. 118/2002
United Kingdom of Great Britain and Northern Ireland	23-06-2011			NBSAP
Czech Republic	23-06-2011			NBSAP
Romania	20-09-2011			Regulation implementing Patent Law 64/1991, as republished.
San Marino				No
Serbia	20-09-2011			NBSAP
Sweden	23-06-2011			Regulation N. 2004:162, of April 1 2004, amending the Patents Decree.
Switzerland	11-05-2011			• Loi Fédérale Sur les Brevets d'Invention, telle que modifiée en 2008. • National Plan of action for the protection and sustainable use of plant genetic resources for food and agriculture
Ukraine	30-01-2012			4th National Report
European Union	23-06-2011			NBSAP
Holy See	Non Party			No
NORTH AMERICA				
Canada				Guiding Principles and Features of ABS Policies in Canada
Mexico	24-02-2011	16-05-2012	rtf	• General Law of Ecological Balance and Environmental Protection • Ley General de Desarrollo Forestal Sustentable • Ley General de Vida Silvestre • Norma oficial Mexicana NOM-126-SEMARNAT-2000 por la que se establecen las especificaciones para la realización de actividades de colecta científica de material biológico de especies de la flora y fauna silvestres y otros recursos biológicos en el territorio nacional

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
United States of America	Non Party			Non Party
CENTRAL AMERICA				
Antigua e Barbuda	28-07-2011			NBSAP 2001
Bahamas				NBSAP
Barbados				NBSAP
Belize				NBSAP
Costa Rica	06-07-2011			• Estrategia Nacional de Biodiversidad • Ley de Biodiversidad N. 7788 • Reglamento al Artículo 80 de la Ley de Biodiversidad, Ley No 7788 del 30 de abril de 1998. No 34958-MINAET-COMEX • Reglamento para el Acceso a los Elementos y Recursos Genéticos y Bioquímicos de la Biodiversidad en Condiciones *ex situ*, Decreto Ejecutivo Nº 33697-MINAE • Reglamento sobre las Normas Generales para el Acceso a los Elementos y a los Recursos Genéticos y Bioquímicos de la Biodiversidad, Decreto Ejecutivo No 31.514-MINAE
Cuba				• Ley 81 del Medio Ambiente • Regulaciones sobre la Diversidad Biológica, Resolucion N. 111/96
Dominica				NBSAP
Dominican Republic	20-09-2011			NBSAP
El Salvador	01-02-2012			Ley del Medio Ambiente
Grenada	22-09-2011			NBSAP
Guatemala	11-05-2011			• Estrategia Nacional para la Conservación y Uso Sostenible de la Biodiversidad y Plan de Acción • Reglamento de Ley de Areas Protegidas
Haiti				NBSAP

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
Honduras	01-02-2012	12-08-2013	rtf	NBSAP
Jamaica				NBSAP
Nicaragua				• Estrategia Nacional de Biodiversidad y su Plan de Accion, Resolucion N. 27-2002, Gaceta N. 156 20/08/2002 • Ley General del Medio Ambiente y los Recursos Naturales • Reglamento de la Ley General del Medio Ambiente y los Recursos Naturales, Decreto N. 9-96 de 25 julio de 1996
Panama	03-05-2011	12-12-2012	rtf	• Decreto Ejecutivo No 25 de 29 de abril de 2009 que Reglamenta el Articulo 71 de la Ley 41 de 1 Julio de 1998, General de Ambiente. • Estrategia Nacional de Biodiversidad, Plan de Accion y Primer Informe sobre el estado de la Diversidad Biológica de Panama • Ley General de Ambiente de la Republica de Panamá (N. 41)
Sain Kitts and Nevis				NBSAP
Saint Lucia				NBSAP
Saint Vicent and Grenadines				NBSAP
Trinidad e Tobago				NBSAP
SOUTH AMERICA				
Argentina	15-11-2011			• Decreto No 474 de Biodiversidad (Provincia de Misiones) • Ley no 3337 sobre la Conservación y Aprovechamiento Sostenible de la Diversidad Biológica y sus Componentes (Provincia de Misiones) • Ley N. 2503 Acceso a los Recursos Genéticos y Bioquímicos (Provincia de Neuquen)

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
Argentina	15-11-2011			• Ley N. 7081 of 29 March 2005, Ley Provincial de Medio Ambiente (Provincia de La Rioja). • Ley Provincial N. 2.600 (Provincia de Rio Negro) of 29 April 2003, regarding preservation of genetic heritage and resources. • Resolucion 91/03 Estrategia Nacional sobre Diversidad Biológica • Resolución no 22/2006 del Instituto Nacional de Semillas (INASE) • Resolución N. 226/2010. Access to genetic resources regime. Creation of a register of access to genetic resources.
Bolivia				Decreto Supremo 24676 - Aprueba reglamento de la decision 391 de la comision del acuerdo de Cartagena y el reglamento sobre biodiversidad
Brazil	02-02-2011			• Decreto No 3.945 of 28 September 2001, defining the composition of the Genetic Heritage Management Council and establishing the rule for its operation. • Decreto No 5.459 of 7 of June 2005, regulating Art. 30 of Medida Provisoria N. 2.186-16 establishing applicable sanction for conducts and actions against genetic heritage and associated traditional knowledge. • Decreto N. 4.339 of 22 August 2002, instituting principles and directives for the implementation of the National Biodiversity Policy. • Decreto N. 6915 of 29 July 2009, regulating Art. 33 of Medida Provisoria N. 2.186-16 establishing the distribution of royalties and benefits derived from genetic heritage components.

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
Brazil	02-02-2011			• Medida Provisoria N. 2.186-16 de 23 de agosto 2001 as clarified by the Genetic Heritage Management Council in their Technical Orientations No 1, 2, 3, 4, 6 and 7; and with the exemptions noted by the Genetic Heritage Management Council lin Resolutions No 26, 29 and 21 as amended by Resolutions No 28 and 30. • Resolution N. 05 of 26 June 2003 (of the Genetic Heritage Management Council) as modified by Resolution No 19 of 22 September 2005, establishing guidelines to obtain previous permit for accessing traditional knowledge associated to genetic heritage for scientific research purposes with no potential or prospect commercial use. • Resolution N. 07 of 26 June 2003 (of the Genetic Heritage Management Council), establishing guidelines for the elaboration and analysis of Contracts for the Use of Genetic Heritage and Benefit-Sharing signed among private parties and which do not involve associated traditional knowledge or wildlife components. • Resolution N. 08 of 24 September 2003 (of the Genetic Heritage Management Council), characterizing as a case of relevant public interest the access to components of the genetic heritage present in private property with the purpose of conducting scientific research which contribute towards the advance of knowledge and which do not present a previously identified potential economic use.

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
Brazil	02-02-2011			• Resolution N. 09 of 18 December 2003 (of the Genetic Heritage Management Council) as modified by Resolution No 19 of 22 September 2005, establishing guidelines for obtaining previous permit for accessing to genetic components located in indigenous lands, private areas or local communities properties with scientific research purpose with no potential or prospect of commercial use. • Resolution N. 11 of 25 March 2004 (of the Genetic Heritage Management Council), establishing guidelines for elaborating Contracts for the Use of Genetic Heritage and Benefit-Sharing, which include access to components of genetic heritage or associated knowledge provided by indigenous or local communities. • Resolution N. 12 of 25 March 2004 (of the Genetic Heritage Management Council) as modified by Resolution No 22 of 28 September 2006, establishing guidelines for obtaining previous permit for access to components of genetic heritage, with bioprospection or technological development purposes. • Resolution N. 17 of 30 September 2004 (of the Genetic Heritage Management Council), giving rules on the procedures for bioprospecting and for the technological development of products or processes resulting from previously authorized access. • Resolution N. 18 of 7 July 2005 (of the Genetic Heritage Management Council) establishing criteria for storage, use and conservation of samples, as modified by Resolutions N. 24 and 33.

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
Brazil	02-02-2011			• Resolution N. 20 of 19 June 2006 (of the Genetic Heritage Management Council) regarding the shipment of components that are found in-situ but kept ex-situ for scientific research development without economic potential uses. It includes a model of standard Material Transfer Agreement and a standard Identification Label. • Resolution N. 207, of 24 March 2009, (of the National Institute of Intellectual Property) regarding patent application procedures when national genetic heritage has been accessed • Resolution N. 06 of 26 June 2003 (of the Genetic Heritage Management Council), establishing guidelines for obtaining previous permit for accessing traditional knowledge associated to genetic heritage, with potential or prospect commercial purpose. • Resolution N. 25 of 24 November 2005 (of the Genetic Heritage Management Council) regarding the shipment of components that are found in-situ but kept ex-situ for bioprospecting purposes, including a model of standard Material Transfer Agreement and a standard Identification Label. • Resolution N. 27 of 27 September 2007 (of the Genetic Heritage Management Council) Establishing guidelines for the development of Contracts for Use of Genetic Heritage and Benefit-Sharing when the Union is a party to the contract. • Resolution N. 06 of 26 June 2003 (of the Genetic Heritage Management Council), establishing guidelines for obtaining previous permit for accessing traditional knowledge associated to genetic heritage, with potential or prospect commercial purpose.

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
Brazil	02-02-2011			• Resolution N. 25 of 24 November 2005 (of the Genetic Heritage Management Council) regarding the shipment of components that are found in-situ but kept ex-situ for bioprospecting purposes, including a model of standard Material Transfer Agreement and a standard Identification Label. • Resolution N. 27 of 27 September 2007 (of the Genetic Heritage Management Council) Establishing guidelines for the development of Contracts for Use of Genetic Heritage and Benefit-Sharing when the Union is a party to the contract. • Resolution N. 31 of 18 February 2008 (of Genetic Heritage Management Council) including several official forms from the National Authorised Institution for access and shipment of components of genetic heritage. • Resolution N. 32 of 27 March 2008 (of the Genetic Heritage Management Council) regarding access to components of genetic resources collected in-situ but kept in ex-situ collections. • Resolution N. 34 of 12 February 2009 (of the Genetic Management Heritage Council), establishing compliance with Medida Provisoria No 2.186-16 with regards to concession of patents from the Intellectual Property National Institute.
Chile				• NBSAP • Plan de Acción de País para la Implementación de la Estrategia Nacional de Biodiversidad 2004-2015

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
Colombia	02-02-2011			• Constitución Política Nacional • Decreto 216 de 3 de febrero 2003 • Decreto 309 de 25 de febrero de 2000 Por el cual se reglamenta la investigación científica sobre diversidad biológica • Decreto 730 del 14 marzo de 1997 Por el cual se determina la Autoridad Nacional Competente en materia de acceso a los recursos genéticos • Ley 99 de 1993 • Política para el Desarrollo Comercial de la Biotecnología a Partir del Uso Sostenible de la Biodiversidad, June 2011 • Resolución 620 de 1997 Por la cual se delegan algunas funciones contenidas en la Decisión 391 de la Comisión del Acuerdo de Cartagena y se establece el procedimiento interno para tramitar las solicitudes de acceso a los recursos genéticos y sus productos derivados
Ecuador	01-04-2011			Decreto Ejecutivo N. 905. Reglamento Nacional al Régimen Común sobre Acceso a los Recursos Genéticos en aplicación a la Decisión 391 de la Comunidad Andina
Guyana				National Policy on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits arising from their utilization (2007)
Paraguay				NBSAP
Peru	04-05-2011			• Decreto Supremo N° 003-2009-MINAM - Elevan al rango de Decreto Supremo la Resolución Ministerial N° 087-2008-MINAM y ratifican la aprobación del Reglamento de Acceso a los Recursos Genéticos

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
Peru	04-05-2011			• Decreto Supremo N° 012-2009-MINAM - Aprueba la Política Nacional del Ambiente • Decreto Supremo no 068-2001-PCM Aprueban el reglamento de la ley sobre la conservacion y approvechamiento sostenible de la diversidad biologica • Estrategia Nacional sobre Diversidad Biológica (01/01/2001) • Ley 28216, Ley de Protección al acceso a la Diversidad Biológica Peruana y los Conocimientos Colectivos de los Pueblos Indígenas (01/05/2004) • Ley No 27811, Ley Que Establece El Régimen de Protección de los Conocimientos Colectivos de los Pueblos Indígenas Vinculados a los Recursos Biológicos (10/08/2002) • Ley N. 26839 sobre la conservación y aprovechamiento sostenible de la diversidad biológica (16/07/1997) • Ordenanza del Gobierno Regional de Cusco N. 048-2008 sobre Acceso a los Recursos Geneticos y a los Conocimientos Tradicionales (15/01/2009) • Política Nacional del Ambiente (23/05/2009) • Reglamento de Acceso a Recursos Genéticos (01/01/2009)
Peru	04-05-2011			• Reglamento de la Ley de Protección al Acceso a la Diversidad Biológica y los Conocimientos Colectivos de los Pueblos Indígenas (04/05/2006) • Resolución Ministerial N°087-2008-MINAM - Aprueban reglamento de Acceso a Recursos Genéticos (01/01/2009)
Suriname				NBSAP
Uruguai	19-07-2011			NBSAP

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
Venezuela (Bolivarian Republic of)				• Ley de Diversidad Biológica • Ley de Patrimonio Cultural de los Pueblos y Comunidades Indígenas, Nº 39.115 • Ley Orgánica de Pueblos y Comunidades Indígenas of 27 December 2005. • Norms regarding the coordination of competences for processing contracts on access to genetic resources, of 23 August 2001. • Resolution N. 00080, of 12 November 2009, regarding the creation of a National Register of Biological Collections.
ÁFRICA				
Argélia	02-02-2011			NBSAP
Angola				NBSAP
Benin	28-10-2011	22-01-2014	rtf	NBSAP
Botswana		21-02-2013	acs	NBSAP
Burkina Faso	20-09-2011	10-01-2014	rtf	NBSAP
Burundi				NBSAP
Cameroon				• Décret N. 95/531, of 23 August 1995, fixant les modalités d'application du régime des forêts. • Loi N. 94/01 de 20 janvier, portant régime des forêts, de la faune et de la pêche. • Loi N. 96/12 of 5 August 1996, portant Loi-Cadre Relative à la Gestion de l'Environnement
Cape Verde	26-09-2011			NBSAP
Central African Republic	06-04-2011			Stratégie nationale et plan d'action en matière de diversité biologique
Chad	31-01-2012			NBSAP
Comoros		28-05-2013	acs	NBSAP

