National Accounts
number 75

Environmental-Economic Accounts

2

Ecosystem Accounts

Species Threatened with Extinction in Brazil

2014

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Instituto Brasileiro de Geografia e Estatística

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Errata

It was detected that the labels of the Caatinga and Cerrado Biomes were inverted in Charts 6 to 11, an error caused at formatting time. As a consequence, these charts were amended.

Ministry of Economy
Brazilian Institute of Geography and Statistics - IBGE
Directorate of Geosciences
Department of Natural Resources and Environmental Studies
Directorate of Surveys
Department of National Accounts

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Disseminates the outputs of the System of National Accounts regarding the Supply and Use Table, Integrated Economic Accounts, Regional Accounts, Gross Domestic Product for Cities, Input-Product Matrix, among other relevant information, as well as the achievements of the Environmental-Economic Accounts, which account for natural resources associated with economic activity.

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Summary

Conventions

-	Numerical data equal to zero not resulting from rounding;
..	No numerical data is applicable;
...	Numerical data is not available;
x	Numerical data omitted to avoid individualization of information;
0; 0.0; 0.00	Numerical data equal to zero resulting from rounding of an originally positive numerical data; and
-0; -0.0; -0.00	Numerical data equal to zero resulting from rounding of an originally negative numerical data.

Preface

Through this publication, the Brazilian Institute of Geography and Statistics - IBGE continues its efforts to produce a line of products for mapping and analyzing Brazilian ecosystems in different environmental perspectives, whose first publication - on land use in the six Brazilian biomes – Amazônia (Amazon), Mata Atlântica (Atlantic Forest), Cerrado, Caatinga, Pampa and Pantanal –, contained an assessment of the changes experienced by these environmental units over the accounting period from 2000 to 2018.

This study embraces the theme of species threatened with extinction in Brazil and, like the previous edition, is based on the methodological reference manual for the System of Environmental-Economic Accounting 2012: Experimental Ecosystem Accounting, known as SEEA-EEA, developed by the United Nations. Threatened Species Accounts are one of the different types of accounts proposed in the SEEA-EEA.

The set of information disclosed herein, covering the year 2014, presents a systematization of the data related to the degree of risk of extinction of species in Brazil, an important parameter for understanding the environmental condition of the territorial units considered – in addition to the Biomes, the marine portion of the Coastal-Marine System, and the territorial sea of the São Pedro e São Paulo Archipelago and of the Trindade and Martim Vaz Islands. The data originates from the Official Brazilian Lists of Fauna and Flora Species Threatened with Extinction, resulting from assessments of the conservation status of the species, published, respectively, by the Chico Mendes Institute for Biodiversity Conservation (ICMBio) and by the Brazilian National Center for Plant Conservation under the Rio de Janeiro Botanic Garden Research Institute (CNCFlora/JBRJ).

It is worth mentioning that the Threatened Species Accounts contribute to the synthesis of information on the conservation status of the species by highlighting the different types of changes between the extinction risk categories, which allows the construction of environmental indicators for different purposes. Due to their multidisciplinary nature, when integrating data from different producers, they also play an important role in fostering interinstitutional cooperation, thus collaborating to enhance synergies in the generation and investigation of biodiversity data for the purpose of obtaining better knowledge and monitoring. By gathering this information from the perspective of natural capital accounting, IBGE reaffirms, through this publication, its commitment to depict the country with information necessary to portray its reality. That is how it contributes to a broad understanding of the role of nature for human well-being and provides, by extension, the appreciation of our natural potential, especially in a country as diverse and environmentally rich as Brazil.

The design and development of the Ecosystem Accounts, including the preparation of this publication, took place during the technical management of João Bosco de Azevedo as head of the IBGE Directorate of Geosciences. Bosco played a decisive role in choosing the studied topics, in collaboration with national and international players, and creating a favorable institutional environment for the completion of this research. The Geosciences Department thanks him for his persistent efforts to portray Brazilian environmental issues and wishes him success in future ventures.

Claudio Stenner
Director of Geosciences

Introduction

The Threatened Species Accounts are part of the development of the Environmental-Economic Accounts, according to the methodological framework of the Experimental Ecosystem Accounts. Their final purpose is the construction of spatially explicit national and subnational indicators that portray the status and condition of the environment, analyzed through the study and compilation of information on biodiversity and its relationship with economic agents. The focus of this publication is on addressing the richness of the species and their conservation status in nature.

Biodiversity plays a fundamental role in the generation of services provided by nature, commonly called ecosystem services[1]. In Brazil, one of the few megadiverse countries in the world, the importance of services provided by biodiversity for economic development is clearly observed by the economic cycles that have marked the country`s history. Its assortment of species that support its ecosystems have enabled the diversified use of wood and non-timber forest products, as well as ensuring the availability of ecosystem services essential to society.

[1] For the IBGE publication series within the framework of the SEEA-EEA manual (System of Environmental-Economic Accounting 2012: Experimental Ecosystem Accounting manual – UNITED NATIONS, 2014), the expression "*ecossistemas*" was adopted as a Portuguese translation of "ecosystem", which is commonly referred to in Brazilian literature as "*ecossistêmicos*". Although they have the same essence, this expression highlights the services provided by ecosystems for human benefits, according to the concept consolidated internationally by the Millennium Ecosystem Assessment initiative (2005). Such an assessment is largely responsible for the insertion of this approach in the political agendas of nations and the basis of studies that measure, assess and value the various aspects related to society's dependence on the ecological processes of nature (ODUM, 2000; COSTANZA et al., 2017).

As examples of this role, the Pau-Brasil Exploration Cycle (species *Caesalpinia echinata* Lam.) and the Rubber Cycle (species *Hevea brasiliensis* (Willd. Ex A.Juss.) Müll. Arg.) stand out, although the historical context has reflected patterns of unsustainable use. Currently, the role of biodiversity and ecosystem services is highlighted by the development of a robust agricultural and livestock industry, which directly depends on ecosystem services, such as soil, climate regulation and water availability, with an increasing concern with the application of technologies that allow the rational use of these services.

Upon becoming a signatory to the Convention on Biological Diversity (CBD), established at the United Nations Conference on Environment and Development, known as ECO-92, held in Rio de Janeiro in June 1992, and ratified through Decree No. 2.519, dated 3/16/1998, Brazil undertook to fulfill the objectives of this Convention, which consist of the conservation and sustainable use of biodiversity and the fair and equitable sharing of the benefits resulting from its use, as well as the associated traditional knowledge (BRAZIL, 2000). In addition to these initiatives, the Ministry of the Environment published the *Estratégia e plano de ação nacionais para a biodiversidade* in 2017, a document known as EPANB[2], to guide the implementation of actions focused on the conservation, sustainable use and sharing of benefits arising from the uses of biodiversity (BRAZIL, 2017a).

For the purpose of expanding the horizons of the System of National Accounts (SNA), in order to consider the use of ecosystem services and record how the use of the flow of these services by the economic system interferes with biodiversity assets, the first publication of the Species Accounts of Brazil contributes to the effort to apply the international recommendations contained in the SEEA-EEA manual.

To that end, this study provides a first compilation of the Brazilian Threatened Species Accounts. As a contribution to the international community's commitment to the methodological development of the SEEA-EEA, an application test proposed in said manual is presented, based on global data from the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, for the species assessed in South America. Specifically for the analysis of data in Brazil, the compilation of these accounts for the years 2010, 2014 and 2018 and the calculation of a simplified version of the Red List Index (RLI), Butchart et al. (2007), are presented – in different spatial and ecological units.

In addition, as a starting point for future editions of the Threatened Species Accounts, this study provides a synthesis of the available data from the Official Brazilian Lists of Fauna and Flora Species Threatened with Extinction, resulting from assessments of species extinction risk, published by the Chico Mendes Institute for Biodiversity Conservation (ICMBio) and by the Brazilian National Center for Plant Conservation under the Rio de Janeiro Botanic Garden Research Institute (CNCFlora/JBRJ), respectively. The official national data is used to present the numbers of species, by threat category, separated into the Brazilian biomes and different realms, in addition to summary maps of information on the distribution of threatened species throughout Brazil. As future updates to the National Lists are published, it will be possible to compile the accounts and indicators shown in this study with national data.

[2] The document was translated into English under the title *National biodiversity strategy and action plan*, known as NBSAP (BRAZIL, 2017b).

Related information

As the publication entitled "Ecosystem Extent Accounts: land use in Brazilian biomes 2000-2018", also by IBGE, this study has been undertaken in the context of the Natural Capital Accounting and Valuation of Ecosystem Services (NCAVES) project, launched in 2017 by the United Nations Statistics Division (UNSD) and by the United Nations Environment Programme (UNEP) with funding from the European Union[3]. The purpose of the NCAVES project is to provide a review of the SEEA-EEA manual, encourage the development of environmental accounting and ecosystem accounting in five countries, including Brazil, through support and training of the national institutions.

[3] The content of the Ecosystem Accounts does not necessarily reflect the opinions of the European Union.

Technical notes

Context

Conceptual framework for biodiversity and ecosystems

Biodiversity plays an essential role in supporting human well-being, as it helps to maintain functional and resilient ecosystems that, in turn, provide services such as food provision, climate regulation, water regulation, cultural and spiritual benefits, among others.

The conceptual framework for biodiversity adopted in the Ecosystem Accounts follows the definition attributed by the CBD, which includes diversity within species, between species and of ecosystems. Diversity within species, also known as genetic diversity, encompasses all variation between individuals in a population, as well as between spatially distinct populations of the same species. Diversity between species, in turn, corresponds to what is commonly called species diversity, i.e., the variety of species existing in some type of environment or in a defined region, at different spatial scales. Finally, ecosystem diversity has been addressed in a way that is correlated to the diversity of vegetation, landscape, or biome phytophysiognomies, although the further expansion of functional characteristics to define ecosystems is still under debate.

The need for a typology to classify ecosystems is common to several initiatives. Recently, the global typology developed under the coordination of the International Union for Conservation of Nature (IUCN), prepared by Keith et al. (2020), has drawn attention due to its focus on the functional characteristics of ecosystems and its compre-

hensive proposal, which makes it a possible reference for the purposes of ecosystem accounting, as discussed in international forums with experts on the subject[4].

Ecosystems contribute to the generation of a variety of goods and services on which people depend, known as ecosystem services. In general terms, an ecosystem's ability to provide services depends on its extent (the area occupied by the ecosystem) and its condition (its quality). In addition to changes due to natural causes, this capacity is modified, both positively and negatively, as a result of human behavior through changes in land use (for example, by converting forests into arable land), in addition to other activities (e.g., pollutant release). The results of these actions, depending on the form and intensity with which they occur, can cause the modification or replacement of certain types of ecosystems, which can lead to variations in the provision of services.

Due to the relevance of biological richness for socio-cultural and socio-economic development in Brazil, two other concepts associated with biodiversity deserve to be highlighted: socio-biodiversity and agrobiodiversity.

In line with the socio-cultural dimension of biodiversity, the concept of socio-biodiversity is defined as the relationship between biological diversity and the diversity of socio-cultural systems. According to item II of Art. 2 of Interministerial Ordinance No. 239, dated 7/21/2009[5], the following are products of socio-biodiversity:

> goods and services (final products, raw materials or benefits) generated from biodiversity resources, focused on forming production chains of interest to traditional peoples and communities and to family farmers, which promote the maintenance and appreciation of their practices and knowledge and ensure the resulting rights, generating income and promoting improvements to their quality of life and the environment in which they live (BRAZIL, 2009).

Agrobiodiversity[6], also known as agricultural biodiversity, is defined by the CBD as a broad term that includes all components of biodiversity that are relevant to agriculture and food. It also includes all components of biodiversity that constitute agricultural ecosystems, composed of the varieties and variability of animals, plants and microorganisms, at the genetic, species and ecosystem levels, which are necessary to support the main functions of agroecosystems, as well as their structures and processes.

[4] For further information on the topic, please visit: https://seea.un.org/events/virtual-expert-forum-seea-experimental-ecosystem-accounting-2020.

[5] This Ordinance establishes guidelines for the implementation of the National Plan for the Promotion of Socio-biodiversity Product Chains.

[6] For further information on the topic, please visit: https://www.mma.gov.br/estruturas/sbf_dpg/_arquivos/cdbport.pdf.

Ecosystem services and the System of National Accounts

Biodiversity is a fundamental part of a country's wealth, contributing to its prosperity by providing benefits for human well-being and inputs for the economy. According to the methodology proposed in the System of National Accounts manual (SNA 2008), not all environmental resources are qualified as economic assets or economic flows (UNITED NATIONS, 2009). Only natural resources over which property rights have been established can qualify as economic assets and are therefore recorded by the System of National Accounts (for example, agricultural products, oil extraction, mineral extraction).

On the other hand, although fundamental to socioeconomic development, some attributes of the ecosystems have specific characteristics that make it impossible to establish their ownership, such as, for example, ecosystem services provided by the Amazon Forest. Since they do not belong to any particular production unit, either because their existence is unknown or because they are inaccessible, several resources are not handled as economic assets (UNITED NATIONS, 2009). Other examples are the availability of water, air, the oceans, the growth of animals living in the wild (birds, fish, among others), or the growth of native vegetation (non-cultivated), which are not classified as produced assets because they do not constitute an economic production process, although they contribute to income generation.

The concept of ecosystem services introduced by the SEEA-EEA manual intends to cover all flows by which humans can benefit from ecosystems. However, ecosystem services are defined as the ecosystem contributions to benefits, they are not the same as benefits. Benefits must be differentiated into two types: a) those that are captured by the System of National Accounts (SNA benefits) and that are currently included in the measurement of the Gross Domestic Product (GDP), such as, for example, the provision of food, timber and mineral resource extraction; and b) other benefits that do not fall within the boundaries of the System of National Accounts (non-SNA benefits), but that contribute to income generation and well-being for economic agents.

By convention, the scope for measuring non-SNA benefits of the ecosystem for accounting purposes should consider the flow of services related to human well-being. Therefore, it is necessary that, in addition to provisioning services (such as ore, wood, food, among others), regulating services are also considered, which are linked to the general functioning of ecosystems (such as, for example, water and climate regulation of forests, waste purification), as well as cultural services related to spirituality, knowledge and well-being linked to the appreciation of nature.

The SEEA-EEA manual, in seeking to include the benefits of ecosystem assets and ecosystem service flows in the SNA, intends to expand the production boundaries of the economy.The incorporation of non-SNA benefits, in turn, intends to change the current measurement of the GDP, for the purpose of obtaining the Environmentally Adjusted Gross Domestic Product, also called Green Gross Domestic Product. For example, by incorporating carbon capture by forests within the SNA's production limit, a service is generated, provided by covering the land with forest vegetation, which will cause a direct increase in the GDP level (UNITED NATIONS, 2014). As such, it is understood that the extension of the production limits will expand the measures of production, consumption and income of a country.This type of approach is particularly interesting for countries that have large stocks of natural ecosystems in good condition, which

is the case in Brazil. The recognition and appreciation of natural wealth in a more effective way favor a better positioning in the international community, increasing the appeal for investments, for example.

Experimental Ecosystem Accounts Methodology

The SEEA-EEA manual provides an accounting structure for integrating and relating the flows of ecosystem services with the biodiversity components, according to the ecosystem types and by species, for the purpose of building an understanding of the relationship with economic agents. Ecosystem Accounts adopt an approach in which Ecosystem Assets are composed of biotic and abiotic factors outlined in spatial units of statistical reference. These assets provide services, which are the contributions to benefits to economic agents.

SEEA-EEA is a comprehensive system consisting of five components:

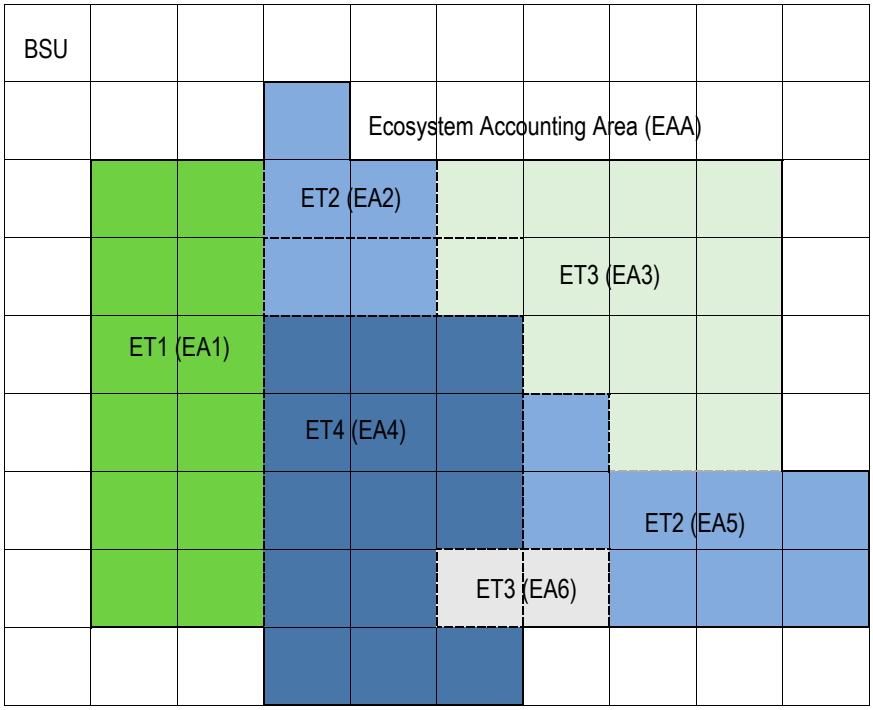
- Ecosystem Extent Account – organizes information about the extent of different ecosystem types within an accounting area (for example, a country's territory) in terms of spatial area. Ideally, the ecosystem types should be defined according to a typology that captures ecological differences and similarities, in particular with regard to their functioning and, consequently, to the different baskets[7] of services they provide. As a starting point, an approximation can be obtained from land use and land cover classes and vegetation types. This account serves as a common first step for ecosystem accounting, as it specifies the area (in square kilometers, for example) for each type of ecosystem;
- Ecosystem Condition Account – measures the overall quality of Ecosystem Assets and capture, in a set of key indicators, their status, i.e., their level of degradation or conservation and their potential to provide services. An important conceptual advance provided by the Ecosystem Accounts perspective is recognition of the importance of maintaining the condition of ecosystems as a whole, as opposed to a vision focused on specific resources;
- Ecosystem Services Account – measures the flows of ecosystem services, in biophysical and/or monetary terms, as well as their corresponding beneficiaries, classified by national accounting categories or other groupings of economic units, such as in the form of a Supply and Use Table;
- Monetary Asset Account – records the monetary value of the opening and closing stocks of all Ecosystem Assets in an accounting area, as well as additions and reductions to these stocks; and
- Thematic Accounts – include the components of land, water, carbon and biodiversity; they are independent and have direct relevance in the measurement of Ecosystem Assets.

The basic principle for ecosystem accounting is to integrate data based on its geographical location (Figure 1). Once the coverage area of the Ecosystem Accounts is defined, i.e., of the Ecosystem Accounting Area (EAA), the approach proposed by the manual is the spatially explicit delimitation of Ecosystem Assets (EA), which are

[7] Baskets correspond to a particular combination of ecosystem services generated in a specific ecosystem asset at a given time.

continuous areas defined according to their functional properties and the services that can be derived from them. Information regarding Ecosystem Assets with similar characteristics can be aggregated into different Ecosystem Types (ET), based on a standardized classification, which allows cross-checking of information from different accounts. The Basic Spatial Units (BSUs) are key elements of the Ecosystem Accounts proposed in the SEEA-EEA manual, as they allow the link between the different layers of information compiled in the different accounts (extent, condition, services, monetary and thematic).

Figure 1 - Relationship between the spatial areas in ecosystem accounting



Source: UNITED NATIONS. Statistics Division. *System of environmental-economic accounting 2012*: experimental ecosystem accounting. NewYork, 2014. 177 p. Prepared under the auspices of the United Nationas, European Commission, Food and Agriculture Organization of the United Nations - FAO, Organisation for Economic Co-operation and Development - OECD and World Bank. Available at: http://unstats.un.org/unsd/envaccounting/seeaRev/eea_final_en.pdf. Accessed: August 2020. Adapted.

Species Account Methodology

In the perspective adopted in the SEEA-EEA manual, the different aspects of biodiversity are covered in different types of accounts. Ecosystem diversity is mainly addressed in the Extent Accounts, which show the area conversions between the different types of ecosystems during the accounting period. Species diversity can be contemplated in Species Accounts, one of the types of Thematic Accounts proposed by the SEEA-EEA with varied objectives, depending on the characteristics assessed or the species selected for the accounts. The different approaches to Species Accounts, developed by the United Nations Environment Programme World Conservation Monitoring Centre (2016), are generally structured as asset accounts, showing stocks and flows over time, e.g., the numbers of individuals in a particular species of interest or the richness of species in a given set (threatened, invasive species, among others). Biodiversity within species, i.e., genetic diversity, may be

relevant for some situations, but its measurement is costly and complex. However, new scientific advances in the area may allow measures of genetic diversity to be integrated into ecosystem accounting in the future.

The potential connections between the biodiversity components and the flows arising from their use – e.g., those linked to economic and socio-cultural activities, such as tourism and plant extraction – are considered to be derived from biodiversity and accounted for in the respective Ecosystem Service Accounts. The purpose of the Thematic Accounts is to assess the condition of the biodiversity, i.e., the status of conservation and degradation over time. In turn, flows are associated with the capacity of the ecosystem to provide services, such as, for example, the diversity of flora species that provide diversified extraction of timber and non-timber forest products for different socioeconomic purposes, or even how the impacts arising from the extraction of products can lead to a deterioration in the condition of the ecosystem, affecting its ability to provide services in the future. The purpose of this logical structure proposed in the SEEA-EEA manual is to recognize that, albeit indirectly, the condition of ecosystems is a fundamental characteristic for their ability to provide services, allowing an understanding of how biodiversity relates to service flows.

The choice of the scope of the Species Account should be guided by the intended uses of the indicators in public policies, and therefore more than one Species Account may be required to respond to the variety of policy issues related to biodiversity. In addition to the possibility of producing indicators directly linked to a specific service, Species Accounts are particularly relevant for measuring the condition of Ecosystem Assets. The SEEA-EEA manual suggests two main approaches for compiling information on the condition of ecosystems using Species Accounts:

- Abundance and distribution of species – refers to an analysis designed to detect the quality of ecosystem types from the average abundance of species characteristic of each ecosystem compared to its reference condition. An example of this approach is the abundance of exotic species as an indicator of poor condition, or that of rare species or habitat[8] specialists as an indicator of good condition; and
- Threatened species conservation status – refers to an assessment of the extinction risk resulting from environmental changes and human activities that directly or indirectly influence population abundance. It is suggested that the Threatened Species Account be regionalized by specific ecosystems within countries.

