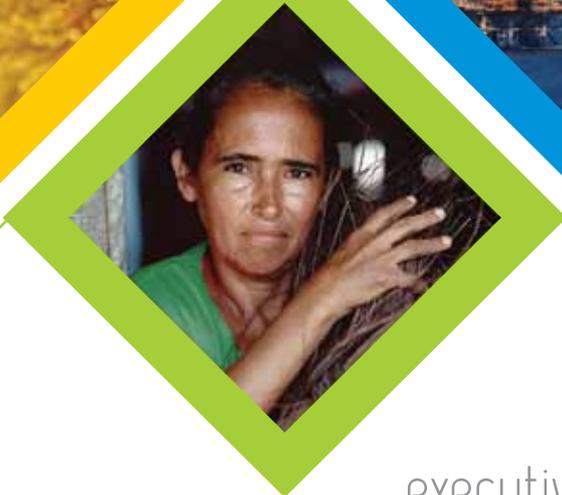


Preliminary Report

TEEB

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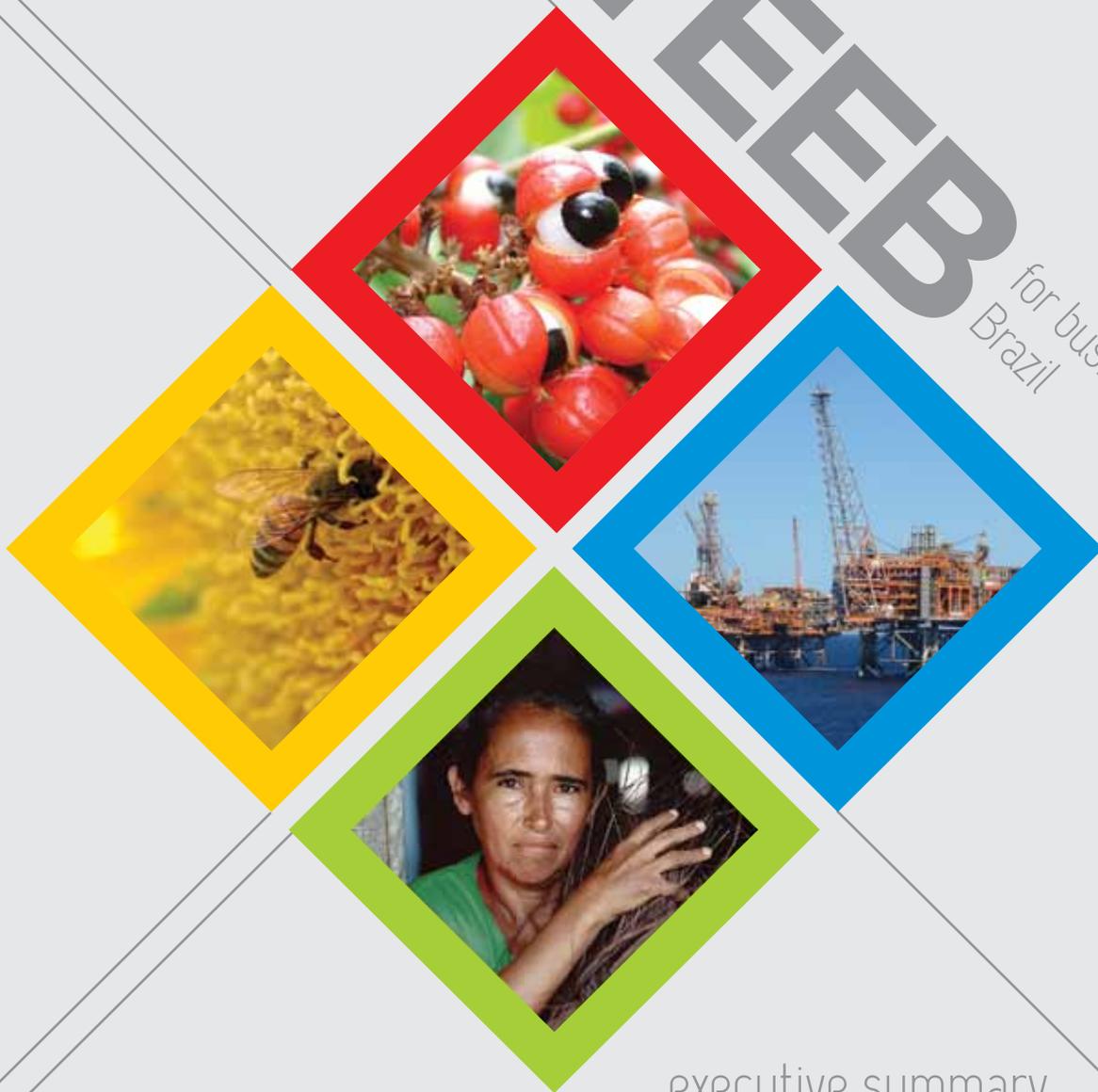


executive summary

Preliminary Report

TEEB

for business
Brazil



executive summary

Building upon a strong foundation of science, partnership and field demonstration, CI empowers societies to responsibly and sustainably care for nature, our global biodiversity, for the long term well-being of people. Founded in 1987 and marking its 25th anniversary in 2012, CI has headquarters in the Washington, DC area, and 800 employees working in nearly 30 countries on four continents, plus 1,000+ partners around the world. For more information, please visit us at www.conservation.org or on Facebook, or follow us on Twitter.

CI started working in Brazil in 1988 and was established as a national NGO in Brazil in 1990. CI-Brazil has offices in Belo Horizonte (MG), Belém (PA), Brasília (DF) and Rio de Janeiro (RJ), as well as a field office in Caravelas (BA). For more information about CI's programs in Brazil, visit www.conservacao.org or follow us on Twitter @CIBrasil and Facebook Conservação Internacional CI-Brazil.

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This report is based on the TEEB project (The Economics of Ecosystems and Biodiversity), a global study that discusses the necessity to consider the value of Biodiversity and Ecosystem Services (BES) in economic assessments.

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TEEB for the Brazilian business sector

The Economics of Ecosystems and Biodiversity (TEEB) is a global study initiated by the Environment Ministers of the G8 countries and the five largest developing economies. The study discusses the need to consider the value of Biodiversity and Ecosystem Services (BES) in economic evaluations. The main conclusions most relevant to the business sector include:

- Many services provided by ecosystems are not captured in financial and investment analyses, which results in decisions that progressively degrade the environment and could lead to significant social and economic costs;
- Decision-makers should take into consideration the costs and benefits of ecosystem services. One way to do this is to attribute a monetary value to BES. This entails using tools and methodologies that have been developed to “decipher” the tangible and intangible values of nature in monetary terms. However, these valuation methods and tools are still incomplete and controversial. Significant advances have been made, but it is still necessary to define the guidelines for determining how BES valuation methods and approaches should be incorporated into decision-making;
- Conventional steps to measure the economic performance of countries such as Gross Domestic Product (GDP) or investment performance (discount rate) still do not reflect the stock of natural capital and the flow of ecosystem services, resulting in a lack of recognition of the value of BES to businesses;
- Developing systems that account for business dependencies and impacts on BES is essential to changing the attitudes of actors throughout the entire value chain. Standards and methodologies to account for and report on such externalities should be developed both in the international and national spheres.

Linking business decisions with biodiversity and ecosystem conservation will be one of the great challenges of the coming years, which is why the United Nations proclaimed

2010-2020 the Biodiversity Decade. In this context, the current report is released at the time of yet another important event for international negotiations related to this topic: the United Nations Conference on Sustainable Development – Rio+20 – held during 2012 in Rio de Janeiro.

Brazil is home to some of the most important biomes in the world in terms of biodiversity and has great potential to help lead the global discussion on BES, which was the basis for the development of the report **“TEEB for business Brazil”**. **The objective of the report is to highlight the relationship between business and BES – in terms of dependency and impact – and to guide the strategic management of related risks and opportunities.**

Recognizing businesses’ **dependencies and impacts on BES** allows organizations to adopt a long-term perspective that is not only based on currently perceived risks, but also on more unpredictable ones, such as the impacts on businesses from climate change, population growth and the growing scarcity of natural resources. For this report, both the dependency and impact of business on BES, as well as **the risks and opportunities for the business sector related to BES** were adapted to the Brazilian context; they were based on the main trends related to BES and businesses as presented in the Global TEEB¹.

“Brazil is a biodiversity superpower, not only given its size, but also the variety of species and the vast quantity of genetic material still undiscovered in its forests. This is a highly valued natural capital that could put the country in a position of leadership in global discussions.”

Pavan Sukhdev, creator of TEEB

¹ For a deeper understanding of the global scenario and concepts, see the international report available at: <http://www.teebweb.org>.



In Brazil, business activities related to BES conservation should consider the dynamics of economic growth in the country. Thus, perspectives from key sectors of the Brazilian economy have been included in the report². The selected sectors include:

- Agriculture, Pulp & Paper
- Oil & Gas and Chemicals
- Cosmetics and Pharmaceuticals
- Mining and Construction
- Financial institutions
- Retail

This executive summary forms an integral part of the **“TEEB for business Brazil”** preliminary report, a product coming out of the first phase of a project headed by Conservation International - Brazil in partnership with the United Nations Environment Programme-World Conservation Monitoring Center (UNEP-WCMC). The project is sponsored by Vale, Natura, Monsanto and Santander. The complete report was divided into seven chapters with specific objectives, which are summarized and presented in the following sections.

“Biodiversity management by companies combines business success with the conservation of biological diversity... For the conservation of our biological diversity, it is important to have a broad-based integration of both biodiversity and business decision management.”

MEB-Brasil – Movimento Empresarial pela Biodiversidade – Brasil

² The Agriculture, Paper and Cellulose, Mining and Construction, Cosmetics and Pharmaceuticals, and Oil, Gas and Chemicals sectors were grouped according to the similarities of their relations of dependency and impact with BES, although these may express themselves in different scales and contexts.



Brazil, a global power in natural capital

Brazilian biodiversity represents a natural heritage of great national and international importance. As a country, Brazil is home to the greatest terrestrial biodiversity, accounting for 15 and 20% of the 1.5 million species on Earth (1), distributed among the Amazon, Cerrado, Caatinga, Atlantic Forest, Pantanal and Pampa biomes. In addition to being rich in biodiversity, these biomes provide a series of relevant ecosystem services. In the context of this report, it is important to understand the significance of the following terms:

- **Biodiversity:** According to the Convention on Biological Diversity, biodiversity is the “variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems”;
- **Ecosystem services:** According to the Millennium Ecosystem Assessment (2), ecosystem services are defined as “benefits that people obtain from ecosystems”. These services can be classified as: provision, regulation, support and cultural. TEEB Global (3) states that the concept of ecosystem services outlines the shifting values generated for human society through the state and quality of natural capital.

Given its immense natural capital, Brazil has made an effort to adopt regulations that protect BES. After the ratification of the Convention on Biological Diversity (CDB) by the Brazilian National Congress in 1994, the country has advanced in establishing a set of regulations aimed at including BES in public policy planning. The goals and commitments made at CDB were the basis for the regulations and public policy that came out for biodiversity conservation in the country. In terms of protected areas, Brazil’s goal consists of officially protecting 20% of its continental area or 30% of national jurisdiction. While Brazil is making progress and is one of the few countries in Latin America that has officially adopted a National Biodiversity Strategy, only two of the 51 goals for the period 2002-2010 have been reached .

³ The targets reached included an accessible list of species in permanent databases and a 25% reduction in the number of hotspots in all biomes.

According to a study by UNEP-WCMC (4), the set of environmental services provided by Conservation Units generate economic contributions that, when monetized, significantly surpasses the sum that has been earmarked by public administration to the National System of Nature Conservation Unites (SNUC). Additionally, the study estimates that the creation and maintenance of the Conservation Units in Brazil have prevented the emission of at least 2.8 million tons of carbon, with a conservatively estimated monetary value of R\$96 billion.

In a global context, the 2012 Conference of the Parties in Japan resulted in the signing of an accord that revisits and renews the CDB goals for the period 2011-2020 – known as the Aichi Targets. The Nagoya Protocol, which establishes rules for access to genetic resources and the fair and equitable sharing of benefits arising from utilization of biodiversity, was also signed at this conference. In response to the Nagoya Protocol and the Aichi Targets, the Ministry of the Environment (MMA) is now developing the Brazilian strategy for 2020 based on the targets established through a process called “Dialogues on biodiversity: constructing a Brazilian strategy for 2020” (5), which is coordinated by MMA, the International Union for the Conservation of Nature (IUCN), WWF-Brazil and the *Instituto de Pesquisas Ecológicas* (IPE). This represents a first step for Brazil toward internalizing the Aichi Targets by establishing means for implementation such as the national plan, sectoral plans, the setting of national biodiversity targets and of financial support mechanisms.

Despite these advances, the pace of economic growth in Brazil over the past decade has increased the pressure on biomes of great importance to the country’s biodiversity. With forecasts indicating the continued growth of Brazil’s

economy over the coming years, it is expected that the pressures and stress to Biodiversity and Ecosystem Services will continue to grow as well.