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
Congo	23-09-2011			NBSAP
Côte d´Ivoire	25-01-2012	24-09-2013	rtf	NBSAP
Democratic Republic of the Congo (ex-Zaire)	21-09-2011			NBSAP
Djibouti	19-10-2011			NBSAP
Egypt	25-01-2012	28-10-2013	rtf	Implementing Regulations for Law 82 of 2002 on the Protection of Intellectual Property Right
Equatorial Guinea				NBSAP
Eritrea				NBSAP
Ethiopia		16-11-2012	acs	• Proclamation N. 120/1998 Institute of Biodiversity Conservation and Establishment Proclamation • Proclamation N. 482/2006 - Access to Genetic Resources and Community Knowledge and Community Rights Proclamation
Gabon	13-05-2011	11-11-2011	acp	NBSAP
Gambia				National Environment Management Act 1994
Ghana	20-05-2011			NBSAP
Guinea	29-12-2011			NBSAP
Guinea-Bissau	01-02-2012	24-09-2013	acp	NBSAP
Kenya	01-02-2012			• Environmental Management and Co-ordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit-Sharing) Regulations, 2006 • Environmental Management and Co-ordination Act, 1999
Lesotho				NBSAP
Liberia				NBSAP
Libya				4th National Report
Madagascar	22-09-2011			NBSAP

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
Malawi				Procedures and Guidelines for Access and Collection of Genetic Resources in Malawi
Mali	19-04-2011			NBSAP
Mauritania	18-05-2011			NBSAP
Mauritius		17-12-2012	acs	NBSAP
Morocco	09-12-2011			NBSAP
Mozambique	26-09-2011			Decree No 19/2007 on the Regulation on Access and Sharing of Benefits arising out of the utilization of Genetic Resources and Associated Traditional Knowledge.
Namibia				NBSAP
Niger	26-09-2011			Loi 98-56, du 28 Décembre 1998, portant loi cadre relative a la Gestion de l'Environnement
Nigeria	01-02-2012			NBSAP
Rwanda	28-02-2011	20-03-2012	rtf	NBSAP
São Tomé e Princípe				NBSAP
Senegal	26-01-2012			NBSAP
Seychelles	15-04-2011	20-04-2012	rtf	NBSAP
Sierra Leone				NBSAP
Somalia	09-01-2012			No
South Africa	11-05-2011	10-01-2013	rtf	• National Environmental Management: Biodiversity Act 2004 • Patents Amendment N. 25 of 2005. • Regulations on Bio-Prospecting, Access and Benefit-Sharing • South Africa's Bioprospecting, Access and Benefit-sharing Regulatory Framework: Guidelines for Providers, Users and Regulators.
South Sudan	Non-Party			Non-Party
Sudan	21-04-2011			NBSAP
Swaziland				NBSAP
Togo	27-09-2011			NBSAP

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
Tunisia	11-05-2011			NBSAP
Uganda				• Guidelines for Accessing Genetic Resources and Benefit-sharing in Uganda • National Environment (Access to Genetic Resources and Benefit-Sharing) Regulations, 2005 • National Environment Statute, 1995
United Republic of Tanzania				NBSAP
Zambia				NBSAP
Zimbabwe				Environmental Management Act, Chapter 20:27
OCEANIA				
Australia	20-01-2012			• Australian Biotechnology: A National Biotechnology Strategy • Biodiscovery in Victoria- A framework for managing access to and use of our native biological resources • Biovision Tasmania 2007-2015: Tasmania's Biotechnology Strategy • Environment Protection and Biodiversity Conservation Act 1999 • Environment Protection and Biodiversity Conservation Amendment Regulations 2005 (N.2) • Environment Protection and Biodiversity Conservation Regulations 2000 • Explanatory document of the Nationally consistent approach for access to and the utilisation of australia's native genetic and biochemical resources • Nationally consistent approach for access to and the utilisation of australia's native genetic and biochemical resources • Northern Territory of Australia Biological Resources Act 2006 • Queensland's Biodiscovery Act 2004

COUTRY	SIGNATURE DATE	APPROVAL DATE ACCEPTANCE, ACCESSION, RATIFICATION		ABS MEASURE
Cook Islands				NBSAP
Fiji		24-10-2012	acs	NBSAP
Kiribati				NBSAP
Marshall Islands				NBSAP
Micronesia (Federated States of)	11-01-2012	30-01-2013	rtf	NBSAP
Nauru				No
New Zealand				NBSAP
Niue				NBSAP
Palau	20-09-2011			NBSAP
Papua New Guinea				NBSAP
Samoa				NBSAP
Solomon Islands				NBSAP
Tonga				NBSAP
Tuvalu				4th National Report
Vanuatu	18-11-2011			Environmental Management and Conservation Act N. 12 of 2002

Annex 2 – Evolution of the topic of access to genetic resources and benefit-sharing under the CBD

Timeline. From the convention on biological diversity to the nagoya protocol

DATE	LOCATION	EVENT
DEVELOPMENT OF THE ABS TOPIC BEFORE THE NEGOTIATIONS OF THE INTERNATIONAL REGIME ON ABS		
December 29, 1993		Convention on Biological Diversity enters into force
4-15 May, 1998	Bratislava, Slovakia	COP 4: 4th Meeting of the Conference of Parties to the CBD. (Decision IV/8 - decided, among other things, to establish a panel of experts on access to genetic resources and benefit-sharing - ABS)

DATE	LOCATION	EVENT
1-5 October, 1999	San José, Costa Rica	1st Meeting of the Expert Panel on Access to Genetic Resources and Benefit-Sharing (ABS)
19 – 22 March, 2001	Montreal, Canada	Expert Panel on ABS
15 – 26 May, 2000	Nairobi, Kenya	COP 5: 5th Conference of the Parties to the CBD (Decision V/26 - renews the panel of experts mandate and schedule - requests Parties to designate focal point and one or more national authorities competent to be responsible for the ABS topic)
22-26 October, 2001	Bonn, Germany	WGABS 1: 1st Meeting of the Ad Hoc Open-Ended Working Group on ABS
7 - 19 April, 2002	The Hague, Netherlands	COP 6: 6th Conference of the Parties to the CBD (Decision VI/24 - **adoption of the Bonn Guidelines**)
2 - 4 December, 2002	Montreal, Canada	Open-Ended Workshop of experts on capacity building for access to genetic resources and benefit-sharing
INTERNATIONAL MANDATE TO NEGOTIATE AN INTERNATIONAL REGIME ON ABS		
September 2002	Johannesburg, South Africa	World Summit on Sustainable Development (Section 44 (n), (o) of the Summit Implementation Plan. This paragraph provides a clear guideline for negotiation of an international regime on ABS)
17 – 20 March, 2003	Montreal, Canada	Open-ended meeting between sessions on the Multi-Year Work Programme of the Conference of the Parties up to 2010 (Decision VI/24)
NEGOTIATIONS OF AN INTERNATIONAL REGIME ON ABS		
1 - 5 December, 2003	Montreal, Canada	WG-ABS 2: 2nd Meeting of the Ad Hoc Open-Ended Working Group on ABS
9 - 20 February, 2004	Kuala Lumpur, Malaysia	COP 7: 7th Conference of the Parties to the CBD (Decision VII/19 - approving terms of reference for the Ad Hoc Open-Ended Working Group on ABS to negotiate an international regime on ABS)
14 - 18 February, 2005	Bangkok, Thailand	WG-ABS 3: 3rd Meeting of the Ad Hoc Open-Ended Working Group on ABS
January 30 - February 3, 2006	Granada, Spain	WG-ABS 4: 4th Meeting of the Ad Hoc Open-Ended Working Group on ABS
20 - 31 March, 2006	Curitiba, Brazil	COP 8: 8th Conference of the Parties to the CBD (Decision VIII/4 - presents the results of WG-ABS, appoints co-presidents to negotiate the international regime and extends the term of the WG)

DATE	LOCATION	EVENT
22 - 25 January, 2007	Lima, Peru	Meeting of the Technical Expert Group on an internationally recognized Certificate of origin/ source/legal origin
8 - 12 October, 2007	Montreal, Canada	WG-ABS 5: 5th Meeting of the Ad Hoc Open-Ended Working Group on ABS
21 - 25 January, 2008	Geneva, Switzerland	WG-ABS 6: 6th Meeting of the Ad Hoc Open-Ended Working Group on ABS
19 - 30 May, 2008	Bonn, Germany	COP 9: 9th Conference of the Parties to the CBD (Decision IX/12 - WG-ABS redefined the agenda until 2010 and created three technical and legal groups, one on compliance, one on concepts and terms, and the third on associated traditional knowledge)
2 - 5 December, 2008	Windhoek, Namibia	Group of Technical and Legal Experts on legal concepts, terms, functional definitions and sectoral approaches
27 - 30 January, 2009	Tokyo, Japan	Group of Technical and Legal Experts on compliance under the International Regime on ABS
2 - 8 April, 2009	Paris, France	WG-ABS 7: 7th Meeting of the Ad Hoc Open-Ended Working Group on ABS
16 - 19 June, 2009	Hyderabad, India	Group of Technical and Legal Experts on traditional knowledge associated with genetic resources
9 - 15 November, 2009	Montreal, Canada	WG-ABS 8: 8th Meeting of the Ad Hoc Open-Ended Working Group on ABS
5 - 6 December, 2009	Siem Reap, Cambodia	Regional Consultation on ABS for Asia
15 - 16 January, 2010	Panama City, Panama	Regional Consultation on ABS for Latin America and the Caribbean
26 - 29 January, 2010	Montreal, Canada	Meeting on ABS of the Friends of the Co-Chairs
9 - 10 February, 2010	Isle of Vilm, Germany	Regional Consultation on ABS for the countries of Central and Eastern Europe
15 - 16 February, 2010	Auckland, New Zealand	Regional Consultation on ABS for the Pacific
4 - 6 March, 2010	Windhoek, Namibia	Regional Consultation on ABS for Africa
16 - 18 March, 2010	Cali, Colombia	ABS: Informal consultation of interregional co-chairs (IARC)
22 - 28 March, 2010	Cali, Colombia	WG-ABS 9: 9th Meeting of the Ad Hoc Open-Ended Working Group on ABS
10 - 16 July, 2010	Montreal, Canada	Continuation of the 9th Meeting of the Ad Hoc Open-Ended Working Group on ABS

DATE	LOCATION	EVENT
18 - 21 September, 2010	Montreal, Canada	Interregional Negotiating Group (ING) of the Ad Hoc Open-Ended Working Group on ABS
13 - 15 October, 2010	Nagoya, Aichi City Hall, Japan	Interregional Negotiating Group (ING) of the Ad Hoc Open-Ended Working Group on ABS
16 October, 2010	Nagoya, Aichi City Hall, Japan	Continuation of the 9th Meeting of the Ad Hoc Open-Ended Working Group on ABS
18 - 29 October, 2010	Nagoya, Aichi City Hall, Japan	COP 10: 10th Conference of the Parties to the CBD - Adoption of the Nagoya Protocol (Decision X/1)COP 10:

Annex 3 – Itemization of import and export values and volumes

MCN CODE	SECTOR CLASSIFICATION	ITEM DESCRIPTION
10	Agriculture	Cereals
08	Agriculture	Fruits; citrus fruit or melon peel
07	Agriculture	Vegetables, roots and tubers, edibles
52	Agriculture	Cotton
12	Agriculture	Seeds and oleaginous fruits; grains, miscellaneous seeds and fruits; industrial or medicinal plants; straw and fodder
09	Agriculture	Coffee, tea, mate and spices
06	Agriculture	Live plants and flower farming products
18	Agriculture and Agroindustry	Cocoa and cocoa preparations
24	Agriculture and agroindustry	Tobacco and manufactured tobacco substitutes
50	Agriculture and agroindustry	Silk
51	Agriculture and agroindustry	Wool, fine or coarse animal hair; horsehair yarn and woven fabric
48	Agroindustry	Paper and paperboard; Articles of paper pulp, paper or paperboard
22	Agroindustry	Beverages, spirits and vinegar
15	Agroindustry	Animal or vegetable fats oils and their cleavage products; Prepared edible fats; animal or plant waxes
11	Agroindustry	Products of the milling industry; malt; starches; inulin; wheat gluten

MCN CODE	SECTOR CLASSIFICATION	ITEM DESCRIPTION
42	Agroindustry	Articles of leather; saddlery and harness; travel goods, handbags and similar containers; articles of animal gut
20	Agroindustry	Preparations of vegetables, fruit, nuts or other parts of plants
35	Agroindustry	Albuminoidal substances; modified starches; glues; enzymes
21	Agroindustry	Miscellaneous edible preparations
02	Agroindustry	Meat and edible offal
47	Agroindustry	Pulp of wood or other fibrous cellulosic material; recovered(waste and scrap) paper or paperboard
23	Agroindustry	Residues and waste from the food industries; prepared animal fodder
19	Agroindustry	Preparations of cereals, flour, starch or milk; Pastries
44	Agroindustry	Wood, and articles of wood; wood charcoal
17	Agroindustry	Sugars and sugar confectionery
13	Agroindustry	Lac; gums, resins and other vegetable saps and extracts
16	Agroindustry	Preparations of meat, fish or crustaceans, mollusks or other aquatic invertebrates
41	Agroindustry	Raw hides and skins (other than furskins) and leather
53	Agroindustry	Other vegetable textile fibers; paper yarn and woven fabrics of paper yarn
45	Agroindustry	Cork and articles made of cork
14	Agroindustry	Vegetable plaiting materials; vegetable products not elsewhere specified or included
67010000	Agroindustry	Skins/other parts of birds with their feathers etc. processed
4302	Agroindustry	Tanned or finished furskins (including heads, tails, paws and other pieces and scrap) not assembled or assembled, without the addition of other materials, other than those under heading 4303
03	Aquaculture	Fish and crustaceans, mollusks and other aquatic invertebrates
71161000	Aquaculture	Articles made of natural or cultured pearls
67030000	Personal care	Hair, wool and other textiles materials, materials for manufacturing of wigs
67041900	Personal care	Beards, eyebrows etc. made of synthetic textile materials
67049000	Personal care	Wigs, beards, eyebrows etc., made of other textile materials
67041100	Personal care	Complete wigs made of synthetic textile materials
67042000	Personal care	Wigs, beards, eyebrows etc. made of hair

MCN CODE	SECTOR CLASSIFICATION	ITEM DESCRIPTION
3004	Pharmaceuticals	Pharmaceutical drugs (such as antibiotics, hormones, derived from plants etc.) not in measured doses or packaged for retail sale
3003	Pharmaceuticals	Pharmaceutical drugs (such as antibiotics, hormones, derived from plants etc.) in measured doses (including those intended to be administered via sub
3002	Hemotherapy Pharmaceuticals	Human blood; animal blood prepared for therapeutic, prophylactic or diagnostic uses; antisera and other blood fractions, modified immunological products, whether or not obtained by means of biotechnological processes; vaccines, toxins, microorganisms cultures (and
3001	Organotherapeutic Pharmaceuticals	Glands and other organs for organotherapeutic uses, dried, whether or not powdered; extracts of glands or other organs or of their secretions for organotherapeutic uses; heparin and its salts; other human or animal substances prepared for therapeutic purposes
04	Livestock Raising	Milk and dairy; poultry eggs; Natural honey; Edible products of animal origin, not elsewhere specified or included in other chapters
05	Livestock Raising	Products of animal origin, not elsewhere specified or included in other chapters
01	Livestock Raising	Live animals
32	Chemical	Tanning or dyeing extracts; tannin and its derivatives; pigments and other coloring matter; paints and varnishes; mastics; inks
4001	Chemical	Natural rubber
3302	Chemical	Mixtures of odoriferous substances and mixtures (including alcoholic solutions) based on one or more of these substances types used as raw materials in industry; other preparations based on odoriferous substances, of the types utilized
3301	Chemical	Essential oils (terpeneless or not), including the so-called 'concrete' or 'absolute'; resinoids; Extracted oleoresins; concentrates of essential oils in fats, in fixed oils, in waxes or similar substances, solutions obtained by
38089191	Chemical	Insecticide based on acephate or Bacillus thuringiensis
38231900	Chemical	Other monocarboxylic industrial fatty acids and acid.refin oils
38210000	Chemical	Culture media prepared for development of microorganisms
38063000	Chemical	Ester gums (run gums)
38069019	Chemical	Other derivatives of rosin or resin acids
38231200	Chemical	Oleic acid (monocarboxylic industrial fatty acid)
38069090	Chemical	Other essences of rosin and rosin oils
38070000	Chemical	Wood tar, wood tar oils etc..