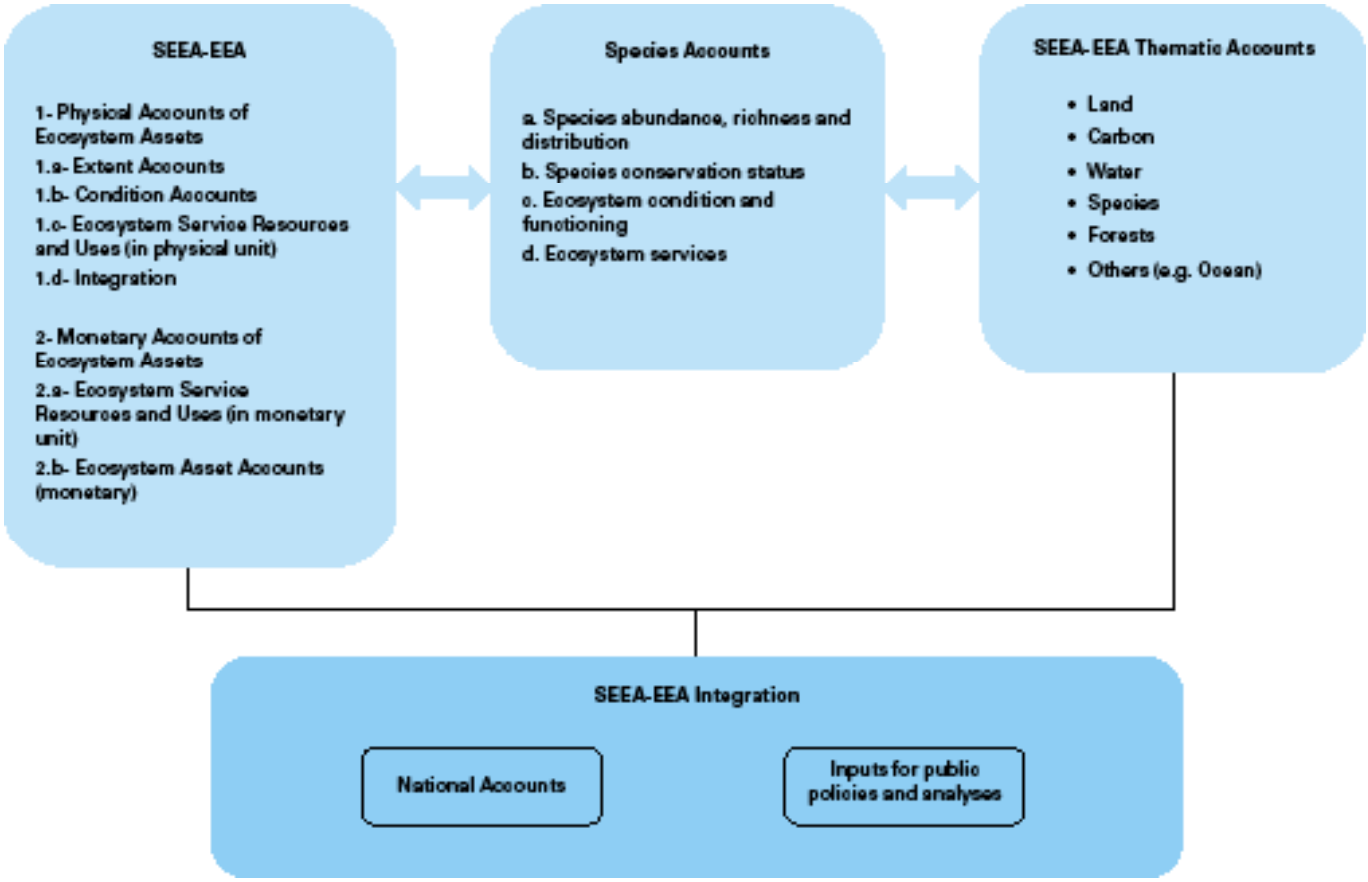
Species Accounts can be useful in the production of different types of indicators, according to the selected set of species. Some prioritization criteria can be outlined to define the scope of such accounts. These include:

- Species of interest from a conservation point of view;
- Species important for the condition and/or functioning of the ecosystem; and
- Species important for the generation of ecosystem services.

[8] Specialist species are those with a very restricted tolerance to the type of resources or ecological conditions they may occupy. Some bird species, for example, are specialists in closed forests and do not venture outside this type of habitat. Changes in the conditions of these environments have deeper and faster impacts on this type of species.

The Species Accounts therefore constitute a Thematic Account that contributes to the characterization of the Ecosystem Accounts. Thus, the importance of integrating their results with other accounts is identified, for example, through condition indicators that provide information to be internalized by the Ecosystem Accounts and other Thematic Accounts (Figure 2).

Figure 2 - Diagram of the integration between the different Ecosystem Accounts and their Thematic Accounts



Source: UNITED NATIONS ENVIRONMENT PROGRAMME WORLD CONSERVATION MONITORING CENTRE. *Exploring approaches for constructing species accounts in the context of the SEEA-EEA*. Cambridge [United Kingdom]: UNEP-WCMC, 2016. 153 p. Available at: https://www.unep-wcmc.org/system/comfy/cms/files/files/000/000/792/original/Exploring_Approaches_for_constructing_Species_Accounts_in_the_context_of_the_SEEA-EEA_FINAL.pdf. Accessed: August 2020. Adapted.

For the construction of Species Accounts, it is essential that the data follow some general biodiversity accounting criteria, according to the guidelines contained in the *Technical recommendations in support of the system of environmental-economic accounting 2012: experimental ecosystem accounting* (UNITED NATIONS, 2019), which are:

- Be accessible in a spatial resolution appropriate for accounting, in order to allow data to be mapped to individual assets and types of ecosystems;
- Be temporally relevant, in order to inform the net variations in the biodiversity stock between the opening and closing of the accounting periods;

- Be comparable to a common reference condition in order to allow the comparison of biodiversity measures with a reference value indicative of a balanced state, in order to assist in the aggregation of different types of biodiversity data;
- Enable the aggregation of measures to provide a composite indicator of the condition of the biodiversity, so that the change in this composite indicator between accounting periods provides an indication of the net biodiversity balance; and
- Be comparable, in space and time, in order to allow direct comparison of the different biodiversity components in different types of ecosystems.

Ecosystem capacity through a biodiversity lens

As specified in the previous section, the perspective adopted in the SEEA-EEA manual is that biodiversity is considered as a component determined by the condition of the ecosystems and species, and not as a flow associated with a given ecosystem service. Biodiversity measures are related to Ecosystem Assets in the accounting model, whose potential connections to services can be direct or indirect. The focus of the Species Accounts is, therefore, to compile information about the species, even if they are not directly related to a specific service, allowing for an assessment of the condition of the ecosystem from a holistic perspective. As an example, biodiversity enables flora species to provide services to economic activities (pharmaceutical, cosmetic, and food industries, among others), such as the locally well-known babassu and copaiba products extracted in Brazil.

Bearing in mind that the variation in species richness and abundance in a given period impacts the provision of ecosystem services in another period of time, it is relevant to recognize that the Species Accounts measures must advance to derive and relate to the Condition Accounts of the Ecosystem and the Ecosystem Service Accounts, in the form of indicators and the Supply and Use Table.

In this perspective, a fundamental concept for the integration of these accounts is the capacity of the ecosystem, which consists of the integration between the Extent, Condition and Ecosystem Services Accounts. An initial definition of ecosystem capacity for natural capital accounting is:

> the ability of an ecosystem to generate a service under its current conditions, which can be used at the maximum level of yield (utilization) or used at a level that does not negatively affect the future supply of the same or other services (HEIN et al., 2016).

The analysis of the ecosystem's capacity seeks to understand, in ecological terms, how variations in the condition of the ecosystem generate variations in a basket of services, or vice versa, how the use of a given ecosystem service impacts the ecosystem's condition indicators. Such an approach aims, for example, to quantify the effects of environmental degradation, generating biophysical and monetary indicators for the application of valuation techniques for Biodiversity Accounts. However, the implementation of the concept still requires further study, for example: in the selection of services to be accounted for (with the possibility of being supplied together); and in the need to define resilience indicators for the limits of use of these services, as well as the dynamics and non-linear factors associated with the ecosystem, such as, for example, abrupt changes in condition when certain thresholds are exceeded.

Scope of the Threatened Species Account in Brazil

Criteria and categories for assessing species' extinction risk

The methodology used to assess the risk of species extinction was developed by the IUCN and is widely used in assessing the conservation status of species at global; national, by countries; or subnational levels, by states. This methodology consists of criteria and categories used to define the risk of species extinction, proposed based on extensive discussions between the IUCN and the scientific community linked to the IUCN Species Survival Commission[9]. The first version of these categories and criteria was developed in 1994; Currently, version 3.1 from 2001 is used[10].

The evaluation processes conducted by the IUCN are carried out at the global level, considering the total taxon population across the globe. National level assessments, such as the one conducted by ICMBio and CNCFlora/JBRJ for Brazil, are considered by the IUCN to be regional evaluations. In the case of species that occur exclusively in Brazil, the evaluations carried out nationally feed, in turn, the global database. Assessments can be conducted at the species taxonomic level or, where relevant, also at the infra-specific level. In the latter case, both the species as a whole and its assessed infra-specific levels (subspecies, varieties, isolated populations) are categorized separately.

In order for global or regional assessments to be conducted properly, five quantitative criteria, called A, B, C, D and E, were defined by the IUCN to analyze the species' extinction risk. Most of them include subcriteria that are used to more precisely justify the classification of a taxon in a specific category. Each of the five criteria has pre-established thresholds for the classification of species in any of the categories, according to that criterion. The concepts of each criterion are briefly presented as follows:

- Criterion A – reduction of the total population of the species (observed in the past, estimated in the present and/or projected). The decline must be measured over 10 years or three generations;
- Criterion B – restricted geographical distribution of the species, showing fragmentation, decline or fluctuations. To apply this criterion, the Extent of Occurrence (EOO) and Area of Occupancy (AOO) are calculated;
- Criterion C – small population and fragmented population, fluctuations or decline (observed, estimated and/or projected);
- Criterion D – very small population or very restricted distribution; and
- Criterion E – quantitative analyzes of the probability of extinction (for example, Population Viability Analysis).

Based on the information collected and according to standardized and objective technical criteria, the extinction risk category for each species is identified. The IUCN differentiates the degree of conservation across nine categories, only three of which

[9] The six IUCN Commissions involve volunteer experts from various fields of knowledge. They are broad and active networks of scientists and experts that provide IUCN and its members with policy knowledge and advice to drive conservation and sustainable development. For further information on the topic, please visit: https://www.iucn.org/about/union/commissions.

[10] For further information on the guidelines for applying the evaluation criteria, please visit: https://www.iucnredlist.org/resources/redlistguidelines. Depending on scientific research and IUCN scientific committee articles, updated versions of these guidelines are issued. The 14th version was published in 2019.

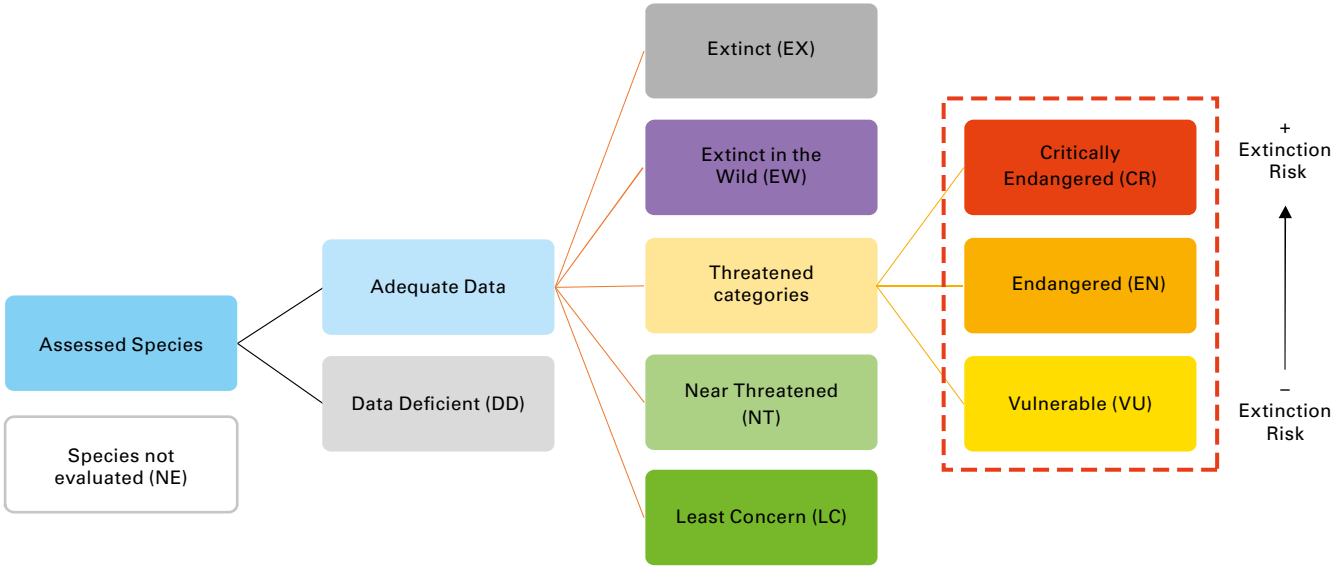
are considered threatened (Critically Endangered (CR), Endangered (EN), and Vulnerable (VU)), as shown in Figure 3. For the purposes of Brazilian legislation, the category Extinct in the Wild (EW) is also considered to be threatened, and the categories Data Deficient (DD) and Near Threatened with Extinction (NT) are considered as priorities for research regarding their conservation status, as provided for in Ordinance No. 43, dated 1/31/2014, from the Ministry of the Environment (BRAZIL, 2014a). The following are the definitions of each IUCN category (IUCN SPECIES SURVIVAL COMMISSION, 2012):

- Extinct (EX) – a species is considered Extinct when there is no doubt that the last individual has died. A species is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic distribution area have failed to record the species. Surveys should be conducted over a time frame appropriate to the life cycle and the biological form of the species in question;
- Extinct in the Wild (EW) – a species is considered Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside its natural distribution area. A species is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic distribution area have failed to record the species. Surveys should be conducted over a time frame appropriate to the life cycle and the biological form of the species in question;
- Regionally Extinct (RE) – a species is considered Regionally Extinct when there is no reasonable doubt that the last individual potentially capable of reproducing in the region has died or disappeared from the wild, or, in the case of a vagrant species[11], the last individual has died or disappeared from the wild in the region. The setting of a time limit for inclusion as Regionally Extinct should not be earlier than 1500 CE;
- Critically Endangered (CR) – a species is considered Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild;
- Endangered (EN) – a species is considered Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing very high risk of extinction in the wild;
- Vulnerable (VU) – a species is considered Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild;
- Near Threatened (NT) – a species is considered Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future;

[11] A vagrant species is one that does not reproduce in a region, but occurs regularly within its limits, either currently or during some period of the last century. For further information on the topic, please visit: https://www.icmbio.gov.br/ran/images/Arquivos/especies_ameacadas/conceitos_iucn_2012.pdf.

- Least Concern (LC) – a species is considered Least Concern when it has been evaluated against the criteria but does not qualify as Critically Endangered, Endangered, Vulnerable or Near Threatened. Broadly distributed and abundant taxa are included in this category;
- Data Deficient (DD) – a species is considered Data Deficient when there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status. A species in this category may be well studied, and its biology well known, but appropriate data on its distribution or abundance are lacking. Classifying a species in this category indicates that more information is needed and that there is a possibility that future research will show that classification in a threat category is appropriate; and
- Not Evaluated (NE) – a species is considered Not Evaluated when it has not yet been evaluated by a Red List Authority, according to IUCN criteria.

Figure 3 - Structure of the categories for preparing the Red List by the IUCN



Source: INTERNATIONAL UNION FOR CONSERVATION OF NATURE. Standards and Petitions Committee. *Guidelines for using the IUCN red list categories and criteria.* Version 12. Gland: IUCN, 2016.

Assessment and parameters for threat category changes

To monitor the conservation status of biodiversity, it is important to reassess species periodically. The reassessment may result in species moving to a different category of the Red List of Threatened Species, from one period to the next, for genuine or non-genuine reasons, according to IUCN:

- Genuine reasons – when the threats to the evaluated species are no longer present, or conservation measures (reintroduction, habitat protection or restoration, legal protection, harvest management, among others) have successfully improved the conservation status of the species enough to transfer it into a lower risk of extinction. Or, on the other hand, the main threats have continued unabated, have increased, or new threats have developed causing the conservation status of the species to deteriorate enough to move it into a higher extinction risk category.

- Non-genuine reasons – when new information has become available since the last assessment (more recent data are available on population sizes, geographic distribution of the species, threatening processes, rates of decline or recovery, among others), or, in the event of a taxonomic revision resulting in change for a certain species (e.g., it is now split into several species, each with smaller ranges, population sizes, etc.; or it has been merged with other species and the distribution area, population size, etc. are now larger than they were previously), the degree of threat for the species may be reassessed. When an error has been discovered in the previous assessment (e.g., the wrong information was used or the IUCN Red List categories and criteria were applied incorrectly; etc.), or also when the previous assessment used an older version of the IUCN Red List Categories and Criteria and the reassessment uses the current criteria which have slightly different thresholds.

The analysis of the reason that led to a category change is essential to differentiate whether the variation in the risk of extinction is due to an increase or a reduction in threat factors, or if it results from an alteration or modification of the research conducted. The reasons for each category change must be registered, thus allowing the identification of species that are in better or worse conservation status, information that is essential for the interpretation of the results of pressure on species, as well as for the evaluation of effectiveness of management responses adopted, such as the National Action Plans for the Conservation of Endangered Species (PANs).

Threatened Species Accounts, according to the SEEA-EEA

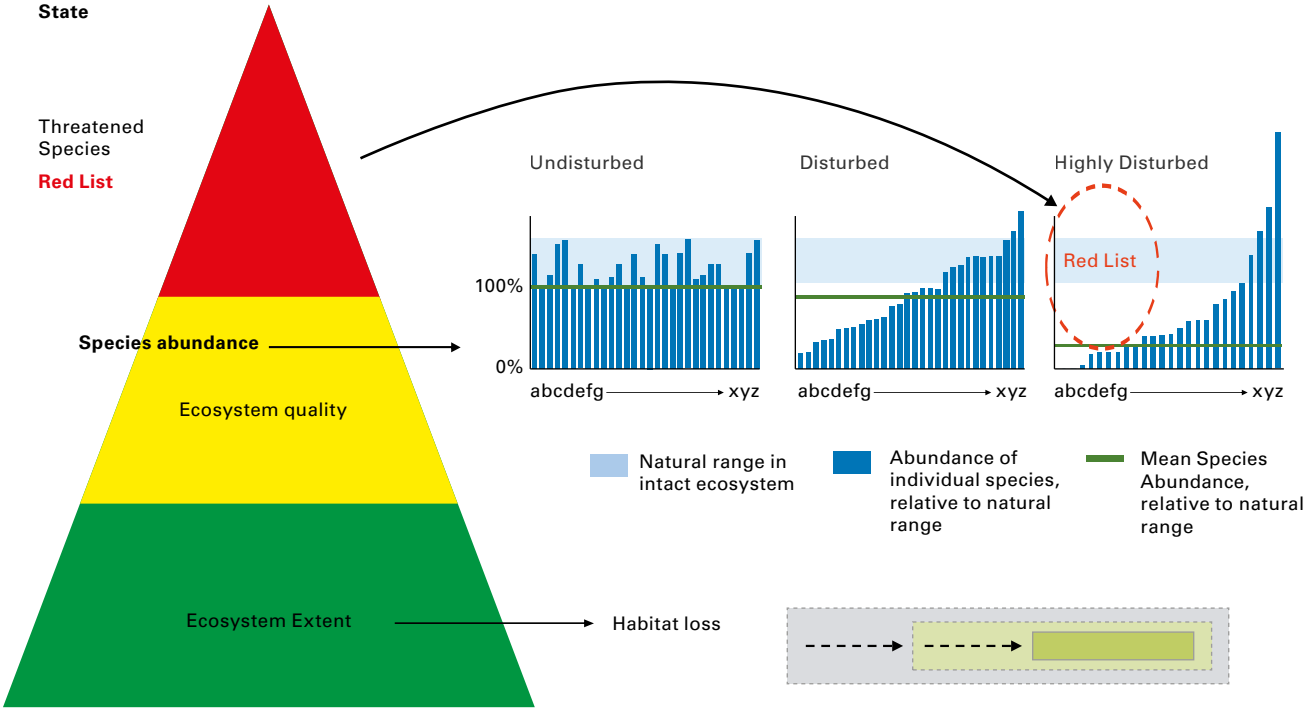
Threatened Species Accounts are one of the different approaches proposed in the SEEA-EEA. The four approaches contained in this manual include:

- Trend in the extent of ecosystems in terms of area and variation over time (loss or gain of habitat);
- Trend of species abundance and distribution, to indicate the average quality of the ecosystem types, characteristic to each one of them;
- Trend in the conservation status of threatened species; and
- Change in genetic diversity.

The approach to species extinction risk assumes that extinction is a function of natural population dynamics, species distribution and abundance, and environmental changes and human activities that directly or indirectly influence population abundance. Figure 4 summarizes the interference caused by changes in ecosystems on changes in species abundance and the consequent impact on the species' extinction risk.

Accounts that show the extinction risk can be constructed based on the conservation status of the species, as defined in the IUCN Red List of Threatened Species categories and related criteria, recognizing that changes in the category may result from changes in knowledge on a particular species, or from genuine changes in its conservation status. It is proposed that the Threatened Species Accounts be prepared for countries as a whole or for specific areas or ecosystems within countries.

Figure 4 - Changes in the size of the ecosystem and in species abundance and extinction risk



Source: UNITED NATIONS. Statistics Division. *System of environmental-economic accounting 2012:* experimental ecosystem accounting. New York, 2014. 177 p. Prepared under the auspices of the United Nations, European Commission, Food and Agriculture Organization of the United Nations - FAO, Organisation for Economic Co-operation and Development - OECD and World Bank. Available at: http://unstats.un.org/unsd/envaccounting/seeaRev/eea_final_en.pdf. Accessed: August 2020.

The main table of this account, which represents the core of the analysis, obeys the standard structure for the accounting tables, including the number of species assessed in each category at the opening and closing of the accounting period, and showing the changes (additions and reductions) with additional information (Figure 5). The analysis of the improvement or worsening of the conservation status of the species is performed by reading the different types of change, whether genuine or non-genuine.

The main elements are:

- Opening stock and closing stock – refers to the balance for the period analyzed, considering the sum of all changes by category and the total;
- Genuine additions – refers to a worsening or improvement in the conservation status, and not to an improvement in the quality of information that allows for a reclassification. Genuine changes can come from lower risk categories, which indicates a worsening of the conservation status, or from higher risk categories, which indicates an improvement in the conservation status. It is worth noting that, when including the addition of a genuine change in the balance sheet (arising from a category of lesser or greater risk), a reduction of genuine change is also recorded in the line to which it refers (arising from a category of lesser or greater risk);

- Discovery of new species/new additions to the list – refers to the inclusion of new species in the evaluation process due to an increase in the efforts to collect information about new species. It is important to note that the balance of the account total, between the opening and closing stocks, will contain the difference in the number of new species assessed, since genuine and non-genuine changes cancel each other between categories with each addition and reduction in the account, such that only the incorporation of new species changes the total balance of the species evaluated; and
- Rediscovery of new extinct species/reclassification/update of the assessment – refers to non-genuine changes that result from new information available since the last assessment (e.g., more recent data on population sizes, threat processes, rates of decline or recovery, among others), or a taxonomic revision (e.g., division into several species, each with smaller ranges, population sizes, etc., or joining with other species, causing an increase in population size), or even an error detected in the previous assessment, due to incorrect information.