How economic growth in Brazil influences BES

Over the past decade, Brazil's economy grew from the ninth to the sixth-largest economy in the world, and the expectation is that it will continue to grow above the global average through 2020 (6).

The 2010 Brazilian Demographic Census presents evidence that the greatest average population growth rates are taking place in the northern and central-western regions. This increase indicates significant migration is driven not only by economic dynamics, but also by Government programs such as the Growth Acceleration Programs that will result in the construction of large public works and developments primarily in the northern and central-western regions of the country. These regions are also home to some of Brazil's most important biomes, such as the Amazon, Cerrado and Pantanal.

The main drivers of biodiversity loss and ecosystem degradation are a combination of a) environmental factors - direct drivers such as the loss of habitat; and b) socio-economic factors – indirect drivers such as demographic growth and political scenarios, as illustrated in Table 1 (7).

Table 1: Relation between activities and their significance to biodiversity loss in Brazil

SOCIO-ECONOMIC FACTORS	ENVIRONMENTAL FACTORS
These activities:	Result in:
Occupation infrastructure (mainly roads).	Loss of habitats for reproduction, migration, etc
Large projects (e.g. mining and energy).	Degradation of habitats and ecological imbalances.
Production of commodities and agricultural products (e.g. agricultural expansion).	Fragmentation and isolation of populations and loss of genetic variability.
Settlement processes and demand for land: induced by Government (e.g. settlements), real estate speculation, land-grabbing, etc.	Invasive species, pests, competition and hybridization.
Urban centers or agricultural activities (e.g. use of herbicides, fungicides, insecticides) and industries (e.g. mining, oil and gas).	Reduced effective population size.
Challenges in transforming potential opportunities of native habitats into real economic gains.	Pollution of water and soil.
Hunting for consumption, incidental capture and conflicts with humans.	
Hunting for trade.	

Source: Adapted from *Quarto Relatório Nacional para a Convenção Sobre Diversidade Biológica* (7).

Recently, the overall deforestation rate has fallen across Brazil's biomes, especially in the Amazon. However, increased pressure on ecosystems resulted in a loss of plant cover in other important biomes, such as the Atlantic Forest which has lost more than 70% of its area as indicated in table 2.

Table 2: Results of monitoring biomes through the Brazilian Biome Deforestation Monitoring Project via Satellite

BIOME	TOTAL AREA IN KM²	AREA LOST IN % 2009	ANNUAL RATE OF PLANT LOSS IN % (BETWEEN 2008 AND 2009)
Amazon	4,196,943	17.63	0.17
Caatinga	826,411	45.92	0.23
Cerrado	2,047,146	48.22	0.37
Atlantic Forest	1,103,961	75.9	0.02
Pampa	177,767	54.12	0.18
Pantanal	151,113	13.3	0.12

Source: Adapted from "Indicators of Sustainable development, 2010" (8)

The loss of BES will have consequences not only for the environment, but also for the prosperity and sustainability of the economy in these regions and for Brazil as a whole.

The economic impact from the loss of BES

The monetary value of the planet's biodiversity – including ecosystem services originating from forests, as well as from agriculture, freshwater, coastal and marine ecosystems – is estimated at US\$ 33 trillion per year (9). This figure is approximately ten times the amount currently spent by governments, industry and NGOs on biodiversity protection.

Brazil is home to the largest tropical forest cover in the world. This is particularly concentrated in the Amazon region, which contains close to 12% of the world's forest cover (7). According to this study, it is possible to infer, although in an imprecise way, that the costs of biodiversity conservation in Brazil could exceed US\$36 billion per year (12% of the US\$33 trillion estimated by the study cited above), which represents approximately 0.9% of the Brazilian GDP⁴. As a comparison, the Environment Ministry's 2011 budget for conservation programs was approximately US\$2 billion.

However, according to the Global TEEB Report, not adopting any additional BES conservation measures could result in costs ranging from US\$2 - 4.5 trillion per year:

- **The economic value of ecosystem services** on the planet is estimated to be around US\$33 trillion (9), of which nutrient cycling is the ecosystem service of greatest value at US\$17 trillion – more than half of the total. Forests contribute with services valuing US\$4.7 trillion, such as nutrient cycling, supply of raw materials, climate regulation and erosion control;
- A loss of BES also results in the deterioration of water resources. Although Brazil holds 12% of the world's water resources, its distribution is heterogeneous and the scarcity of this resource would represent a risk to businesses, especially in the cases of urban and industrial supply, the generation of hydro-electricity and the maintenance of agricultural production;
- A study by the *Water Resources Group* (10) predicts that just the State of São Paulo will demand more than 20 billion cubic meters (m³) of water in 2030. For comparison, the current supply is just above 18 billion m³. To eliminate the gaps aggregated in four regions of the State of São Paulo, the study estimates an annual cost of US\$18 billion. Extrapolating the findings to the global demand for water, the costs of increasing supply could vary between US\$50 and 60 billion per year. This amount, although high, is still 75% smaller than the investment that would be necessary in the event no measures are taken to reduce water consumption by 2030.

⁴ GDP in 2011: US\$ 2,5 trillion.

Some businesses recognize that water supply, together with the management of greenhouse gas (GHG) emissions, is one of the ecosystem services considered most relevant to the agendas of Brazilian businesses. There is an expectation that water management will be one of the most important issues from a business perspective, given that its relevance to business operations is more tangible and that dwindling supplies would result in direct impacts on productive activities (11).

- The relationship between BES loss and water scarcity involves complex environmental dynamics that are difficult to detect using traditional methods of business management. Studies suggest that the loss of ecosystem services provided by the Amazon forest could affect the main urban centers in the southeastern region of Brazil. Air masses from the Amazon forest transport an amount of water vapor that can reach the same grand scale as the flow of the Amazon river (200,000 m³/s). The routes of these "flying rivers" include the states of Goiás, Santa Catarina, Mato Grosso, Paraná, São Paulo and Minas Gerais and play a critical role in the hydrological cycle in the Rio Prata basin – the hydrographic basin that extends across Brazil, Uruguay, Bolivia, Paraguay and Argentina.
- Beyond impacts to water flow and climate, deforestation in the Amazon also implicates direct economic losses. A study carried out by the *Instituto de Pesquisa Econômica Aplicada* (IPEA) estimated the cost of deforestation in the Amazon at US\$108 per hectare per year. This figure includes the supply of extracted resources and environmental services and the value of future use of genetic resources, among other factors⁵. The conclusion of the study highlights that "in order for the [BES] losses caused by deforestation in the Amazon forest to not damage local communities, it would be necessary to create market mechanisms or international compensation schemes that value the environmental services of forests, which are captured by the global population as a whole" (12).

The examples presented seek to demonstrate that the loss of Biodiversity and Ecosystem Services have direct and measurable impacts on the economy. However, these impacts will be felt unequally across society:

- Data from the *Global Footprint Network* illustrates that more than 80% of the global population live in coun-

⁵ For information on currently available valuation methods, see "TEEB Ecological and Economic Foundations in Environment and Development Economics", available at: <http://www.teebweb.org/EcologicalandEconomicFoundation/tabid/1018/Default.aspx>.

tries whose resource consumption is greater than its generative capacity. These countries rely on the excess resources concentrated in the so-called ecological creditors – countries that consume less than their biocapacity – to fulfill domestic needs. Developing countries assume a large portion of environmental impacts by exporting agricultural and mining products and other raw materials to developed countries;

- This pattern can also be observed within a large country like Brazil. The southeastern region is the main energy consumer in the country, but in accordance with the Decennial Plan for Energy Expansion new developments should be concentrated in the northern region. The construction and operation of these works are frequently related to a BES loss where they are located.

This viewpoint is not always clear, because the economic indicators traditionally used worldwide, such as the Gross Domestic Product (GDP), do not reflect this relationship between society and its dependence on BES;

- Brazil for example, ranks 84th on the Human Development Index (HDI) rankings, but is considered the sixth-largest global economy;
- A study developed by the *International Human Dimensions Programme on Global Environment Change* (UNU-IHDP) proposes an indicator of natural resource wealth that takes into consideration environmental aspects. According to this new indicator, when factoring the cost of depleted natural resources into economic growth, Brazil has grown 3% since 1990, in contrast to a growth rate of 34% when considering GDP alone;
- There are various initiatives to integrate socio-environmental aspects that reflect human well-being into evaluations of economic growth (13), such as green GDP (14). The Statistics Division of the UN, which defines the methodologies and norms associated with the calculation of National Accounts, has provided instructions for the inclusion of socio-environmental aspects and the normalization of National Environmental Accounts since the 1990s. Thus, this is not a recent initiative, but political support is still required for countries to adopt indicators that include considerations for human well-being as opposed to purely economic aspects.

Despite the fact that conventional indicators to measure economic performance do not reflect changes to natural capital stocks, the recognition of the importance of BES to businesses has increased among industry leaders:

- According to the study *Biodiversity and Business Risks*, carried out by PwC (15), 53% of CEOs in Latin America and 45% in Africa worry about the possibility that biodiversity loss could negatively affect growth prospects for their businesses, in contrast to 11% in Central and Eastern Europe;
- Research by the *Instituto Brasileiro de Opinião Pública e Estatística* (IBOPE) (2011) (16), which surveyed 400 Brazilian business leaders, showed that 70% of those interviewed believe their clients seek to know if their businesses engage in sustainable practices and that they themselves consider sustainability practices when selecting service providers;
- The relevance of the topic “Biodiversity and Ecosystem Services” can be observed in another survey of 21 Brazilian business leaders (17) on the main sustainability trends in Brazil. The question posed to businesses was: “Which of these trends will most impact your business?”



Table 3: Research on sustainability-related topics in 13 sectors of the Brazilian economy

TOPIC	NUMBER OF CITATIONS	NOMINATED AS MOST RELEVANT
Transparency	17	12
Water	14	10
GHG emissions	14	7
Dematerialization ⁶ (“Green Information Technology” and virtual businesses)	10	6
Environmental services	5	4
Organic and natural	3	1
Biodiversity	2	0

Source: Adapted from Idéia Sustentável, 2011 (17)

The growing recognition of the importance of BES by the private sector has led to important initiatives with the aim at discussing ways to promote strategic management of BES within businesses, as outlined in Chart 1.

Chart 1: Inter-sectoral initiatives to promote a better understanding of BES by businesses

The *Conselho Temático de Meio Ambiente (COEMA)* (19) is one of the thematic councils of the *Confederação Nacional da Indústria (CNI)*. Its overall objective is to formulate directives and strategies that serve as a basis for the decision-making process and the political, economic and social positioning of CNI in the environmental area.

The *Movimento Empresarial pela Biodiversidade - Brasil (MEB-Brasil)* is an inter-sector movement that seeks to mobilize the business sector toward conservation and the sustainable use of biodiversity and to promote dialogue between government and business in order to improve existing legal and regulatory frameworks, with participation and support from civil society organizations (<http://mebbrasil.org.br/>)⁷ (18).

Another important initiative is the thematic chamber on biodiversity, organized by businesses associated with the *Conselho Empresarial Brasileiro para o Desenvolvimento Sustentável (CEBDS)*. In 2010, CEBDS members agreed to seek the best synergy between business and biodiversity, and to improve the understanding of how these topics relate to their businesses. This is being done through analysis and the selection of tools that allow for an improved management of BES.

“Businesses cannot function if ecosystems and its services— such as water, fibers, food, soil and climate – are degraded and unbalanced”.

World Business Council for Sustainable Development

⁶ Green information technology refers to the use of information systems to improve the efficiency of environmental management, and virtual businesses refer to all services or products sold over the Internet. These alternatives can be divided into three main categories: sellers, brokers and advertisers.

⁷ Launched in 2010, the founding members of MEB include Alcoa Aluminium S.A., Natura Cosmetics S.A., Vale S.A., and Walmart Brasil Ltda., the Brazilian *Associação Brasileira de Comunicação Empresarial (ABERJE)*, *Conservation International Brazil (CI-Brasil)*, the Center for Sustainability Studies at the *Fundação Getúlio Vargas (FGVCes)*, the *Fundo Brasileiro para a Biodiversidade (Funbio)*, the *Instituto do Homem e do Meio Ambiente da Amazônia (Imazon)*, the *Instituto de Pesquisas Ecológicas*, the *Instituto Ethos de Empresas e Responsabilidade Social*, the *Union for Ethical BioTrade (UEBT)* and *WWF-Brasil*.

Relations of dependence and impact between businesses and BES

The loss of BES will have long-term impacts on the global economy, which in turn will affect prices, business models and access to natural resources for all businesses. These implications will also be felt differently depending on the relations of dependence and impact of companies and BES.

Businesses benefit, to a greater or lesser extent, from ecosystem services such as: resource provision, nutrients cycling and maintenance of hydrological cycles. This relation of dependence generates both opportunities and risks for businesses, a compelling reason why businesses should expand their understanding of the topic to identify strategies that best apply to their activities. Table 4 presents some examples of this relationship.