MCN CODE	SECTOR CLASSIFICATION	ITEM DESCRIPTION
38069011	Chemical	Oxidized, hydrogenated, dehydrogenated, rosin etc.
38231300	Chemical	Fatty acid (fat) of the "tall oil"
38062000	Chemical	Salts of rosin, resin acids or their derivatives
38059090	Chemical	Other terpene essences d/fab.d/mad paper
38059010	Chemical	Pine oil
38061000	Chemical	Rosin and resin acids
38051000	Chemical	Turpentine, wood essences, or etc.

EXPORT items containing generic resource-based (BRG) commodities

MCN CODE	SECTOR CLASSIFICATION	ITEM DESCRIPTION
12	Agriculture	Seeds and oleaginous fruits; grains, miscellaneous seeds and fruits; industrial or medicinal plants; straw and fodder
10	Agriculture	Cereals
09	Agriculture	Coffee, tea, mate and spices
52	Agriculture	Cotton
08	Agriculture	Fruits; citrus fruit or melon peel
07	Agriculture	Vegetables, roots and tubers, edibles
06	Agriculture	Live plants and flower farming products
24	Agriculture and agroindustry	Tobacco and manufactured tobacco products
18	Agriculture and agroindustry	Cocoa and cocoa preparations
51	Agriculture and agroindustry	Wool, fine or coarse animal hair; yarn and horsehair woven fabric
50	Agriculture and agroindustry	Silk
02	Agroindustry	Meat and edible offal
17	Agroindustry	Sugars and sugar confectionery
23	Agroindustry	Residues and waste from the food industries; prepared animal feed
47	Agroindustry	Wood pulp or other fibrous cellulosic material; paper or recovered cardboard (waste and scrap)
20	Agroindustry	Preparations of vegetables, fruit, nuts or other parts of plants
15	Agroindustry	Animal or vegetable fats oils; products made from their dissociation; Prepared edible fats; animal or plant waxes

MCN CODE	SECTOR CLASSIFICATION	ITEM DESCRIPTION
22	Agroindustry	Beverages, spirits and vinegar
41	Agroindustry	Hides, except furskins, and leathers
48	Agroindustry	Paper and paperboard; Articles of paper pulp, paper or paperboard
44	Agroindustry	madeira Wood, charcoal and wood items
16	Agroindustry	Preparations of meat, fish or crustaceans, mollusks or other aquatic invertebrates
21	Agroindustry	Miscellaneous edible preparations
35	Agroindustry	Albuminoidal substances; Products based on starches or modified starches; glues; enzymes
19	Agroindustry	Preparations of cereals, flour, starch or milk; Pastries
13	Agroindustry	Gums, resins and other plant saps and extracts
42	Agroindustry	Leather items; saddlery and harness; travel commodities, handbags and similar artifacts; items made of intestines
11	Agroindustry	Products of the milling industry; malt; starches; inulin; wheat gluten
53	Agroindustry	Other plant textile fibers; paper yarn and woven paper thread fabric
14	Agroindustry	Materials used to plait other plant products, not specified elsewhere or included in other chapters
45	Agroindustry	Cork and articles made of cork
67010000	Agroindustry	Skins/other parts of birds with their feathers etc. processed
03	Aquaculture	Fish and crustaceans, mollusks and other aquatic invertebrates
71161000	Aquaculture	Articles made of natural or cultured pearls
67030000	Personal care	Hair, wool and other textiles materials, materials for manufacturing of wigs
67042000	Personal care	Wigs, beards, eyebrows etc. made of hair
67041900	Personal care	Beards, eyebrows etc. made of synthetic textile materials
67041100	Personal care	Complete wigs made of synthetic textile materials
67049000	Personal care	Wigs, beards, eyebrows etc., made of other textile materials
3004	Pharmaceuticals	Pharmaceuticals drugs (such as antibiotics, hormones, derived from plants etc.) not presented in measured doses or packaged for retail sale
3003	Pharmaceuticals	Pharmaceutical drugs (such as antibiotics, hormones, derived from plants etc.) in measured doses (including those intended to be administered via sub
3002	Hemotherapy pharmaceuticals	Human blood; animal blood prepared for therapeutic, prophylactic or diagnostic uses; antisera and other blood fractions, modified immunological products, whether or not obtained by means of biotechnological processes; vaccines, toxins, microorganisms cultures (and

MCN CODE	SECTOR CLASSIFICATION	ITEM DESCRIPTION
3001	Organotherapeutic pharmaceuticals	Glands and other organs for organotherapeutic uses, dried, whether or not powdered; extracts of glands or other organs or of their secretions for organotherapeutic uses; heparin and its salts; other human or animal substances prepared for therapeutic purposes
01	Livestock raising	Live animals
05	Livestock raising	Other products of animal origin, not elsewhere specified or included in other chapters
04	Livestock raising	Milk and dairy; poultry eggs; Natural honey; Edible products of animal origin, not elsewhere specified or included in other chapters
3201	Chemical	Tanning extracts of vegetable origin; tannins and their salts, ethers, esters and other derivatives
3203	Chemical	Coloring matter of vegetable or animal origin and preparations based on them
3204	Chemical	Organic coloring matter, whether or not chemically defined; preparations as specified in note 3 to this chapter, based on synthetic organic coloring matter; synthetic organic products of a kind used as agents aviv
3301	Chemical	Essential oils (terpeneless or not), including the so-called 'concrete' or 'absolute'; resinoids; Extracted oleoresins; concentrates of essential oils in fats, in fixed oils, in waxes or similar substances, solutions obtained by
38061000	Chemical	Rosin and resin acids
3302	Chemical	Mixtures of odoriferous substances and mixtures (including alcoholic solutions) based on one or more of these substances types used as raw materials in industry; other preparations based on odoriferous substances, of the types utilized
38231900	Chemical	Other monocarboxylic industrial fatty acids and acid.refin oils
38051000	Chemical	Turpentine, pine essences, or etc.
38059090	Chemical	Other terpene essences d/fab.d/mad paper
38069011	Chemical	Oxidized, hydrogenated, dehydrogenated, rosin etc.
38237010	Chemical	Stearic alcohol (industrial fatty alcohols)
38231200	Chemical	Oleic acid (monocarboxylic industrial fatty acid)
38069090	Chemical	Other essences of rosin and rosin oils
38237020	Chemical	Lauric alcohol (industrial fatty alcohols)
38069019	Chemical	Other derivatives of rosin or resin acids
38063000	Chemical	Ester gums (run gums)
38089191	Chemical	Acephate-based insecticide presented differently
38210000	Chemical	Culture media prepared for development of microorganisms

MCN CODE	SECTOR CLASSIFICATION	ITEM DESCRIPTION
38231300	Chemical	Fatty acid (fat) of the "tall oil"
38231100	Chemical	Stearic acid (industrial monocarboxylic fatty acid)
38070000	Chemical	Wood tar, wood tar oils etc..
38237090	Chemical	Other chemical industrial fatty alcohols
38059010	Chemical	Pine oil
38062000	Chemical	Salts of rosin, resin acids or their derivatives
38237030	Chemical	Other mixtures of aliphatic primary alcohols

Aggregated industry analysis

Agriculture: disaggregated balance of trade for NCM items (average amounts, 2010-2012)

SEGMENTS	EXPORTS (2010-2012 AVERAGE, US$)	IMPORTS (2010-2012 AVERAGES, US$)	BALANCE
Live plants and floricultural products	27,704,521.33	33,830,988.00	6,126,466.67
Vegetables, roots and tubers, edible	33,705,679.67	623,681,411.33	589,975,731.67
Fruits; peel of citrus fruit or melons	876,131,806.00	707,517,983.67	68,613,822.33
Coffee, tea, mate and spices	6,582,120,042.67	71,192,159.00	6,510,927,883.67
Cereals	4,396,984,246.00	2,269,276,109.67	2,127,708,136.33
Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruits; industrial or medicinal plants; straw and fodder	15,130,379,236.00	229,450,604.33	14,900,928,631.67
Cotton	1,687,293,773.33	626,199,278.33	1,061,094,495.00
TOTAL	**28,734,319,305.00**	**4,561,148,534.33**	**24,173,170,770.67**

Agribusiness: disaggregated balance of trade for NCM items (average amounts, 2010-2012)

SEGMENTS	EXPORTS (2010-2012 AVERAGE, US$)	IMPORTS (2010-2012 AVERAGE, US$)	BALANCE
Sugars and sugar confectionery	12,954,730,930.00	61,518,288.00	12,893,212,642.00
Beverages, spirits and vinegar	1,120,007,561.00	478,242,696.00	641,764,865.00

SEGMENTS	EXPORTS (2010-2012 AVERAGE, US$)	IMPORTS (2010-2012 AVERAGE, US$)	BALANCE
Meat and meat offal, edible	11,878,430,662.00	210,410,324.00	11,668,020,338.00
Cork and derived products	1,933,602.00	7,292,929.00	-5,359,327.00
Gums, resins and other vegetable saps and extracts	79,109,182.00	95,326,246.00	-16,217,064.00
Animal or vegetable fats and oils; Products of their dissociation; Prepared edible fats; Waxes of animal or vegetable origin	1,661,416,789.00	745,706,560.00	915,710,229.00
Wood, charcoal wood and wood works	1,917,892,951.00	133,085,500.00	1,784,807,451.00
Albuminoidal substances; Products based on starches or modified starches; Glues; Enzymes	307,578,142.00	312,010,662.00	-4,432,520.00
Materials for plaiting other plant products not specified or included in other chapters	13,382,669.00	3,273,246.00	10,109,423.00
Articles of Leather; saddlery and harness; travel goods, handbags and similar containers; Leather rag articles	93,404,359.00	390,345,776.00	-296,941,417.00
Other vegetable textile fibers; paper yarn and woven paper yarn	40,226,864.00	35,461,368.00	4,765,496.00
Paper and paperboard; Articles made of paper pulp, paper or paperboard	2,008,555,598.00	1,540,652,062.00	467,903,536.00
Wood pulp or other fibrous cellulosic material; paper or recoverable paper (waste and scrap)	4,761,677,070.00	360,086,995.00	4,401,590,075.00
Tanned or dressed furskins (including heads, tails, paws and other pieces, pieces or cuttings), unassembled or assembled, without the addition of other materials other than those of heading 4303	-	171,192.00	-171,192.00

SEGMENTS	EXPORTS (2010-2012 AVERAGE, US$)	IMPORTS (2010-2012 AVERAGE, US$)	BALANCE
Raw hides and skins (other than furskins) and leather	1,742,722,794.00	84,702,925.00	1,658,019,869.00
Skins/other parts of birds with their feathers, etc. after being worked on	61.00	535,996.00	-535,935.00
Preparations based on cereals, flour, starch or milk; Pastries	167,548,580.00	103,451,006.00	64,097,574.00
Miscellaneous edible preparations	1,131,490,166.00	295,423,808.00	836,066,358.00
Preparations of meat, fish or crustaceans, mollusks or other aquatic invertebrates	1,466,652,913.00	49,264,954.00	1,417,387,959.00
Preparations of vegetables, fruit, nuts or other parts of plants	1,997,065,331.00	476,079,268.00	1,520,986,063.00
Products of the milling industry; malt; starches; inulin; wheat gluten	51,348,822.00	723,258,377.00	-671,909,555.00
Residues and waste from food industries; prepared animal feed	5,038,397,929.00	198,101,418.00	4,840,296,511.00
TOTAL	**48,433,572,975.00**	**6,304,401,596.00**	**42,129,171,379.00**

Agriculture + Agribusiness: disaggregated balance of trade for NCM items (average amounts, 2010-2012)

SEGMENTS	EXPORTS (2010-2012 AVERAGE, US$)	IMPORTS (2010-2012 AVERAGE, US$)	BALANCE
Cocoa and cocoa preparations	406,165,701.33	309,269,816.00	96,895,885.33
Smoking (tobacco) and manufactured tobacco substitutes	2,984,806,808.67	51,143,087.33	2,933,663,721.33
Silk	33,356,577.67	21,625,904.00	11,730,673.67
Wool, fine or coarse; Horsehair, yarn and woven	37,678,780.00	19,651,593.67	18,027,186.33
TOTAL	**3,462,007,867.67**	**401,690,401.00**	**3,060,317,466.67**

Livestock: disaggregated balance of trade for NCM items (average amounts, 2010-2012)

DESCRIPTION	EXPORTS (2010-2012 AVERAGE, US$)	IMPORTS (2010-2012 AVERAGE, US$)	BALANCE
Milk and dairy products; Poultry eggs; Natural honey; Edible products of animal origin not elsewhere specified or included in other chapters	610,501,707.33	539,414,578.67	71,087,128.67
Other products of animal origin not elsewhere specified or included in other chapters	279,421,598.67	162,668,242.33	116,753,356.33
Live animals	514,033,154.67	13,272,575.67	500,760,579.00
TOTAL	**1,403,956,460.67**	**715,355,396.67**	**688,601,064.00**

Aquaculture: disaggregated balance of trade for NCM items (average amounts, 2010-2012)