In addition to these changes explained in the SEEA-EEA manual's table, the possibility of highlighting two more types of changes was also identified, which are:

- Reassessment of species coming from the DD category and going to other categories/reassessment coming from other categories and going to the DD category – allows the identification of the number of species that were categorized due to an improvement or worsening in the quality of data previously insufficient for categorization; and
- Stable reassessment – refers to species that were reassessed in the period and remained in the same category. This allows measuring the assessment effort, when considered in conjunction with the additions and reductions listed above. Ideally, all species should be reassessed during each period, but this is not always possible.

Threatened Species Accounts can be carried out at the national or sub-national level, i.e., for specific areas or ecosystems. The degree of effort required to prepare these accounts increases according to the number of territorial units for which they are prepared, or according to the scale of analysis that the available data allow for their spatialization.

Figure 5 - Table of the Threatened Species Account

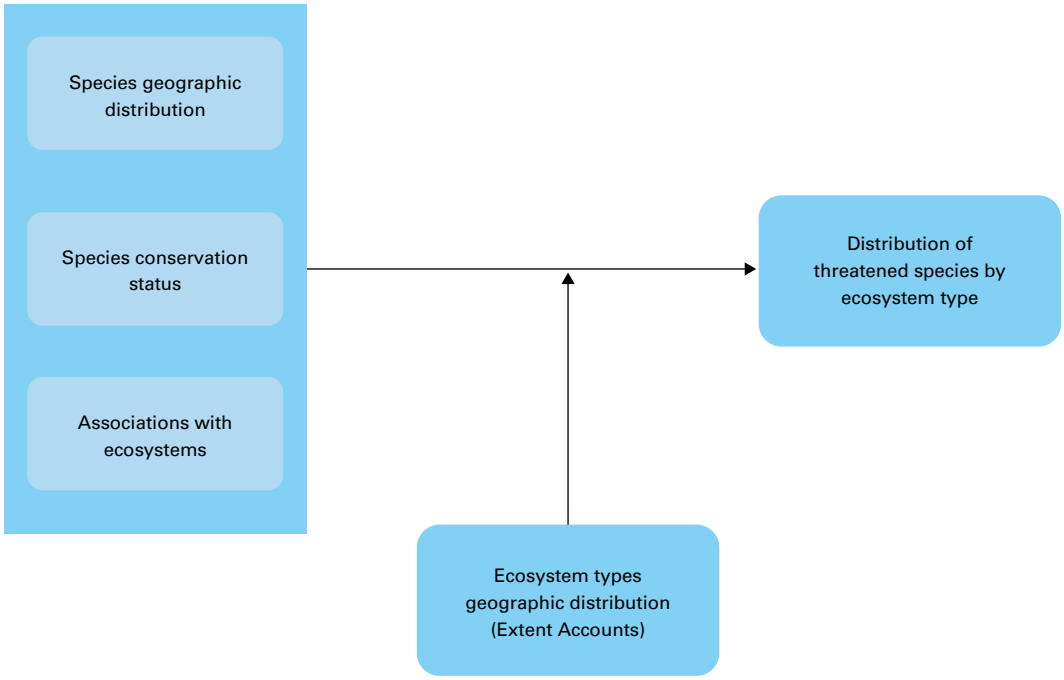
Threatened Species Accounts

	Red List Categories								
	Extinct	Extinct in the wild	Critically Endangered	Endangered	Vulnerable	Near Threatened	Least Concern	Data Deficient	**Total**
Opening Stock									
Additions									
From categories of lower risk									
From categories of higher risk									
Discoveries of new species									
Rediscoveries of extinct species									
Reclassifications									
Updated assessments									
New additions to the list									
Total additions									
Reductions									
To categories of lower risk									
To categories of higher risk									
Reclassifications									
Local extinctions									
Updated assessments									
Total reductions									
Closing stock									

Source: UNITED NATIONS. Statistics Division. *System of environmental-economic accounting 2012:* experimental ecosystem accounting. New York, 2014. 177 p. Prepared under the auspices of the United Nations, European Commission, Food and Agriculture Organization of the United Nations - FAO, Organisation for Economic Co-operation and Development - OECD and World Bank. Available at: http://unstats.un.org/unsd/envaccounting/seeaRev/eea_final_en.pdf. Accessed: August 2020.

In the context of Ecosystem Accounts, the information gathered during the assessment process allows relevant statistics and indicators to be produced. The possibility of delimiting thematic breakdowns of the condition of groups of interest is especially interesting, such as, for example, species associated with certain types of ecosystems or species affected by some type of threat, in particular. Combined with information on the geographic distribution of the species, these breakdowns can be spatialized in specific ways, providing information specifically focused on solving practical issues. The grouping of species by types of threats to which they are vulnerable, for example, has been successfully applied in the generation of compatibility scenarios between the development of socioeconomic activities and the conservation of biodiversity, as illustrated by the Impact Reduction Plan (ICMBio 2018b). This type of information, together with the other accounts in the SEEA-EEA manual, such as the Ecosystem Extent Account and the Ecosystem Services Account, is particularly relevant for understanding the relationship between biodiversity, ecosystem services and the consequences of the use of these services, and, thus, favor their sustainable use (Figure 6).

Figure 6 - Conceptual structure of the integration between information on threatened species, their geographical distribution and associated ecosystems



Source: IBGE, Diretoria de Geociências, Coordenação de Recursos Naturais e Estudos Ambientais.

During the formal review process for the SEEA-EEA manual[12], major advances have been made towards the definition of a reference typology for the classification of ecosystems, in order to provide a common basis for application in different countries, a fundamental condition for international comparison. The IUCN Global Ecosystem Typology (Figure 7) that was recently published (KEITH et al., 2020) presents a series of characteristics that make it a good candidate as a classification system for global comparability. Its hierarchical structure facilitates the aggregation of information according to the level of detail required. Since the proposal has a global focus, it seeks to encompass the different types of ecosystems found on the planet and is being developed in order to allow compatibility between existing national or subnational classifications. Additionally, the functional perspective provided by level 3 of the aforementioned classification, integrated with compositional characteristics at the most detailed levels, allows highlighting the ecological processes important for the formation, maintenance and functioning of ecosystems, defining characteristics for the condition and capacity to supply services.

As a first approximation, this study adopts the definition associated with the first level of such typology, which distinguishes three main "realms": terrestrial, freshwater and marine (Photo 1). This level of detail is adequate for the purposes of applying the methodology, since this information is easily available for the species assessed, while maintaining a significant association with the delimitation of ecosystems that is intended to be formulated in the future by the international community. In addition,

[12] For further information on the review process for this manual, please visit: https://seea.un.org/content/seea-experimental-ecosystem-accounting-revision.

when possible, analyses are carried out taking into account the national delimitation of biomes[13].

The Threatened Species Accounts are a very relevant starting point for ecosystem accounting, with the consolidation of data related to the degree of extinction risk for species in Brazil, an important parameter for understanding the environmental condition of the country's different environments. The Red Lists, in turn, are a tool consolidated worldwide and are already reflected in Brazilian policies and legislation, for example, for the formulation of National Action Plans for the Conservation of Endangered Species (PANs) and the identification of Priority Areas for Conservation, Sustainable Use and Sharing of the Benefits of Biodiversity, which makes them good candidates as information for biodiversity accounts. Furthermore, the Threatened Species Accounts represent a reinterpretation of existing data and seek to provide additional uses to that data.

Photo 1 - Examples of ecosystems in different realms

A - Terrestrial realm, transition between typical cerrado and deciduous seasonal forest. Nova Roma, Goiás.

Photo: Leonardo Lima Bergamini, 2018.

[13] Although the concept adopted in the delimitation of Brazilian biomes by IBGE (BIOMAS ..., 2019) is not identical to the definition provided for in the IUCN Global Ecosystem Typology, since it takes into account biogeographic criteria, both definitions have similarities that allow a close association.

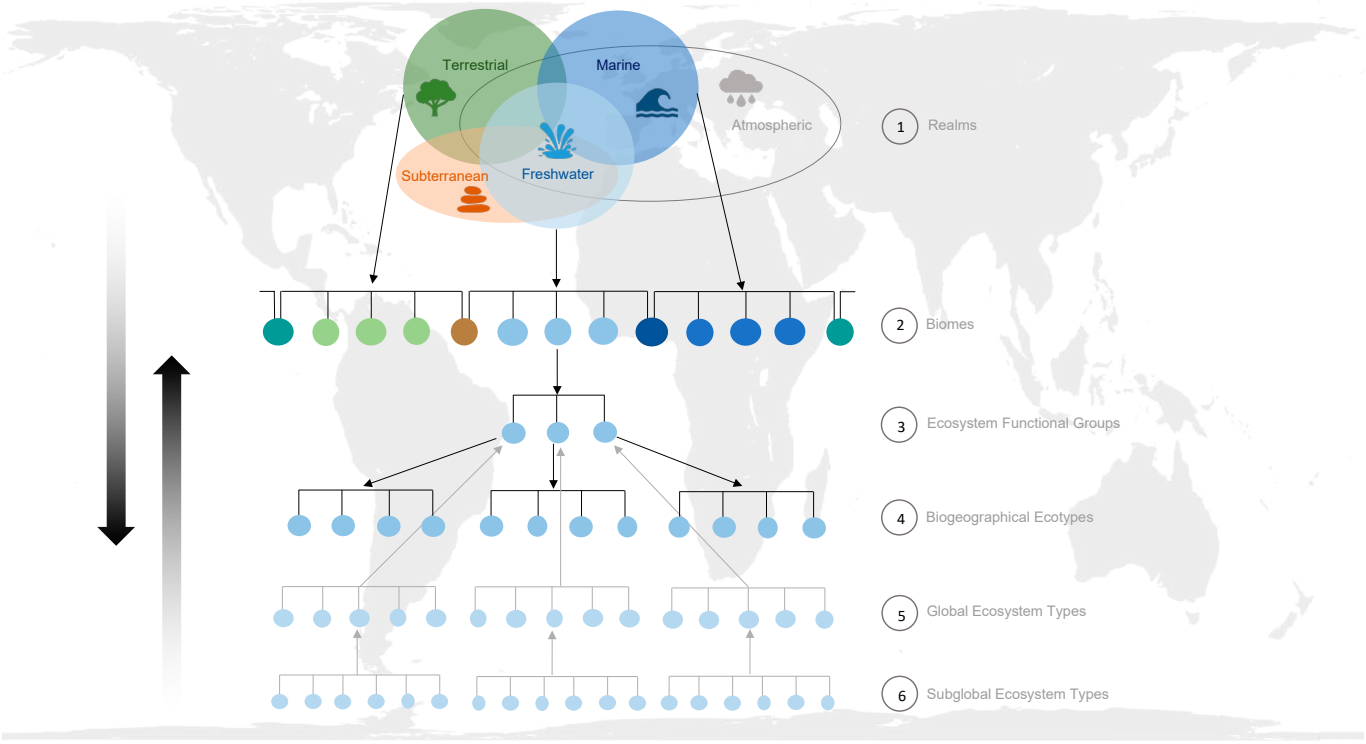
B - Freshwater realm, vereda ecosystem with buritis [*Mauritia flexuosa* L.f.].
Crixás do Tocantins, Tocantins.

Photo: Chryslainne Prazeres Araújo, 2018.

C - Marine realm, mangrove and restinga (coastal vegetation) in a tidal channel.
Piaçabuçu, Alagoas.

Foto: Marcia de Melo Faria, 2009.

Figure 7 - Hierarchical structure of the Global Ecosystem Typology



Fonte: KEITH, D. A. *et al. The IUCN global ecosystem typology v1.01*: descriptive profiles for biomes and ecosystem functional groups. Gland: International Union for Conservation of Nature - IUCN, 2020. 128 p. Disponível em: https://iucnrle.org/static/media/uploads/references/research-development/keith_etal_iucnglobalecosystemtypology_v1.01.pdf. Acesso em: ago. 2020. Adaptado.

IUCN Red List and National Red Lists

The species' extinction risk is assessed in a systematic and global manner by the IUCN, and in Brazil, by official institutions, such as ICMBio and CNCFlora/JBRJ, which have been consolidating a process of regional assessment of the species' conservation status in the country. The IUCN has been coordinating the global assessment of species' extinction risk since 1965, through the collaboration of several institutions and groups of experts around the world, and has updated and published these results in the updated IUCN Red List of Threatened Species, continuously since 2002. The IUCN employs a reassessment periodicity of five years whenever possible, or at most every 10 years, for each species assessed.

The databases compiled in the assessment process include information on distribution, population trends, threats, habitat and species ecology. The periodic publication of international data on threatened species, the IUCN Red List of Threatened Species, whose last edition was released in 2020, makes it possible to compare the evolution of the conservation status of species in different time periods and, through spatial overlays for those that hold spatially explicit geographic distribution data, it is possible to break down the information to national and subnational levels. Global IUCN data can be obtained annually for Brazil; therefore, it is possible, based on this global data, to build a Threatened Species Account structure by taxonomic group and extinction risk, in different periods of time, as well as to assess the change in the species' extinction risk over time, for a global analysis of the national conservation status.

Red Lists have been adopted as part of environmental policy in Brazil for some decades. The commitments adopted with the CBD paved the way for major advances in public policies focused on the conservation of biodiversity. The creation of ICMBio, in 2007, and CNCFlora/JBRJ, in 2008, for example, allowed for better consolidation of the production of Red Lists in the country, in a systematic and structured collaborative process. Ordinance No. 43, dated 01/31/2014, from the Ministry of the Environment that instituted the National Program for the Conservation of Species Threatened with Extinction (Pró-Espécies), recommends that the methodology to be used to assess the extinction risk of Brazilian flora and fauna must be the same as applied by the IUCN Red List Criteria and Categories System. In addition, it establishes that CNCFlora/JBRJ is the national authority designated to conduct assessments on extinction risk for Brazilian flora, being recognized as National Authority on Red Lists by the IUCN and a member of IUCN's Species Survival Commission (SSC).

From the national assessments that promoted the Official National Lists of Flora and Fauna Species Threatened with Extinction, published in Ordinances 443, 444, and 445, dated 12/17/2014, from the Ministry of the Environment, the evaluation methodology adopted now follows the internationally agreed roadmap. According to § 2 of Art. 7 of Ordinance No. 43 of the Ministry of the Environment, also called the *Pró-Espécies* Program, published in 2014, the species must be reevaluated every five years (BRAZIL, 2014a). The results of these evaluations were published in 2013 by CNCFlora/JBRJ, in *Livro vermelho da flora do Brasil* (Red Book of Brazilian Flora) (MARTINELLI; MORAES, 2013); and, in 2018, in *Livro vermelho da fauna brasileira ameaçada de extinção* (Red Book of Brazilian fauna threatened with extinction), published in seven volumes (INSTITUTO CHICO MENDES DE CONSERVAÇÃO DA BIODIVERSIDADE, 2018a). Since then, the two institutions responsible for assessing the extinction risk of Brazilian species have been working on revising and updating these lists, coordinating on-site workshops or in an online format, publishing other lists, in addition to preparing National Action Plans for the Conservation of Endangered Species (PANs), focused on improving their conservation status.

The *Livro Vermelho da fauna brasileira ameaçada de extinção* (Red Book of Brazilian fauna threatened with extinction) published in 2018 by ICMBio, replaces the book published under the same name in 2008 by the Ministry of the Environment (MACHADO; DRUMMOND; PAGLIA, 2008), referring to the previous lists of threatened fauna, released in 2003 and 2004 (corrected in 2005) under the coordination of the *Biodiversitas* Foundation. The List of Brazilian Flora Species Threatened with Extinction was published in *Livro vermelho da flora do Brasil* 2013 (Red Book of Brazilian Flora 2013) (MARTINELLI; MORAES, 2013). This work presents the methodology used for the evaluation of the species, the species threatened with extinction and the distribution maps. All threatened species were fully included in Ordinance no. 443, dated 12/17/2014, from the Ministry of the Environment (BRAZIL, 2014b). As such, threatened species are protected by law.

The evaluation of the IUCN Red List is global, therefore, the categorization of the degree of the species' extinction risk that occur in Brazil represents the conservation status of the species worldwide, and not specifically in the national territory. On the other hand, the National Red List is considered a Regional Red List, which, although it meets the IUCN criteria, has specificities for informing the species' extinction risk, considering only their distribution and populations in the national territory.

Due to differences in the scale of application of the methodology, information from regional and global lists needs to be read with caution. Brito et al. (2010) pointed out some differences and similarities found between the IUCN global Red List and the national lists of species threatened with extinction in four countries (Brazil, Colombia, China and the Philippines) for the year 2008. The threat assessments coincide for most species. However, cases were identified in which the species were listed nationally as threatened, but had not yet been assessed globally by the IUCN; some species had been considered globally as threatened by the IUCN, but were not listed nationally; and some species had not been considered globally as threatened by the IUCN, but were listed nationally as threatened. In this sense, both analyses of the Red List, global and national, complement each other and generate data on the conservation status of species at different levels of analysis.

As such, the IUCN Red List, which is global in character, and the National Red List have complementary functions. The first contributes to understanding the evolution of the conservation status of species on a global level, enabling the development of an international strategy to combat species extinction. The second, in turn, corresponds to the regionalization of this data and allows the targeting of local actions and the assessment of the responsibilities of different countries or regions in the conservation of species. On the other hand, it is worth noting that the National Red List focuses not only on the conservation objective of the species as a whole, but also on its maintenance in Brazilian territory and, with that, the preservation of national biological heritage. Therefore, data from the Brazilian lists can directly feed national planning, supporting the definition of conservation priorities, specific action plans, and monitoring of the effectiveness of measures.

For the publication of the Threatened Species Accounts, the analysis was carried out in two approaches:

- From a global perspective, a methodological application of the SEEA-EEA manual was undertaken with the production of tables of the Threatened Species Accounts and the elaboration of the Red List Index in the regional context of South America, and specifically for Brazil, considering the groups of species used to produce global indicator 15.5.1 of the Sustainable Development Goals (SDGs) (birds, amphibians, mammals, reef-forming coral and cycads)[14]. The Threatened Species Accounts were structured by realm and species groups, as well as by category of extinction risk, from the IUCN Red List, of a global character, for the years 2010, 2014 and 2018. The number of threatened species in South America was mapped, and the Red List Index was calculated for different spatial and ecological units, including the Brazilian biomes.
- For a national approach, focusing on the production of official statistics, a table with the number of threatened species was structured by groups of species, biomes and associated realms, based on the National Red Lists of Fauna and Flora, published respectively by ICMBio and CNCFlora/JBRJ, with 2014 as the

[14] Brazil's target for this indicator is: By 2020, the risk of extinction of threatened species will be significantly reduced, tending to zero, and their conservation situation, especially those suffering the greatest decline, will have improved. For further information on the topic, please visit: https://www.ipea.gov.br/ods/ods15.html.

reference year. The available information on the species' area of occurrence was spatialized according to the biomes and the Coastal-Marine System environment, and overlaid with the classification of natural and anthropized areas of the Ecosystem Extent Accounts prepared by IBGE (CONTAS ..., 2020), for the year 2014, with data on land use and land cover also from the Institute (MONITORAMENTO ..., 2020).

Methodology adopted in the study

Application of the methodology from the SEEA-EEA manual with data from the IUCN Red List

For this study, the groups adopted in the production of SDG indicator 15.5.1[15] at the global level were selected (birds, amphibians, mammals, reef-forming corals and cycads). These groups are considered the most suitable for international comparison because they have at least two global assessments. Additionally, with the exception of cycads, these groups have a good availability of spatially explicit information on the distribution of species. The data used can be consulted in the supplementary tables for this publication, available on the IBGE website.

Initially, the list of species with occurrences registered in the countries and territories of South America and the information related to the taxonomic groups to which they belong and the realms in which each species occurs (terrestrial, freshwater and marine) were obtained by searching the IUCN database. For the species of the selected groups, the evaluation histories, with the category applied to each species in the years in which they were assessed, were retrieved in a subsequent query.

The categorization of category changes as genuine or non-genuine was obtained from Table 7 of the IUCN Red List[16], which presents the data available for the changes that occurred since 2007, while the spatial data of the respective groups was obtained from the entity's spatial portal[17]. Since data on the history of assessments and the reasons for change are only available at the species level, all analyses considered this level. In spatial analyses, all types of distribution represented (extant, possibly extant, distribution areas of subspecies, among others) were aggregated for the respective species.

Two analyses were then conducted: the first considers the data of all species registered for South America and the second only considers the data on species with registered occurrence for Brazil. The years 2010, 2014 and 2018 were considered, in order to allow the visualization of the changes that occurred between at least two periods and to guarantee an adequate time interval between the evaluated periods.

The tables show the total number of species assessed by extinction risk category: Extinct (EX), Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC) and Data Deficient (DD). As highlighted in the presentation of the scope of this study, the tables differentiate the

15 For further information on the topic, please visit: https://unstats.un.org/sdgs/metadata/files/Metadata-15-05-01.pdf.

16 For further information on the topic, please visit: https://www.iucnredlist.org/resources/summary-statistics#Table_7.

17 For further information on the topic, please visit: https://www.iucnredlist.org/resources/spatial-data-download

variations between degrees of threat with genuine and non-genuine occurrence. The opening balance, after adding the total additions and subtracting the total reductions (genuine and non-genuine) totals the opening balance for the following period. The tables in the Attachment to this publication, available on the IBGE portal, show the data aggregated by realms.

To spatialize the number of threatened species, considering the uncertainties and heterogeneity associated with data from different species, a grid was adopted for statistical purposes, also referred to as a BSU (Basic Spatial Unit), as recommended in the SEEA-EEA manual, with spatial resolution associated with 50 km x 50 km cells. For spatial analysis, the study region was determined to be the area covered by the official limit of the Country from the Cartographic Base 1: 250 000 (BC250) (BASE ..., 2019), prepared by IBGE, plus the territorial sea (22.4 km) of the islands present in the cartographic base (Brazilian or otherwise) and the delimitation of the Large Marine Ecosystems (UNITED STATES GEOLOGICAL SURVEY, 2017), which include the coasts of the countries in South America. The grid covering the area of interest was defined based on the parameters of the Brazilian statistical grid prepared by IBGE (GRADE ..., [2016]) in an area-equivalent projection, ensuring that all cells had a constant area.

To assess the conservation status of biodiversity globally, the Red List Index (RLI) by Butchart et al (2007) was adopted, an aggregate indicator developed to show the variation in the extinction risk of species by taxonomic group, in two periods of time, based on the categorization of the degree of threat from the IUCN Red List. This choice was based on indications from the Biodiversity Indicators Partnership[18], which suggests various indicators to be considered for monitoring the Aichi Biodiversity Targets[19]. With respect to Aichi Target 12, which states that "By 2020, the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained" (NATIONAL BIODIVERSITY COMMISSION, 2013), three indicators directly related to the referred target are proposed, namely:

- Number of threatened species;
- Red List Index; and
- Number of extinctions prevented.