Table 4: Examples of BES and the business sector's dependencies

ECOSYSTEM SERVICES:	RELATED SECTORS (DIRECT USE)	RELATION TO PRODUCTION PROCESS	MAIN IMPACTS FROM A LOSS OR DEGRADATION OF BES
Provision: of water, fibers, fuel and food.	All	- Consumption of raw materials.	- Escassez de recursos. - Aumento de preços de matérias-primas na cadeia de fornecimento.
Provision: of genetic resources, especialmente agrobiodiversidade.	Cosmetics and Pharmaceuticals, Agriculture, Paper and Cellulose	- Prospecting to discover new uses and develop new products and technologies. - Research and development in biotechnology for genetic improvement in cultures and modern commercial creations. - Conservation of resources for research related to areas such as biology, ecology, paleontology, anthropology and archeology.	- Escassez de recursos. - Perda de produtividade agrícola. - Contaminação dos recursos hídricos.
Regulation: water purification.	All	- Human, animal, agricultural, industrial and energy consumption.	- Aumento de custos operacionais por conta da captação e do tratamento de água.
Climate control: carbon stock and regional climate regulation (climate processes, such as water cycles).	All	- Land use and settlement. - Consumption of raw materials. - Emission of greenhouse gases.	- Alteração do regime de chuvas e clima local e efeito sobre as condições ótimas para cultivo agrícola e criação de animais. - Riscos de perdas materiais por conta das cheias e das secas.
Regulation: pollination.	Agriculture, Pulp & Paper	- Agricultural production of food and biofuels.	- Perda de produtividade agrícola.
Regulation: disease control, especially related to agro-forestry activities.	Agriculture, Pulp & Paper	- Maintaining agricultural production.	- Perda de produtividade agrícola.
Cultural: traditional knowledge of medicinal resources.	Cosmetics and pharmaceuticals	- Utilization of medicinal plants as sources for medicines and cosmetics production.	- Diminuição de opções de insumos para comercialização de novos produtos. - Perda de produtividade e de áreas produtivas.
Support: nutrients cycling and soil formation.	Agriculture, Pulp & Paper	- Land use and occupation.	- Aumento do custo com insumos para correção do solo. - Diminuição da qualidade dos recursos hídricos por conta de processos de erosão e assoreamento.

Next, a few sectors of the Brazilian economy will be presented along with a discussion about their dependencies and impacts on BES. The sectors were grouped based on the similarity of their direct relations of dependence and impact to BES, even though the scales of these may differ.

Agriculture and Pulp & Paper

Agriculture is one of the main economic activities in Brazil and it was the sector that grew the most over the past decade (20). The primary agricultural products include corn, soy, sugarcane, rice, cotton, wheat, coffee and oranges. The products with the greatest growth potential in Brazil over the coming years are cotton, soy, sugarcane and forestry for paper and cellulose.

The main relations of dependence on BES include: water availability, soil fertility, nutrient cycling, biological pest control, and the regulation of soils, climate and pollination.

The main environmental impacts in the sector occur due to the use and occupation of soil and the reduction of plant coverage in Brazilian biomes. This may cause erosion, reduced water availability, introduction of exotic species and could affect the quality of the provision of services such as water resources, through the use of pesticides and fertilizers, as well as cause erosion and soil compression. The growth of the Brazilian population and economy poses the challenge of increasing production without contributing to an accelerated loss of biodiversity and the fragmentation of ecosystems. As such, increased production should come primarily from a productivity increase.

The absence of services provided by bees in global agriculture could amount to losses as high as 189 billion dollars (Global TEEB).

Oil & Gas and Chemicals

The petroleum and gas sector represents an important portion of the Brazilian economy. Last year, petroleum production grew by 17.5% (22). Furthermore, the recent discovery of reserves in the pre and post salt layers off the Brazilian coast has greatly influenced national energy planning. In addition to its role in energy provision, oil has other important uses in the chemicals industry for example. The Brazilian chemicals sector brought in R\$ 200 billion in 2009 and represented 2.6% of the GDP (23). The question about dependence on ecosystem services, such as the direct provision of services, which is relevant to almost all other sectors, is of little importance to this sector since petroleum was formed over millions of years. Therefore, the main interactions of the sector with BES are related to investments in mitigation and

compensation for impacts on BES necessary to sustain activities and natural resources in the proximity of these regions.

Considering that the majority of Brazilian petroleum extraction is done via offshore platforms, impacts primarily occur in marine ecosystems during petroleum exploration and production activities including seismic studies, drilling, construction, production, maintenance and transportation (Global TEEB). Activities related to oil and gas extraction are considered the fourth most significant factor in marine biodiversity degradation (24). There is also some onshore extraction in the Brazilian Legal Amazon, especially of natural gas⁸. The exploration of oil and gas and the construction of gas pipelines result in impacts to BES such as erosion and sedimentation of water resources, forest cover clearing in exploited areas and along the roads and pipelines, as well as indirect impacts such as attracting new economic activities and people to the region and risks of accidental spills.

The Amazon region represents the second largest gas reserve in the country. The most efficient way to extract gas and supply municipalities in the region is to construct pipelines, a question that is at the forefront of the debate on the socio-environmental viability of this type of venture in the Amazon, as shown by the Uruçu-Coari-Manaus pipeline that extends to more than 600 km (21).

Cosmetics and Pharmaceuticals

The pharmaceutical sector in Brazil brings in US\$ 10 billion annually, which makes it the fourth largest pharmaceutical industry in the world. The Brazilian industry for personal hygiene, perfumes and cosmetics jumped from R\$ 4.9 billion in 1996 to R\$ 27.3 billion in 2010 (25), an average growth of 10.5% in the past 15 years. According to data from the *Associação Brasileira da Indústria de Higiene Pessoal, Perfumaria e Cosméticos* (ABIHPEC), there are 1,596 firms in the sector, of which only 15 are large-scale companies with annual net revenues of above R\$ 100 million, representing 70% of the total revenue for the sector (25).

These sectors are greatly dependent on BES, especially due to the use of inputs derived from phylogenetic elements, with the goals of discovering natural active elements with therapeutic potential, producing phytomedicines and developing new lines of cosmetic products. In Brazil, phytotherapeutics (herbal) make up an important portion of the pharmaceutical market, representing approximately 7% of this market (7). Factors such as a lack of understanding related to

⁸www.petrobras.com.br

genetic and biological heritage, as well as difficulties in obtaining licenses to develop new products prevent growth in this figure.

The impacts of these industries come from the exploitation of natural resources (including genetic) and from the production process that could result in environmental impacts due to the disposal of residues and wastes. Furthermore, indirect social impacts stemming from the unequal distribution of resources can frequently be observed.

Mining and Construction

The Brazilian mining production in 2011 was estimated at US\$ 50 billion, a 28% increase compared to 2010, thus indicating significant growth in this sector. The main export products in terms of revenue are: iron ore, kaolin, tin, gold, niobium and copper. Mineral aggregates (sand, gravel and clay) are also important and the growth in infrastructure investments for the 2014 World Cup and the 2016 Olympics guarantee a demand for aggregates until 2022 (26). In 2009, the construction sector encompassed 64 thousand businesses employing 2 million people and totaling almost R\$ 200 billion in revenue (27).

The BES dependence of the Mining and Construction sectors occurs primarily through the provision services, such as water and timber.

Impacts are related to habitat loss due to the clearing of vegetation coverage, the pollution of water bodies and the contamination of soil and groundwater due to inadequate disposal of wastewater and solid waste. These impacts are concentrated at the implementation stage of projects, with the primary impact being vegetation coverage clearing.

Financial institutions

Financial institutions depend on the economic growth of the country and in cases where this isn't accompanied by efficient BES management, impacts from biodiversity loss and

degradation could affect their interests directly or indirectly. Examples include downturns in the economy or in specific economic activities due to a scarcity of natural resources; losses and damages caused by increased conflicts around the use and access to BES; and changing patterns of consumption in developed countries.

With regards to impacts, financial institutions have a responsibility to minimize environmental damages caused to BES, due to their responsibility in the economic feasibility of ventures and projects that may have significant impact on BES. An advance concerning this responsibility is the initiative *Biodiversity for Banks* (B4B), developed by the Equator Principles, the *World Wildlife Fund* (WWF) and the *Business Biodiversity Offsets Program*. The B4B is a training program designed to assist banks in incorporating the value of BES in their decision-making.

Retail

The largest retail segments in Brazil are automobiles, fuel, textile products such as fabrics, clothing and footwear, and supermarkets.

The businesses operating in retail show an indirect dependence on BES, mainly through the value chain. Furthermore, the retail sector has the closest access to the final consumer and is therefore capable of influencing the decision-making of consumers in relation to products and brands associated with sustainability. Thus, issues related to biodiversity are mainly associated with the reputation and public image of a company, creating a link between the responsibility of the business and the sectors it finances or how their inputs are acquired, and the final consumer.

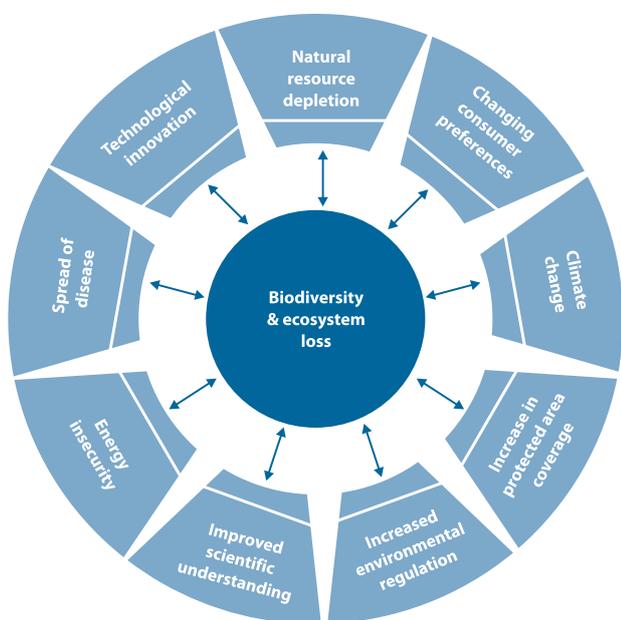
With regards to the direct impacts this sector has on BES, the main impacts are associated with the pollution of soil and waterbodies through the disposal of packaging and other residues, as well as impacts to soil, water and air due to the transportation of merchandise, which in Brazil is centered around roads.

Risks and opportunities associated with BES

Main trends

In the analysis of risks and opportunities, biodiversity loss and ecosystem degradation should be considered in a manner that is integrated with other issues. Economic growth, natural resource depletion, climate change, energy insecurity and changes in consumer preferences are some global trends that influence how BES is perceived by businesses (Image 1). The following sections discuss how these trends manifest themselves in Brazil and in what ways they could significantly impact Brazilian businesses.

Image 1: Trends that affect biodiversity loss



Source: Adapted from Global TEEB, 2011

Depletion or scarcity of ecosystem services and natural resources

This risk is already perceived by Brazilian businesses, which recognize that access to resources will become more

difficult in the future, especially in the case of resources such as water and timber. It is estimated that the main economic risks resulting from resource scarcity will be: price increases of raw materials in the supply chain due to biodiversity loss and degraded ecosystem services; growing operational costs due to catchment and treatment of water or other resources; and impacts from degradation of ecosystem services on the value chain and/or production.

Greater environmental regulation

There is a tendency towards intensified legal and policy reforms in Brazil that are directly or indirectly related to BES conservation, especially in the following areas: biodiversity targets⁹; climate change¹⁰; Payments for Ecosystem Services (PES)¹¹; water resource management¹²; the Forest Code¹³; access to genetic resources, traditional knowledge and sharing of benefits¹⁴; and the creation of mechanisms such as environmental markets¹⁵. Businesses should increasingly expand their efforts to ensure legal compliance with remediation, mitigation and compensation standards for damages caused to biodiversity¹⁶.

⁹ Decree no 4.339/2002, which established the National Biodiversity Policy, through the Strategic Biodiversity Plan 2011-2020 in Brazil.

¹⁰ Law no 12.187/2009, which established the National Climate Change Policy (PNMC) and voluntary emission reduction targets through sectoral plans.

¹¹ Proposed law no 792/2007, which aims to establish the National Payments for Ecosystem Services Policy.

¹² Law no 9.433/1997, which established the National Water Resource Policy and charges for water usage, and could be utilized as a reference for establishing PES mechanisms.

¹³ Law no 4.771/1965, which established the Forest Code, currently under revision, and which will impact biodiversity and business operations.

¹⁴ Law no 11.105/2005, which established security norms and compliance mechanisms for activities involving genetically modified organisms and the Provisional Measure no 2.186-16/2001 (not yet implemented), which deals with the distribution of benefits and traditional knowledge.