SEGMENTS	EXPORTS (2010-2012 AVERAGE, US$)	IMPORTS (2010-2012 AVERAGE, US$)	BALANCE
Fish and crustaceans, mollusks and other aquatic invertebrates	196,438,970.67	57,596.33	196,381,374.33
Articles of natural or cultured pearls	0.00	1,101,919,381.00	1,101,919,381.00

Personal Care: disaggregated balance of trade for NCM items (average amounts, 2010-2012)

SECTORS	EXPORTS (2010-2012 AVERAGE, US$)	IMPORTS (2010-2012 AVERAGE, US$)	BALANCE
Hair, wool and other textile mat. prepared by wig factories	58,503.00	1,963,517.67	- 1,905,014.67
Wigs, beards, eyebrows, etc. made of hair	15,754.67	335,327.67	- 319,573.00
Wigs, beards, eyebrows, etc. made of other textile mat.	185.00	801,907.00	- 801,722.00
TOTAL	**89,804.67**	**928,274.27**	**- 838,469.60**

Drugs: disaggregated balance of trade for NCM items (average amounts, 2010-2012)

SECTORS	DESCRIPTION	EXPORTS (2010-2012 AVERAGE, US$)	IMPORTS (2010-2012 AVERAGE, US$)	BALANCE
PHARMACEUTICAL				
Medications (antibiotics, hormones derived from plants, etc.) not measured in doses or packaged for retail sale		8,823,724.00	99,039,907.00	- 90,216,183.00
Medications (antibiotics, hormones derived from plants, etc.) in measured doses (including those intended to be administered subcutaneously)		1,020,092,044.33	3,409,018,065.00	- 2,388,926,020.67
TOTAL		**1,028,915,768.33**	**3,508,057,972.00**	**- 2,479,142,203.67**
ORGANOTHERAPICS				
Glands and other organs for organo-therapeutic uses, dried, whether or not powdered; extracts of glands or other organs or of their secretions for organo-therapeutic uses; heparin and its salts; other human or animal substances prepared for therapeutic purposes		42,973,508.00	87,932,962.33	- 44,959,454.33
HAEMOTHERAPICS				
Human blood; animal blood prepared for therapeutic, prophylactic or diagnostic uses; antisera and other blood fractions, modified immunological products, whether or not obtained by means of biotechnological processes; vaccines, toxins, cultures of microorganisms (and		68,610,933.67	2,662,230,029.33	- 2,593,619,095.67

Chemical: disaggregated balance of trade for NCM items (average amounts, 2010-2012)

DESCRIPTION	EXPORTS (2010-2012 AVERAGE, US$)	IMPORTS (2010-2012 AVERAGE, US$)	BALANCE
Fatty acid from tall oil	1,703,720.00	663,017.33	1,040,702.67
Oleic acid (industrial monocarboxylic fatty acid)	4,055,408.33	1,219,508.00	2,835,900.33
Wood tar, wood tar oils, etc.	377,188.67	1,124,419.33	- 747,230.67

DESCRIPTION	EXPORTS (2010-2012 AVERAGE, US$)	IMPORTS (2010-2012 AVERAGE, US$)	BALANCE
Stearyl alcohol (industrial fatty alcohol)	5,378,374.00	11,436,334.67	- 6,057,960.67
Lauryl alcohol (industrial fatty alcohol)	5,304,593.67	0.00	5,304,593.67
Natural rubber, balata, gutta-percha, guayule, chicle and similar natural gums in primary forms or in plates, sheets or strip	0.00	851,492,933.00	- 851,492,933.00
Rosin and resin acids	54,713,617.67	4,836,160.67	49,877,457.00
Oxidized, hydrogenated, dehydrogenated, etc. forms of rosin	8,360,901.67	1,027,172.67	7,333,729.00
Spirits of turpentine, pinewood, etc.	15,955,120.67	62,330.00	15,892,790.67
Tanning or dyeing extracts; tannin and derivatives; pigments and other coloring matter; paints and varnishes; mastics; inks	462,193,614.67	9,264,017.67	452,929,597.00
Ester gums	3,174,481.00	3,929,996.33	- 755,515.33
Otherwise-presented acephate-based insecticides	887,932.33	31,121,475.33	- 30,233,543.00
Coloring matter of vegetable or animal origin and preparations based thereon	0.00	18,409,220.00	- 18,409,220.00
Synthetic organic coloring matter, whether or not chemically defined; preparations as specified in note 3 to this chapter based on synthetic organic coloring matter; synthetic organic products of the types used as brightening agents	0.00	328,057,748.00	- 328,057,748.00
Culture media prepared for microorganisms development	1,838,716.67	30,102,110.33	- 28,263,393.67
Mixtures of odoriferous substances and mixtures (including alcoholic solutions) based on one or more of these substances, of a kind used as raw materials in industry; other preparations based on odoriferous substances, of a kind used for the manufacture of beverages	58,923,115.67	113,325,562.33	- 54,402,446.67
Pine oil	398,485.67	93,124.67	305,361.00

DESCRIPTION	EXPORTS (2010-2012 AVERAGE, US$)	IMPORTS (2010-2012 AVERAGE, US$)	BALANCE
Essential oils (terpeneless or not), including the so-called 'concrete' or 'absolute' oils; resinoids; Extracted oleoresins; concentrates of essential oils in fats, in fixed oils, in waxes or the like, obtained by enfleurage or maceration;	224,737,299.33	62,217,117.33	162,520,182.00
Other essences of rosin and rosin oils	4,318,682.67	1,687,258.67	2,631,424.00
Other mixtures of aliphatic primary alcohols	20,479.33	16,482,239.67	- 16,461,760.33
Industrial monocarboxylic fatty acids and acid oils from refining	44,076,507.67	40,561,069.33	3,515,438.33
Other industrial fatty alcohols	222,075.67	28,479,815.33	- 28,257,739.67
Other derivatives of rosin or resin acids	2,092,504.33	7,996,714.33	- 5,904,210.00
Other turpentine oils produced by distillation or treatment of timber	10,180,238.67	120,288.67	10,059,950.00
Salts of rosin, resin acids or their derivatives	479,929.67	336,583.00	143,346.67
TOTAL	**910,433,274.00**	**1,588,942,421.00**	**- 678,509,147.00**

Domestic Production of Goods Based on Genetic Resources (BRG)

Average amounts of national production by subject (2009-2010, thousand R$)

SOURCE OF DATA	AVERAGE THOUSAND R$ (2009-2011)
Plant Extraction - PAM	4,571,707.00
Forestry - PAM	10,953,722.00
Production of animal origin - PAM	27,702,842.33
Perennial crop - PAM	33,019,874.67
Temporary crops - PAM	130,715,069.67
Industrial Production - PIA	1,973,838,799.67

Average output value amounts of goods based on genetic resources in Agriculture (R$ thousands, 2009-2011)

NCM	AVERAGE, R$ THOUSAND (2009-2011)	% AVERAGE PARTICIPATION
Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruits; industrial or medicinal plants; straw and fodder	152,067.67	0.2%
Cotton	4,955,609.67	4.8%
Vegetables, roots and tubers, edible	8,855,474.67	8.9%
Coffee, tea, mate and spices	12,623,805.67	12.4%
Cereals	73,698,957.67	73.8%
TOTAL	**100,285,915.33**	**100.0%**

Average output value amounts of goods based on genetic resources in agribusiness (R$ thousands, 2009-2011)

NCM	AVERAGE, R$ THOUSAND (2009-2011)	% AVERAGE PARTICIPATION
Meat and meat offal, edible	72,590,879.00	33.4%
Sugars and sugar confectionery	31,477,327.00	14.5%
Preparations of vegetables, fruit, nuts or other parts of plants	22,613,730.00	10.5%
Preparations based on cereals, flour, starch or milk; Pastries	18,404,275.67	8.5%
Preparations of meat, fish or crustaceans, mollusks or other aquatic invertebrates	13,052,567.00	6.0%
Cocoa and cocoa preparations	11,559,068.67	5.4%
Wood, charcoal wood and wood works	10,953,722.00	5.0%
Paper and paperboard; Articles made of paper pulp, paper or paperboard	10,736,605.00	5.0%
Miscellaneous edible preparations	9,370,806.33	4.3%
Smoking (tobacco) and manufactured tobacco substitutes	6,486,229.33	3.1%
Beverages, spirits and vinegar	2,981,878.67	1.4%
Articles of Leather; saddlery and harness; travel goods, handbags and similar containers; Leather rag articles	1,248,867.67	0.6%
Raw hides and skins (other than furskins) and leather	1,248,867.67	0.6%
Products of the milling industry; malt; starches; inulin; wheat gluten	1,215,671.00	0.6%

NCM	AVERAGE, R$ THOUSAND (2009-2011)	% AVERAGE PARTICIPATION
Animal or vegetable fats and oils; Products of their dissociation; Prepared edible fats; Waxes of animal or vegetable origin	643,066.00	0.3%
Natural rubber, balata, gutta-percha, guayule, chicle and similar natural gums in primary forms or in plates, sheets or strip.	571,588.00	0.3%
Other vegetable textile fibers; paper yarn and woven paper yarn	383,261.00	0.2%
Albuminoidal substances; Products based on starches or modified starches; Glues; Enzymes	316,655.00	0.2%
Residues and waste from food industries; prepared animal feed	248,620.00	0.1%
Wool, fine or coarse; Horsehair, yarn and woven	250,631.67	0.1%
Gums, resins and other vegetable saps and extracts	93,962.67	0.0%
Silk	49,630.67	0.0%
Wood pulp or other fibrous cellulosic material; paper or recoverable paper (waste and scrap)	36,784.67	0.0%
Materials for plaiting other plant products not specified or included in other chapters	11,632.00	0.0%
TOTAL	**216,570,260.00**	**100.0%**

Annex 4 - Characterization of the Pulp and Paper Sector

The pulp and paper sector integrates a strongly globalized industrial agroforestry sector in which Brazil is an important player. Brazilian pulp and paper production has grown at significant rates since the 1970s, which led the country to a leading role in the global scenario of producers. Brazil now ranks fourth as a global producer of pulp - the largest in relation to eucalyptus pulp - and tenth largest paper producer in the world.

Planted forests in the country are distinguished by their high productivity. When compared to other countries, the figures impress. In 2011, the average productivity of eucalypt forests was 44 m³/ha/year, with pine forests reaching 38 m³/ha/year. This excellent productivity is the result of intense technological and genetic development allied to appropriate soil and climate conditions, which together guarantee the country's competitiveness in this sector (CNI, 2012).

When compared with other agribusiness sectors, the pulp and paper sector has considerable ability to add

value. In 2011, the export value per m² was among the highest in the market, equating to coffee (Table 1).

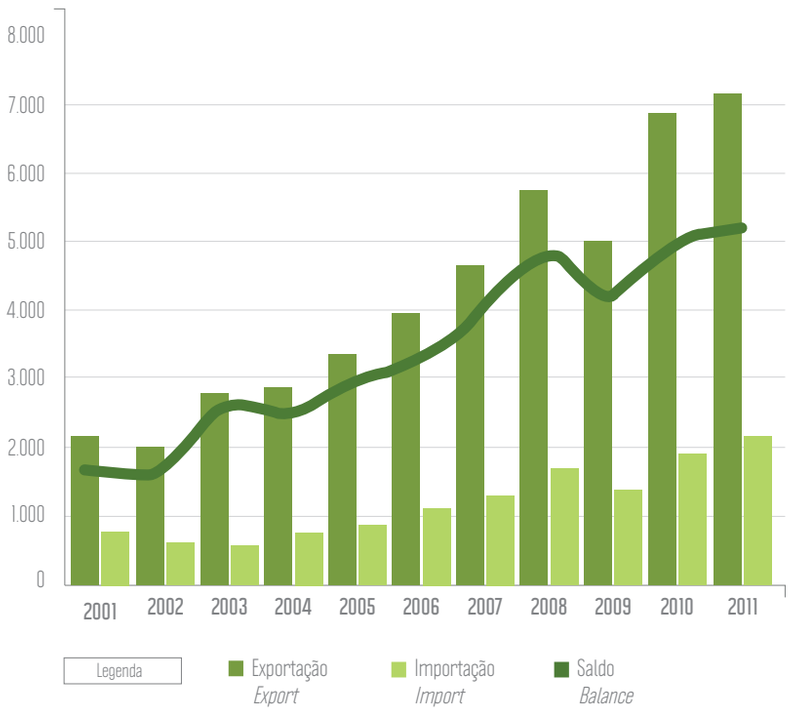
Table 1. Exports by acreage (US$/ha) in 2011

PRODUCTS	EXPORTS US$ MILLION	AREA PLANTED THOUSAND HA	US$/HA
Soybean	24,154	25,018	965
Sugar-Alcohol	16,404	8,567	1,915
Coffee	8,731	2,753	3,171
Pulp and paper	**7,190**	**2,347**	**3,063**
Maize	2,766	15,451	179
Cotton	1,977	1,430	1,383

Source: Bracelpa, 2013, from data provided by CONAB/FNP/MAPA/SECEX.

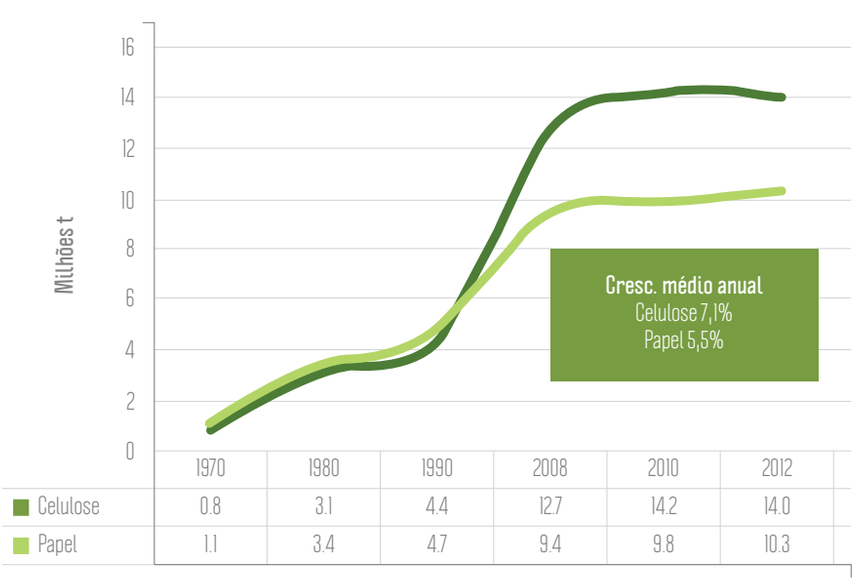
The evolution of the balance of trade in the sector can be seen in Figure 1. The industry has been generating increasing surpluses since the 1970s, but in recent years has stabilized at around 5 billion dollars.