To separate the effects of the increased effort invested in species assessment, the RLI is calculated based on genuine deteriorations (species approaching extinction) or improvements (reduced extinction risk) of the species' conservation status between periods. RLI values can be interpreted as a proportion of the number of species in each extinction risk category (with higher weights for categories of higher risk) in relation to an ideal scenario in which all species evaluated are in the Least Concern (LC) category. In this interpretation, the values vary from 0% to 100%.

[18] For further information on the topic, please visit: https://www.bipindicators.net/list-of-global-indicators-available-for-review.

[19] The Aichi Biodiversity Targets are propositions established within the Strategic Plan for Biodiversity. Gathered in five strategic objectives, the 20 Aichi Biodiversity Targets are related to the preservation of the biodiversity and constitute the base of the current planning related to the implementation of the Convention on Biological Diversity - CBD. For further information on the topic, please visit: https://www.cbd.int/sp/targets/. Also visit: https://www.mma.gov.br/images/arquivo/80049/Conabio/Documentos/Resolucao_06_03set2013.pdf.

A RLI value equal to 100% is equivalent to all species being categorized as Least Concern and as such, none of them are expected to become extinct in the near future. A RLI value of 0% indicates that all species have been extinct. A constant RLI value, over time, indicates that the overall extinction risk for the group is constant. Therefore, the lower the RLI value, the closer the set of species is to extinction. In other words, a decreasing trend in RLI values, over time, indicates that the species extinction rate is probably increasing, i.e., that the rate of biodiversity loss continues to increase. On the other hand, an upward trend in the RLI values, over time, indicates a downturn in the species extinction rate and a corresponding improvement in the conservation status of the species and it is also likely that the rate of biodiversity loss is lower.

In its most recent formulation (BUTCHART et al., 2007), the RLI is calculated for a set of species according to equation 1:

$$ILV_t = \left(1 - \frac{\sum_s W_{c(t,s)}}{W_{EX} \cdot N}\right) \cdot 100 \qquad (1)$$

Where:

ILV_t is the value of the Red List Index over time;

$W_{C(t,s)}$ is the weight of the extinction risk category for each species over time. The weights can be assigned in different ways. The recommended weighting, known as "equal steps" weights, is as follows: EX/EW = 5, CR = 4, EN = 3, VU = 2, NT = 1, LC = 0;

W_{EX} is the weight of category EX (5 in the case of the weighting used); and

N is the number of species assessed, disregarding the species in the DD category and those that were evaluated as EX since the beginning of the period.

To calculate the RLI as defined above, it is necessary that the set of species present in each of the time periods is identical. Changes in the set of species due to new inclusions in the period are resolved using a back-casting procedure (BUTCHART et al., 2007). The focus for this study was placed on the species' conservation status in 2010, 2014 and 2018. To that end, the species evaluated in the year 2018 and their categories were considered, excluding the species categorized as DD in that year and all species assessed for the first time after the year 2014 (unless the species included after 2014 has undergone more than one assessment between 2014 and 2018). For previous years, categories were considered according to the 2018 assessment, except in cases where a genuine category change was registered, as recommended by Butchart et al. (2007).

In order to facilitate the correspondence between the tabulated information and the RLI values, we opted for the use of a simplified version of the index, without the procedures of interpolation, extrapolation and estimation of uncertainties proposed by Butchart et al. (2010). As such, the simplified values of the index reflect the changes that occurred on the date of the evaluations, in a manner compatible with the information measured in accounting periods.

Although they were originally designed for global evaluations, methods are available that allow the breakdown of the RLI to other spatial scales, weighted by the fraction of the distribution of each species that occurs in a particular country or region, based on the methodology published by Rodrigues et al. (2014). For the spatial analysis of the species distribution, each species was considered present in a specific spatial unit whenever its mapped geographical distribution overlapped with that unit. The species' spatial data provided by the IUCN and BirdLife International[20] is used to calculate the proportion of the total distribution area of each species that overlaps with each spatial unit considered, such as, for example, each country or biome. The ratio between the two areas is used as a weighting factor that modifies the contribution of each species in the calculation of the index value, attributing greater weight to species with a higher proportion of their distribution contained in the spatial area of interest.

The spatial breakdown with global data in this study was performed for four different levels:

- South America – all species that occur in any country or territory in South America were considered, and the weighting factor used was the proportion of the distribution for each species included in the region, considering the continental portion and the islands present in the BC250 Country Limit layer (BASE ..., 2019), by IBGE, the territorial sea of the islands present in BC250, and the large marine ecosystems (UNITED STATES GEOLOGICAL SURVEY, 2017) that include the coasts of the countries of South America;
- Brazil – all species that occur in the country were considered, and the weighting factor used was the proportion of the distribution of each species included in the national territory, considering the official limits of BC250, the marine portion of the Coastal-Marine System and the territorial sea of the São Pedro e São Paulo Archipelago and of the Trindade and Martim Vaz Islands, which are addressed separately because they are far from the coast and are not within the limits of the IBGE Coastal-Marine System (BIOMAS ..., 2019);
- Brazilian biomes and other South American regions, covering: each of the six terrestrial biomes, the maritime portion of the Marine-Coastal System, the territorial sea of the São Pedro e São Paulo Archipelago and the Trindade and Martim Vaz Islands, the other terrestrial regions of South America, and the other large marine ecosystems (UNITED STATES GEOLOGICAL SURVEY, 2017) of South America – all species that occur in any country or territory in South America were considered, and the weighting factor used was the proportion of the distribution of each species included in each of the cited regions; and
- Statistical grid – all species present in each of the cells covering the region described at the level corresponding to South America were considered, and the weighting factor used was the inverse of the total area of the species, calculated in relation to the area of each cell (cells measuring 50 km on each side, totaling an area of 2,500 sq km each).

For each of the spatial breakdowns, RLI values were calculated for each of the years in the period considered (2010-2018), for the different realms (terrestrial, fresh-

[20] For further information on the topic, please visit: https://www.iucnredlist.org/. Also visit: http://datazone.birdlife.org/species/requestdis.

water and marine) and for each of the four selected groups, if applicable (for example, the group of reef-forming corals only occurs in the marine realm). Average RLI values were calculated considering the groups present in each realm and in each unit, as applicable. For spatialization in the statistical grid, proportional variations in the RLI value between 2010 and 2018 were also calculated for each cell.

The data were processed in the R software, version 3.6.1, from The R Foundation (2019), using the packages: sf, in version 0.8-0, by Pebesma (2018); rgdal in version 1.4-8, by Bivand et al. (2019); lwgeom in version 0.2-1 by Pebesma (2020); mapview in version 2.7.0 by Appelhans et al. (2019); smoothr in version 0.1.2 by Strimas-Mackey (2020); data.table in version 1.12.8 by Dowle et al. (2019); dplyr in version 0.8.5 by Wickham et al. (2020); stringr in version 1.4.0 by Wickham et al. (2019); bit64 in version 0.9-7 by Oehlschlägel and Silvestri (2017); flora in version 0.3.4 by Carvalho (2020); purrr in version 0.3.4 by Henry and Wickham (2020); taxize in version 0.9.91 by Chamberlain and Szocs (2013); and worrms in version 0.4.0 by Chamberlain (2019) and their dependencies.

The National Red Lists in the context of the Threatened Species Accounts

The National Red Lists for Fauna, prepared by ICMBio, and Flora, by CNCFlora/JBRJ, meet the classification criteria for extinction risk defined by the IUCN[21] and have a methodology for surveying threatened species that has been consolidated in both institutions. In this study, the Official Lists published in 2014[22] for the first edition of the Threatened Species Accounts for Brazil are considered as a starting point. However, the relevance of monitoring the results of technical lists is recognized as information produced by legally instituted bodies and based on the best scientific data available. Eventually, future editions may be based directly on the data produced during the evaluation cycles, allowing the monitoring not only of the indicators of biodiversity condition on its own, but also of others that reflect the evolution and progress of the assessment processes themselves, thus encouraging their maintenance.

The guideline for the process of preparing the Red List of Brazilian Fauna conducted by ICMBio recommends the assessment of all vertebrate animals and the selective assessment of some invertebrates, considering their ecological, economic and social importance. The publication of this list includes information by species and, in some cases, subspecies, order, family, common name, distribution of threatened species, biomes with occurrence of the species, presence in Conservation Units, previous national assessment, justification for changing the category, conservation status of the species in state lists of threatened species, and global assessment. In addition to this information, the Red List of Fauna also presents an analysis of the threat factors. In 2018, this information was published in *Livro vermelho da fauna brasileira ameaçada de extinção* (The red book of Brazilian fauna threatened with extinction), in seven volumes, by ICMBio.

[21] As presented in the context of this study, the previous evaluations did not follow the same criteria and, therefore, were not considered comparable for the preparation of the accounts.

[22] The Red Lists were made official by Ordinances No. 443, 444, and 445, dated 12/17/2014, from the Ministry of the Environment, which released the Official National Lists of Flora and Fauna Species Threatened with Extinction.

CNCFlora, linked to the Rio de Janeiro Botanic Garden, has been coordinating the assessment of the extinction risk of flora taxa in Brazil since 2008. It is the national authority for assessing the extinction risk of Brazilian flora, focusing on endemic species of the country, and it provides global assessments to the IUCN and the Ministry of the Environment. The first result of this assessment was published in 2013, in *Livro vermelho da flora do Brasil* (Red Book of Brazilian Flora) (MARTINELLI; MORAES, 2013), which contains an indicative list of the species evaluated (in some cases, varieties or other infra-specific taxa) of Brazilian plants considered to be threatened with extinction. This book also provides information on the distribution of the evaluated species, with an indication of the biomes in which they occur, in addition to the justifications and criteria and sub-criteria used for categorization.

For both lists, information was also collected on the association between the species and the three realms considered (terrestrial, freshwater and marine).

For flora species, this association was established using the types of vegetation in which each species occurs, considering the data presented in the species records from the 2020 Brazilian Flora System[23]. The associated realms were then assigned for each type of vegetation (see details in Attachment 1). In the case of species for which it was not possible to obtain information on the types of vegetation occurring, the association with the realms was inferred from the associations of higher taxa (species or genera). Finally, a spatial check was performed by cross-checking layers of information in a GIS environment to detect threatened species, from the marine realm, in which the occurrence was indicated for species whose points or polygons overlap the IBGE Coastal-Marine System (BIOMAS ..., 2019). The tables complementary to this publication, available for consultation on the IBGE portal, show the data used, including the species/realm associations defined here.

For the fauna species, associations were established with realms based on a sequential strategy, as follows: query of the IUCN Red List of Threatened Species database; query of the World Register of Marine Species - WoRMS database; inference from the group categorization provided by ICMBio (for example, sea birds, terrestrial invertebrates); inference by the characteristics of the higher taxa (genus, family, etc.); and individual search in other scientific sources. The tables complementary to this publication, available for consultation on the IBGE portal, show the data used, including the species/realm associations defined here.

Based on data from the National Red Lists, a tabulation was prepared with the number of threatened species, by realm and by biome, according to their degree of threat. Although the data do not show the occurrence in the Coastal-Marine System, whose information was first published by IBGE in 2019 (BIOMAS ..., 2019), the fauna data also show the presence of species in the sea and in oceanic islands.

[23] The 2020 Brazilian Flora System, among other objectives, intends to disseminate descriptions, identification keys and illustrations for all species of plants, algae and fungi known to the country. This system is an integral part of the Reflora Program and is supported by the Brazilian Biodiversity Information System (SiBBr). For further information on the topic, please visit: http://floradobrasil.jbrj.gov.br/.

The geographic distribution data of threatened species (categories VU, EN and CR) from ICMBio[24] and CNCFlora/JBRJ[25] were aggregated to 50 km x 50 km cells and overlaid with the anthropized areas and the natural areas of Brazil, according to the IBGE (CONTAS ..., 2020). The data were presented for the total of species and for the species associated with each of the three realms considered (terrestrial, freshwater and marine). The purpose of this spatial overlay is to indicate areas of greater or lesser anthropization, with and without the presence of threatened species.

[24] For further information on the topic, please visit: https://www.icmbio.gov.br/portal/component/content/article/10187.

[25] For further information on the topic, please visit: http://geonode.jbrj.gov.br/layers/geonode%3Apoligonos_ameacadas_atualizado_22042015_portaria_443_2014/metadata_read. Also visit: http://geonode.jbrj.gov.br/layers/geonode%3Apontos_ameacadas_atualizado_portaria_443_2014/metadata_read.

Analysis of results

Application of the methodology in the global context

Tables of Threatened Species Accounts were produced for South America and Brazil, shown in Attachment 2, considering aggregations by groups of species and realms for the years 2010, 2014 and 2018.

Table 1 presents the Threatened Species Accounts based on the global data from the International Union for Conservation of Nature (IUCN) Red List of Threatened Species for the five groups analyzed (birds, amphibians, mammals, reef-forming coral and cycads) that occur in Brazil[26]. The groups analyzed with the highest number of assessed species are birds, amphibians and mammals, with 1565, 732 and 611 species, respectively, in 2010, and 1841, 745 and 612 species, respectively, in 2018. From the total additions and reductions together with the stable reassessments, it is possible to calculate an assessment effort indicator (the number of species assessed for the first time plus the number of species reassessed in relation to the total set of species assessed at the end of the period). With regard to birds, the species were evaluated, on average, more than once in the period (effort indicator 1.89), while for amphibians and reef-forming coral, the reassessment effort in the analyzed period was much lower (0.26 and 0.05, respectively).

[26] As detailed in the **Technical Notes** section, global IUCN data can be obtained annually for Brazil; therefore, it is possible, based on this global data, to build a Threatened Species Account structure by taxonomic group and extinction risk, in different periods of time, as well as to assess the change in the species' extinction risk over time, for a worldwide analysis of the national conservation status.

In the period analyzed, from 2010 to 2018, there was an increase in species classified as threatened, with the greatest changes being observed between 2010 and 2014. The groups that recorded the greatest increases in new species included in the assessments were birds, mammals and amphibians, with additions of 113, 1 and 18 species, respectively, between 2010 and 2014, and 163, 64 and 2 species, respectively, between 2014 and 2018. Among the additions of species assessed for the first time, the rodent *Juscelinomys candango* stands out, considered extinct in its assessment in 2017. This species was registered only once, in 1960, during the construction works of the City of Brasília, where the Brasília Zoo stands today, but it was never registered again, which led to its categorization as Extinct by the IUCN. In the national assessment, the species is categorized as Critically Endangered (Possibly Extinct).

In relation to genuine variations, i.e., changes in the conservation status of the species, it is observed that the group of birds showed the greatest variation in the period considered, with a change of 53 species between 2010 and 2014 and 7 species between 2014 and 2018. Reclassifications also occurred in the two periods, accounting for 17 between 2010 and 2014 and 29 between 2014 and 2018. The different category change factors (genuine variations, reclassifications, increase in species evaluated, among others) observed in this group caused important variations in the period from 2010 to 2018: from 18 to 21 species in the Critically Endangered (CR) category; from 36 to 51 species in the Endangered (EN) category; from 67 to 104 species in the Vulnerable (VU) category; from 101 to 130 species in the Near Threatened (NT) category; and from 1342 to 1533 species in the Least Concern (LC) category. The groups of reef-forming corals and cycads did not show any variation in the two periods.

Table 1 - Threatened species accounts, by conservation status according to species groups - 2010/2018

(continued)

Variables	Conservation status								
	Total	Extinct	Extinct in the Wild	Critically endangered	Endangered	Vulnerable	Near Threatened	Least Concern	Data deficient
Total									
Opening Stock (2010)	**889**	**3**	**1**	**11**	**32**	**58**	**65**	**488**	**231**
Additions									
Improvement in the conservation status	1	-	-	-	-	-	-	1	-
Worsening in the conservation status	54	-	-	-	-	4	3	20	27
Advances in knowledge	151	-	-	1	-	4	10	12	23
Total Additions	206	-	-	1	-	8	13	33	50
Reductions									
Improvement in the conservation status	(-) 1	-	-	-	-	-	(-) 1	-	-
Worsening in the conservation status	(-) 9	-	-	-	-	-	(-) 2	(-) 1	(-) 6
Advances in knowledge	(-) 15	-	-	-	(-) 1	(-) 1	(-) 2	(-) 2	(-) 9
Total Reductions	(-) 25	-	-	-	(-) 1	(-) 1	(-) 5	(-) 3	(-) 15
Stable Reassessments	279	-	1	-	3	22	37	110	106
Stock (2014)	**969**	**3**	**1**	**12**	**31**	**65**	**73**	**518**	**266**
Additions									
Improvement in the conservation status	2	-	-	-	-	1	-	-	1
Worsening in the conservation status	8	-	-	-	-	2	2	2	2
Advances in knowledge	136	1	-	-	4	7	21	72	31
Total Additions	146	1	-	-	4	10	23	74	34
Reductions									
Improvement in the conservation status	(-) 2	-	-	-	(-) 1	-	-	(-) 1	-
Worsening in the conservation status	(-) 6	-	-	-	-	-	(-) 1	(-) 3	(-) 2
Advances in knowledge	(-) 61	-	-	-	(-) 2	(-) 9	(-) 8	(-) 6	(-) 36
Total Reductions	(-) 69	-	-	-	(-) 3	(-) 9	(-) 9	(-) 10	(-) 38
Stable Reassessments	2,127	-	1	24	50	103	135	1 761	53
Closing Stock (2018)	**1,046**	**4**	**1**	**12**	**32**	**66**	**87**	**582**	**262**
Amphibians									
Opening Stock (2010)	**732**	**1**	**-**	**5**	**5**	**15**	**21**	**451**	**234**
Additions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	1	-	-	1	-	-	-	-	-
Advances in knowledge	18	-	-	1	1	-	2	8	6
Total Additions	19	-	-	2	1	-	2	8	6
Reductions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	(-) 1	-	-	-	-	-	(-) 1	-	-
Advances in knowledge	-	-	-	-	-	-	-	-	-
Total Reductions	(-) 1	-	-	-	-	-	(-) 1	-	-
Stable Reassessments	147	-	-	1	-	4	-	127	15
Stock (2014)	**750**	**1**	**-**	**7**	**6**	**15**	**22**	**459**	**240**
Additions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	-	-	-	-	-	-	-	-	-
Advances in knowledge	2	-	-	-	-	-	-	2	-
Total Additions	2	-	-	-	-	-	-	2	-
Reductions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	-	-	-	-	-	-	-	-	-
Advances in knowledge	-	-	-	-	-	-	-	-	-
Total Reductions	-	-	-	-	-	-	-	-	-
Stable Reassessments	30	-	-	1	1	-	1	20	7
Closing Stock (2018)	**752**	**1**	**-**	**7**	**6**	**15**	**22**	**461**	**240**

Table 1 - Threatened species accounts, by conservation status according to species groups - 2010/2018

(continuation)

Variables	Conservation status								
	Total	Extinct	Extinct in the Wild	Critically endangered	Endangered	Vulnerable	Near Threatened	Least Concern	Data deficient
Birds									
Opening Stock (2010)	**1,565**	**-**	**1**	**18**	**36**	**67**	**101**	**1,342**	**-**
Additions									
Improvement in the conservation status	1	-	-	-	-	1	-	-	-
Worsening in the conservation status	52	-	-	2	3	20	27	-	-
Advances in knowledge	130	-	-	2	9	12	20	87	-
Total Additions	183	-	-	4	12	33	47	87	-
Reductions									
Improvement in the conservation status	(-) 1	-	-	-	(-) 1	-	-	-	-
Worsening in the conservation status	(-) 52	-	-	-	(-) 1	(-) 1	(-) 5	(-) 45	-
Advances in knowledge	(-) 17	-	-	(-) 1	(-) 2	(-) 2	(-) 8	(-) 4	-
Total Reductions	(-) 70	-	-	(-) 1	(-) 4	(-) 3	(-) 13	(-) 49	-
Stable Reassessments	1,495	-	1	17	32	64	88	1,293	-
Stock (2014)	**1,678**	**-**	**1**	**21**	**44**	**97**	**135**	**1,380**	**-**
Additions									
Improvement in the conservation status	1	-	-	-	-	-	1	-	-
Worsening in the conservation status	6	-	-	1	1	2	2	-	-
Advances in knowledge	192	-	-	3	13	12	8	155	1
Total Additions	199	-	-	4	14	14	11	155	1
Reductions									
Improvement in the conservation status	(-) 1	-	-	-	-	(-) 1	-	-	-
Worsening in the conservation status	(-) 6	-	-	-	(-) 1	(-) 1	(-) 2	(-) 2	-
Advances in knowledge	(-) 29	-	-	(-) 4	(-) 6	(-) 4	(-) 11	(-) 4	-
Total Reductions	(-) 36	-	-	(-) 4	(-) 7	(-) 6	(-) 13	(-) 6	-
Stable Reassessments	1,642	-	1	17	37	91	122	1,374	-
Closing Stock (2018)	**1,841**	**-**	**1**	**21**	**51**	**105**	**133**	**1,529**	**1**
Mammals									
Opening Stock (2010)	**611**	**2**	**-**	**10**	**31**	**35**	**24**	**406**	**103**
Additions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	1	-	-	-	-	1	-	-	-
Advances in knowledge	3	-	-	1	-	1	-	-	1
Total Additions	4	-	-	1	-	2	-	-	1
Reductions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	(-) 1	-	-	-	-	-	(-) 1	-	-
Advances in knowledge	(-) 2	-	-	-	(-) 1	-	-	-	(-) 1
Total Reductions	(-) 3	-	-	-	(-) 1	-	(-) 1	-	(-) 1
Stable Reassessments	66	-	-	-	2	4	5	42	13
Stock (2014)	**612**	**2**	**-**	**11**	**30**	**37**	**23**	**406**	**103**
Additions									
Improvement in the conservation status	1	-	-	-	-	1	-	-	-
Worsening in the conservation status	2	-	-	-	-	1	1	-	-
Advances in knowledge	100	1	-	-	4	4	8	60	23
Total Additions	103	1	-	-	4	6	9	60	23
Reductions									
Improvement in the conservation status	(-) 1	-	-	-	(-) 1	-	-	-	-
Worsening in the conservation status	(-) 2	-	-	-	-	-	-	(-) 2	-
Advances in knowledge	(-) 36	-	-	-	(-) 2	(-) 5	(-) 2	(-) 2	(-) 25
Total Reductions	(-) 39	-	-	-	(-) 3	(-) 5	(-) 2	(-) 4	(-) 25
Stable Reassessments	454	-	-	6	12	12	12	367	45
Closing Stock (2018)	**676**	**3**	**-**	**11**	**31**	**38**	**30**	**462**	**101**

Table 1 - Threatened species accounts, by conservation status according to species groups - 2010/2018

(conclusion)

Variables	Conservation status								
	Total	Extinct	Extinct in the Wild	Critically endangered	Endangered	Vulnerable	Near Threatened	Least Concern	Data deficient
Coral reefs									
Opening Stock (2010)	**18**	**-**	**-**	**-**	**-**	**-**	**1**	**7**	**10**
Additions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	-	-	-	-	-	-	-	-	-
Advances in knowledge	-	-	-	-	-	-	-	-	-
Total Additions	-	-	-	-	-	-	-	-	-
Reductions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	-	-	-	-	-	-	-	-	-
Advances in knowledge	-	-	-	-	-	-	-	-	-
Total Reductions	-	-	-	-	-	-	-	-	-
Stable Reassessments	-	-	-	-	-	-	-	-	-
Stock (2014)	**18**	**-**	**-**	**-**	**-**	**-**	**1**	**7**	**10**
Additions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	-	-	-	-	-	-	-	-	-
Advances in knowledge	-	-	-	-	-	-	-	-	-
Total Additions	-	-	-	-	-	-	-	-	-
Reductions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	-	-	-	-	-	-	-	-	-
Advances in knowledge	-	-	-	-	-	-	-	-	-
Total Reductions	-	-	-	-	-	-	-	-	-
Stable Reassessments	1	-	-	-	-	-	-	-	1
Closing Stock (2018)	**18**	**-**	**-**	**-**	**-**	**-**	**1**	**7**	**10**
Flora - Cycads									
Opening Stock (2010)	**5**	**-**	**-**	**-**	**-**	**-**	**5**	**-**	**-**
Additions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	-	-	-	-	-	-	-	-	-
Advances in knowledge	-	-	-	-	-	-	-	-	-
Total Additions	-	-	-	-	-	-	-	-	-
Reductions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	-	-	-	-	-	-	-	-	-
Advances in knowledge	-	-	-	-	-	-	-	-	-
Total Reductions	-	-	-	-	-	-	-	-	-
Stable Reassessments	5	-	-	-	-	-	5	-	-
Stock (2014)	**5**	**-**	**-**	**-**	**-**	**-**	**5**	**-**	**-**
Additions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	-	-	-	-	-	-	-	-	-
Advances in knowledge	-	-	-	-	-	-	-	-	-
Total Additions	-	-	-	-	-	-	-	-	-
Reductions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	-	-	-	-	-	-	-	-	-
Advances in knowledge	-	-	-	-	-	-	-	-	-
Total Reductions	-	-	-	-	-	-	-	-	-
Stable Reassessments	-	-	-	-	-	-	-	-	-
Closing Stock (2018)	**5**	**-**	**-**	**-**	**-**	**-**	**5**	**-**	**-**

Source: INTERNATIONAL UNION FOR CONSERVATION OF NATURE. *The IUCN red list of threatened species* . Version 2018.2. Gland: IUCN, 2018.