¹⁵ Proposed law 195/2011 on REDD+, which aims to create a Certificate of Emission Reductions by Deforestation and Forest Degradation (CREDD).

¹⁶ Some examples of compensation measures currently applied in Brazil include: Taxes (ICMS, Ecological IPTU, etc), fees (charging for water usage, Environmental Monitoring and Control Fee and Licensing Fee), compensation (environmental compensation, compensation for mining resources extraction), and royalties (petroleum and natural gas).

Energy insecurity

Brazil is known for having an energy matrix with the highest percentage of energy generated from renewable sources (45%), compared to 13% in the global matrix (28). According to the Decennial Energy Plan (until 2019), the main investment areas will be in petroleum, natural gas and hydro-electricity (28). The increased demand for energy will result in developments located in increasingly technically challenging operating environments, such as deep water in the case of pre-salt and freshwater resources in the case of energy businesses operating in the Amazon region. It is estimated that approximately 78% of Brazilian hydro-electricity potential is located in the Amazon River Basin. However, exploring these sensitive environments increases political, social and economic risks.

Another relevant issue in Brazil is the production of biofuels. The Decennial Energy Plan forecasts that biofuel production will double by 2019, especially in the case of ethanol, but large-scale production could have impacts on land use and occupation. Thus, plans to order expansion and sustainable production of biofuels are important, as is the Sugarcane Agro-ecological Zoning¹⁷, which aims to provide technical subsidies for the formulation of public policies.

Spread of disease and exotic species

The introduction of certain exotic species in non-familiar ecosystems is one of the causes of Brazilian biodiversity loss, which is why both federal and state government entities have already presented proposals to combat invasive species. A survey conducted by PROBIO in 2005 registered 171 invasive species in Brazil, of which 63 (37%) are animal species and 108 (63%) are plant species (7). The future prospect is that this number could increase by 35% for terrestrial environments or decline by 15%, depending on the programs implemented, while the estimate for marine environments ranges from 3.3 to 0.5 new species introduced per year (7).

Climate change

The risks associated with increased extreme climate events, elevated sea levels, growing pressure on water resources and droughts would drastically alter the availability of ecosystem services that all businesses depend on. One of the sectors most vulnerable to climate change is agriculture (see Chart 2).

Chart 2: Impact of climate change on agricultural production

In 2008, the Brazilian Business for Agricultural Research (Embrapa) carried out a study in partnership with the University of Campinas on the impacts of climate change on Brazilian agriculture (29), which included the main crops cultivated in the country. Starting in the 2007 zoning, climate scenarios were simulated for 2010, 2020, 2050 and 2070. Some of the main results presented by the study indicate that all crops, with the exception of sugarcane and cassava, could be negatively affected by climate change as follows:

“Global warming could compromise food production, resulting in losses of R\$ 7.4 billion in 2020, and possibly reaching R\$ 14 billion in 2070;

Soy will be the most affected crop. In the worst case scenario losses could reach 40% by 2070, causing damages of up to R\$ 7.6 billion;

Arabic coffee will lose up to 33% of the low-risk area in São Paulo and Minas Gerais, despite the possibility of increased production in the southern part of the country;

Corn, rice, beans, cotton and sunflower will suffer sharp reductions of low-risk areas in the northeast, with significant losses in production;

Cassava will experience overall gains of low-risk areas, but should suffer severe losses in the northeast;

The cultivation of sugarcane could double in the coming decades.”

Increase in Protected Areas

Brazil adopted targets for the Convention on Biological Diversity (CBD) to protect 30% of the Amazon biome and 10% of the other Brazilian biomes through Conservation Units. Businesses need to work regionally or locally with their partners, regulators and NGOs to ensure that operations are compatible with the creation of these protected areas.

¹⁷ <http://sweeteralternative.com/admin/documents/sugarcane-agroecological-zoning.pdf>



Consumer pressure to internalize sustainability criteria

Business reputation is one of the main risks currently noticed by the Brazilian business community. Firms should invest primarily in transparency and communication of how environmental issues and BES are incorporated in business management. There could be changes in reporting standards to include relations of impact and dependence on biodiversity.

Technological Innovation

Despite technological innovation being predominantly an opportunity, some cases could result in situations of increased risk to businesses, because the results of utilizing new technologies with smaller impacts on biodiversity may not be entirely known. Some technologies and management systems present significant environmental gains; however, complex interactions of ecosystems could result in a loss of genetic diversity or damage ecosystems in other ways, as in the case of biotechnology. According to the Food and Agriculture Organization of the United Nations (FAO), the world will need to produce food for 9 billion people in 2050. On a planet with diminishing availability of productive land, biotechnology becomes an important alternative to ensure more efficient crop yields and lower pesticide use. The introduction of genetically modified organisms contributed to the reduction of some impacts on biodiversity by being more productive and resistant, thus reducing the demand for pesticides, inputs and land. However, there is a possibility that these crops could impact biodiversity, for example, by adding new genotypes, eliminating species and reducing genetic diversity.

Improved scientific knowledge

One of the main challenges to the inclusion of BES in business strategy is the need to increase understanding, measurement and reporting on the relations of impact and dependence of businesses on biodiversity. These issues demand that businesses implement procedures to measure, manage and report on BES management.

Main opportunities

Brazil is a megadiverse country and home to large forested areas and globally significant ecosystems such as the Amazon. Brazil has also maintained impressive economic growth in recent years, even in the face of international crises. The combination of an expanding economy and conditions favorable to natural resource extraction promote the development of businesses with less impact on BES. Some sectors have already identified and taken advantage of significant comparative advantages, such as renewable energy, biofuel production, improved agricultural productivity and the export of certified paper and cellulose.

Considering the Brazilian context, the inclusion of BES in business management could generate new opportunities through a reduction in costs, development of new products and markets, appeal to new clients and creation of new businesses.

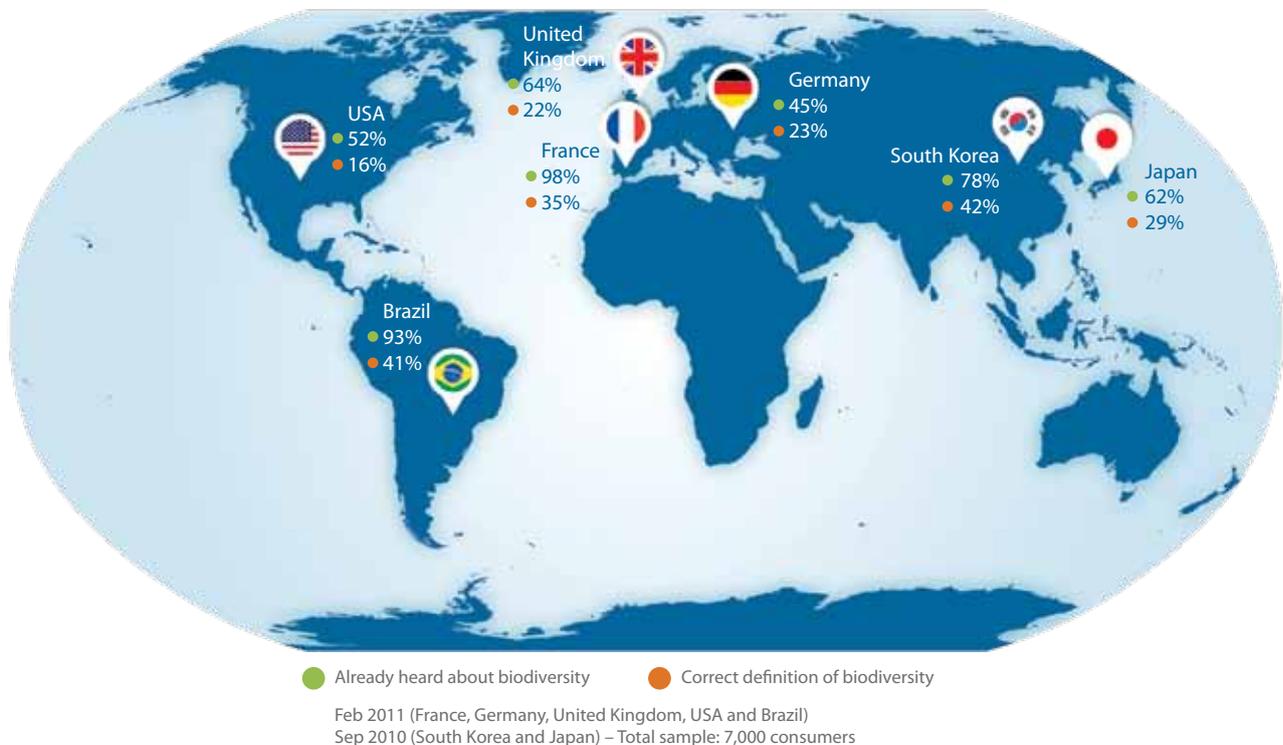
The economy of ecosystems and cost reductions through businesses' environmental variables

Brazilian businesses are already familiar with the concept of Cleaner Production, which involves the adoption of engineering, process and technology solutions capable of increasing efficiency and consequently reducing impacts on BES. At the same time, these measures bring better quality and lower cost inputs and higher productivity outcomes. It is also possible to identify opportunities to reduce costs associated with improving ecosystem services, such as the role of wetlands in the filtering and purification of water or the role of vegetation in the protection against floods.

Improving reputation, attracting new clients and reaching new niche markets

The *Union for Ethical Biotrade* (UEBT) carried out a study of consumers in various countries which found that Brazilian consumers' understanding of biodiversity is relatively advanced in comparison to countries such as the United Kingdom, Germany, France, and the United States, as demonstrated in the following image¹⁸.

Image 2: What do consumers know about subjects related to biodiversity? (30)



Source: Union for Ethical Biotrade, 2011 (30)

A 2009 survey by *Green Brands Global Survey* found that 73% of Brazilians plan on increasing their spending on green products and services and that 28% of them are willing to spend up to 30% more on green products and services. Another survey identified that 48% would be willing to spend 10% more on green products.

The most conservative results came out of research by the *Corporate Social Responsibility Monitor* (2009) (17), which implies that close to 30% of consumers adopt some type of sustainability parameter when selecting products, but that the remaining 70% do not adopt the criteria of product sustainability, instead relying primarily on price and brand affinity. The 30% figure represents a large number of consumers, and thus businesses understand that adopting sustainability practices could be important in order to reach certain niche markets.

¹⁸ The percentage of interviewees that recognize topics related to BES is displayed in green and the percentage of interviewees that know the correct definition of biodiversity is presented in orange.

Development of new products and technologies

The National Project of Public-Private Integrated Actions for Biodiversity (PROBIO) developed Plants for the Future during 2005 and 2007, which identified 755 priority species with potential for commercial use. These species exhibit potential for the development of new products such as medicines, vitamins, genetic material for biotechnology, and the production of vegetable oils, cosmetics and biofuels industry. It is important to create incentives to attract businesses and reduce barriers and restrictions related to access to these products (31).

Beyond the direct use of biodiversity, there are opportunities to develop new “green products” or certificates, biotechnology, clean technology or sustainable systems for extracting natural resources (32):

- The market for certified or “green” products is growing in Brazil. In agriculture, for example, organic products are gaining market share and have grown at an annual rate of 20% but still only represent less than 2% of the market (7). However, key industries such as mining, construction and oil and gas face the greatest difficulties in greening their production practices;
- Seeds and agricultural inputs developed using biotechnology have the advantage of being able to better adapt to climatic environmental changes and sites with smaller provision of ecosystem services, such as water and soil nutrient;
- Furthermore, there is space to develop new technologies and products. One example is the creation of green polymers, created using raw materials from renewable sources, such as corn, sugarcane, cellulose, chitin and others.

Development of new markets

According to information from the *Ecosystem Marketplace* (33), global compensation for biodiversity and payments for environmental services could exceed US\$ 17 billion by 2020. In Brazil, there is the potential to reduce emissions up to 6.2 giga tCO₂e through forest projects by 2030, according to the World Bank. Close to 20 projects are being developed within Brazil, which, given an average price for a forest credit of US\$ 2.90, equals close to **US\$ 1.9 trillion** in REDD+ credits for this period.

The development of markets for ecosystem services – such as credits for carbon, water, biodiversity, legal reserve compensation, reverse logistics, renewable energy, etc. – is already envisioned by existing legislation in Brazil, such as the National Policy on Climate Change, and the expectation is that these mechanisms will be progressively implemented in the country. Businesses that possess large forested areas could become beneficiaries of market mechanisms or Payments for Ecosystem Services (PES) and capture new revenue flows from environmental assets. However, the expectation is that this type of instrument will have greater potential to benefit Protected Areas and small rural producers, while large businesses fill the role of potential contributors. Firms view such mechanisms from a medium or long-term perspective and see that the market still lacks sufficient regulation to create a secure demand that would warrant investments at a significant scale. Some pilot initiatives to form these markets have surfaced, such as:

- The *Green Development Initiative*¹⁹, created mainly by government and NGO representatives working towards developing certification standards for “biodiversity credits,” with the aim of facilitating the involvement of the private sector in conservation initiatives;
- *Bolsa Verde do Rio de Janeiro* (BVRio), a non-profit civic association structured to involve various sectors of society, represented by businesses, NGOs and scientists or individuals involved with environmental finance. It aims to develop a market for environmental assets in order to promote a green economy in Rio de Janeiro state. It is the first project for a regulated Brazilian carbon market, but also involves other commodities such as industrial effluents, reforestation and waste.