Figure 1. Balance of trade for Pulp and Paper sector, US$ millions. Source: Bracelpa, 2013, from data provided by SECEX.



The 1960s and 1970s were a time of marked expansion of the pulp and paper sector in Brazil, with the emergence of various companies acting in the industry and the consequent expansion of manufacturing capacity. In relation to domestic production (Figure 2), there is a visible jump in production occurred in the last 20 years, with average annual growth rates of 7.1% for pulp and 5.5% for paper.

Figure 2. Domestic production of pulp and paper. Source: Bracelpa 2013



	1970	1980	1990	2008	2010	2012
Celulose	0.8	3.1	4.4	12.7	14.2	14.0
Papel	1.1	3.4	4.7	9.4	9.8	10.3

The sector represented 2.74% of Brazil's exports and 0.87% of its imports in 2012. There was a drop in the final balance of exports in 2012 compared to the previous year. The phenomenon occurred on a national scale. While the fall in the country's balance of trade was of 35%, the sector only saw a decrease of 7% (Table 2). On one hand, this behavior may be a reflection of the international crisis, while on the other it may have been caused by the recent stagnation of the internal market. Variations in recent years indicate no stable trend so far.

Table 2. Participation of the Pulp and Paper Sector in the Brazilian Balance of Trade - US$ million FOB

	BRAZIL					PULP AND PAPER					PARTICIPATION %		
	2010 (A)	2011 (B)	2012 (C)	VAR. % (B/A)	VAR. % (C/B)	2010 (D)	2011 (E)	2012 (F)	VAR. % (E/D)	VAR. % (F/E)	2010	2011	2012
Exports	201.915	256.040	242.580	27	-5	6.770	7.190	6.657	6	-7	3	3	2,74
Imports	181.768	226.246	223.149	25	-1	1.900	2.128	1.945	12	-9	1	1	0,87
BALANCE	**20.147**	**29.794**	**19.431**	**48**	**-35**	**4.870**	**5.062**	**4.712**	**4**	**-7**	**-**	**-**	**-**

Source: BRACELPA 2012; 2013)

Pulp

Pulp production in the country has as its flagship product the production of short fiber, which represents 85% of national production and 89% of domestic consumption. [23]

Table 3. Pulp production, domestic sales and apparent consumption in the 2010-2012 triennium (1,000 tons)

PULP	2010	2011	2012*
Production	**14,164**	**13,922**	**13,896**
Hardwood	12,137	11,844	11,832
Softwood	1,596	1,643	1,629
High-Yield Pulp	431	435	435
Domestic Sales	**1,585**	**1,548**	**1,640**
Hardwood	1,380	1,340	1,466
Softwood	71	79	46
High-Yield Pulp	134	129	128

23 In Brazil, almost all production of pulp and paper comes from planted forests of pine and eucalyptus. The pine provides softwood pulp, which is more resistant (used in the manufacture of packaging paper, cardboard, press and specialty papers and similar types). Eucalyptus provides softwood pulp, which is less resistant (provides good absorption and high smoothness, ideal for the production of papers such as printing and writing paper and paper for sanitary purposes - toilet paper, paper towels, napkins).

PULP	2010	2011	2012*
Apparent consumption	**6,201**	**5,836**	**5,794**

* BRACELPA Estimate (2) Source: SECEX/MDIC

Figure 3. below shows the evolution of national pulp production since 2001. A highlight is 2010, with production surpassing 14,000 tons.

Figure 3. Evolution of Brazilian pulp production (thousand tons). Source: Bracelpa 2012

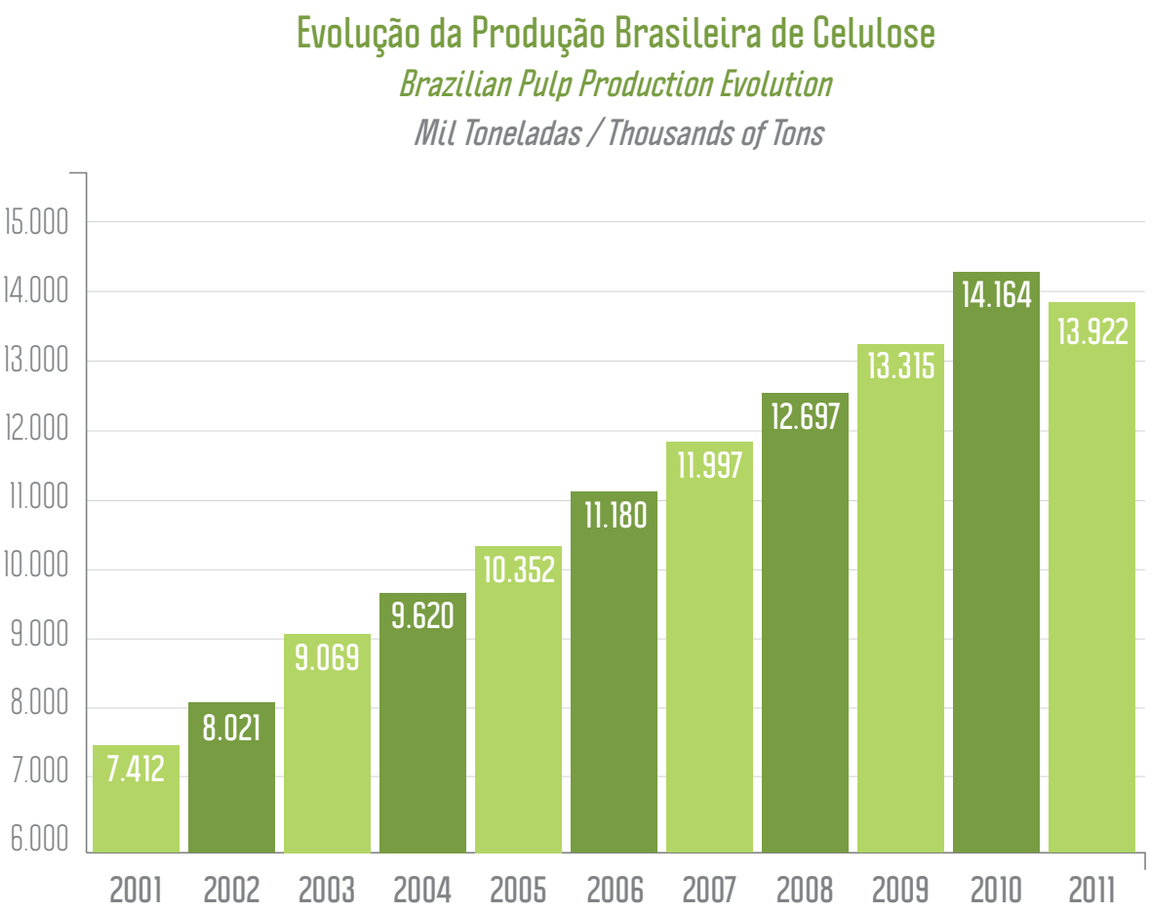


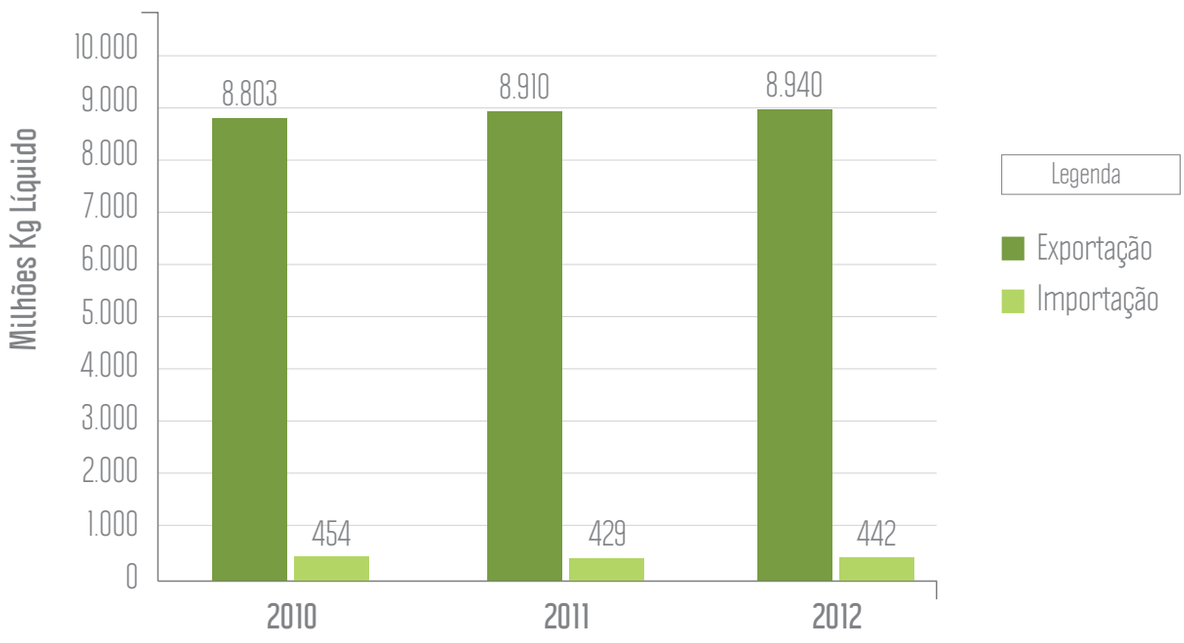
Table 4 and Figure 4 below show the amount of pulp exported and imported per year in the country. The exports of pulp are markedly higher than imports by net kg.

Table 4. Amount (Net Kg) of pulp exported and imported in the 2010-2012 triennium

	2010	2011	2012
Exports (Net Kg)	8,803,049,047	8,910,445,424	8,940,182,113
Imports (Net Kg)	454,177,997	428,515,658	441,736,259

Source of data: Aliceweb, 2013; prepared for this report.

Figure 4. Imports and exports of pulp (net kg) in the 2010-2012 triennium.



Source: Aliceweb, 2013; prepared for this report

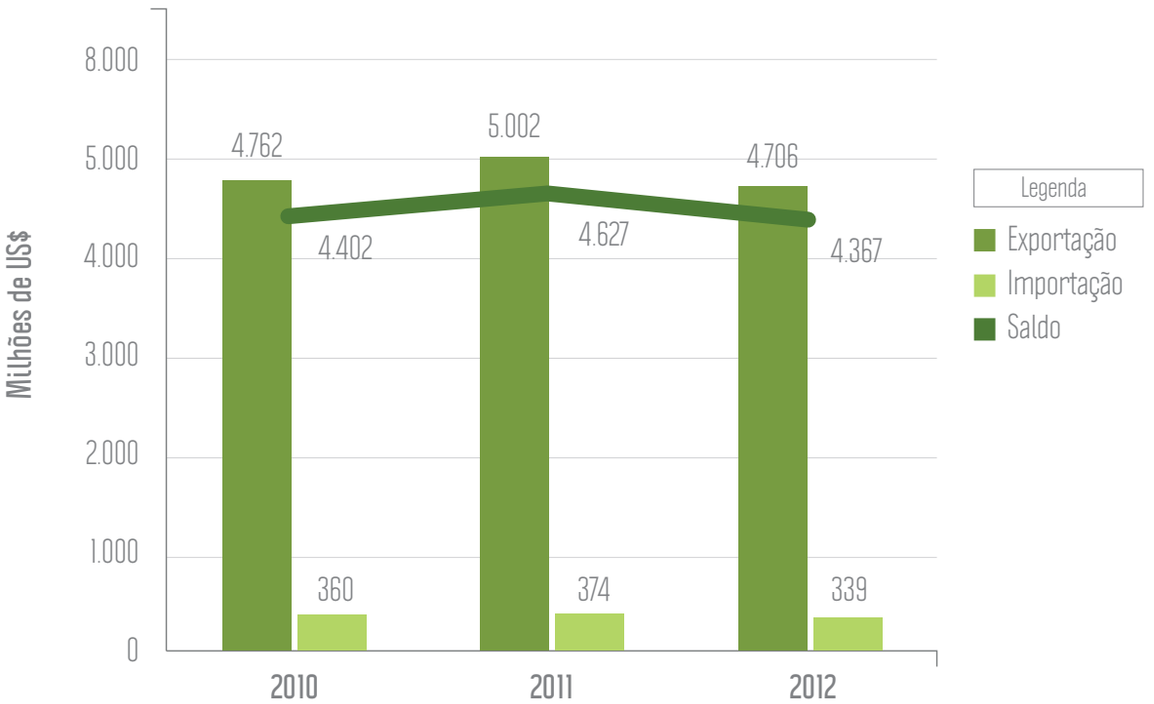
The pulp industry has in the last three years exported an average of US$ 4,823,076,748.33 (9% of agribusiness) and imported an average of US$ 357,884,183.00 (5% of agribusiness).

Table 5. Balance of trade (US$) of pulp products in the 2010-2012 triennium

	2010	2011	2012
Exports (US$)	$ 4,761,677,070.00	$ 5,001,622,054.00	$ 4,705,931,121.00
Imports (US$)	$ 360,086,995.00	$ 374,380,327.00	$ 339,185,227.00
BALANCE (US$)	**$ 4,401,590,075.00**	**$ 4,627,241,727.00**	**$ 4,366,745,894.00**

Source of data: Aliceweb, 2013; prepared for this report.

Figure 5. Imports and exports of pulp (US$ millions) in the 2010-2012 triennium.



Source of data: Aliceweb, 2013; prepared for this report.

The balance of trade of the Brazilian pulp and paper industry has been in surplus since 1979, having increased from US$ 50 million that year to US$ 4.3 billion in 2012 (Figure 5).

Regarding exports, 92.3% of pulp materials exported chemical wood pulp, soda or sulphate, other than dissolving grades. (Table 3). This item covers, almost in its entirety, the exports of non-coniferous semi-bleached chemical wood pulp based on soda/sulfate and wood derived from eucalyptus (US$ 4,452,387,973.67, or a 92% average in 2010-1012 triennium).

Table 6. Average amount of exports (US$) and average share (%) of pulp products in the 2010 -2012 triennium

DESCRIPTION	AVERAGE AMOUNT (US$)	AVERAGE PART. (%)
Chemically treated - wood pulp, soda or sulphate, other than dissolving pulp paste	4,456,925,293	92.3%
Chemical wood pulp, dissolving grades	354,939,375	7.4%
Other	11,212,080	0.1%
GRAND TOTAL	**4,823,076,748**	**100%**

Source of data: Aliceweb, 2013; prepared for this report.