Note: From IUCN global data.

Table 2 presents the Threatened Species Accounts from the IUCN Red List for Brazil, of the five groups of species, by realm (terrestrial, freshwater and marine), with the different types of changes also for the years 2010, 2014 and 2018. This table clearly shows the improvement and worsening in the conservation status of the species in each realm, i.e., if genuine variations occurred from one category to another with a greater or lesser extinction risk. The terrestrial realm stands out in this analysis, presenting, with regard to the conservation status, 54 worsening shifts between 2010 and 2014, and 8 worsening shifts between 2014 and 2018, represented by additions from lower risk categories. On the other hand, there were only 2 improvements in the conservation status of this realm in the period. Furthermore, an increase in the categories of threatened species from the Data Deficient (DD) category is identified for terrestrial species. Between 2010 and 2014, one species was added to the Critically Endangered category, and between 2014 and 2018, one species was added to the Endangered (EN) category and 1 species to the Vulnerable (VU) category. This data demonstrates that advances in knowledge can result in the categorization of DD species directly into categories of high extinction risk, emphasizing that species in this category are a priority for further studies. In other realms, there is also a preponderance of worsening in the conservation status, with more genuine additions coming from a lower risk category. The freshwater realm showed 9 worsening shifts between 2010 and 2014 and 4 between 2014 and 2018. The marine realm, with fewer species, registered 2 worsening shifts, both between 2010 and 2014 and between 2014 and 2018. It should be noted that this realm showed a genuine addition of species from a higher to lower risk category between 2014 and 2018, while the freshwater realm did not indicate any genuine addition that would indicate an improvement in its conservation status in the analyzed period.

It is worth noting that some species can inhabit more than one realm, so the tables do not total the assessed species. It is observed that most of the species evaluated are terrestrial or freshwater: 2,854 and 999 species evaluated in 2010; 2,986 and 1,029, in 2014; and 3,215 and 1,060 in 2018, respectively. This distribution between realms reflects the preponderance of terrestrial species among the selected groups. As full assessments become available for a wider range of taxonomic groups, it will become easier to make relevant comparisons that more directly reflect biodiversity in relation to certain environments.

Table 2 - Threatened species accounts, by conservation status, according to terrestrial, freshwater and marine realms - 2010/2018

(continued)

Variables	Conservation status								
	Total	Extinct	Extinct in the Wild	Critically endangered	Endangered	Vulnerable	Near Threatened	Least Concern	Data deficient
Terrestrial									
Opening Stock (2010)	**2,854**	**3**	**1**	**32**	**69**	**113**	**149**	**2,182**	**305**
Additions									
Improvement in the conservation status	1	-	-	-	-	1	-	-	-
Worsening in the conservation status	54	-	-	3	3	21	27	-	-
Advances in knowledge	151	-	-	4	10	13	22	95	7
Total Additions	206	-	-	7	13	35	49	95	7
Reductions									
Improvement in the conservation status	(-) 1	-	-	-	(-) 1	-	-	-	-
Worsening in the conservation status	(-) 54	-	-	-	(-) 1	(-) 1	(-) 7	(-) 45	-
Advances in knowledge	(-) 19	-	-	(-) 1	(-) 3	(-) 2	(-) 8	(-) 4	(-) 1
Total Reductions	(-) 74	-	-	(-) 1	(-) 5	(-) 3	(-) 15	(-) 49	(-) 1
Stable Reassessments	1,685	-	1	17	33	71	96	1,452	15
Stock (2014)	**2,986**	**3**	**1**	**38**	**77**	**145**	**183**	**2,228**	**311**
Additions									
Improvement in the conservation status	1	-	-	-	-	-	1	-	-
Worsening in the conservation status	8	-	-	1	1	3	3	-	-
Advances in knowledge	279	1	-	3	16	16	12	207	24
Total Additions	288	1	-	4	17	19	16	207	24
Reductions									
Improvement in the conservation status	(-) 1	-	-	-	-	(-) 1	-	-	-
Worsening in the conservation status	(-) 8	-	-	-	(-) 1	(-) 1	(-) 2	(-) 4	-
Advances in knowledge	(-) 50	-	-	(-) 4	(-) 8	(-) 9	(-) 13	(-) 6	(-) 10
Total Reductions	(-) 59	-	-	(-) 4	(-) 9	(-) 11	(-) 15	(-) 10	(-) 10
Stable Reassessments	2,109	-	1	23	48	101	133	1 753	50
Closing Stock (2018)	**3,215**	**4**	**1**	**38**	**85**	**153**	**184**	**2,425**	**325**
Freshwater									
Opening Stock (2010)	**1**	**-**	**4**	**8**	**26**	**31**	**752**	**177**	**999**
Additions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	-	-	2	-	3	4	-	-	9
Advances in knowledge	-	-	1	1	-	5	19	5	31
Total Additions	-	-	3	1	3	9	19	5	40
Reductions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	-	-	-	-	-	(-) 4	(-) 5	-	(-) 9
Advances in knowledge	-	-	-	-	-	-	(-) 1	-	(-) 1
Total Reductions	-	-	-	-	-	(-) 4	(-) 6	-	(-) 10
Stable Reassessments	-	-	2	4	15	12	475	16	524
Stock (2014)	**1**	**-**	**7**	**9**	**29**	**36**	**765**	**182**	**1,029**
Additions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	-	-	-	1	1	2	-	-	4
Advances in knowledge	-	-	1	1	1	3	29	-	35
Total Additions	-	-	1	2	2	5	29	-	39
Reductions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	-	-	-	-	(-) 1	(-) 1	(-) 2	-	(-) 4
Advances in knowledge	-	-	-	(-) 1	-	-	-	(-) 3	(-) 4
Total Reductions	-	-	-	(-) 1	(-) 1	(-) 1	(-) 2	(-) 3	(-) 8
Stable Reassessments	-	-	3	5	16	19	407	7	457
Closing Stock (2018)	**1**	**-**	**8**	**10**	**30**	**40**	**792**	**179**	**-**

Table 2 - Threatened species accounts, by conservation status, according to terrestrial, freshwater and marine realms - 2010/2018

(continued)

Variables	Conservation status								
	Total	Extinct	Extinct in the Wild	Critically endangered	Endangered	Vulnerable	Near Threatened	Least Concern	Data deficient
Marine									
Opening Stock (2010)	**-**	**-**	**1**	**8**	**14**	**10**	**158**	**36**	**227**
Additions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	-	-	-	1	-	1	-	-	2
Advances in knowledge	-	-	-	-	1	2	10	-	13
Total Additions	-	-	-	1	1	3	10	-	15
Reductions									
Improvement in the conservation status	-	-	-	-	-	-	-	-	-
Worsening in the conservation status	-	-	-	-	(-) 1	-	(-) 1	-	(-) 2
Advances in knowledge	-	-	-	(-) 1	(-) 1	-	-	-	(-) 2
Total Reductions	-	-	-	(-) 1	(-) 2	-	(-) 1	-	(-) 4
Stable Reassessments	**-**	**-**	**1**	**5**	**10**	**9**	**138**	**12**	**175**
Stock (2014)	**-**	**-**	**1**	**8**	**13**	**13**	**167**	**36**	**238**
Additions									
Improvement in the conservation status	-	-	-	-	1	-	-	-	1
Worsening in the conservation status	-	-	-	-	-	2	-	-	2
Advances in knowledge	-	-	-	-	1	4	11	-	16
Total Additions	-	-	-	-	2	6	11	-	19
Reductions									
Improvement in the conservation status	-	-	-	(-) 1	-	-	-	-	(-) 1
Worsening in the conservation status	-	-	-	-	-	-	(-) 2	-	(-) 2
Advances in knowledge	-	-	-	-	-	(-) 1	-	(-) 14	(-) 15
Total Reductions	-	-	-	(-) 1	-	(-) 1	(-) 2	(-) 14	(-) 18
Stable Reassessments	**-**	**-**	**1**	**7**	**11**	**11**	**151**	**3**	**184**
Closing Stock (2018)	**-**	**-**	**1**	**7**	**15**	**18**	**176**	**22**	**239**

Source: INTERNATIONAL UNION FOR CONSERVATION OF NATURE. *The IUCN red list of threatened species* . Version 2018.2. Gland: IUCN, 2018.

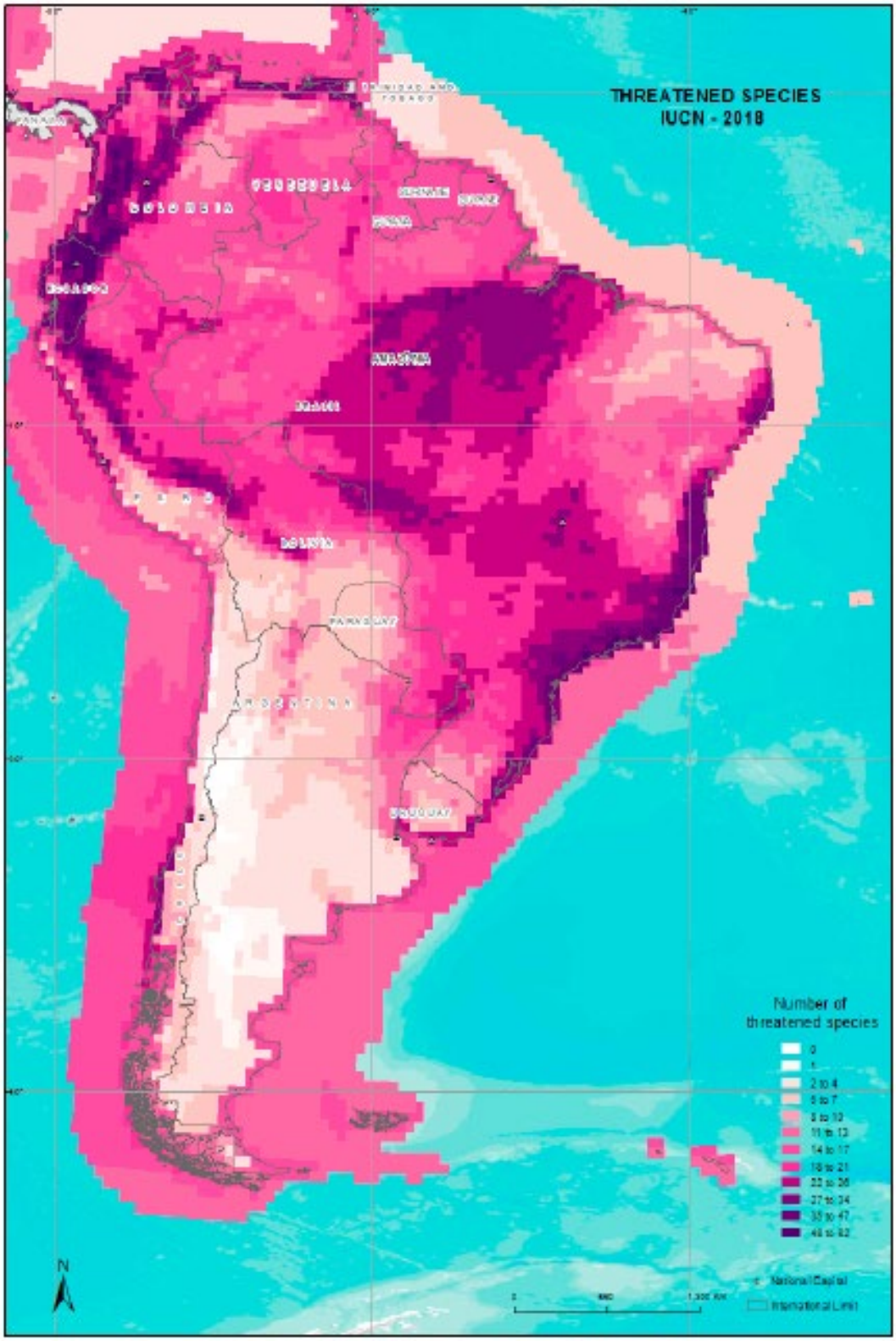
Note: Some species can inhabit more than one realm, which is why the tables do not total the assessed species.

The mappings produced with the South American spatial profile for the year 2018 portray the distribution of the number of threatened species and the Red List Index (RLI) for four of the five groups of species selected, since data on the geographic distribution of cycads is not available. Attachment 3 provides RLI values broken down by realm (terrestrial, freshwater and marine).

The evaluation of Map 1, with the total number of threatened species from the four groups considered (birds, amphibians, mammals and reef-forming corals) reveals a concentration of threatened species mainly in the Andean region and along the coasts. Coastal regions have the particularity of harboring both terrestrial and marine species, which increases the total number of threatened species present in these areas. In addition, the greatest diversity of marine species is found in coastal environments. In the case of Brazil, the fact that the coastal region coincides with the largest portion of the Mata Atlântica Biome is also worth noting, which is the Brazilian biome with the lowest proportion of preserved original cover, thus concentrating a greater number of threatened species (INSTITUTO CHICO MENDES DE CONSERVAÇÃO DA BIODIVERSIDADE, 2018a).

It is important to emphasize that the indicator of the number of threatened species, which can also be interpreted as the richness of threatened species, according to the ecological concept, incorporates the effects of differences in total richness throughout the evaluated region, so that areas with higher total species richness also tend to present high values of threatened species richness. This effect can be explained both by the higher number of species present but also, in part, by the prevalence of species with restricted distribution in these regions (for example, in mountainous regions) and by being places subject to strong pressure due to anthropic factors, mainly those related to activities of economic interest. The understanding of these patterns is relevant in several contexts, such as, for example, for the identification of areas with a high concentration of threatened species. However, for comparisons between different realms or between trends of different species groups, which differ in total richness, aggregate indicators, such as the simplified version of the RLI adopted in this study, may be more illustrative. The use of such indicators allows for a better separation of the previously exemplified effects, since the proportion of threatened species will be more directly related to the presence of species that are actually more vulnerable (for example, the specialist species with restricted distributions) than with the total number of species present in each region.

Map 1 - Number of species threatened with extinction in South America - 2018

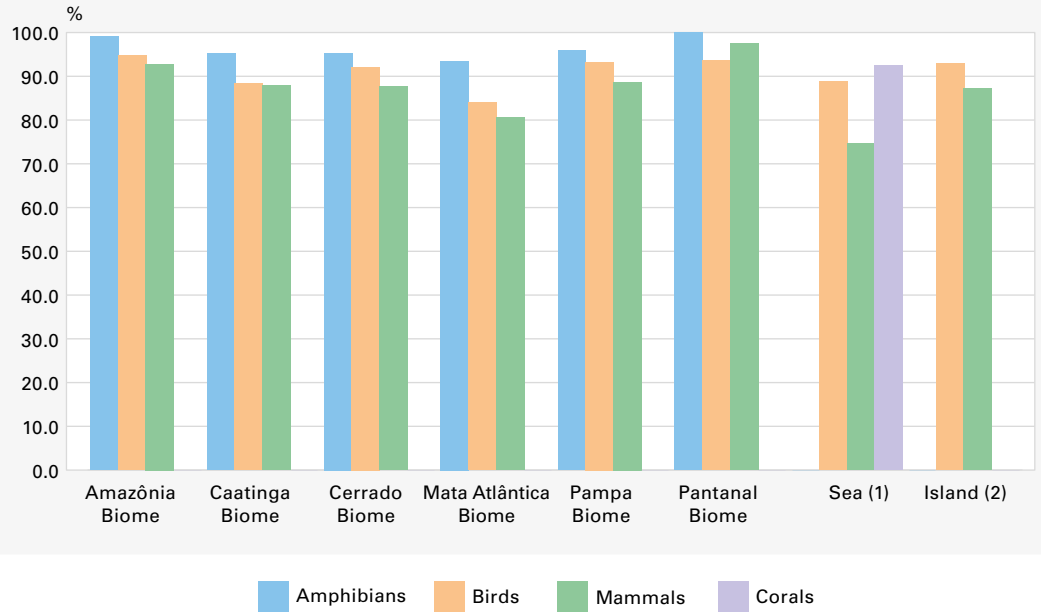


Sources: 1. INTERNATIONAL UNION FOR CONSERVATION OF NATURE. *The IUCN red list of threatened species*. Version 2019.3. Gland: IUCN, 2019. 2. BIRDLIFE INTERNATIONAL. 2. Bird species distribution maps of the world. Version 2019.1. *In*: BIRDLIFE INTERNATIONAL. *Data Zone*. Cambridge [United Kingdom], 2020. Also visit: http://datazone.birdlife.org/species/requestdis. Accessed: August 2020.

Notes: 1. The groups represented are amphibians, birds, reef-forming corals and mammals.
2. Data organized by 50 km x 50 km cells.

Chart 1 shows the 2018 RLI comparison for each of the groups considered, by environmental region. The Mata Atlântica Biome and the marine portion of the Coastal-Marine System stand out, with the lowest values of the index. The highest scores, by species group, were found in the Pantanal Biome, for amphibians (100.00%) and mammals (97.41%), and in the Amazônia Biome, for birds (94.70%). Comparing species by biome, it can be seen that amphibians obtained the highest RLIs in all of them, therefore, the best conservation status, and that mammals had the lowest RLI, with the exception of the Pantanal Biome, where birds had a lower RLI than that of the other groups.

Chart 1 - Red List Index (RLI) by groups of species, according to the regions considered - 2018



Source: IBGE, Diretoria de Geociências, Coordenação de Recursos Naturais e Estudos Ambientais.

Notes: 1. The Brazilian RLI was calculated based on a simplified version of the Red List Index (RLI) by Butchart et al. (2007) and on the International Union for Conservation of Nature list (2018).

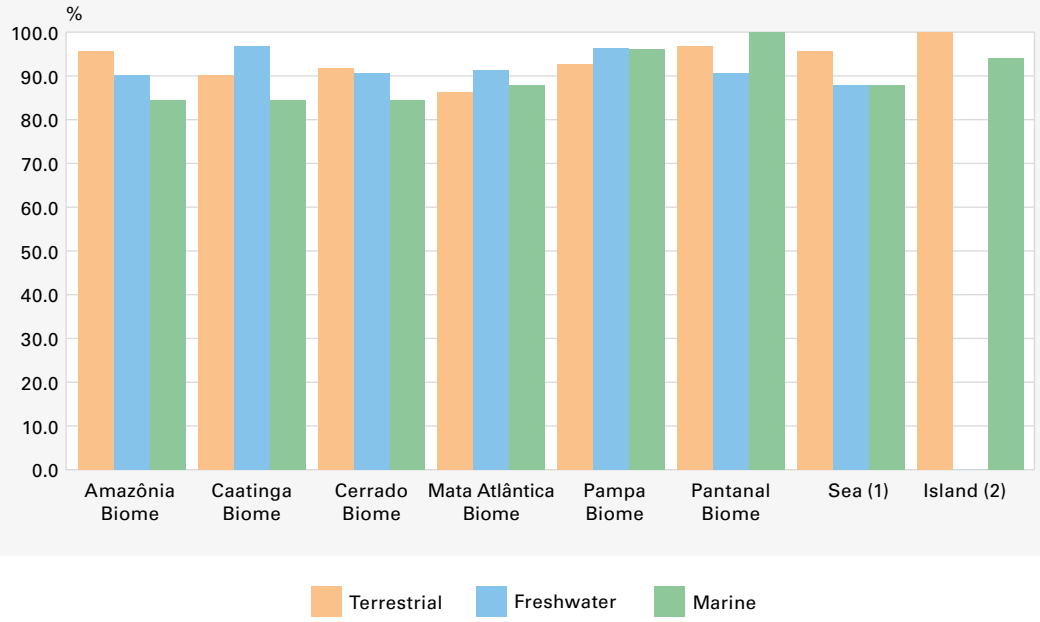
2. Higher index values indicate a better conservation status.

(1) Marine portion of the Coastal-Marine System. (2) Territorial seas of the São Pedro e São Paulo Archipelago and the Trindade and Martim Vaz Islands.

Chart 2 shows the 2018 RLI comparison of terrestrial, freshwater and marine species for each Brazilian biome, for the marine portion of the Coastal-Marine System and for the territorial sea of the São Pedro e São Paulo Archipelago and of the Trinidad and Martim Vaz Islands. This chart clearly displays the fact that the Mata Atlântica Biome has the lowest average index for terrestrial species (86.22%). The marine portion of the Coastal-Marine System has the lowest average index for freshwater species (84.11%), possibly due to the presence of aquatic birds that occur in both the marine and freshwater realms. For marine species, the lowest average index values are observed in the Cerrado, Caatinga and Amazônia Biomes (84.37%, 84.40% and 84.40%, respectively). This result is explained by the fact that few threatened marine species occur in these biomes (the distribution of some seabirds covers these three biomes), which leads to a low average value, since these species are in high extinction risk categories. After these three biomes, the lowest RLI values for marine species are observed in the

Mata Atlântica Biome (87.78%) and the marine portion of the Coastal-Marine System (87.80%). The highest average indexes, which indicate a better conservation status by biome, are registered for the terrestrial and marine species of the Trindade and Martim Vaz Islands and the Pantanal Biome (100% for both) and for the freshwater species of the Caatinga Biome (96.85%).