Risks and opportunities for Brazilian business sectors

The importance and influence of the risks and opportunities associated with biodiversity loss and ecosystem degradation will vary depending on the sector and the region in which a business operates.

Agriculture and extractive activities are subject to the greatest operational risks. On the other hand, sectors that utilize biodiversity in their products, such as cosmetics, pharmaceuticals and agriculture, have greater opportunities to benefit from managing BES in the development of new products.

The main opportunities for sectors such as mining, construction, oil and gas are concentrated around minimizing risks and costs associated with the strategic management of BES, such as the rational use of natural resources and minimizing the generation of wastes and effluents.

¹⁹ www.gdm.earthmind.net

Incorporating the value chain is a priority issue for all sectors. In agriculture, for example, increasing productive efficiency for small and medium landowners or creating differentiated markets for sustainable products are interesting ways to involve the value chain in taking advantage of opportunities associated with BES. For mining and construction, involving the supply chain affects primarily suppliers of timber. In the cosmetics and pharmaceutical industries, access to and distribution of benefits related to biodiversity resources is the main factor to be considered. Financial institutions, on the other hand, form partnerships to offer specific credit for environmental adjustments made by suppliers in large retail chains, among others. Also relevant to the financial sector, resource scarcity and the potential effects of climate change, and BES in general, could generate great opportunities for the insurance sector.

Consumer behavior and market competition are also determining factors in motivating creation of new businesses with a focus on BES. As Brazilian consumers pay more attention to the value chain or the origins of the products that they consume, the importance of sound BES management in the sector will increase.

The following sections present a detailed outline of sectoral risks and opportunities within the Brazilian context:

Agriculture and Pulp & Paper

RISKS

Reduced productivity:

Due to climate change: The agricultural sector could be negatively impacted by climate change, with potential losses of up to R\$ 7.4 billion in 2020, with the possibility of reaching R\$14 billion by 2070.

Due to a loss of ecosystem services: Loss of ecosystem services could cause elevated operational costs because of greater needs for irrigation and other inputs, as well as facilitate the spread of pests and reduce the numbers of pollinators (34).

Tainted reputation due to the introduction of exotic species, biotechnology and deforestation: Agroindustry faces the challenge of better communicating about the impacts of its products on the environment, especially those related to exotic species, biotechnology or agricultural expansion.

Regulatory risks: The Forest Code and Law n. 11.105/2005, which establish security norms and monitoring mechanisms for activities that involve genetically modified organisms, are the most relevant regulations in the sector.

OPPORTUNITIES

Research and development (R&D) and improved practices: Brazil is the second largest producer of biotechnology. Biotechnology will be important to increasing productivity and fulfilling growing demands for food, and can thus minimize the impacts of agriculture on BES because of the higher productivity and reduced consumption of water, fuel and pesticides.

Furthermore, sustainable practices have potential for expansion. According to the Brazilian Program for Low Carbon Agriculture, developed by the Federal Government, there is a possibility of recovering 15 million hectares of pasture and implementing 4 million hectares of systems that integrate Crop-Livestock-Forest, and 5.5 million hectares that could be used for biological fixation.

Adoption of environmental certifications and sectoral protocols: One of the most successful cases of certification is the FSC label (*Forest Stewardship Council*). Brazil has around 6,500 hectares of land certified by FSC and 83 valid certificates for forest and chain of custody management (35). The Program for Forest Certification (Cerflor) is a Brazilian initiative that has already certified approximately 2,250 hectares (36). Comparatively, the total area of planted forest is 6.8 million hectares, according to the Brazilian Forest Service (37). In agriculture, global round tables or sectoral associations linking businesses and governments are the most significant initiatives to establish protocols for sustainable practices, such as the Round Table on Responsible Soy. Organic agriculture in Brazil grows at an annual rate of 20%, but still only represents 2% of the market.

Engagement of suppliers in order to consolidate sustainable chains: The rise of business models that seek to promote sustainable practices along the entire value chain, by offering differentiated remuneration to producers that adopt best practices or credit lines that benefit such producers, is an important opportunity. For example, the Ministry of the Environment and BNDES created a credit line for small livestock farmers in the Amazon that supply meat to large chains.

The potential of biotechnology in Brazil to reduce impacts on BES is outlined in Chart 3.

Chart 3: Socio-environmental benefits of biotechnology could be profitable for Brazilian agriculture

Studies suggest that the use of biotechnology for soy, corn and cotton crops in Brazil could result in significant environmental benefits over the next ten years, such as a reduction in the volume of freshwater equivalent to that supplied to the cities of Recife and Porto Alegre during one year; reduction of CO₂ atmospheric emissions equivalent to planting almost 22 million trees; reduction in fuel burning in the amount needed to fill up 465,000 diesel vehicles; and reduction of 120,000 tons in pesticides sprayed on Brazilian farmlands (38).

The planting of transgenic corn in the 2009/2010 harvest, for example, reduced the use of agricultural chemicals by approximately 2,700 tons. Over the next ten years, the adoption of biotechnology to corn crops will enable a 49.5 million hectare reduction in the area planted with this crop; and for cotton and soy, up to 9.3 million hectares could be spared.

Oil & Gas and Chemicals

RISKS

Tainted reputation due to environmental risks associated with business: The main activities of the oil and gas sector are located in coastal and marine areas. Cases of oil spills and the discovery of the pre-salt reserves that require drilling and exploration at increasing depths generate growing pressure on environmental institutions in Brazil due to the risks involved. Firms that adopt a proactive position in relation to the inclusion of BES in business management could benefit from an improved image as role models in the production of fuels and related products.

Regulatory risks: Law no12. 351/2010 regarding Pre-salt oil production established that part of the resources from extraction of oil and gas will be channeled to National Climate Change Fund. The sizes of fines from oil spills tend to increase.

OPPORTUNITIES

Development of new products: The Braskem Initiative to produce green polyethylene is an example of taking advantage of opportunities presented by BES management. Braskem is a business in the petrochemical and chemical industry that stands out globally as the largest producer of thermoplastic resins in the Americas.

New energy markets: The market for alternative energy sources, such as biomass, Small Hydroelectric Plants (SHPs), and wind and solar energy, can be developed in order to diversify the energy matrix. The National Energy Plan estimates a 4.1% average growth in renewable energy production until 2030 in order to maintain the 50% renewable energy share of the matrix.

Environmental management practices that minimize impacts on biodiversity: The petroleum, gas and chemicals sector exhibits a smaller degree of dependence on biodiversity resources. Consequently, the main opportunities are concentrated in minimizing the risks and costs associated with the strategic management of Biodiversity and Ecosystem Services, such as the rational use of natural resources and waste minimization, as well as the prevention of fines resulting from spills, which BES management could help to implement.

Examples of reputational and operational risks to which the sector is exposed are outlined in Chart 4.

Chart 4: Oil and gas extraction in Abrolhos, Bahia

The Abrolhos region, an area of 56,000 Km², is home to some of the most highly prioritized marine biodiversity conservation areas in the South Atlantic, due to its high rates of endemism and species wealth. Various species of Brazilian corals can be found in this region. In 2003, the National Petroleum Agency (ANP) offered some concessions, during the fourth round of bidding, of blocks for exploration in the Abrolhos region. Studies carried out by Conservation International and partners on the impacts of oil exploration in the region highlighted the great fragility and importance of the ecosystems in the area. These studies served as the basis for an initial proposal to exclude 162 of the 243 blocks located in mangroves, seaweed banks and reefs. At a second stage, through a precautionary measure conceded on the eve of the auction, the remaining 81 blocks were excluded by the federal justice system. Currently, bidding and exploration of any block located within a 60 km radius of the Abrolhos National Marine Park (Parnam Abrolhos) is prohibited (39).

RISKS

Diminishing natural resources: The cosmetics and pharmaceuticals sectors are direct users of biodiversity, and as such, a BES loss reduces the potential for new products in the long run. Despite the great potential of Brazilian biodiversity, only a limited number of resources (genes or species) are used in the production of cosmetics and pharmaceuticals, making it difficult to estimate the impact of a loss in genetic and species biodiversity on these businesses.

Regulatory and reputational risks of misappropriation of traditional knowledge: The development and manufacture of products derived from biodiversity often rely on traditional knowledge without the relevant communities being remunerated for their knowledge. As consciousness of the importance of just and equal distribution of benefits grows, businesses that do not implement mechanisms to ensure this distribution will be increasingly subject to retaliation from consumers. Moreover, there are still legal uncertainties around questions related to access to genetic and biodiversity resources and patent registrations, which is why the number of patent requests associated with biodiversity components is only growing slowly. Provisional Measure no 2.186-16/2001, currently in place, deals with the distribution of benefits and traditional knowledge, but this field still is not completely regulated. The greater share of biotechnological patent applications made in Brazil is solicited by foreigners; in July 2010, INPI registered 1,296 patents, of which only 15% were from Brazilian researchers and 51% were from researchers from the United States (17).

OPPORTUNITIES

Utilizing Brazilian biodiversity to develop new products: For the cosmetics sector, many business opportunities are related to the creation of specific product lines that represent the uniqueness and variety of Brazilian biodiversity. An example of this is the existence of approximately 22 plant oils and dyes in the cosmetics industry that are produced from plant essences from the Amazon.

Herbal remedies in Brazil correspond to around 7% of the pharmaceutical market, currently generating US\$ 400 million per year. A mere 20 products represent more than 60% of revenues from herbal remedies bought in pharmacies, and these are mainly of foreign origins. There is thus great potential to explore and utilize native Brazilian species, and more than 650 species with economic value have already been identified in the Brazilian Legal Amazon. However, there are some barriers with regard to registering and commercializing these products, because patent applications for the invention of products and processes derived from genetic heritage and traditional knowledge must be accompanied by certifications of origins and authorized access (36).

Founded in 1969, Natura is the largest Brazilian producer of cosmetics and leads the direct sales sector. In 2011, the company registered net revenues of R\$ 5.5 billion from its operations in Latin America and France²⁰. Natura utilizes biodiversity for the creation of new product lines, as outlined in Chart 5.

Chart 5: Sustainable use of socio-biodiversity products and services – the case of Natura

The product line Natura Ekos is one of the most important business platforms for the company, which developed a production model that involves relationships with supply communities, grouped into cooperatives and associations, primarily in the Amazon region. Production chains are established with these communities and are guided by fair prices, remuneration for the use of genetic heritage and the valuation of traditional knowledge.

In 2011, the company involved 32 supply communities of 3,235 families, representing a 40% increase in the number of families involved in the process compared to the previous year. This advance is part of a strategy to strengthen transactions with the supply communities and expand the social benefits generated by the business. With regard to resources destined for the communities (which involves primarily the amount paid for the supply of inputs and the associated redistribution of benefits from the access to genetic heritage and traditional knowledge), R\$10 million was invested in 2011, a 15% increase in comparison with 2010.

Natura seeks to promote discussion on the sustainable use of products and services from socio-biodiversity and to establish a new legal framework for biodiversity access which favors the sustainable use of Brazil's genetic heritage and the associated traditional knowledge.

Recognizing the importance of this ecosystem for the development of a new sustainable business platform, Natura launched the Amazon Program in 2011. The program had turnover of R\$ 64.8 million in 2011, and expects a R\$ 1 billion turnover in the region by 2020. In this manner, the company aims to associate its brand with the creation of sustainable development initiatives for the region and to spark new business focused on socio-biodiversity, valuation of traditional knowledge and the culture in the region, through four interrelated themes: Science; Technology and Innovation; Sustainable Production Chains; and Capacity Building.

²⁰ www.natura.net

Mining and Construction

RISKS

Tainted reputation due to negative impacts of business operations: The sector has significant impacts on Biodiversity and Ecosystem Services. This could imply reputational risks, especially for projects located in sensitive regions such as the Amazon.

Regulatory risks: The expectation is that the environmental licensing process will incorporate new restrictions and requirements in relation to BES. Additionally, for the mining sector, requirements associated with the recuperation of degraded areas could be more rigid with regard to BES recovery.

Operational risks: With increasing degradation of ecosystems, access to certain areas considered important for conservation should be restricted and the degradation of ecosystem services could reduce the feasibility of operations in certain locations (due to decreased water availability, for example).

OPPORTUNITIES

Environmental management practices that minimize impacts on biodiversity: As with the oil and gas sector, the mining and construction sectors exhibit lesser degrees of dependence on resources from biodiversity, which is why the primary opportunities are concentrated around minimizing risks and costs, including:

- engineering studies to evaluate project alternatives that promote a reduction in affected areas and encourage work in locations that minimize environmental impacts and costs;
- reducing costs of recovering degraded areas through the realization of studies that contribute to process efficiency gains;
- adoption of cleaner production strategies (reduce, reuse and recycle);
- measurement (in monetary terms) of avoided costs and gains from minimizing impacts and definition of alternatives.