Regarding imports, the pulp industry also imports predominantly chemical wood pulp, soda- or sulphate-based, other than dissolving grades (89%). However, imports are concentrated on the acquisition of semi-bleached soda- or sulphate-based coniferous wood chemical pulp (average of US$ 311,628,328.33 in the 2010 - 1012 triennium).

Pulp imports came from the United States, Canada and Chile, and paper imports came from Canada, United States, Finland and Germany.

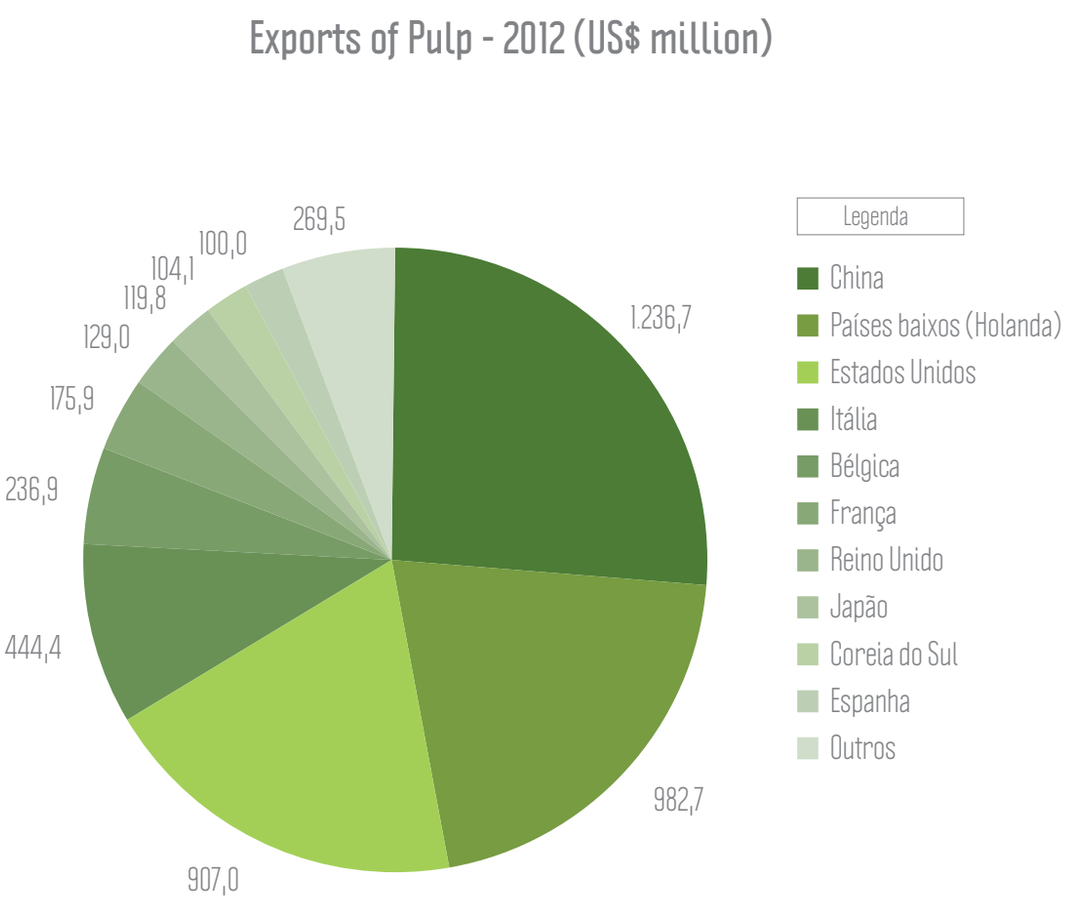
Table 7. Average amount of Imports (US$) and average share (%) of pulp products in the 2010 -2012 triennium

DESCRIPTION	AVERAGE AMOUNT (US$)	AVERAGE PART. (%)
Chemically treated - wood pulp, soda or sulphate, other than dissolving pulp paste	318,579,967.33	89%
Pulps of fibers derived from recycled paper or cardboard (waste and scrap) or other fibrous cellulosic material	18,056,179.67	5%
Chemical wood pulp, dissolving grades	14,847,812.67	4%
Other	6,400,223.33	2%
GRAND TOTAL	**357,884,183.00**	**100%**

Source: Aliceweb, 2013.

China is the lead pulp importer from Brazil, with over US$ 1.2 billion imports in 2012. Next is the Netherlands (US$ 982.7 million in 2012) and the United States with US$ 907 million in 2012 (Figure 3). These three countries concentrate their imports in the acquisition of non-coniferous chemical pulp. The countries listed below (except for “others”) together represent 94% of pulp exports from Brazil (Table 5).

Figure 6. Distribution of pulp exports by countries in 2012 (US$).



Source: Aliceweb, 2013

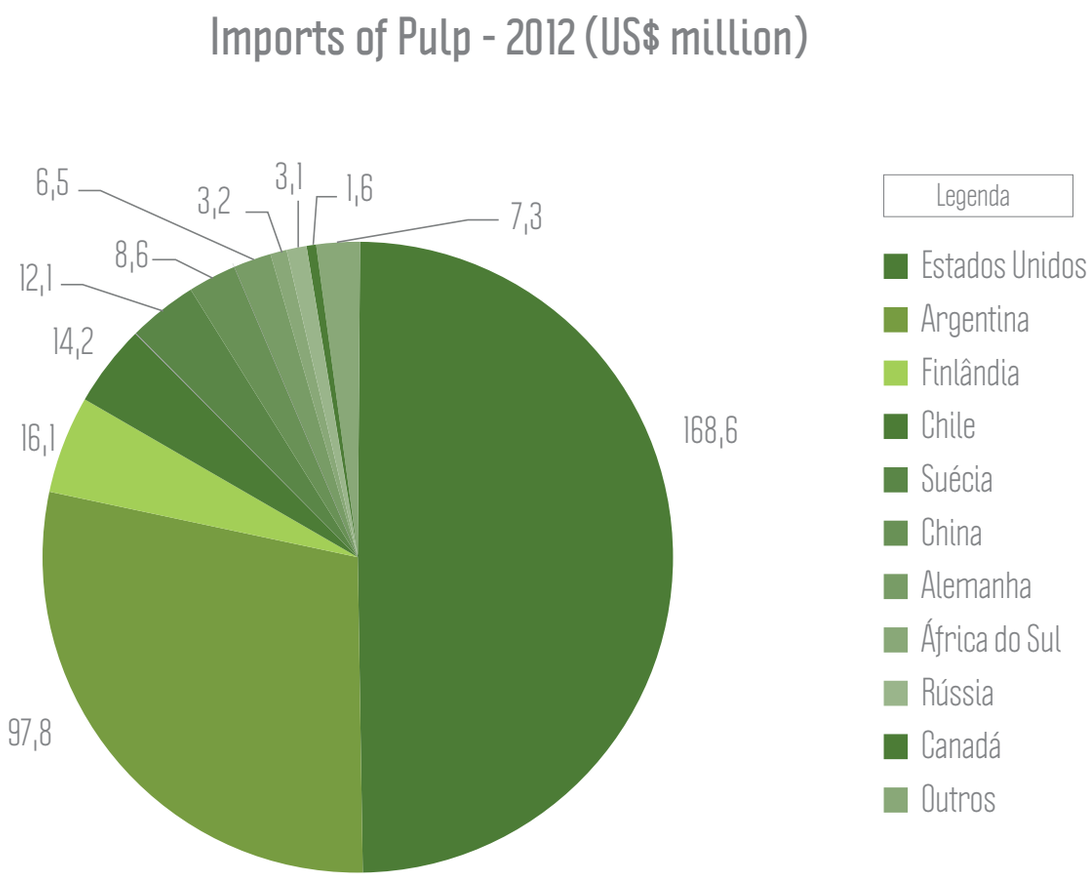
Table 8. Countries to which Brazil exported pulp in the 2010-1012 triennium.

COUNTRIES	2012	2011	2010
China	1,236,671,810.00	$1,299,678,294.00	$1,126,181,015.00
Netherlands	982,722,959.00	$1,059,840,857.00	945,625,521.00
United States	906,984,498.00	934,974,580.00	850,446,392.00
Italy	444,434,389.00	497,584,416.00	520,042,871.00
Belgium	236,863,179.00	195,621,055.00	269,653,639.00
France	175,877,841.00	197,241,003.00	193,812,119.00
United Kingdom	129,027,798.00	92,925,001.00	83,402,430.00
Japan	119,794,496.00	127,567,388.00	132,350,428.00
South Korea	104,058,500.00	162,036,142.00	208,933,872.00
Spain	100,033,030.00	94,141,966.00	44,264,432.00
Other	269,462,621.00	340,011,352.00	386,964,351.00
TOTAL	**4,705,931,121.00**	**5,001,622,054.00**	**4,761,677,070.00**

Source: Aliceweb, 2013.

Brazil's imports are concentrated primarily in two countries, namely: United States and Argentina (Figure 4). Together these two countries account for 77% of Brazil's imports in 2012. The largest import from these countries in 2012 was semi-bleached soda- or sulphate-based coniferous wood chemical pulp, corresponding to 50% of imports.

Figure 7. Distribution of pulp imports per country in 2012 (US$).



Source: Aliceweb, 2013; prepared for this report.

Table 9 -10. Countries from which Brazil imported pulp in the 2010-1012 triennium.

COUNTRIES	2012	2011	2010
United States	168,621,295.00	180,950,580.00	169,584,767.00
Argentina	97,820,035.00	115,796,239.00	129,450,225.00
Finland	16,054,604.00	16,523,476.00	9,831,807.00
Chile	14,231,237.00	18,202,708.00	18,433,451.00
Sweden	12,095,689.00	13,267,256.00	16,267,882.00
China	8,606,132.00	3,853,045.00	2,120,436.00
Germany	6,501,321.00	5,014,956.00	4,164,682.00
South Africa	3,196,635.00	3,751,974.00	-

COUNTRIES	2012	2011	2010
Russia	3,124,279.00	2,054,791.00	1,479,426.00
Canada	1,638,398.00	429,586.00	117,401.00
Other	7,295,602.00	14,535,716.00	8,636,918.00
TOTAL	**346,480,829.00**	**388,916,043.00**	**368,723,913.00**

Source: Aliceweb, 2013; prepared for this report.

PAPER

Brazil's paper production has surpassed 10,000 tons/year since 2011. An item of highlight is packaging, representing about 50% of production. Domestic sales absorbed approximately 53% of production in 2012, according to estimates by Bracelpa (2013).

Table 1. Paper production, domestic sales and apparent consumption in the 2010-2012 triennium (1,000 tons)

PAPER	2010	2011	2012*
Production	**9,844**	**10,159**	**10,182**
Packaging	4,862	5,168	5,115
Printing and Writing	2,704	2,680	2,635
Press	124	129	131
Sanitary Purposes	905	961	1,034
Cardboard	786	733	760
Other	463	488	507
Domestic Sales	**5,317**	**5,290**	**5,482**
Packaging	1,690	1,681	1,689
Printing and Writing	1,630	1,630	1,688
Press	122	121	132
Sanitary Purposes	902	933	1,022
Cardboard	573	512	530
Other	400	413	421
Apparent consumption	**9,272**	**9,562**	**9,703**

*BRACELPA Estimate (2)
Source: SECEX/MDIC

Figure 8 below shows the evolution of Brazilian paper production in thousand tons. Since the beginning of 2000 the production has increased by 36%.

Figure 8. Evolution of Brazilian paper production in thousand tons.

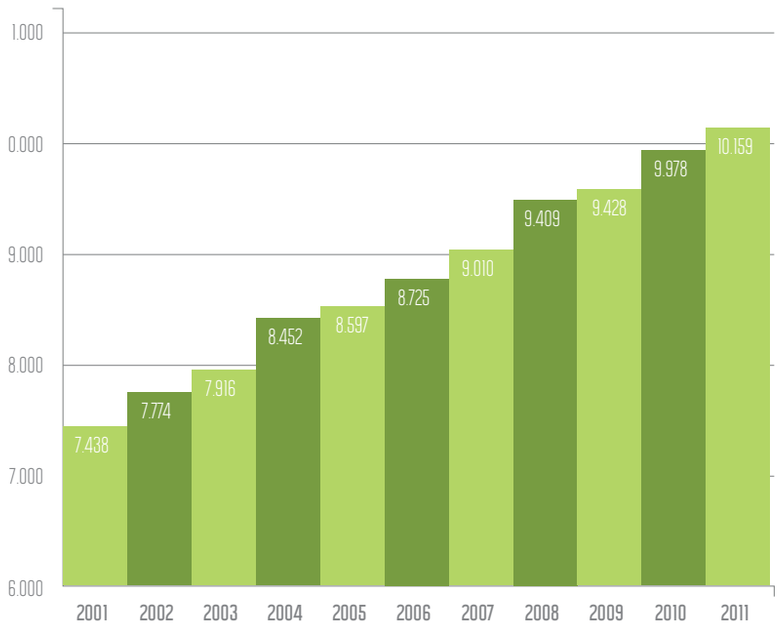


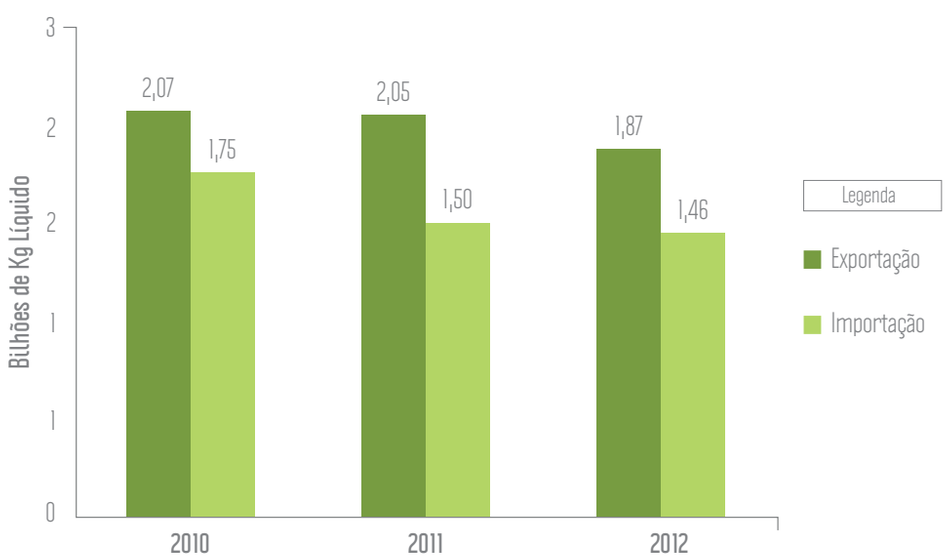
Table 12 presents paper production for export and import in net kilograms. These values are plotted in sequence (Figure 9).