Chart 2 - Red List Index (RLI) by realm, according to the regions considered - 2018



Source: IBGE, Diretoria de Geociências, Coordenação de Recursos Naturais e Estudos Ambientais.

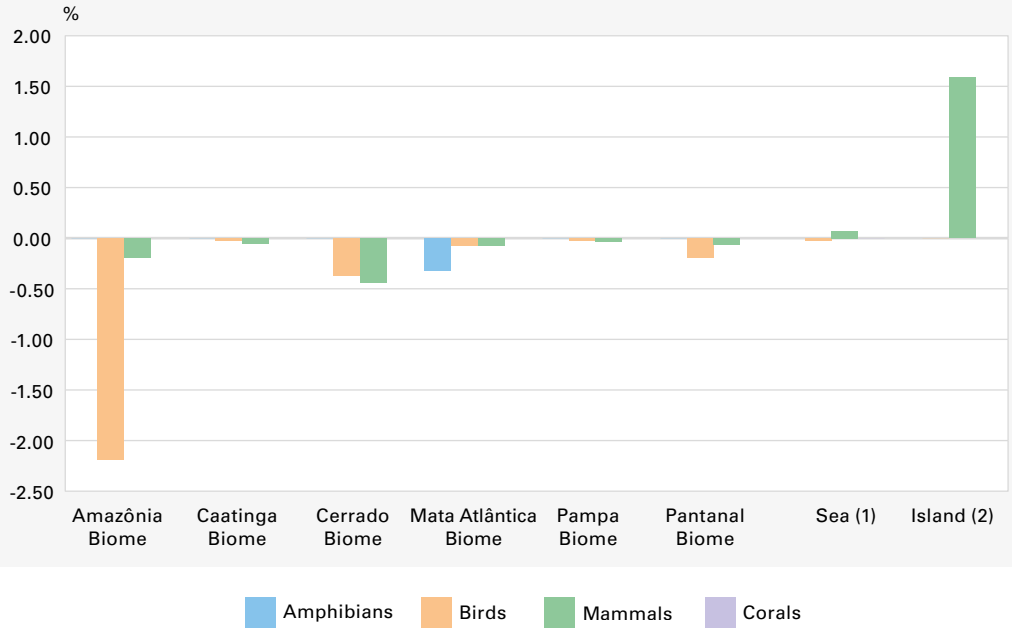
Notes: 1. The Brazilian RLI was calculated based on a simplified version of the Red List Index (RLI) by Butchart et al. (2007) and on the International Union for Conservation of Nature list (2018).

2. Higher index values indicate a better conservation status.

(1) Marine portion of the Coastal-Marine System. (2) Territorial seas of the São Pedro e São Paulo Archipelago and the Trindade and Martim Vaz Islands.

Chart 3 shows the 2018 RLI comparison by species groups for each biome. For cycads, it was not possible to calculate the spatialized values of this index because information about the geographic distribution of species in this group is not available. An analysis of the RLI evolution between 2010 and 2018 shows that the species of most groups show an increased extinction risk, with the exception of marine mammals present in the marine portion of the Coastal-Marine System and in the territorial sea of the oceanic islands. The group that showed the greatest deterioration in the conservation status in the period was the birds of the Amazônia Biome, with a reduction in the RLI of more than 2 percentage points. This variation raises some concern, as this is the best studied group, with the greatest reassessment efforts, and can be considered a good indicator of trends in the general conservation status of biodiversity.

Chart 3 - Percentage variation of the Red List Index (RLI) between 2010 and 2018, by groups of species, according to the regions considered



Source: IBGE, Diretoria de Geociências, Coordenação de Recursos Naturais e Estudos Ambientais.

Notes: 1. The Brazilian RLI was calculated based on a simplified version of the Red List Index (RLI) by Butchart et al. (2007) and on the International Union for Conservation of Nature list (2018).

2. Higher index values indicate a better conservation status.

(1) Marine portion of the Coastal-Marine System. (2) Territorial seas of the São Pedro e São Paulo Archipelago and the Trindade and Martim Vaz Islands.

Chart 4 shows the percentage variation of the RLI between 2010 and 2018 for terrestrial, freshwater and marine species in each biome.

Confirming what was already evident in the previous analyses, it is observed that the species of the Mata Atlântica Biome suffered an increase in the extinction risk across all realms, represented by the following RLI reductions: 0.23% for terrestrial species; 0.22% for freshwater species; and 0.11% for marine species. Such evolution indicates that there was an increase in the degree of threat and therefore, the species' extinction risk in the biome, across the three types of realms.

There was an RLI reduction in the Cerrado Biome of 0.22% for terrestrial species and 0.22% for freshwater species. Such evolution indicates that there was an increase in the species' extinction risk in the biome, in both realms. The marine realm remained stable.

The RLI for the Amazônia Biome worsened for terrestrial, freshwater and marine species. It can be seen that the species in all these realms experienced an increase in the extinction risk, represented by the following RLI reductions: 0.83% for terrestrial species; 0.55% for freshwater species; and 0.12% for marine species.

In the Pantanal Biome, the main variation of the RLI was observed in the freshwater realm, with a reduction of 0.33%. While the terrestrial and freshwater realms of the Pampa Biome remained stable, the marine realm showed a reduction of 0.10%.

The Caatinga Biome recorded the lowest RLI variation among the others, with a small reduction in freshwater species (-0.02%) and stable values in the other realms. The marine species of the oceanic islands and the Coastal-Marine System were the only groups to show an improvement in RLI values (0.39% and 0.02%, respectively).

Chart 4 - Percentage variation of the Red List Index (RLI) between 2010 and 2018, by realms, according to the regions considered

Source: IBGE, Diretoria de Geociências, Coordenação de Recursos Naturais e Estudos Ambientais.

Notes: 1. The Brazilian RLI was calculated based on a simplified version of the Red List Index (RLI) by Butchart et al. (2007) and on the International Union for Conservation of Nature list (2018).

2. Higher index values indicate a better conservation status.

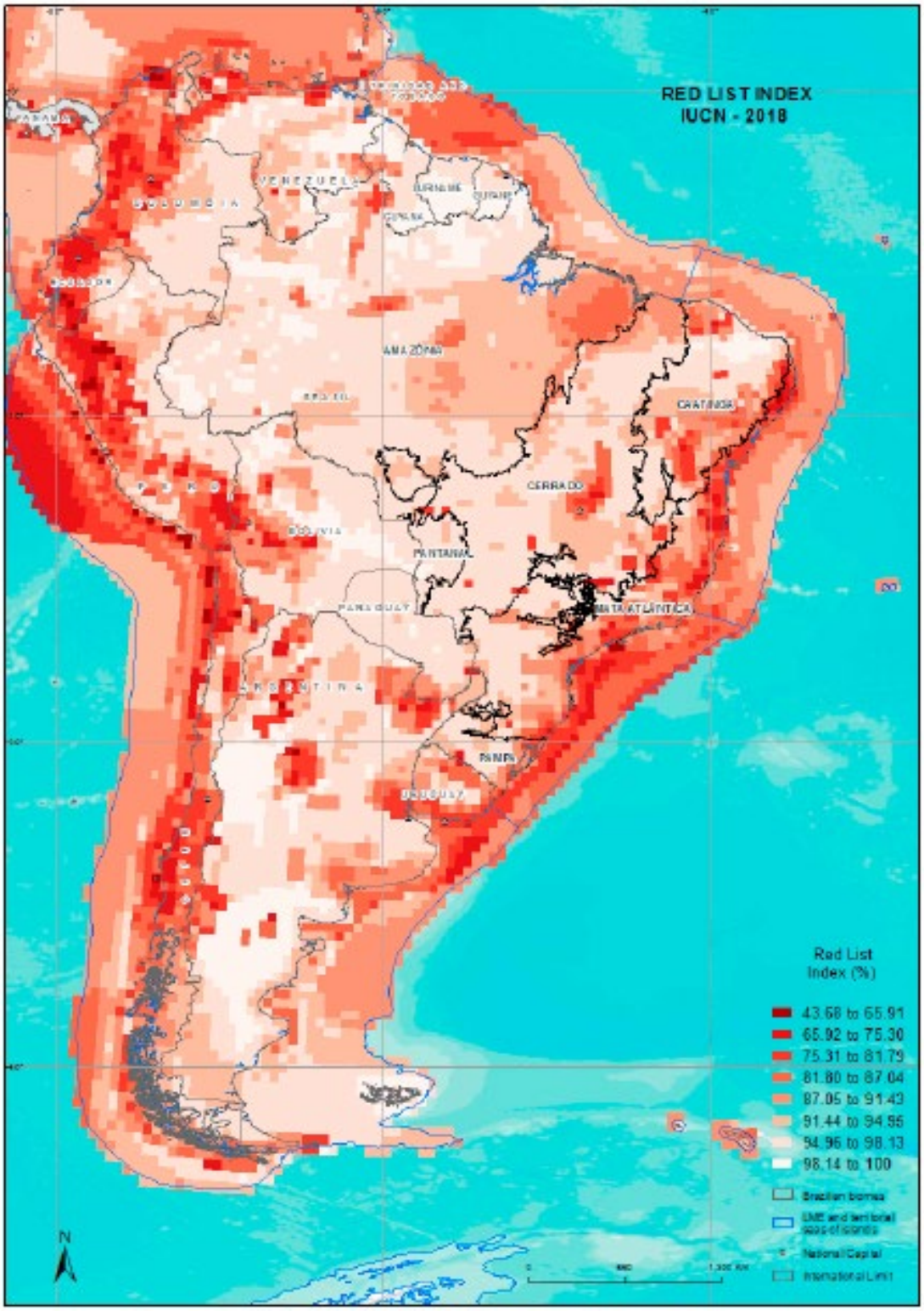
(1) Marine portion of the Coastal-Marine System. (2) Territorial seas of the São Pedro e São Paulo Archipelago and the Trindade and Martim Vaz Islands.

Map 2 indicates the spatial distribution of the average RLI for the total of the four groups of species analyzed (birds, amphibians, mammals and reef-forming corals) in 2018. Maps with data broken down for each of the three realms are available in Attachment 3.

Compared to Map 1, which illustrates the total number of threatened species, the use of RLI in Map 2 allows areas with a higher proportional concentration of threatened species to be detected, in addition to being weighted by the different degrees of extinction risk. On this map, it is possible to highlight, for example, low values of the index, which indicate the worst conservation status, both in the Mata Atlântica Biome, especially in its northern portion, as well as in the marine portion of the South and Southeast Regions of Brazil and in areas such as the Andes and the plateau regions, such as Chapada Diamantina and Chapada dos Veadeiros. An important point to be stressed is that, since the data on the geographic distribution of the species is incomplete – a limitation that is avoided, to some extent, by the use of the most well-known groups, however the lack of primary data is still an important limitation in the interpretation of information associated with biodiversity – spatial analyses, both of the richness maps and of the RLI values, bring with them a certain level of uncertainty. From this point of view, the temporal assessment is complementary.

Map 3 shows the average RLI variation between 2010 and 2018, considering the four groups of species analyzed (birds, amphibians, mammals and reef-forming corals). This form of visualization allows direct assessment of the regions where the species underwent genuine changes in their conservation status during the period. Thus, it is easily verified that the greatest deteriorations in the conservation status of the species were concentrated in the Amazon Basin, while improvements were registered at some points, such as a portion of the southeastern coast of Brazil and in isolated points in Peru and Ecuador. An example to be highlighted is the case of the coastal region of the states of São Paulo and Paraná, where the red-tailed amazon (*Amazona brasiliensis*) occurs, a species that has been showing a strong response to the conservation programs developed in the region, having experienced a genuine improvement in its last evaluation in 2017 (from the VU to the NT category). Another highlight, shown in map 3, is the reduction in the RLI in the Amazônia Biome. This reduction was strongly influenced by a variation in the average index observed in the group of birds, on the order of -2.19%. This map shows the RLI variation for the overall set of species, but breaking it down by groups of species or by types of environments is perfectly feasible.

Map 2 - Red List Index in South America - 2018



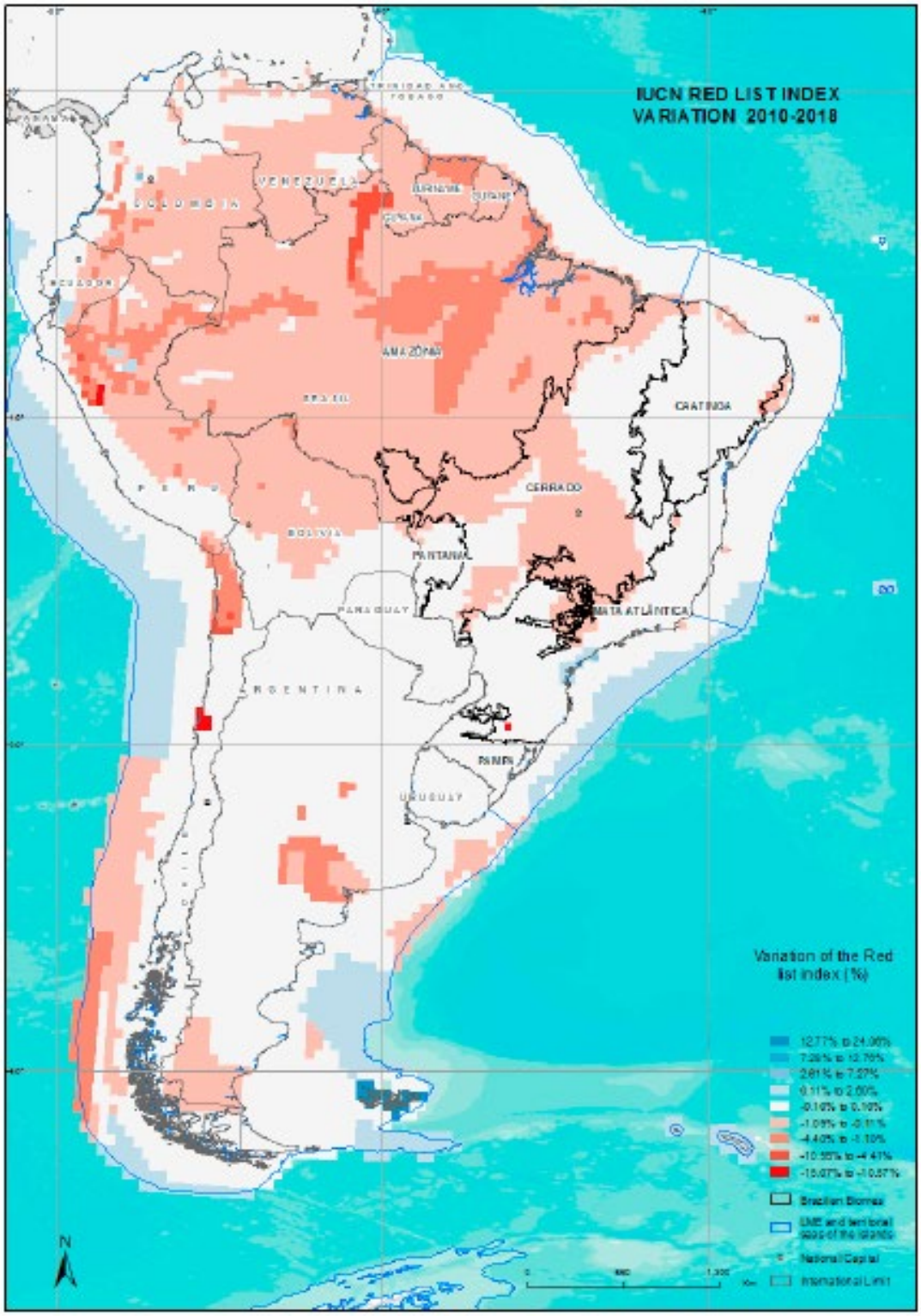
Sources: 1. INTERNATIONAL UNION FOR CONSERVATION OF NATURE. *The IUCN red list of threatened species*. Version 2019.3. Gland: IUCN, 2019. 2. BIRDLIFE INTERNATIONAL. 2. Bird species distribution maps of the world. Version 2019.1. *In*: BIRDLIFE INTERNATIONAL. *Data Zone*. Cambridge [United Kingdom], 2020. Also visit: http://datazone.birdlife.org/species/requestdis. Accessed: August 2020.

Notes: 1. The groups represented are amphibians, birds, reef-forming corals and mammals.

2. RLI values can be interpreted as a proportion between the number of species in each extinction risk category (with higher weights for those of higher risk) and an ideal scenario where all species evaluated are in the Least Concern (LC) category. In this interpretation, the values vary from 0% to 100%: the value 100 corresponds to all species categorized as Least Concern, and the value 0, to the extinction of all species.

3. Data organized by 50 km x 50 km cells.

Map 3 - Percentage change of the Red List Index in South America - 2010/2018



Sources: 1. INTERNATIONAL UNION FOR CONSERVATION OF NATURE. *The IUCN red list of threatened species*. Version 2019.3. Gland: IUCN, 2019. 2. BIRDLIFE INTERNATIONAL. 2. Bird species distribution maps of the world. Version 2019.1. *In*: BIRDLIFE INTERNATIONAL. *Data Zone*. Cambridge [United Kingdom], 2020. Also visit: http://datazone.birdlife.org/species/requestdis. Accessed: August 2020.

Notes: 1. The groups represented are amphibians, birds, reef-forming corals and mammals.

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3. Data organized by 50 km x 50 km cells.

Conservation status of Brazilian species using national assessments

The Red Lists presented by the Brazilian National Center for Plant Conservation (CNCFlora), of the Rio de Janeiro Botanic Garden Research Institute, in the *Livro vermelho da flora do Brasil* (Red Book of Brazilian Flora) (MARTINELLI; MORAES, 2013), and in the *Livro vermelho da fauna brasileira ameaçada de extinção* (Red Book of Brazilian fauna threatened with extinction), published in seven volumes (INSTITUTO CHICO MENDES DE CONSERVAÇÃO DA BIODIVERSIDADE, 2018a), follow the classification criteria for the degree of extinction risk defined by the IUCN and have a methodology for surveying threatened species that is being consolidated.

Currently, 49,168 plant species are recognized in Brazil, according to the 2020 Brazilian Flora System[27], and 117,096 animal species, with estimates that these exceed 137,000, according to ICMBio. Of these totals, CNCFlora assessed 4,617 species of flora until 2013 and ICMBio assessed 12,262[28] species of fauna (Photo 2). Among the flora species assessed in 2013, 407 have been reassessed since then, the majority of which are tree species. In relation to the fauna, all described species of the vertebrate group are assessed during each complete assessment cycle of approximately five years. Due to the great diversity and limitations to the available information, there is no intention to assess all species of invertebrates; those previously assessed are reassessed during each cycle, and some new groups are added selectively, considering their ecological, economic and social importance, as provided in Normative Instruction No. 34, dated 10/17/2013 (INSTITUTO CHICO MENDES DE CONSERVAÇÃO DA BIODIVERSIDADE, 2013).

Photo 2 - Representatives of threatened or near threatened species

A - Pirá-Brasília fish [*Simpsonichthys boitonei* Carvalho, 1959].
Brasília, Distrito Federal. Category: Vulnerable (VU)

Photo: Mauro Lambert Ribeiro, 2008.

[27] The 2020 Brazilian Flora System, among other objectives, intends to disseminate descriptions, identification keys and illustrations for all species of plants, algae and fungi known to the country. This system is an integral part of the Reflora Program and is supported by the Brazilian Biodiversity Information System (SiBBr). For further information on the topic, please visit: http://floradobrasil.jbrj.gov.br/.

[28] Of this total, about 2% of the taxa were categorized as Not Applicable (NA) for the Brazilian assessment, as they occur marginally in the national territory or present only occasional records, so they are not included in any of the categories summarized in the tables.

B - Jaguar [*Panthera onca* (Linnaeus, 1758)]. Brasília, Distrito Federal. Category: Vulnerable (VU)

Photo: Bárbara Araújo Ribeiro Bergamini, 2017.

C - Magellanic penguin [*Spheniscus magellanicus* (Forster, 1781)]. Península Valdés, Chubut, Argentina. Category: Near Threatened (NT)

Photo: Leonardo Lima Bergamini, 2019.

D - Lobelia [*Lobelia brasiliensis* A.O.S.Vieira & G.J.Sheph.]. Brasília, Distrito Federal.
Category: Endangered (EN)

Photo: Leonardo Lima Bergamini, 2018.

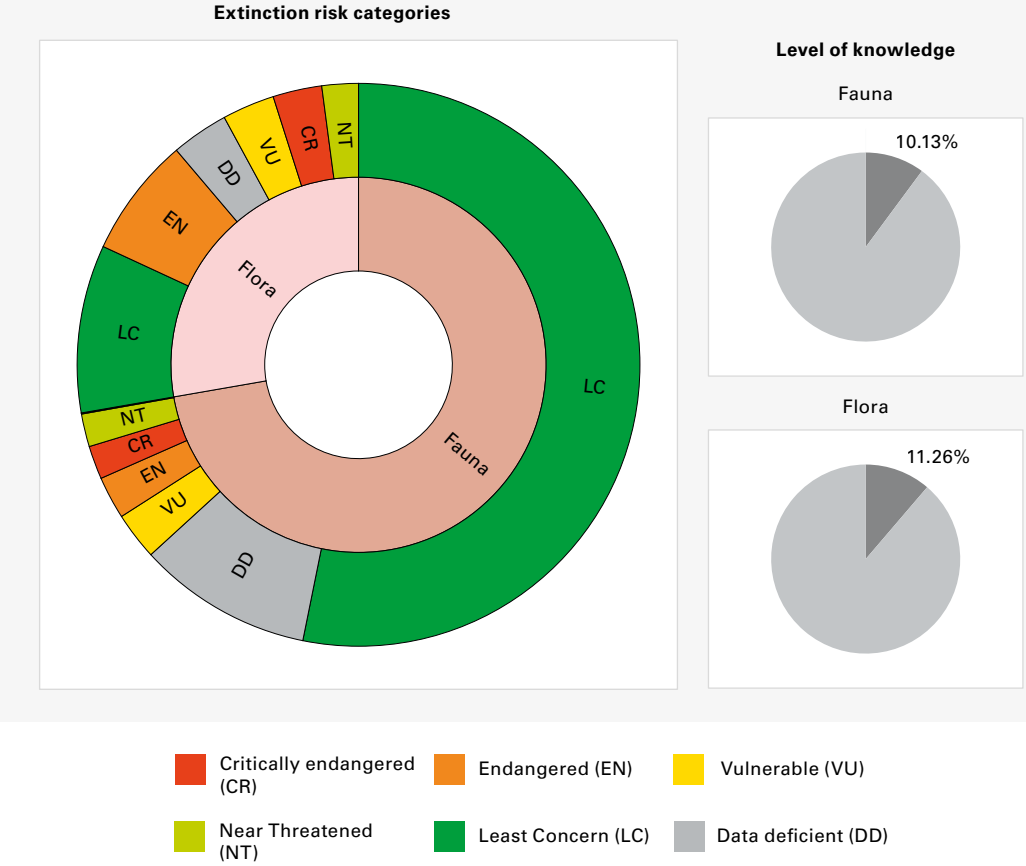
E - Araucaria [*Araucaria angustifolia* (Bertol.) Kuntze]. General Carneiro, Paraná.
Category: Endangered (EN)

Photo: Lismariane Smolhak Vieira, 2018.