Engaging the supply chain: The supply of timber is a critical component for the Brazilian mining industry value chain, for production of pig iron, and in construction. Thus, developing programs that build capacity and encourage the establishment of industrial plants that supply timber from sustainable origins represents an opportunity for the sector.

Mining and construction businesses can lower costs by reducing the clearing of vegetation, as demonstrated in Chart 6.

Chart 6: Economic benefits to reducing plant removal for the Camargo Corrêa construction company

The Camargo Corrêa group is one of the largest business conglomerates in Brazil. Initially established as a construction company, the Group expanded and diversified its businesses and is now active in different sectors of the economy, such as engineering, cement, energy and transport concessions, footwear, shipping, real estate and steel.

In 2011, the Group developed a Carbon Management Plan, where various opportunities to reduce emissions were identified. Based on the GHG emissions inventory for the company, activities involving the removal of vegetation were considered relevant to reduce emissions. By adopting a new activity model, the Camargo Corrêa construction company managed to reduce vegetation removal considerably, in some cases achieving up to a 30% reduction in vegetation suppression authorized by environmental authorities. The construction company estimated savings of up to R\$25,000 per hectare and the project has the potential to reduce the company's total emissions by up to 22%.

RISKS

Risks to reputation and image: Financial institutions could be subject to damages resulting from their joint liability with the projects that they finance. The lines of action for financial institutions in relation to BES include²¹:

- avoiding financing projects responsible for increasing the loss and degradation of biodiversity;
- conditioning project financing on a mitigation plan that reduces impacts on BES;
- evaluating risks of projects that include BES elements;
- creating internal policies and strategies for risk reduction related to BES.

OPPORTUNITIES

Participating in the trade of environmental commodities: Transforming water, biodiversity and carbon into commodities is becoming a trend, and the financial market could make a positive impact by attributing values to these goods. However, it is necessary that this transformation be well-regulated so that prices are not subject to speculation and that all benefits from ecosystem services are properly reflected. Therefore, it is necessary to reflect upon the need for progressive stages of including environmental externalities in the financial market. The commercialization of environmental inputs is a positive trend; however, regulation and the establishment of limits is necessary from a medium to long-term perspective. In Brazil, an example of this type of initiative is the *Bolsa Verde do Rio de Janeiro* (BV-Rio).

Investment funds and lines of financing for businesses related to BES:

Opportunities exist in the creation of new credit lines and specific funds aimed at new businesses related to BES management, environmental inputs, and the acquisition of equipment, projects or systems that reduce impacts on BES.

Creation of environmental insurance: Insurance associated with environmental risks is still underdeveloped, in part due to the great complexity of the issue. Development of new models is therefore an opportunity which should intensify in the future.

Financial institutions are adopting environmental principles and safeguards for offering credit or creating new products that encourage sustainable projects, such as the directives of the Equator Principles (see Chart 7).

Chart 7: BES-related voluntary requirements and commitments by financial institutions in Brazil

These are examples of BES-related voluntary commitments assumed by financial institutions:

- The signing of the Green Protocol by the Ministry of the Environment and five Brazilian banks, adopting commitments to sustainable practices for financed activities (40);
- The *Conselho Monetário Nacional* (CMN) resolution, which determined the need for corroborative documentation of environmental compliance and other requirements for agricultural financing in the Amazon biome (Resolution CMN BACEN no 3.545 DOU of 03/03/08);
- As of June 2011, Banco do Brasil requires its clients to join the Federal Program for Environmental Compliance of Rural Properties - called Mais Ambiente - or proof of registration of Legal Reserves as a prerequisite for extending rural credit;
- The Equator Principles, a credit risk management initiative to determine, evaluate and manage environmental and social risks in the operations of large development projects. These principles are adopted voluntarily and apply when project costs exceed US\$ 10 million (41);
- The Principles of Responsible Investment (PRI), a network of international investors that work together to put responsible investment principles into practice (42);
- The Natural Capital Declaration, a declaration by the financial sector to demonstrate its commitment to Rio+20 and work to integrate natural capital criteria into its products and services (43).

²¹ Adapted from A Challenging Climate 2.0 – What banks must do to combat climate change – BankTrack. Dec 2009 (http://www.banktrack.org/download/a_challenging_climate_2_0_what_banks_must_do_to_combat_climate_change/091210_banktrack_climate_paper.pdf).

Retail

RISKS

Damages to reputation and image: Issues related to biodiversity are closely associated with the reputation and public perception of a business, linking the responsibility of a retail company to its suppliers.

Risks of losses in the supply chain: There is a risk of instability or increase of costs in the supply chain due to a loss of BES, especially for critical products such as wood and other non-wood forest products such as heart of palm, açai, babassu nuts, palm fiber, mate, and others.

Regulatory risks: The proposed Law of Environmental Labeling determines that businesses should display their impacts on product labels, and the National Solid Waste Policy (Law no 12.305/2010) obliges Brazilian businesses to consider the entire life-cycles of products.

The recent laws on plastic bag use in the municipality of Belo Horizonte and in the state of São Paulo, which has implications for a large share of businesses in the retail sector, constitutes an example of regulatory risk.

OPPORTUNITIES

Improved reputation: Considering that the sector is in direct contact with the consumer, measures that promote a reduction of impacts and the sustainable use of BES could reflect positively on the image of businesses, allowing them to reach new market niches and achieve greater loyalty from consumers.

Strengthening the supply chain: Retail businesses could contribute significantly to strengthening supply chains through voluntary actions, with the objective of consolidating chains and establishing mechanisms that guarantee competitive prices, as well as sustainable extraction of resources.

New products: A strategy of businesses in the retail sector is to resort to innovation as a way to aggregate value to “green” products and discover new market segments. Furthermore, other factors can be included in this strategy, such as the employment of biodegradable formulas, recycled packaging, increased use of refills, and use of plant inputs.

For the retail sector, the major opportunities related to BES management are activities in the supply chain, as demonstrated in Chart 8.

Chart 8: Socioenvironmental Table by Abril Group

Abril is one of the largest and most influent communication and education groups in Latin America. In the search for engaging stakeholders in the sustainability theme, it constructed a map that details the materials and processes involved in the production, impression and distribution of magazines. Thus, the map – called the Socioenvironmental Table – presents information on the raw materials and the production lines chosen, with the aim of creating the lowest possible negative impact on the environment and society. The magazines NATIONAL GEOGRAPHIC Brasil, SUPERINTERESSANTE and NOVA ESCOLA have already published the Socioenvironmental Table with the following information:

- Consumption of paper, ink, energy and packaging;
- Number of collaborators involved in the edition's production and distribution of issues; and
- Waste generated by the production of issues, including GHG emissions.

This work is being studied for continuous improvement and may be extended to all magazines published by the Abril Group.



Including BES in the strategic management of businesses

On a national scale, Brazilian businesses are approaching BES management in different ways:

- Demonstrating concern for BES through philanthropic conservation projects, though without necessarily considering strategic links with business activities;
- Developing voluntary or compulsory mitigation programs that address biodiversity impacts;
- Introducing some aspects of BES into strategy, for example, by including corporate strategies for water management in environments with a water deficit and sustainable management of natural resources (such as fishery and forest resources);
- Implementing pilot programs that generate value for the business through biodiversity conservation, in particular for the creation of new products, marketable environmental assets and the inclusion of BES in business accounting.

To strengthen the impact of actions developed by business both in the reputational and economic spheres, it is necessary to:

- Develop strategies related to BES actions that are aligned with business transactions;
- Implement adequate internal systems to identify, monitor and measure BES to support decision-making;
- Incorporate the commitment to approach BES systematically in the corporate governance of the organization.

The greatest challenge in defining projects related to BES management is to clearly establish the objectives to be achieved because there are various motivations and distinct initiatives for the inclusion of BES in business, such as:

- Evaluating better alternatives for implementing ventures taking into account sustainability of the territory (ex. engineering projects that cause less environmental impact);
- Effective consideration of environmental requirements in the proposal and negotiation process, in order to permit an adequate management of the impacts generated by projects;

- Supporting the implementation of better practices for operating in sensitive ecosystems (for example, protecting strategic areas for the provision of ecosystem services that support business operations);
- Improving environmental management and reducing operational costs through greater resource use efficiency, supported by operational decisions (for example, selection of more sustainable production technologies);
- Supporting the implementation of payments for ecosystem services supplied by ecosystem remnants located near its operations and other strategic areas;
- Utilizing economic valuation as an instrument to create awareness by the general public and business decision-makers;
- Developing new products and identifying business opportunities compatible with observed trends in BES, considering also the applications of biotechnology and development of new products and patents (for example development of crop species that are more resistant to arid climates);
- Evaluating reputational risks of each project and taking decisions that consider maintaining good relations with local communities and authorities;
- Anticipating regulatory frameworks related to BES, preparing for new demands and reducing operational risks and costs;
- Increasing transparency in supplying information to investors, who are increasingly interested in the environmental performance of businesses;
- Preparing to access demanding markets, especially abroad;
- Drafting reports that allow stakeholders to identify the business' commitment to sustainability and how this contributes to a sustainable strategy to create value in the long term.

It is important to identify the main factors that motivate the organization before initiating strategic BES management, in order to define the tools and methodologies that correspond to the objectives.

The process of including BES in business passes through several stages. Global TEEB presents some central lines of action to include Biodiversity and Ecosystem Services in the business sector:

- Step 1 – Identify relations of impact and dependence of business activities on biodiversity and ecosystem services
- Step 2 – Evaluate risks and opportunities of activities associated with relations of impact and dependence
- Step 3 – Develop information systems for BES, establish SMART²² targets, measure and value performance and report results
- Step 4 – Find measures to avoid, minimize and mitigate risks of BES loss, including offsets where possible
- Step 5 – Seek emerging business opportunities for BES related to cost-effectiveness, new products and new markets
- Step 6 – Integrate strategies and actions related to business opportunities in BES with other corporate social responsibility initiatives
- Step 7 – Engage with other businesses with similar activities and interested government, NGO and civil society organizations to improve decisions related to BES

Steps 1 through 7 below outline examples of how Brazilian businesses are operating, based on the steps listed above.

In 2011, the World Business Council for Sustainable Development published the report *Guide to Corporate Ecosystem Valuation (CEV)* (45), a guide for how to include biodiversity and ecosystem services in business management, as well as the available tools for evaluating risks and opportunities, valuing ecosystem services and examples of international cases.

Step 1 – Identifying relations of impact and dependence of business activities on biodiversity and ecosystem services

Some Brazilian businesses are initiating this evaluation by identifying **relations of dependence and impact of the business on BES, utilizing tools such as the Corporate Eco-**

²² The term SMART is an acronym for Specific, Measurable, Attainable, Relevant, and Time-bound.

system Services Review (ESR) developed by the *World Resources Institute*. The objective of this evaluation is to identify priority ecosystem services for the business. Business units and activities should be mapped, prioritizing those that present great potential for impacts or strong dependence on biodiversity, with a significant level of organizational control. Chart 9 presents a case study of a Brazilian company that initiated BES evaluation studies.

Chart 9: Votorantim intends to value and monitor biodiversity

Votorantim Industrial is a privately owned Brazilian business that encompasses Votorantim Participações, which conducts operations in areas such as cement, mining and metals (aluminum, zinc and nickel), steel, Pulp & Paper, orange juice concentrate and electricity generation. With operations in 24 countries, Votorantim Industrial registered net revenues of R\$ 23.3 billion in 2010.

In 2010, Votorantim Industrial assumed a commitment to map biodiversity in the regions where it operates. Within five years the company aims to develop general practices as well as value and monitor biodiversity in its operating environments, but admits that the lack of a widely accepted methodology for mapping and taking inventory of biodiversity complicates the work. Therefore, the firm established partnerships with institutions such as the *Conselho Empresarial Brasileiro para o Desenvolvimento Sustentável (CEBDS)* and other businesses, in order to join forces to find efficient and relevant ways to map and conserve/preserve ecosystem and biodiversity resources.

Step 2 – Evaluate risks and opportunities of activities associated with relations of impact and dependence

Global TEEB asserts that there is no one specific tool or stage of the process for evaluating risk, but that various tools can be utilized: norms, structures and methodological tools (*Corporate Ecosystem Services Review*–ESR, ISO 14.001); data collection tools (*Integrated Biodiversity Tool* – IBAT); and tools based on models or scenarios (*Artificial Intelligence for Ecosystem Services* - ARIES and *Integrated Valuation of Ecosystem Services and Tradeoffs* – InVEST). Risk evaluation helps an organization to **refine the objectives to be attained with the inclusion of BES and facilitate the selection of adequate tools** to develop an information system for BES

within an organization, as outlined in Step 3. Chart 10 demonstrates how a Brazilian construction company identified risks within its operations.