Table 12. Volume (Kg Net) of paper exports and imports in the 2010-2012 triennium

	2010	2011	2012
Exports (Net Kg)	2,074,213,641	2,052,054,207	1,874,869,268
Imports (Net Kg)	*1,754,204,737*	*1,502,880,019*	*1,455,480,098*

Source: Aliceweb, 2013.

Figure 9. Imports and exports of paper in billion net kg



On average, the paper industry exported US$ 2,049,169,106.33 over the last three years, representing 4% of agribusiness. On imports the sector takes the lead, with average of US$ 1,633,679,578.67 over the last three years, or 22% of total agro-industry imports.

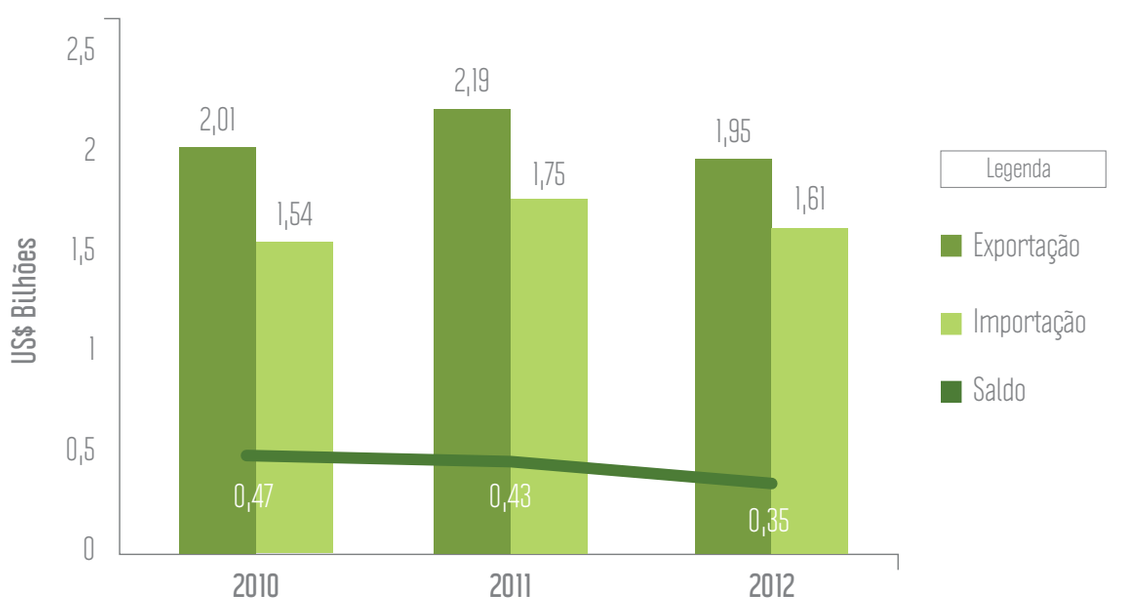
Table 13 below shows the absolute amounts for imports, exports and balance of trade for the 2010-2012 triennium. There was a decrease of 11% in exports and a 9% drop in imports last year. Table 13 is shown graphically in Figure 10.

Table 13. Balance of trade (in US$) for paper products in the 2010-2012 triennium

	2010	2011	2012
Exports (US$)	2,008,555,598	2,187,579,920	1,951,371,801
Imports (US$)	1,540,652,062	1,754,204,737	1,606,135,937
BALANCE	**467,903,536**	**433,375,183**	**345,235,864**

Source: Aliceweb, 2013.

Figure 10. Exports, imports and balance of trade for paper in US$ billions



As for products exported by the country, items of highlight include uncoated paper and paperboard used for writing, with average participation of 45.2% over the last 3 years, followed by paper and paperboard coated with kaolin or other inorganic substances, with 20.8%; paper and paperboard (other than those that occur in the coated paper and paperboard group), with 9.8%, and paper, paperboard, cellulose wadding and webs of cellulose fibers (coated, impregnated, covered, surface colored or decorated), with 9.5% average over the period (Table 14). In the first group of products, items of highlight include fiber

paper w/ mech. proc. <= 10%, 40 <= p <= 150g /m^2, side sheet <= 360mm, with average of 26.2% participation in exports (US$ 536,215,123, 00) in the triennium and kraft paper, mech. processed fiber <= 10%, 40g/m^2 <= p <= 150g/m^2, with 9.7% on average of exports (US$ 198,232,352.67); the second group participates with other paper / paperboard for writing, etc. mech. fiber > 10%, rolls, totaling $ 221,474,503.33 in the three-year average, or 10.9%, and other multi-layer paper coated with kaolin, rolls/sheets, with $ 150,961,715.33 (7.4% average for the triennium).

Table 14. Average amount of exports (US$) and average share (%) of paper products in the 2010 - 2012.

DESCRIPTION	AVERAGE AMOUNT	AVERAGE SHARE (%)
Uncoated paper and paperboard of a kind used for writing, printing or other graphic purposes and paper and paperboard used to make cards and punch tape, not perforated, in rolls or sheets of square or rectangular shape, in any form	$ 925,735,838.33	45.2%
Paper and paperboard, coated on one or both sides with kaolin or other inorganic substances, with or without a binder, and with no other coating, whether or not surface-colored, surface-decorated or printed, in rolls or rectangular (including square) sheets of any size falling under CN codes	$ 426,266,842.00	20.8%
Kraft paper and paperboard, uncoated, in rolls or sheets, other than those of heading 4802 or 4803	$ 201,079,968.00	9.8%
Paper, paperboard, cellulose wadding or webs of cellulose fibers, coated, impregnated, covered, surface-colored, surface-decorated or printed, in rolls or sheets of rectangular or square shape, of any shape or size other than goods of the kind described in heading 4803, 4809 or 4810	$ 193,728,204.67	9.5%
Cartons, boxes, cases, bags and other packing containers, of paper, paperboard, cellulose wadding or webs of cellulose fibers; paperboard of a kind used in offices, shops or the like	$ 96,438,864.33	4.7%
Cigarette paper, whether or not cut to size in booklets or tubes	$ 49,284,609.33	2.4%
Ledgers, account books, notebooks, order books, receipt books, appointment notebooks, letter pads, diaries and similar articles, exercise books, document folders, binders, covers for binders (loose-leaf or other)	$ 32,471,383.67	1.6%
Other	$ 32,471,383.67	2%
GRAND TOTAL	**$ 2,049,169,106.33**	**100.0%**

Source: Aliceweb, 2013.

Imports have focused on paper and paperboard coated with kaolin or other inorganic substances. On average this product group accounted for 33.6% of national imports in the 2010-2012 triennium. In second comes the group type "newsprint paper in rolls or sheets" with 15.1% of imports and, thirdly, "paper products, paperboard, cellulose wadding and webs of cellulose fibers (coated, impregnated, surface-colored or surface-decorated), with 13.1% average participation over the period (table 15). On a more specific level, the first group is represented by product type "other paper/paperboard f/ writing, etc., fiber mech <= 10%" (US$ 160,624,761.67, or 9.9%), and "other paper/paperboard f/ writing, etc. p > 150g/m^2 fiber <= 10%" (US$ 98,819,867.67, or 6.1%) and "other paper f/ writing, etc. fiber <= 10%, rolls (US$ 95,359,151.00, or 5.9%). The second group is formed in its entirety (15.1% of imports) by product type "newsprint paper, rolls/sheets, p <= 57g/m^2, mech. proc. fiber >= 65%".

Table 15. Average amount of Imports (US$) and average share (%) of paper products in the 2010-2012 triennium

4-DIGIT NCM NUMBER	DESCRIPTION	AVERAGE AMOUNT (US$)	AVERAGE SHARE (%)
4810	Paper and paperboard, coated on one or both sides with kaolin or other inorganic substances, with or without a binder, and with no other coating, whether or not surface-colored, surface-decorated or printed, in rolls or rectangular (including square) sheets of any size falling under CN codes	547,635,414.00	33.6%
4801	Newsprint, in rolls or sheets	246,926,622.33	15.1%
4811	Paper, paperboard, cellulose wadding or webs of cellulose fibers, coated, impregnated, covered, surface-colored, surface-decorated or printed, in rolls or sheets of rectangular or square shape, of any shape or size other than goods of the kind described in heading 4803, 4809 or 4810	214,198,021.00	13.1%
4802	Uncoated paper and paperboard, of a kind used for writing, printing or other graphic purposes, and non-perforated punch card and punch tape paper, in rolls or rectangular(including square) sheets of any size	194,852,163.67	11.9%
4819	Cartons, boxes, cases, bags and other packing containers, of paper, paperboard, cellulose wadding or webs of cellulose fibers; paperboard of a kind used in offices, shops or the like	116,640,017.33	7.1%

4805	Other uncoated, non-impregnated paper and paperboard, in rolls or sheets, not further worked or processed than as specified in Note 3 to this Chapter	62,632,830.00	3.8%
4818	Paper used for the manufacture of toilet paper and similar paper, cellulose adding or webs of cellulose fibers, of a kind used for household or sanitary purposes, in rolls of a width not exceeding 36 cm, or cut to size or shape;	57,123,986.33	3.4%
4804	Kraft paper and paperboard, uncoated, in rolls or sheets, other than those of heading 4802 or 4803	47,602,440.67	2.9%
	Other	146,052,750.00	9%
GRAND TOTAL		**1,633,664,245.33**	**100.0%**

Source: Aliceweb, 2013.

Among the countries to which Brazil exported, the leaders are Argentina and the United States. Together these countries surpass the mark of $ 600 million, or 30% of exports. These two countries are also the two countries from Brazil imported the most pulp in 2012. Table 16 shows exports amount in US$ per year per country. These top ten countries account for 75% of national exports. Figure 11 plots the exports of 2012.

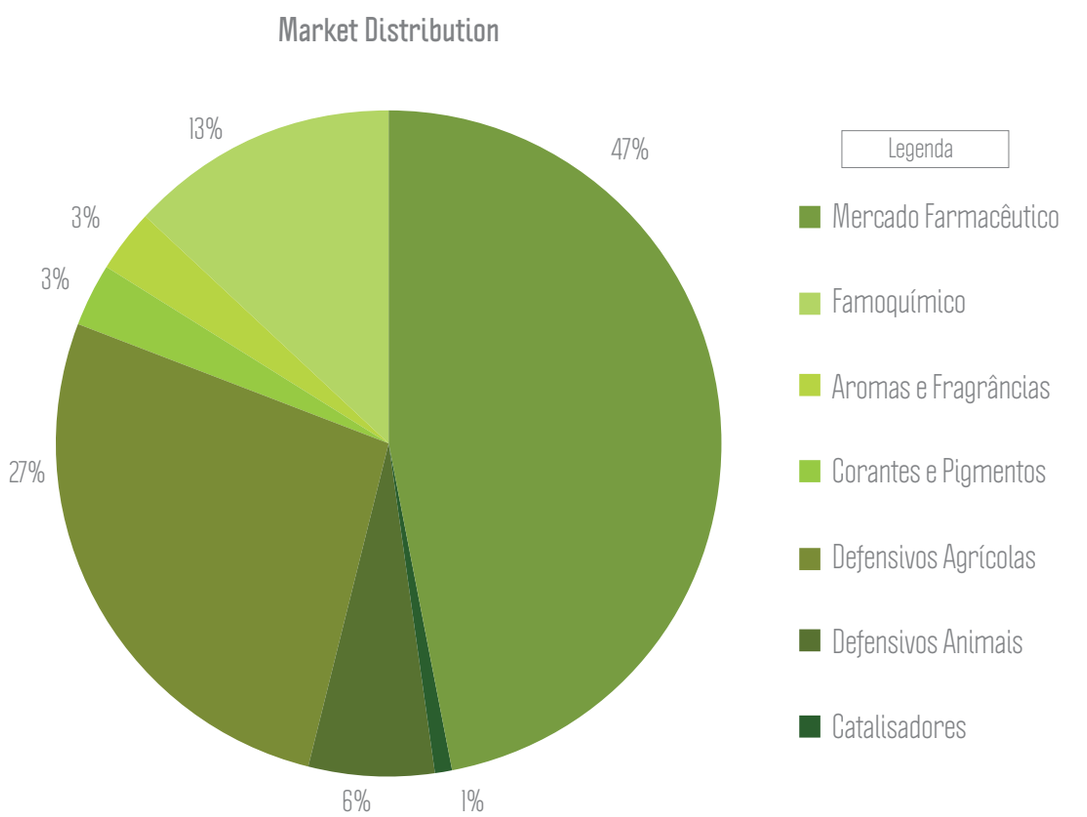
Table 16. List of countries to which Brazil exported paper in the 2010-1012 triennium in US$

COUNTRIES	2012	2011	2010
Argentina	400,887,739.00	382,782,642.00	456,218,133.00
United States	201,464,706.00	194,586,589.00	205,811,128.00
The United Kingdom	144,109,889.00	110,154,254.00	141,581,305.00
Chile	105,788,152.00	119,417,191.00	103,339,127.00
China	86,752,888.00	76,947,368.00	96,614,675.00
Venezuela	86,141,075.00	117,093,752.00	111,378,398.00
Paraguay	84,334,324.00	93,239,137.00	99,342,157.00
Peru	69,860,360.00	76,122,938.00	88,314,686.00
Spain	55,879,967.00	48,544,268.00	70,919,295.00
Colombia	52,741,261.00	61,931,032.00	57,835,523.00
Singapore	49,600,221.00	57,635,648.00	45,334,065.00

COUNTRIES	2012	2011	2010
Italy	44,914,708.00	41,875,475.00	57,458,239.00
Cayman Islands	43,750,483.00	16,368,974.00	26,107,995.00
Uruguay	43,436,156.00	43,330,698.00	45,953,715.00
Bolivia	39,516,158.00	38,679,873.00	42,544,483.00
OTHERS	**499,377,511.00**	**472,661,962.00**	**538,826,996.00**

Source: Aliceweb, 2013.