Tables 3 and 4 show the number of fauna and flora species classified as threatened, by groups of species, biomes and habitat, for the reference year 2014, representative of the ICMBio Red List (INSTITUTO CHICO MENDES DE CONSERVAÇÃO DA BIODIVERSIDADE, 2018a) and the CNCFlora Red List (MARTINELLI; MORAES, 2013). It should be noted that some species can inhabit and be distributed in more than one biome. When this occurs, the species total presented by groups and categories does not match the sum of species by biome. It was not possible to obtain information on the realm of occurrence for 25 species of flora (1 in the VU category, 4 in the NT category, 14 in the LC category and 6 in the DD category). Likewise, for 4 species of flora (3 in the DD category and 1 in the EN category) and for 58 fauna species (1 in the NT category, 27 in the LC category and 30 in the DD category, 31 of which are invertebrates and 27 vertebrates), it was not possible to obtain information about the biome of occurrence.

Chart 5 shows the distribution of the species, by extinction risk categories and also provides the proportion of those assessed in relation to the total of known species of fauna and flora.

Chart 5 - Distribution of fauna and flora species, by extinction risk categories and level of knowledge about the species assessed in relation to the total of known species in 2014



Sources: 1. IBGE, Diretoria de Geociências, Coordenação de Recursos Naturais e Estudos Ambientais. 2. CHICO MENDES INSTITUTE FOR BIODIVERSITY CONSERVATION. *Livro vermelho da fauna brasileira ameaçada de extinção*. Brasília, DF: ICMBio, 2018a.7 v. Available at: https://www.icmbio.gov.br/portal/component/contentt/article/10187. Accessed: August 2020. 3. MARTINELLI, G.; MORAES, M. A. (org.). *Livro vermelho da flora do Brasil 2013*. Rio de Janeiro: Rio de Janeiro Botanic Garden Research Institute - JBRJ, National Centre for Plant Conservation - CNCFlora, 2013.1100 p. Available at: http://cncflora.jbrj.gov.br/arquivos/arquivos/pdfs/LivroVermelho.pdf. Accessed: August 2020. 4. FORZZA, R. C. et al. (ed.). *Catálogo de plantas a fungos do Brasil*. Rio de Janeiro: Botanical Gardens of Rio de Janeiro (JBRJ): Andrea Jekobsson Estúdio, 2010.2 v.

Of the total number of fauna assessed, there are 319 species in the Critically Endangered category (2.65%), 408 in the Endangered category (3.39%), and 454 in the Vulnerable category (3.77%). Of the total number of flora assessed, there are 468 species in the Critically Endangered category (10.14%), 1,148 in the Endangered category (24.86%), and 501 in the Vulnerable category (10.85%). The Mata Atlântica and Cerrado biomes are considered hotspots, i.e., areas with great richness, endemism and great anthropic pressure, thus being priorities for conservation at a global level. When the number of threatened species is analyzed by biome, it is observed that the highest number is found in the Mata Atlântica, with 600 fauna species and 1,389 flora species threatened, followed by the Cerrado and Caatinga Biomes for flora, with 753 and 232 threatened species, respectively, and by the Cerrado and Amazônia Biomes for fauna, with 308 and 183 threatened species, respectively.

The fauna groups with the highest number of species categorized as Critically Endangered or Endangered include continental fish, which represent 31.66% and 27.45% of the total of these two categories, respectively, and terrestrial invertebrates, which total 26.02% and 19.85%, respectively. Continental fish classified in these threat categories are mostly distributed across the Mata Atlântica, Cerrado and Amazônia Biomes; and terrestrial invertebrates, in the Mata Atlântica, Cerrado and Caatinga Biomes. Among the groups with the highest number of species in the Vulnerable category, continental birds and fish stand out, representing 26.65% and 22.03% of the total of this category, respectively. It can be observed that birds categorized as Critically Endangered are mostly distributed in the Mata Atlântica and Pantanal Biomes.

Table 4 shows that the fauna and flora species categorized as Critically Endangered, Endangered or Vulnerable are mostly present in terrestrial and aquatic freshwater realms in the Mata Atlântica and Cerrado Biomes.

Of the total number of species assessed, 10 were classified as Extinct, namely: birds (6) – Eskimo curlew (*Numenius borealis*), cryptic treehunter (*Cichlocolaptes mazarbarnetti*), Alagoas foliage-gleaner (*Philydor novaesi*), Pampas meadowlark (*Sturnella defilippii*), Glaucous macaw (*Anodorhynchus glaucus*), and Pernambuco pygmy owl (*Glaucidium mooreorum*); amphibians (1) – Spiny-knee leaf frog (*Phrynomedusa fimbriata*); mammals (1) – Vespucci's rodent (*Noronhomys vespuccii*); and marine fish (2) – Finetooth shark (*Carcharhinus isodon*), and Narrowmouthed catshark (*Schroederichthys bivius*).

Table 3 - Species of fauna and flora, by conservation status, according to groups of species and selected regions

(continued)

Selected regions	Conservation status								
	Total	Extinct	Extinct in the Wild	Critically endangered	Endangered	Vulnerable	Near Threatened	Least Concern	Data deficient
Fauna (total)									
Total	**12,028**	**10**	**1**	**319**	**408**	**454**	**314**	**8,851**	**1,671**
Amazônia	5,210	-	-	32	46	105	69	4,523	435
Cerrado	3,447	-	-	61	115	132	82	2,706	351
Caatinga	1,303	-	-	31	59	44	29	1,030	110
Mata Atlântica	4,612	6	1	171	232	197	149	3,221	635
Pampa	1,006	2	-	15	29	33	27	846	54
Pantanal	1,250	1	-	2	9	25	21	1,135	57
Sea and islands	2,068	3	-	51	36	77	51	1,550	300
Unknown	58	-	-	-	-	-	1	27	30
Amphibians									
Total	**973**	**1**	**-**	**18**	**12**	**11**	**22**	**742**	**167**
Amazônia	296	-	-	-	1	-	-	272	23
Cerrado	200	-	-	2	2	-	2	170	24
Caatinga	69	-	-	1	-	1	-	63	4
Mata Atlântica	537	1	-	17	10	10	18	371	110
Pampa	51	-	-	-	-	1	2	48	-
Pantanal	50	-	-	-	-	-	-	47	3
Sea and islands	-	-	-	-	-	-	-	-	-
Unknown	7	-	-	-	-	-	-	-	-
Birds									
Total	**1,867**	**6**	**1**	**42**	**72**	**121**	**65**	**1,525**	**35**
Amazônia	1,295	-	-	4	14	49	26	1,176	26
Cerrado	711	-	-	6	12	29	28	622	14
Caatinga	485	-	-	6	16	16	12	430	5
Mata Atlântica	907	5	1	26	40	58	30	736	11
Pampa	347	2	-	3	2	11	9	316	4
Pantanal	476	1	-	2	3	8	12	444	6
Sea and islands	62	-	-	7	8	7	4	35	1
Unknown	6	-	-	-	-	-	-	6	-
Mammals									
Total	**703**	**1**	**-**	**12**	**43**	**56**	**24**	**457**	**110**
Amazônia	422	-	-	4	6	26	10	317	59
Cerrado	259	-	-	1	17	30	5	183	23
Caatinga	137	-	-	1	8	9	1	106	12
Mata Atlântica	297	-	-	4	22	28	9	201	33
Pampa	75	-	-	-	3	9	4	49	10
Pantanal	115	-	-	-	1	15	3	88	8
Sea and islands	33	1	-	2	4	2	1	15	8
Unknown	-	-	-	-	-	-	-	-	-
Aquatic invertebrates									
Total	**905**	**-**	**-**	**18**	**23**	**25**	**21**	**657**	**161**
Amazônia	108	-	-	-	-	1	1	92	14
Cerrado	90	-	-	1	1	1	3	63	21
Caatinga	19	-	-	1	1	1	-	12	4
Mata Atlântica	134	-	-	10	13	9	8	71	23
Pampa	63	-	-	1	9	2	6	39	6
Pantanal	26	-	-	-	1	-	2	21	2
Sea and islands	656	-	-	6	7	16	9	507	111
Unknown	1	-	-	-	-	-	-	1	-

Table 3 - Species of fauna and flora, by conservation status, according to groups of species and selected regions

(conclusion)

Selected regions	Conservation status								
	Total	Extinct	Extinct in the Wild	Critically endangered	Endangered	Vulnerable	Near Threatened	Least Concern	Data deficient
Terrestrial invertebrates									
Total	**2,413**	**-**	**-**	**83**	**81**	**69**	**29**	**1,579**	**572**
Amazônia	1,045	-	-	8	1	2	1	903	130
Cerrado	880	-	-	26	27	14	6	666	141
Caatinga	210	-	-	10	5	6	4	151	34
Mata Atlântica	1,447	-	-	51	63	55	24	929	325
Pampa	171	-	-	-	-	3	-	152	16
Pantanal	201	-	-	-	3	1	-	179	18
Sea and islands	7	-	-	-	1	2	-	3	1
Unknown	30	-	-	-	-	-	-	11	19
Continental fish									
Total	**3,133**	**-**	**-**	**101**	**112**	**100**	**100**	**2,337**	**383**
Amazônia	1,710	-	-	16	18	26	27	1,451	172
Cerrado	985	-	-	24	40	52	31	735	103
Caatinga	201	-	-	11	8	9	7	129	37
Mata Atlântica	991	-	-	56	63	20	56	680	116
Pampa	228	-	-	11	11	5	5	183	13
Pantanal	247	-	-	-	-	-	4	230	13
Sea and islands	-	-	-	-	-	-	-	-	-
Unknown	11	-	-	-	-	-	1	7	3
Marine fish									
Total	**1,303**	**2**	**-**	**34**	**14**	**49**	**37**	**988**	**179**
Amazônia	-	-	-	-	-	-	-	-	-
Cerrado	-	-	-	-	-	-	-	-	-
Caatinga	-	-	-	-	-	-	-	-	-
Mata Atlântica	-	-	-	-	-	-	-	-	-
Pampa	-	-	-	-	-	-	-	-	-
Pantanal	-	-	-	-	-	-	-	-	-
Sea and islands	1,303	2	-	34	14	49	37	988	179
Unknown	-	-	-	-	-	-	-	-	-
Reptiles									
Total	**731**	**-**	**-**	**11**	**51**	**23**	**16**	**566**	**64**
Amazônia	334	-	-	-	6	1	4	312	11
Cerrado	322	-	-	1	16	6	7	267	25
Caatinga	182	-	-	1	21	2	5	139	14
Mata Atlântica	299	-	-	7	21	17	4	233	17
Pampa	71	-	-	-	4	2	1	59	5
Pantanal	135	-	-	-	1	1	-	126	7
Sea and islands	7	-	-	2	2	1	-	2	-
Unknown	3	-	-	-	-	-	-	2	1
Flora (total)									
Total	**4,617**	**-**	**-**	**468**	**1,148**	**501**	**348**	**1,605**	**547**
Amazônia	734	-	-	17	35	43	32	487	120
Cerrado	1,950	-	-	155	400	198	120	903	174
Caatinga	712	-	-	35	131	66	44	397	39
Mata Atlântica	3,334	-	-	292	758	339	277	1,355	313
Pampa	330	-	-	26	63	28	21	145	47
Pantanal	155	-	-	3	8	7	11	111	15
Unknown	4	-	-	-	1	-	-	-	3

Sources: 1. INSTITUTO CHICO MENDES DE CONSERVAÇÃO DA BIODIVERSIDADE. Livro vermelho da fauna brasileira ameaçada de extinção. Brasília, DF: ICMBio, 2018a. 7 v. Available at: https://www.icmbio.gov.br/portal/component/content/article/10187. Accessed: August 2020. 2. MARTINELLI, G.; MORAES, M. A. (org.). Livro vermelho da flora do Brasil 2013. Rio de Janeiro: Rio de Janeiro Botanic Garden Research Institute - JBRJ, National Centre for Plant Conservation - CNCFlora, 2013. 1100 p. Available at: http://cncflora.jbrj.gov.br/arquivos/arquivos/pdfs/LivroVermelho.pdf. Accessed: August 2020.

Note: Some species can inhabit more than one of the selected regions, which is why the tables do not total the assessed species.

Table 4 - Species of fauna and flora, by conservation status, according to the realms and selected regions

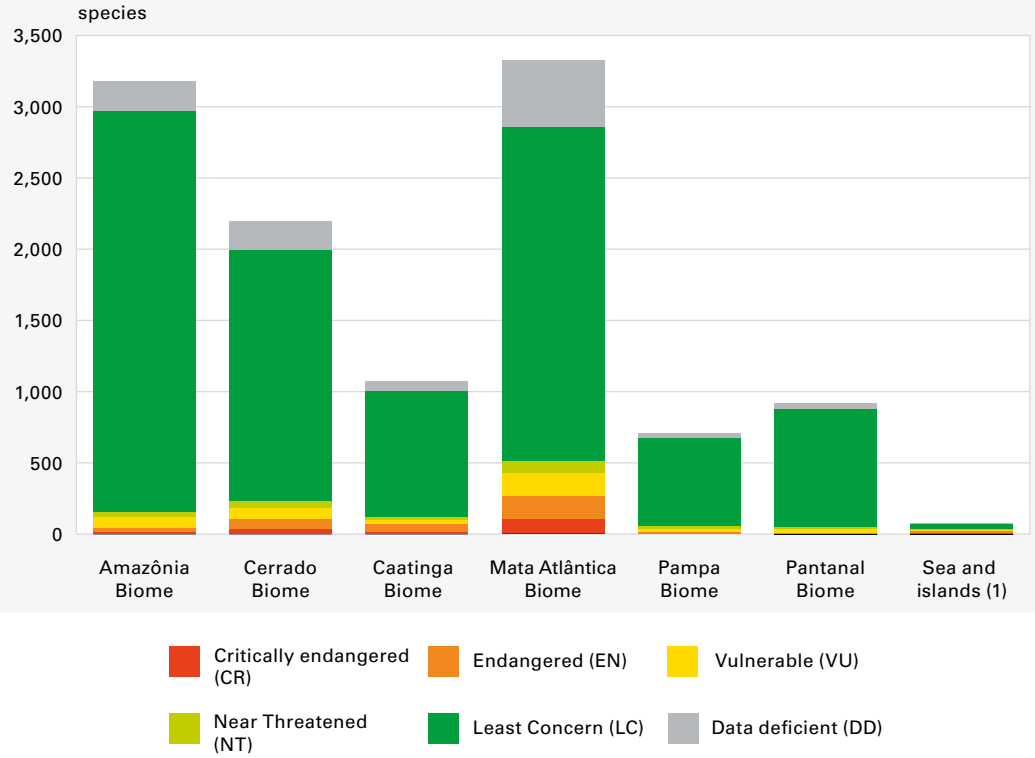
Selected regions	Conservation status								
	Total	Extinct	Extinct in the Wild	Critically endangered	Endangered	Vulnerable	Near Threatened	Least Concern	Data deficient
Fauna									
Terrestrial									
Total	**6,327**	**8**	**1**	**161**	**254**	**276**	**151**	**4,619**	**857**
Amazônia	3,183	-	-	16	27	77	39	2,814	210
Cerrado	2,199	-	-	35	73	78	48	1,762	203
Caatinga	1,073	-	-	19	50	34	22	881	67
Mata Atlântica	3,324	6	1	102	156	167	83	2,344	465
Pampa	707	2	-	3	9	26	16	616	35
Pantanal	922	1	-	2	8	25	15	831	40
Sea and oceanic islands	78	1	-	9	11	10	4	41	2
Unknown	43	-	-	-	-	-	-	19	24
Freshwater									
Total	**5,673**	**2**	**-**	**140**	**154**	**163**	**161**	**4,233**	**820**
Amazônia	2,926	-	-	18	21	40	41	2,515	291
Cerrado	1,948	-	-	29	49	65	47	1,533	225
Caatinga	504	-	-	14	10	12	9	408	51
Mata Atlântica	2,271	2	-	87	95	62	87	1,603	335
Pampa	569	1	-	12	22	14	20	470	30
Pantanal	685	1	-	2	2	6	10	630	34
Sea and oceanic islands	157	-	-	4	2	8	5	109	29
Unknown	22	-	-	-	-	-	1	13	8
Marine									
Total	**2,171**	**2**	**-**	**53**	**37**	**76**	**59**	**1,633**	**311**
Amazônia	74	-	-	1	1	1	2	62	7
Cerrado	41	-	-	-	1	-	-	38	2
Caatinga	38	-	-	-	1	1	-	35	1
Mata Atlântica	91	-	-	1	1	3	6	73	7
Pampa	47	-	-	-	1	1	1	40	4
Pantanal	46	-	-	1	1	-	2	39	3
Sea and oceanic islands	2,056	2	-	51	35	73	51	1,545	299
Unknown	9	-	-	-	-	-	1	8	-
Flora									
Terrestrial									
Total	**4,557**	**-**	**-**	**467**	**1,145**	**497**	**344**	**1,570**	**534**
Amazônia	714	-	-	17	35	42	31	470	119
Cerrado	1,921	-	-	155	399	196	120	881	170
Caatinga	692	-	-	35	131	65	43	379	39
Mata Atlântica	3,282	-	-	291	755	334	274	1,323	305
Pampa	311	-	-	26	63	25	21	132	44
Pantanal	139	-	-	3	8	6	9	99	14
Unknown	3	-	-	-	1	-	-	-	2
Freshwater									
Total	**806**	**-**	**-**	**21**	**80**	**65**	**44**	**527**	**69**
Amazônia	297	-	-	3	4	18	11	233	28
Cerrado	508	-	-	10	30	33	29	383	23
Caatinga	209	-	-	1	6	10	3	187	2
Mata Atlântica	652	-	-	13	50	53	35	468	33
Pampa	92	-	-	1	7	9	6	64	5
Pantanal	83	-	-	1	4	2	1	69	6
Unknown	1	-	-	-	1	-	-	-	-
Marine									
Total	**463**	**-**	**-**	**18**	**83**	**49**	**43**	**239**	**31**
Amazônia	91	-	-	-	-	-	7	78	6
Cerrado	144	-	-	-	1	6	5	123	9
Caatinga	98	-	-	-	6	9	7	67	9
Mata Atlântica	447	-	-	18	80	48	42	231	28
Pampa	35	-	-	-	4	4	1	25	1
Pantanal	17	-	-	-	-	-	1	16	-
Unknown	1	-	-	-	-	-	-	-	1

Sources: 1. INSTITUTO CHICO MENDES DE CONSERVAÇÃO DA BIODIVERSIDADE. Livro vermelho da fauna brasileira ameaçada de extinção. Brasília, DF: ICMBio, 2018a. 7 v. Available at: https://www.icmbio.gov.br/portal/component/content/article/10187. Accessed: August 2020. 2. MARTINELLI, G.; MORAES, M. A. (org.). Livro vermelho da flora do Brasil 2013. Rio de Janeiro: Research Institute of the Rio de Janeiro Botanical Gardens - JBRJ, Brazilian National Center for Flora Conservation - CNCFlora, 2013. 1100 p. Available at: http://cncflora.jbrj.gov.br/arquivos/arquivos/pdfs/LivroVermelho.pdf. Accessed: August 2020.

Note: Some species can inhabit more than one of the regions or realms considered, which is why the tables do not total the assessed species.

Regarding the fauna of the terrestrial realm, Chart 6 illustrates that the biomes with the highest number of species assessed are Mata Atlântica (3,324 species), Amazônia (3,183 species) and Cerrado (2,199 species). Considering the species assessed by biome, the marine portion of the Coastal-Marine System and the territorial sea of the São Pedro e São Paulo Archipelago and of the Trindade and Martim Vaz Islands (Sea and Islands), the highest proportions of threatened species of fauna are found in the Sea and oceanic islands, totaling 30 (38.46% of the total terrestrial species in this region) and in the Mata Atlântica Biome, totaling 426 (12.82% of the total terrestrial species in this biome). Both the islands and the Mata Atlântica Biome are characterized by many species with restricted distributions, which makes these regions of special interest for conservation. The Caatinga and Cerrado Biomes registered, respectively, 103 and 186 threatened species (9.60% and 8.46% of the total species of each biome). When observing the total number of threatened fauna species in the terrestrial realm, the biome with the highest proportion is the Mata Atlântica (45.42%), followed by the Cerrado (19.83%), Amazônia (12.79%) and Caatinga (10.98%) Biomes.

Chart 6 - Species of terrestrial fauna, by conservation status, according to the regions considered



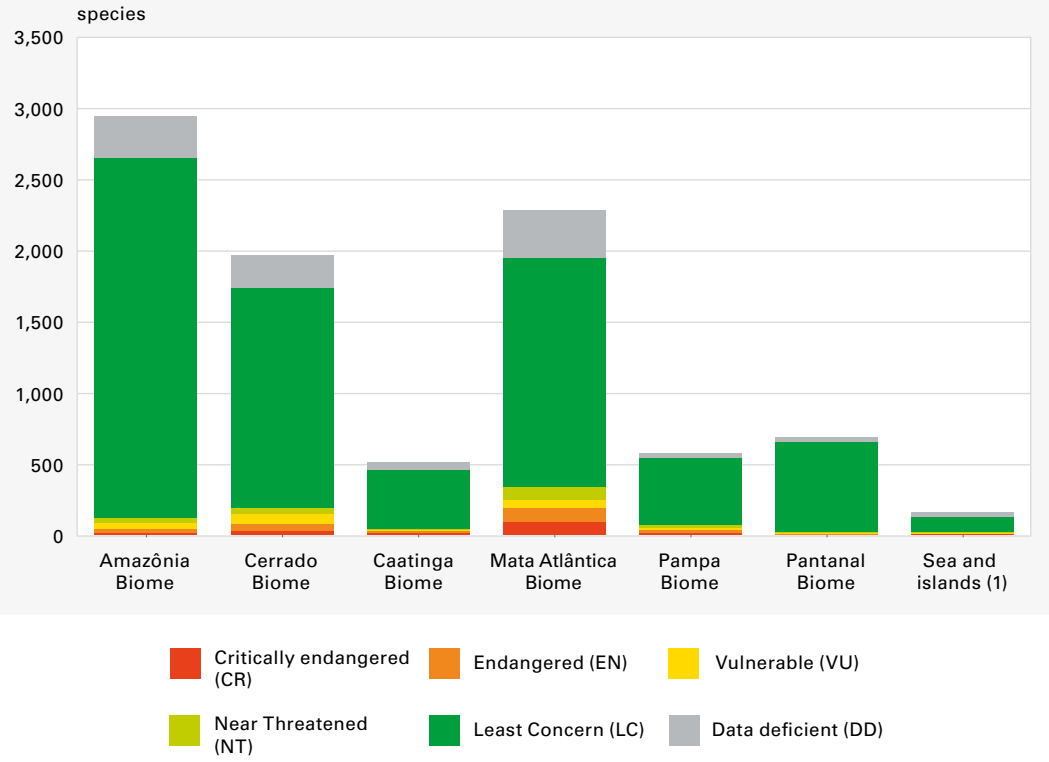
Sources: 1. IBGE, Diretoria de Geociências, Coordenação de Recursos Naturais e Estudos Ambientais. 2. CHICO MENDES INSTITUTE FOR BIODIVERSITY CONSERVATION. *Livro vermelho da fauna brasileira ameaçada de extinção.* Brasília, DF: ICMBio, 2018a.7 v. Available at: https://www.icmbio.gov.br/portal/component/contentt/article/10187. Accessed: August 2020.