Chart 10: Amazon Directives: strategic planning by the Camargo Corrêa construction company

After a strategic planning study, the construction company Camargo Corrêa identified that its operations should intensify over the coming years in the North, East-Central and Northeastern regions of Brazil. These regions are characterized as environmentally sensitive areas with population growth above the national average. Based on recognizing the importance of responsible activities in these areas, the company created a document to guide its operations. To draft the document, the operational and administrative departments of the company gathered in workshops and working groups to discuss, among other topics:

- Risks and opportunities of operating in these areas;
- How to operate responsibly in these areas;
- How to implement training of teams operating in these areas;
- What information is relevant to managers and partners working on projects in these areas.

This process of participative construction produced a document that established criteria and commitments related to socio-environmentally responsible construction activities: The Amazon Directives.

Step 3 – Develop information systems for BES, establish SMART targets, measure and value performance and report results

Some international businesses have established objectives, targets and indicators based on the concept of Net Positive Loss, also known as No Net Loss. The concept of ecological neutrality proposes the measurement of business impacts and adoption of means to prevent, mitigate or compensate for impacts so that the net result for the environment is null. This concept is highly innovative and similar to mitigation of greenhouse gas emissions; however, there is still no consolidated and accepted methodology for measuring BES-related impacts and dependencies, as in the case of tons of carbon equivalent (tCO₂e). Thus, Global TEEB cites four different possible information systems for BES (3):



- 1. Systems that link BES information and conventional environmental accounting systems:** This includes integrating BES information with already-existing management systems and internal accounting procedures such as budgets, etc. The company Natura incorporated information on environmental impacts in its supply management procedures, as outlined in Chart 11:

Chart 11: Natura – webs of sustainable inputs: the true value of sustainability

In partnership with international consulting firms, Natura initiated the Sustainable Supply Chain Strategy in 2011, based on an innovative methodology that allows Natura to consider the value of socio-environmental criteria in the selection of suppliers (so-called socio-environmental externalities) and establish development plans for a more sustainable production chain.

The development of this methodology began with a global consulting project with A.T. Kearney, while seeking international references on topics linked to TEEB. The first step was to understand the social and environmental aspects most relevant to Natura, which during the 2009-2010 period were: biodiversity, impact of products, greenhouse gases, quality of relations with its suppliers, education and water.

Then, 50 suppliers (16 supply chains) were invited to workshops that involved the following topics: Environmental: 1) CO₂, 2) Water consumption, and 3) Solid wastes; and Social: 4) Education, 5) Training, 6) Work safety, 7) Social inclusion and 8) Direct community investments. In addition to costs, the real impacts on society were also discussed. For example, in the case of carbon, instead of considering the cost of currently marketed credits (focused on mitigation), discussions aimed to determine the real impact of emissions on society, including additional costs to public health, agriculture, etc.

Each supplier was guided by specific *inducing factors* on which to focus (with issues varying from traditional price competition to new targets for CO₂ emissions through changes in technology, logistics, etc.). The process was implemented in 60% of the supply base (16 chains), with benefits of R\$ 1 million for short term socio-environmental aspects (4% improvement) and a medium term expectation of another R\$ 3 million (an additional 13%).

- 2. Systems that seek to incorporate BES into capital investment decisions:** These systems supply information that enables decisions to be taken on which investments to make, through the incorporation of environmental externalities in techniques of commercial valuation, such as Discounted Cash Flow (DCF) and Internal Rate of Return (IRR). The economic values of ecosystems can be determined through environmental valuation methods such as the Dose-Response Method (MDR), the Replacement Cost Method (RCM) and Methods of Avoided Costs (MCE), among others. This type of valuation is still rare among Brazilian businesses and entails expensive and complex studies, primarily carried out by the scientific community. Chart 12 outlines a valuation study done by Vale, the second largest mining company in the world and the largest private firm in Latin America, with notable operations in iron and nickel mining. From this initiative, Vale sought to demonstrate that the costs of maintaining protected areas are actually investments in conservation and maintenance of natural capital.

Chart 12: Valuation studies in Vale's Private Reserves

A valuation study was carried out by CI-Brasil in partnership with Vale on the ecosystem services provided by the company's Private Reserves (RRPN, from the acronym in Portuguese) located in the state of Minas Gerais. The ecosystem services selected were: plant carbon stock, soil conservation (based on economic calculations of maintaining fertility and preventing erosion), water resources and environmental assets with potential for direct use (species with known timber uses). The monetary valuation of this service was calculated for RPPN Córrego Seco, which is important to the water supply for the city Itabirito, with the following results:

ECOSYSTEM SERVICES	ESTIMATED VALUE
Carbon	R\$ 11,825,684.53
Soil regulation (fertility)	R\$ 23,336.63
Soil regulation (protection and erosion)	R\$ 6,771,250.34
Water use (RPPN Corrego Seco)	R\$ 3,785,155.80

This valuation study is also being developed for another Vale Protected Area (Linhares/Espírito Santo) in partnership with the *Lawrence Berkeley Laboratory* (University of California), with collaboration from other researchers from national and international institutions.

- 3. Systems that permit the collection and utilization of information at the product level:** Life-Cycle Analyses (LCA) should be expanded and refined to allow businesses to evaluate BES through the life-cycles of products and value chains, as LCA is more focused on the relation of impact of businesses on BES (3), therefore limited in relation to assessing dependence on ecosystem services. In Brazil, LCA studies are being done by many different corporations. In addition, the use of LCA software is limited due to the lack of a regional data base.
- 4. Systems for reporting and information gathering at group level:** The adoption of an Integrated Report is one of the main future trends for businesses. Integrated reports allow stakeholders to identify in which way the commitment of a corporation to sustainability is contributing to a sustainable strategy of creating long-term value. Integrated reports should combine financial and sustainability reports, offering basic information on financial, environmental and social performance of the business and demonstrating how these factors are related. Some Brazilian corporations are participating in round tables that aim to integrate both accounting systems, such as the workshop held in 2011 by the *International Integrated Reporting Council* (IIRC). However, this is a long-term strategy, since it depends on the progressive implementation of BES valuation measures in the financial market and also on the promotion and standardization of the accounting of ecosystem services in businesses. Furthermore, new accounting rules should be adopted by businesses on a global scale to avoid a loss of competition among businesses and countries. Another type of results reporting widely applied in Brazil and the world is the *Global Reporting Initiative* (GRI) tool.

Step 4 – Find measures to avoid, minimize and mitigate risks of BES loss, including offsets where possible

In relation to **mitigation initiatives of business impacts on BES**, the main activities implemented by Brazilian corporations include:

- Recuperation of degraded areas or minimization of degradation;
- Sustainable agriculture and agriculture management programs;
- Creation and maintenance of protected areas in Brazil;
- Cleaner production, that is, initiatives to reduce, reuse and recycle or engineering studies to identify the alternative with the least impact on biodiversity;
- Promotion of sustainable value chains;
- Certifications for sustainability or adoption of sustainability protocols;
- Research and technology, especially biotechnology;

- Commercialization of species of economic interest (for example, buriti, açai and cupuaçu);
- Redistribution of benefits from traditional knowledge and biodiversity;
- Funds and credit lines for sustainable projects.

Step 5 – Seek emerging business opportunities for BES cost-effectiveness, new products and new markets

Biodiversity and ecosystem services offer opportunities for all sectors, as demonstrated in the previous section. The analysis of risks naturally leads to an analysis of opportunities. Chart 13 contains an example of the Centroflora Group, which identified new business opportunities related to biodiversity.

Chart 13: The Centroflora Group (46)

The Centroflora group was founded in 1957 and is currently the South American leader in the production and development of plant extracts for the pharmaceutical, cosmetic and food industries. The group's niche is the formation of partnerships with agricultural production communities that produce various plant species, thus facilitating the access to raw materials and guaranteeing quality standards.

Some examples of success include the partnership between Centroflora and Ache Laboratory seeking to promote ethical values such as social inclusion in the production of Acheflan, the first herbal medicine in Brazil; and Natura's partnership with Centroflora for the creation of a new product line for anti-aging treatment based on Jambu and passionflower, known as Chronos.

Step 6 – Integrate strategies and actions related to business opportunities in BES with other corporate social responsibility initiatives

The sustainable use of biodiversity could be an investment opportunity in "inclusive business"²³ through the strengthening of social ventures involving low-income groups. Inclusive business related to BES primarily includes activities such as fishery resources and plant extractivism, especially of babassu nuts, palm fiber, yerba mate, açai, brazil nuts, carnauba wax, coagulated rubber and heart of palm. According to statistics, the non-timber extractives segment in Brazil is worth R\$ 480 million, involving close to 90,000 people and corresponds to 0.48% of national primary production.

Studies in Brazil demonstrate that successful entrepreneurial strategies for sustainable use of biodiversity and social inclusion involve the formation of alliances and partnerships between large corporations and local groups or associations responsible for the management or supply of products. In addition to promoting the establishment of commercial channels, these partnerships provide technical and administrative support, primarily in the first years of operation, and long-term credit or funding from bilateral and multilateral international entities, foundations, NGOs, etc. (see example in Chart 14).

²³ Inclusive business opportunities are economically profitable and socio-environmentally responsible entrepreneurial ventures that seek mutual benefits, incorporating low-income communities in value chains. Capacity building in low-income communities for the sustainable use of forest resources such as nuts, oils, fruits, etc., is already a reality in Brazil.

Chart 14: Investments in biotechnology solutions by Monsanto bring results to the value chain

The community in Catuti (Minas Gerais) worked with the public and private sectors to recuperate the main economic activity in the region – cotton production.

The northern part of the State of Minas Gerais used to be a large producer of cotton, but during the 1990's pests wiped out plantations, and with the opening of the Brazilian market to cotton imports, production dwindled. In 2006, a project advised by COOPERCAT (Cooperative for Cotton Producers in Catuti), with support from Monsanto, allowed the recuperation of the local economy by cultivating cotton using the Bollgard® technology, resistant to pests and of greater productivity, which increased competitiveness.

The project resulted in a 40 arrobas per hectare increase in productivity in 2006, and 230 arrobas per hectare in 2009. Furthermore, the community (basically composed of family producers) benefited economically by raising the price of seed cotton by 150%.

In addition to Monsanto, the project also involved the Brazilian Association of Cotton Producers (Abrapa), the Minas Gerais Association of Cotton Producers (Amipa), the municipality of Catuti, the Minas Gerais Syndicate of Spinning and Weaving Industries, the Minas Gerais Cotton Incentives Program, the State Secretariat of Agriculture and the Technical Assistance and Rural Extension Institute (Emater). Families were assisted by investments from the Ministry of Agriculture, Livestock and Supply (MAPA).

and civil society. Furthermore, sectoral and value chain integration could avoid overlapping responsibilities and lack of coordination (see Chart 15). In Brazil, some priority measures to undertake with interested parties include:

- Mobilization and definition of an inter-sectoral agenda to determine objectives and targets related to BES;
- Standardization of methodologies and tools for the inclusion of BES in business;
- Dialogue with the government to carry out strategic studies with the aim of ensuring that development does not jeopardize the support capacity of ecosystems and direct business actions through protective measures such as Strategic Environmental Assessments (SEA), Ecological Economic Zoning (EEZ) and the systematic collection of regional data on biodiversity;
- Dialogue with the government on regulation and laws related to BES, especially in the case of payments for environmental services, which should include ample participation from the private sector in establishing metrics and targets to be achieved by these instruments.

Chart 15: Strategic industry map includes program related to biodiversity

In 2005, the *Confederação Nacional da Indústria (CNI)* included in its strategic planning a project specific to biodiversity, given that various industrial processes depend on clear rules that encourage investment in sustainable activities related to biodiversity. The objective of the project is to participate in the formulation of policies on the sustainable use of biodiversity in various aspects: access to genetic resources and benefits sharing, permanent preservation areas, legal reserves, and technology transfers, among others. CNI's participation in the drafting of national sub-targets within the scope of the Strategic Plan of the Convention on Biological Diversity (CBD), through an initiative called "Dialogues on Biodiversity: Constructing a Brazilian Strategy for 2020" is part of this strategy.

Furthermore, the main topics debated during CNI's meetings on the theme included altering the legal framework for access to genetic resources and the forest code, and discussions on legislative proposals related to ecosystem services, labeling of biodiversity products, managing licenses for research and access to biodiversity.

Step 7 – Engage with other businesses with similar activities and interested government, NGO and civil society organizations to improve decisions related to BES

Risks related to biodiversity loss and ecosystem degradation will not only affect businesses individually, but also collectively at a regional level. This fact implies that programs that seek to promote BES conservation should consider the possibility of joint actions among businesses, governments



Conclusions and Recommendations

The objective of this chapter is to discuss the importance of Brazilian biodiversity to social and economic development, and it seeks to clarify the relationship between the business sector and biodiversity in order to overcome the main challenges related to managing BES in Brazil.