Figure 11. Distribution of paper exports per country in 2012 (US$). Source: Aliceweb, 2013

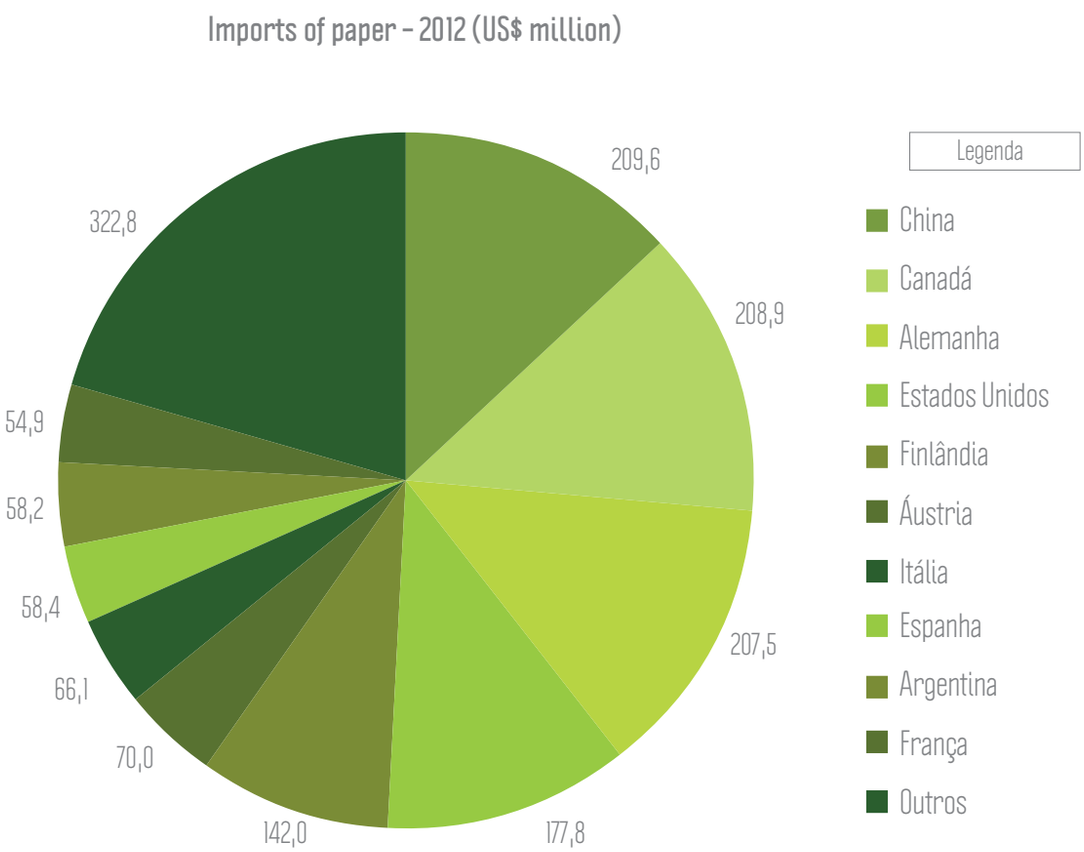


The 10 countries reported in Table 17 represent 78% of Brazil's imports. Imports of paper by Brazil have three leading sources: China, Canada and Germany, all nearly tied in 2012 (Figure 12). However, China has been increased its imports to Brazil at an accelerated pace. Imports grew by 86% in three years, which made China jump from sixth place in 2010 to first place in 2012. A noteworthy fact is that China is also be the main buyer of pulp in Brazil, consuming ¼ of the pulp exported by the country.

Table 17. Countries from which Brazil imported paper in the 2010-2012 triennium

COUNTRIES	2012	2011	2010
China	209,577,327.00	172,439,934.00	112,180,616.00
Canada	208,875,413.00	224,146,646.00	207,459,484.00
Germany	207,505,994.00	213,105,379.00	174,531,354.00
United States	177,838,418.00	196,847,234.00	187,420,458.00
Finland	142,045,429.00	171,182,395.00	163,293,324.00
Austria	69,984,258.00	75,324,875.00	79,479,766.00
Italy	66,129,352.00	61,131,709.00	49,125,956.00
Spain	58,379,095.00	44,772,271.00	32,045,982.00
Argentina	58,189,323.00	87,631,255.00	73,019,764.00
France	54,920,260.00	65,342,535.00	65,586,513.00
Others	322,832,101.00	387,393,765.00	356,685,165.00

Figure 12. Distribution of paper imports by country in 2012 (US$). Source: Aliceweb, 2013



Annex 5 – Overview of the Fine Chemicals Industry

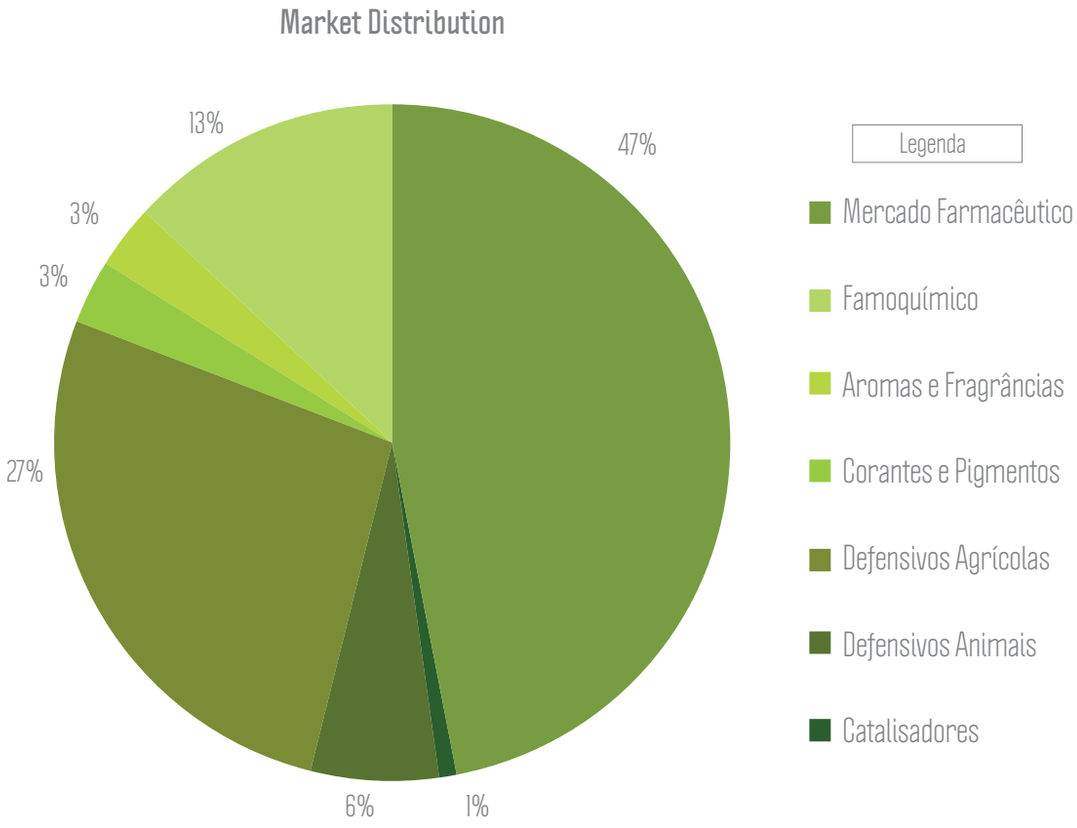
The Fine Chemicals sector is represented by a set of companies that manufacture a wide variety of products with high technological content and high added value, such as chemical synthesis intermediates and chemical 'use' intermediates (active ingredients used in the manufacturing of products), for use as drugs, medicines, vaccines, animal and agricultural pesticides, industrial catalysts, dyes, additives and aromatic fragrances and products, analytical reagents and test reagents and high-tech products for various specific applications.

A fine chemicals industry may be a 'monodrug' specialist or focus on sophisticated physical mixtures, always characterized by the high technological content of its products and by targeting end products with large unit value.

Figure 1. Production chains of fine chemicals.

<table>
<tr><td rowspan="2">ORGANIC
Petrochemical or Biomass</td><td rowspan="2">REACTION INTERMEDIATES</td><td rowspan="2">PERFORMANCE INTERMEDIATES
Drugs or Technical products</td><td>DRUGS</td></tr>
<tr><td rowspan="2">AGROCHEMICALS</td></tr>
<tr><td>INORGANIC
Synthetics or Extraction Minerals</td><td colspan="2">ADDITIVES
CATALYTICS</td></tr>
</table>

Source: Oliveira, 2005.



Chemical synthesis intermediates are products manufactured by chemical synthesis, usually through petrochemical or biotechnological processes, from basic organic chemistry raw materials of petrochemical or biomass origin. From the synthesis intermediates are produced the 'use intermediates', i.e. the active ingredients used in the manufacture of specialty drugs - drugs, pesticides and animal drugs, as well as the other specialty applications of fine chemistry – including products placed in the consumer market, like cosmetics.

The fine chemical industry has sought new technological routes, such as biotechnology, to leverage Brazilian biodiversity, either for energy production (such as ethanol and biodiesel), or as raw material for the entire chemical industry in the future (Oliveira, 2005).

In terms of economic importance of this industry in Brazil, revenues for 2004 for the sector were estimated at around US$ 12.3 billion, which represented about 21% of the revenues of the Brazilian chemical industry (US$ 12.3 of US$ 58.7 billion) (Oliveira, 2005).

The chemical industry is strategic for the country's development. It is an industry that has been increasingly thriving on the immaterial, i.e. that which is not seen but adds value to the product, such as advanced technologies embedded in products produced on small scale but with immense value.

According to estimates from ABIQUIM (2012), net sales for the sector were of R$ 226.1 billion in 2010. This performance represents a 26.9% increase in dollars over 2009, putting Brazil in seventh place in the world ranking of chemical industries (in terms of net sales). On the national scene, the chemical industry accounted for 2.6% of Brazil's GDP in 2009 and 10.1% of its manufacturing GDP, which places it as the fourth most important industry in the country.

Despite its importance, both nationally and internationally, the Brazilian chemical industry has been unable, historically, to meet domestic demand, and therefore imports have grown much faster than exports, resulting in deficits in the balance of trade of chemicals. In 1990 the deficit in this segment was of US$ 1.19 billion, increasing to US$ 6.63 billion in 2000 and reaching US$ 8.46 billion in 2006 (CNI, 2011). In 2010, the deficit reached US$ 20.67 billion (Abiquim 2012)

Regarding the specific segments of the sector, pesticides or agrochemicals had a very important role in the successive increases in the Brazilian agricultural productivity, contributing to the development and advancement of Brazilian agriculture. It is a segment that has been growing strongly in Brazil, which is today the world leader in consumption of agrochemicals, a position previously occupied by the United States. Revenues of the segment in 2011 were of US$ 8.5 billion, up 16% compared to 2010 (US$ 7.3 billion). Despite this increase, the agrochemical segment has shown deficits in the balance of payments.

The Drugs and Medicines segment is characterized as R&D-intensive and as the most important link in the drug industry production chain. The trend in this segment throughout the world is the search for alternative production routes by means of biotechnological processes and the production of drugs obtained from natural raw materials, the so-called herbal medicines.

Despite the US$ 17.1 billion increase in revenue in 2008, the balance of trade of the Brazilian pharmaceutical industry has been showing continuous deficits, which reached about US$ 2.0 billion in 2008. Regarding the pharmacochemical industry, responsible for the production of active principles, the deficit was of US$ 1.1 billion in 2008. Despite the accumulated deficit there have been increases in Brazilian drug and drug exports in recent years, which reached about US$ 1.2 billion in 2008. Medicines exports amounted to 65% of that total, while pharmaceutical chemicals responded for the remaining 35%. Exports of drugs and medicines increased by about 50% between 2005 and 2008.

In the pharmacochemical/pharmaceutical industry, imports of strategic inputs do not stop growing, and now account for over 90% of the country's needs. The Brazilian fine chemicals industry currently

experiences a worrying situation due to lack of competitiveness of their products against similar Asians products, both in the internal and foreign markets. The trade deficit in the pharmaceutical industry is increasing every year, reaching close to US$ 6.7 billion in 2012. Of these, US$ 1.8 billion refer to active pharmaceutical ingredients (APIs).

The Animal Drugs segment consists of approximately two hundred companies, mostly small and of national capital (ABIFINA), but this market segment is led by multinationals. Sales of that sector in the country have increased in recent years, from US$ 2.6732 billion in 2009 to US$ 3.415 billion in 2011, or 27.76% growth in two years.

The vaccines segment, according to the ABIFINA classification, comprises only human vaccines. It is a segment that is not self-sufficient in production and does not meet the internal demands of the country, thus requiring the import of vaccines.

Catalysts and additives comprise another segment. Data on catalysts shows that although exports have increased, the trade deficit has also grown. For additives, no statistical data is available on its production and market share levels, largely due to its high dispersion in terms of nature of the products and their applications.

The companies that make up the Synthesis Intermediates segments are highly dependent on products from third countries, which have been growing in market share over the years, leading to imports of US$ 5,651 million of synthesis intermediates.

The segment of Dyes and Organic Pigments in Brazil consists of a small number of dyestuffs manufacturers. Their annual sales revolve around US$ 100 million. Such segment has been showing growing trade deficits in recent years.

A statistical analysis of the fine chemicals industry conducted by ABIFINA presents estimated and approximate data because the way the different players of the sector classify their products is not harmonized. In the Mercosur Common Nomenclature (NCM), for example, the data are scattered between chapters 15 and 39. This is repeated in the nomenclature by the Brazilian IBGE, making it difficult to precisely quantify economic significance. The import and export data were obtained from official sources of the Federal Government - the Secretariat of Foreign Trade of the Ministry of Development, Industry and Foreign Trade - and by industry associations like ABIFINA, ABIQUIM and ABIQUIF.

SECTOR	IMPORTS AND EXPORTS (US$ THOUSAND)								
	IMP 2010	EXP 2010	BALANCE 2010	IMP 2011	EXP 2011	BALANCE FOR 2011	IMP 2012	EXP 2012	BALANCE FOR 2012
Catalytics	235.080	37.077	-198.003	257.916	48.461	-209.455	239.445	59.763	-179.682
Dyes & Pigments	338.133	75.548	-262.585	310.874	81.545	-229.329	335.124	66.384	-268.740
Pesticides	1.533.600	423.334	-1.110.266	1.958.809	471.728	-1.487.081	2.245.806	428.698	-1.817.108
Animal Vaccines	103.400	21.923	-81.477	145.428	26.637	-118.791	150.867	32.348	-118.519
Pharmacochemicals	2.362.200	514.800	-1.847.400	2.483.700	807.700	-1.676.000	2.535.200	757.300	-1.777.900
Drugs	3.244.982	910.629	-2.334.353	3.597.675	1.061.566	-2.536.109	3.681.484	1.114.552	-2.566.932
Human Vaccines	1.097.300	23.037	-1.074.263	559.539	26.238	-533.301	584.883	20.539	-564.344
Total	8.914.695	2.006.348	-6.826.870	9.313.942	2.523.876	-6.790.066	9.772.809	2.479.583	-7.293.226

Source: Data from ABIFINA and ABIQUIF (www.abifina.org.br)

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