The importance of business sector participation in biodiversity initiatives

Brazil, a country with an enormous natural capital, is recognized for sound environmental practices. However, despite public policy advances to promote sectoral agreements, such as the Aichi Targets, there are still uncertainties about how the country's growth can be reconciled with environmental issues, and especially with pressures on biodiversity, in the near future.

What businesses can do:

- Organize in multisectoral initiatives that place the private sector in the national environmental agenda, as is the case of the biodiversity fora of CEBDS, CNI, and MEB-Brasil, and initiatives such as the Dialogues on Biodiversity project.

The necessity of evolving BES management for the Brazilian business sector

It is very important for businesses to evaluate their impacts and dependence on BES in order to improve risk management, capture opportunities and conserve natural resources. Upon identifying this relationship, BES can be incorporated in the strategic management of a business. In general, though, BES management is not included in the business administration of most Brazilian companies, which implies a necessity to improve the understanding of this relationship. This will be essential for the development of planning, investments and

actions aimed at conservation in tandem with the objectives of each business.

What businesses can do:

The impact and dependence between BES and businesses vary depending on the sector and industry. However, overall these relationships are revealed when the following factors are understood:

- Ecosystem services on which the operations of the business depend;
- The impacts of business activities on the ecosystems;
- Trends that will affect BES in the short, medium and long terms and how these can affect operations;
- Regulations related to BES that could affect business activities;
- Relations of dependence and impact of BES with the business value chain.

Environmental regulation in Brazil is a key factor to stimulate business actions related to BES

Currently, Brazil relies on a large number of environmental laws related to the protection and conservation of Biodiversity, such as the National System of Conservation Units Law (SNUC), the National Policy on Climate Change and the proposed regulations related to Payments for Ecosystem Services (PES). Regulations related to BES serve as an incentive for businesses to understand the importance of strategic BES management in their operations.

What businesses can do:

- Understanding legislation could aid in drafting contingency plans and identifying risks and opportunities. For example, the utilization of valuation tools for ecosystem services allows for businesses to recognize that conservation areas previously maintained without any knowledge of the benefits they can provide can be seen as assets.

Risks and opportunities related to BES are derived from common trends

Trends affecting biodiversity and businesses can be seen as risks and opportunities, depending on the context in which a business operates. The following trends stand out for the business sector:

- Reducing the provision of ecosystem services important to the business results in reduced productivity, loss of market, etc;
- Costs of ecosystem services and materials that are utilized in the operations of businesses as inputs may increase and/or decrease as a result of growing scarcity;
- Intensifying regulation and stakeholder demands for accountability related to business activities and BES conservation;
- Emergence of new business opportunities related to BES.

What businesses can do:

- Sectors that exhibit direct dependence on BES, as is the case of the agricultural, pulp & paper, and cosmetics and pharmaceuticals industries can improve their management of risks and opportunities by focusing both on reducing the use of inputs and on the utilization of BES to develop new products and brands related to Brazilian biodiversity.
- Sectors such as mining and construction can manage risks and opportunities by focusing on the mitigation of impacts and on seeking compensation measures, due to the nature of their business activities. In this case, benefits from BES are related to improved communication regarding their operations, as well as being more transparent regarding their activities towards the civil society.
- The retail sector has a large scope for action, as Brazilian consumers start paying more attention to the value chain and the origins of the products they are consuming.
- All sectors can benefit from operating in new markets, such as the carbon market and biodiversity credits.

Trends related to biodiversity should consider social aspects

In Brazil, many indigenous communities and low-income communities that have limited access to basic resources and show low indices of human development are dependent on biodiversity for their income generation. Therefore, there are great opportunities for the business sector to conciliate environmental and socio-economic interests related to biodiversity, for example through more inclusive business activities.

What businesses can do:

- Redistribute benefits related to traditional knowledge in a more equal and fair manner. In Brazil, Natura developed a project that resulted in direct benefits for communities and also improved overall business-community relations, thus ensuring good relations with local populations in areas where the company extracts its inputs;
- Support conservation projects, especially those aimed at reducing emissions that utilize methodologies for avoided deforestation (REDD+). These projects integrate the capture of greenhouse gases, the recuperation and conservation of biodiversity priority areas and the provision of benefits for the socio-economic development of communities.



Appendixes

Appendix I – List of collaborators

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Bibliography

1. **MINISTÉRIO DO MEIO AMBIENTE.** *Biodiversidade Brasileira: avaliação e identificação de áreas e ações prioritárias para a conservação, utilização sustentável e repartição dos benefícios da biodiversidade nos biomas brasileiros.* Brasília : s.n., 2002.
2. **MILLENNIUM ECOSYSTEM ASSESSMENT.** *Ecosystems and Human Well-being: Opportunities and Challenges for Business and Industry.* World Resources Institute . [S.l.] : s.n., 2005.
3. **TEEB – The Economy of Ecosystems and Biodiversity.** *Report for the Business Sector.* 2010.
4. **UNEP - WCMC.** *Overview of the linkages between biodiversity, ecosystem services and the private sector.* 2011.
5. **WEIGAND, R., SILVA, D. C. and SILVA, D. O.** *Metas de Aichi: Situação atual no Brasil.* Brasília : s.n., 2011.
6. **INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA.** *Economia. Instituto Brasileiro de Geografia e Estatística.* [Online] 2012. [Cited: 15 março 2012.] http://www.ibge.gov.br/home/mapa_site/mapa_site.php#economia.
7. **MINISTÉRIO DO MEIO AMBIENTE.** *Quarto Relatório Nacional para a Convenção Sobre Diversidade Biológica.* Brasília : s.n., 2011.
8. **INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA.** *Indicadores de desenvolvimento sustentável.* 2010.
9. **COSTANZA, R.** et al. The value of the world's ecosystem services and natural capital. *Nature*, 387: 253-260. 1997.
10. **2030 WATER RESOURCE GROUP.** *Charting our water future: economic frameworks to inform decision-making.* [S.l.] : s.n., 2009.
11. *Água, o novo carbono. IDEIA SUSTENTÁVEL.* São Paulo : setembro 2010, Ideia Sustentável, Vol. Edição nº 21.
12. **MOTTA, R. S.** *Estimativa do Custo Econômico do Desmatamento na Amazônia.* Rio de Janeiro : s.n., 2002.
13. **STIGLITZ, J. E., SEN, A. FITOUSSI, J.P.** *Report of the commission on the measurement of economic performance et social progress.* 2009.
14. **TELLES, O.** Agência Câmara de Notícias. *Câmara dos Deputados.* [Online] 2012. [Cited: 15 março 2012.] <http://www2.camara.gov.br/agencia/noticias/MEIO-AMBIENTE/208270-PROJETO-CRIA-O-PIB-VERDE-NO-BRASIL.html>.
15. **PwC.** *Biodiversity and business risks: a global risks network briefing.* World Economic Forum. Cologny : s.n., 2010.
16. **IBOPE.** *Pesquisa IBOPE Ambiental.* Instituto Brasileiro de Opinião Pública e Estatística. [S.l.] : s.n., 2011.
17. *Oito tendências de sustentabilidade. IDEIA SUSTENTÁVEL.* São Paulo : s.n., Setembro 2010, Ideia Sustentável, Vol. Edição nº 21.
18. **MOVIMENTO EMPRESARIAL PELA BIODIVERSIDADE.** *Biblioteca: Legislação. Movimento Empresarial pela Biodiversidade.* [Online] 2012. [Cited: 15 março 2012.] http://www.mebbrasil.org.br/default.aspx?pag=biblioteca&id_menu=23.
19. **CONFEDERAÇÃO NACIONAL DA INDÚSTRIA.** *Conselhos Temáticos. Confederação Nacional da Indústria.* [Online] 2012. [Cited: 15 março 2012.] <http://www.cni.org.br/portal/data/pages/FF80808121B517F40121B54C11014735.htm>.
20. *Expansão do PIB agrícola bate outros setores na década. O ESTADO DE S. PAULO.* março 2011, O ESTADO DE S. PAULO.
21. **PETROBRÁS.** *Gasoduto Urucu-Coari-Manaus: mais energia para o Brasil. Petrobrás.* [Online] 2009. [Cited: 18 Maio 2012.] <http://www.petrobras.com.br/pt/noticias/gasoduto-urucu-coari-manaus-mais-energia-para-o-brasil/>.
22. **MINISTÉRIO DE MINAS E ENERGIA.** *Balanço Energético Nacional.* Brasília : s.n., 2011.
23. **ASSOCIAÇÃO BRASILEIRA DA INDÚSTRIA QUÍMICA.** *A indústria química brasileira em 2009.* 2010.
24. **CHARWIN, A.** *Priorities for Coastal and Marine Conservation in South America.* The Nature Conservancy. Arlington : s.n., 2007.
25. **ASSOCIAÇÃO BRASILEIRA DA INDÚSTRIA DE HIGIENE PESSOAL, PERFUMARIA E COSMÉTICOS.** *Panorama do setor 2011.* 2012.
26. **INSTITUTO BRASILEIRO DE MINERAÇÃO.** *Informações e análises da economia mineral brasileira.* 2011.
27. **INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA.** *Pesquisa Anual da Indústria da Construção.* 2009.
28. **MINISTÉRIO DE MINAS E ENERGIA.** *Plano Decenal de Expansão de Energia 2019.* Brasília : s.n., 2010.
29. **EMBRAPA & UNICAMP.** *Aquecimento global e a nova geografia da produção agrícola no Brasil.* São Paulo : s.n., 2008.
30. **UNION OF ETHICAL BIO TRADE.** *The Main Conclusions of the Biodiversity Barometer UEBT.* Sourcing with respect. [S.l.] : s.n., 2011.
31. **MAY, P. H. and VINHA, V.** *Uso Sustentável da Biodiversidade na Economia Verde.*
32. **CARMO, C. C. T.** *Responsabilidade Socioambiental das empresas no varejo e comércio justo: Um estudo sobre o programa Caras do Brasil, do Grupo Pão de Açúcar.* Rio de Janeiro : s.n., 2010.
33. **FOREST TRENDS & ECOSYSTEMMARKETPLACE.** *Payments for Ecosystems Services: Market Profiles.* 2008.
34. **INICIATIVA BRASILEIRA DOS POLINIZADORES.** *Notícias.* . s.l. : www.webbee.org.br, Acesso em 20 abr 2012.
35. **FOREST STEWARDSHIP COUNCIL.** *Global FSC certificates: type and distribution.* 2012.
36. **PAVESE, H. B., YOUNG, C. E. F. and MEDEIROS, R.** *Panorama sobre relações entre biodiversidade, serviços ecossistêmicos e setor privado.* [S.l.] : s.n., 2011.
37. **SERVIÇO FLORESTAL BRASILEIRO.** *Florestas do Brasil em resumo.* 2010.
38. **ASSOCIAÇÃO BRASILEIRA DE SEMENTES E MUDAS.** *Benefícios socioambientais da biotecnologia são rentáveis. Agrolink.* [Online] 2011. [Cited: 15 março 2012.] http://www.agrolink.com.br/sementes/noticia/beneficios-socioambientais-da-biotecnologia-sao-rentaveis_127478.html.
39. **MARCHIORO, G.B et al.** *Avaliação dos impactos da exploração e produção de hidrocarbonetos no Banco dos Abrolhos e adjacências. Megadiversidade.* nº 2, 2005, Vol. I.
40. **BANCO DO BRASIL.** *Protocolo de Intenções pela responsabilidade sociambiental que entre si celebram o Ministério do Meio Ambiente, o BNDES, a Caixa Econômica Federal, o Banco do Brasil S.A., o Banco da Amazônia e o Banco do Nordeste do Brasil.* [S.l.] : s.n., 2007.
41. **EQUATOR PRINCIPLES ASSOCIATION.** *Equator Principles: environmental & social risk management for project finance.* 2011.
42. **PRINCIPLES OF RESPONSIBLE INVESTMENTS.** *About us. PRI: Principles of Responsible Investments.* [Online] 2012. [Cited: 15 março 2012.] <http://www.unpri.org/about/>.
43. **NATURAL CAPITAL CONSERVATION.** *Introduction. Natural Capital Conservation.* [Online] 2012. [Cited: 15 março 2012.] <http://www.naturalcapitaldeclaration.org/>.
44. **SUPER INTERESSANTE.** *Tabela Socioambiental.* Grupo Abril. 2011.
45. **WORLD BUSINESS COUNCIL FOR SUSTAINABLE DEVELOPMENT.** *Corporate Ecosystem Valuation . WBCSD: business solutions for a sustainable world .* [Online] 2012. [Cited: 15 março 2012.] <http://www.wbcd.org/work-program/ecosystems/cev.aspx>.
46. **CENTROFLORA.** *Empresas do grupo. Grupo Centroflora: parcerias para um mundo melhor.* [Online] 2012. [Cited: 15 março 2012.] <http://www.centroflora.com.br/index.php/pt/empresas-do-grupo.html>.

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