Note: In addition to the data displayed in the chart, there are 6 species in the EX category in the Mata Atlântica Biome; 2 in the Pampa Biome; and 1 in the Pantanal Biome. There is also 1 species in the EW category in the Atlantic Forest Biome.

(1) Marine portion of the Coastal-Marine System and territorial sea of the São Pedro e São Paulo Archipelago and of the Trindade and Martim Vaz Islands.

Chart 7 shows the distribution of the number of species of freshwater fauna, by extinction risk categories, in different territorial areas. Fauna in the freshwater realm has a pattern similar to that observed in the terrestrial realm, with slightly smaller proportions of threatened species. In this realm, the highest numbers of species evaluated are recorded in the Amazônia (2,926 species), Mata Atlântica (2,271 species) and Cerrado (1,948 species) Biomes. However, in this realm, the highest proportions of species classified as Data Deficient are observed for most regions, highlighting the need for better information for some groups, such as continental fish and freshwater invertebrates. When observing the total number of threatened fauna species in a freshwater realm, the biome with the highest proportion is the Mata Atlântica (42.51%), followed by the Cerrado (24.91%), Amazônia (13.76%) and Pampa (8.36%) Biomes.

Chart 7 - Species of freshwater fauna, by conservation status, according to the regions considered



Sources: 1. IBGE, Diretoria de Geociências, Coordenação de Recursos Naturais e Estudos Ambientais. 2. CHICO MENDES INSTITUTE FOR BIODIVERSITY CONSERVATION. *Livro vermelho da fauna brasileira ameaçada de extinção.* Brasília, DF: ICMBio, 2018a.7 v. Available at: https://www.icmbio.gov.br/portal/component/contentt/article/10187. Accessed: August 2020.

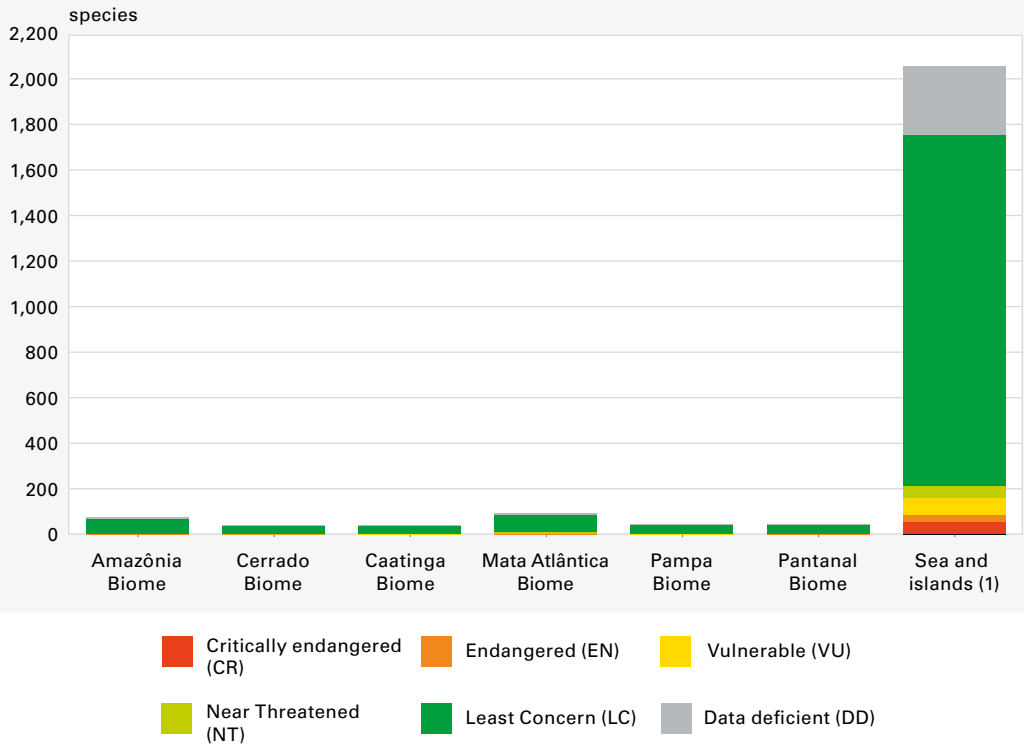
Note: In addition to the data displayed in the chart, there are 6 species in the EX category in the Mata Atlântica Biome; 2 in the Pampa Biome; and 1 in the Pantanal Biome. There is also 1 species in the EW category in the Atlantic Forest Biome.

(1) Marine portion of the Coastal-Marine System and territorial sea of the São Pedro e São Paulo Archipelago and of the Trindade and Martim Vaz Islands.

Chart 8 shows the distribution of the number of marine fauna species by extinction risk categories in different territorial regions. Assessed fauna of the marine realm is mainly located in the Sea and oceanic islands (2,056 species) and in the Mata Atlântica Biome (91 species). Proportionately, the marine realm has fewer

threatened species than the terrestrial and freshwater realms. Of the total species assessed in the Sea and oceanic islands, 159 are threatened (7.73%), and 5 in the Mata Atlântica Biome (5.49%). When observing the total number of threatened fauna species in the marine realm, the Sea and oceanic islands is the region that registers the highest proportion (91.38%). The pattern of large numbers of endangered species in the marine realm observed on the maps can be partly explained by the broad distributions of many organisms in this realm. In addition to completely aquatic groups, such as fish and several groups of marine invertebrates, coastal species such as seabirds are included here, many of which have wide distribution and also occur in continental water environments.

Chart 8 - Species of marine fauna, by conservation status, according to the regions considered



Sources: 1. IBGE, Diretoria de Geociências, Coordenação de Recursos Naturais e Estudos Ambientais. 2. CHICO MENDES INSTITUTE FOR BIODIVERSITY CONSERVATION. *Livro vermelho da fauna brasileira ameaçada de extinção.* Brasília, DF: ICMBio, 2018a.7 v. Available at: https://www.icmbio.gov.br/portal/component/contentt/article/10187. Accessed: August 2020.

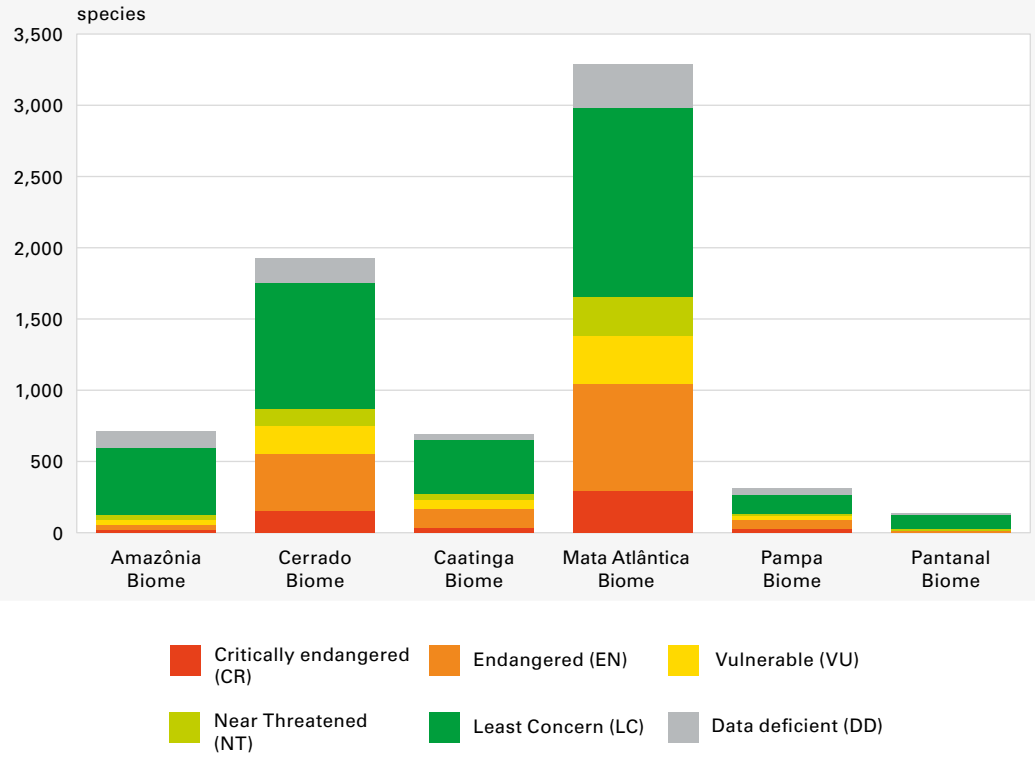
Note: In addition to the data displayed in the chart, there are 6 species in the EX category in the Mata Atlântica Biome; 2 in the Pampa Biome; and 1 in the Pantanal Biome. There is also 1 species in the EW category in the Atlantic Forest Biome.

(1) Marine portion of the Coastal-Marine System and territorial sea of the São Pedro e São Paulo Archipelago and of the Trindade and Martim Vaz Islands.

Chart 9 shows the distribution of the number of terrestrial flora species, by extinction risk categories, in Brazilian biomes. As observed in relation to fauna, there is a large number and a large proportion of threatened species of terrestrial flora in the Mata Atlântica Biome. For terrestrial flora, the biomes with the highest numbers of species evaluated are Mata Atlântica (3,282 species), Cerrado (1,921 species) and Amazônia (714 species). With regard to the proportion of threatened

species in relation to the total number of species evaluated in each biome, the Mata Atlântica Biomes stand out, with 1,380 threatened species (42.05%); Cerrado, with 750 threatened species (39.04%); Pampa, with 114 threatened species (36.66%); Caatinga, with 231 threatened species (33.38%); and Amazônia, with 94 threatened species (13.17%). The Amazônia Biome is the one that shows the highest proportion of species in the DD category in relation to the total number of species evaluated (16.67%). In general, the proportional values of threatened species of terrestrial flora mainly reflect the higher altitude environments of the Mata Atlântica Biome and the plateaus of the Cerrado and Caatinga Biomes. Many endemic plants are found in these landforms, in environments of low resilience.

Chart 9 - Species of terrestrial flora, by conservation status, according to the regions considered

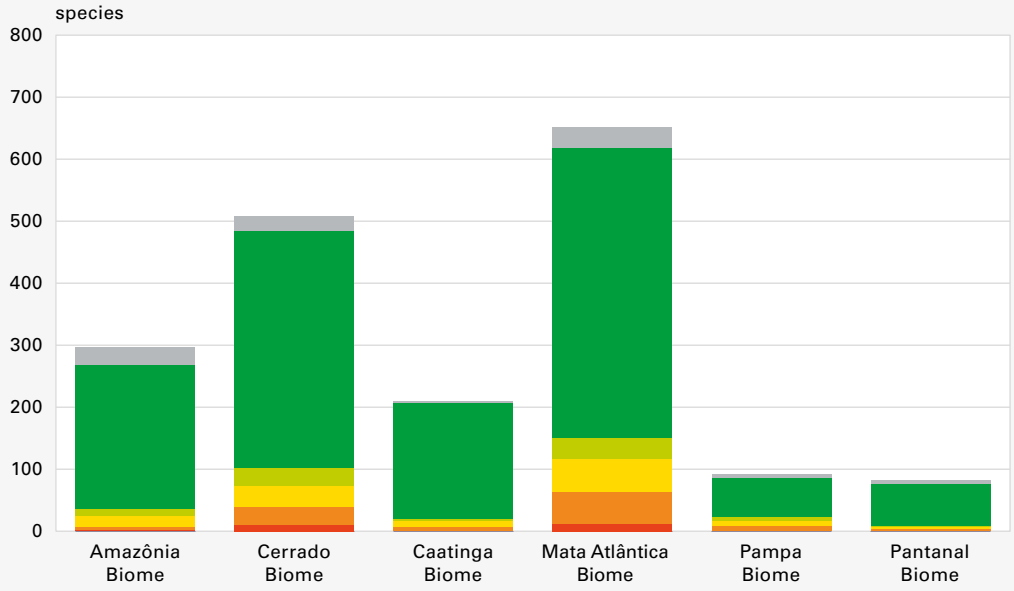


Sources: 1. IBGE, Diretoria de Geociências, Coordenação de Recursos Naturais e Estudos Ambientais. 2. MARTINELLI, G.; MORAES, M. A. (org.). *Livro vermelho da flora do Brasil 2013*. Rio de Janeiro: Rio de Janeiro Botanic Garden Research Institute - JBRJ, National Centre for Plant Conservation - CNCFlora, 2013.1100 p. Available at: http://cncflora.jbrj.gov.br/arquivos/arquivos/pdfs/LivroVermelho.pdf. Accessed: August 2020.

Chart 10 shows the distribution of the number of freshwater flora species, by extinction risk categories, in Brazilian biomes. Both strictly aquatic species and those from riverside or seasonally flooded environments are included among those associated with the freshwater realm. The total number of species assessed for freshwater flora is lower compared to terrestrial flora. The biomes with the highest numbers of species evaluated are Mata Atlântica (652 species), Cerrado (508 species) and Amazônia (297 species). The Pampa Biome stands out in this realm, which, despite a relatively low number of freshwater species assessed (93 species), presents 18 of them as threatened (19.35%), which makes it the largest proportion of

threatened species. It is followed by the Mata Atlântica Biome, which, as previously said, has the largest number of species assessed, of which 116 are threatened, and the second largest proportion of threatened species (17.79%).

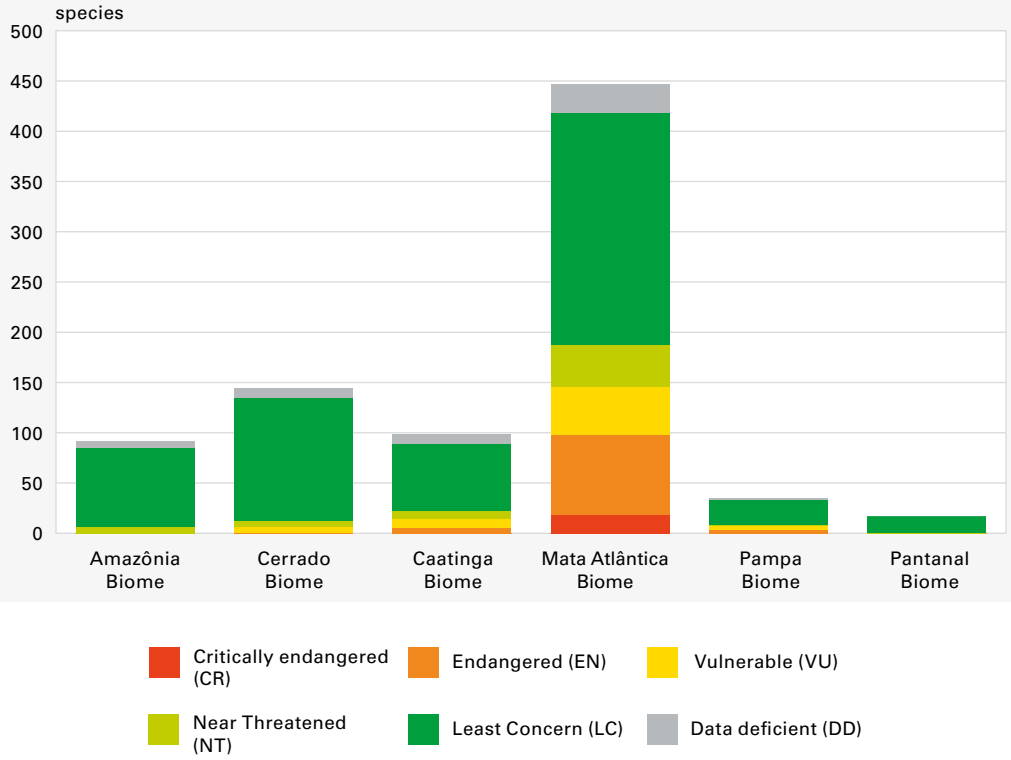
Chart 10 - Species of flora associated to freshwater environments, by conservation status, according to the regions considered



Sources: 1. IBGE, Diretoria de Geociências, Coordenação de Recursos Naturais e Estudos Ambientais. 2. MARTINELLI, G.; MORAES, M. A. (org.). *Livro vermelho da flora do Brasil 2013*. Rio de Janeiro: Rio de Janeiro Botanic Garden Research Institute - JBRJ, National Centre for Plant Conservation - CNCFlora, 2013.1100 p. Available at: http://cncflora.jbrj.gov.br/arquivos/arquivos/pdfs/LivroVermelho.pdf. Accessed: August 2020.

Chart 11 shows the distribution of the number of marine flora species, by extinction risk categories, in Brazilian biomes. Vegetation associated with the marine realm, such as mangroves and sandbanks, often have a particular flora, adapted to both salinity and high incidence of sun and strong winds. Because it comprises the largest proportion of these environments in Brazil, the Mata Atlântica Biome is home to most species of flora associated with the marine realm. The total number of species assessed for freshwater flora is lower compared to terrestrial flora. The biomes with the highest numbers of species assessed are Mata Atlântica (447 species), Cerrado (144 species) and Caatinga (98 species). Of the total species assessed in the Mata Atlântica Biome, 146 are threatened (32.66%). Next, the Pampa Biome stands out, which, despite having a small number of species assessed (35 species), of which 8 are threatened, has the second highest proportion of threatened species (22.86%).

Chart 11 - Species of flora associated to marine environments, by conservation status, according to the regions considered

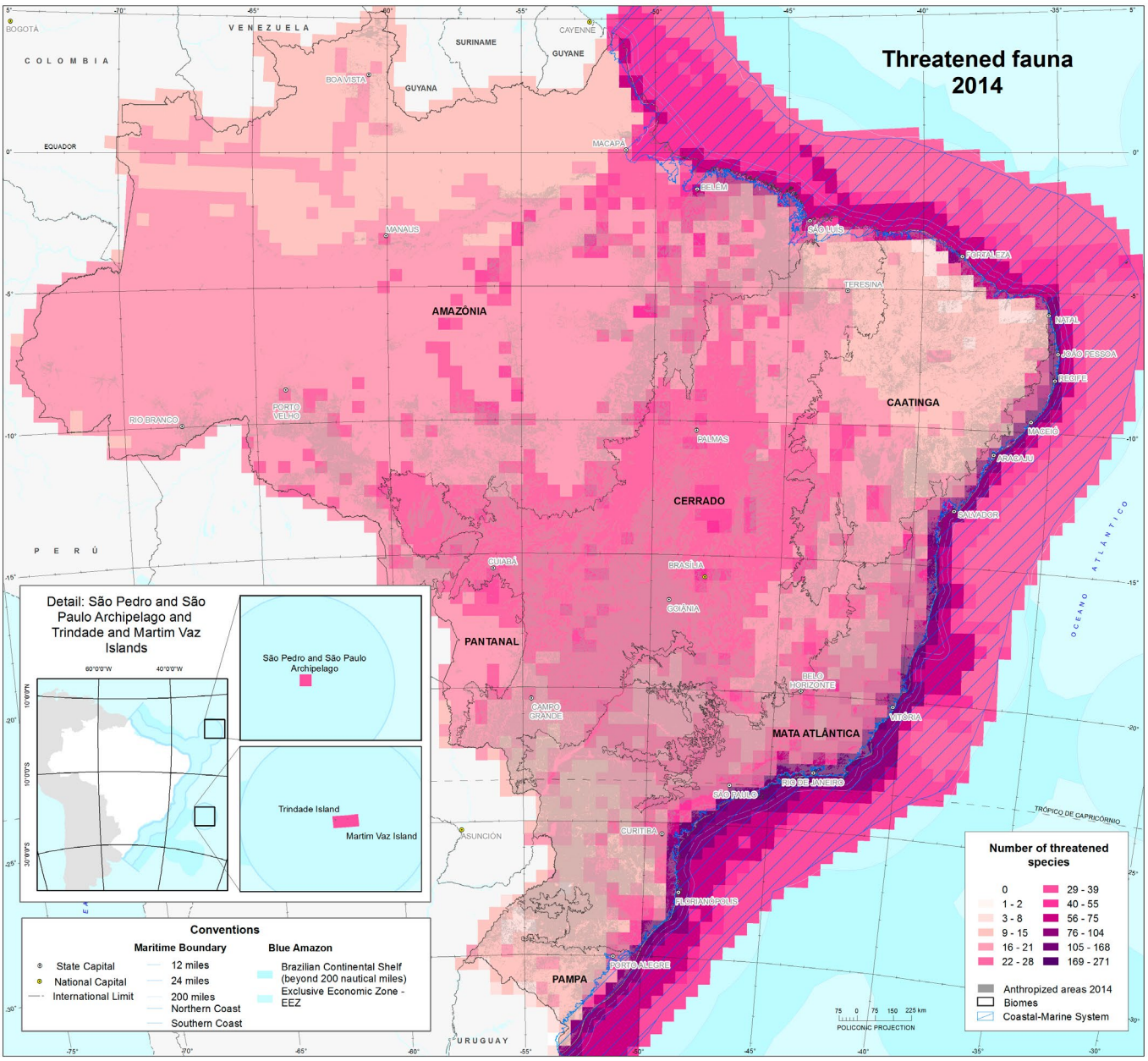


Sources: 1. IBGE, Diretoria de Geociências, Coordenação de Recursos Naturais e Estudos Ambientais. 2. MARTINELLI, G.; MORAES, M. A. (org.). *Livro vermelho da flora do Brasil 2013*. Rio de Janeiro: Rio de Janeiro Botanic Garden Research Institute - JBRJ, National Centre for Plant Conservation - CNCFlora, 2013.1100 p. Available at: http://cncflora.jbrj.gov.br/arquivos/arquivos/pdfs/LivroVermelho.pdf. Accessed: August 2020.

Maps 4 and 5 were produced using information on the occurrence of species on the National Red Lists of Fauna and Flora published by ICMBio and CNCFlora, respectively, and from IBGE data on land use and land cover (MONITORAMENTO ..., 2020). The spatial representation of the number of threatened species of fauna and flora, overlapped on the anthropized and natural areas of Brazil, makes it possible to assess areas with a high concentration of threatened species. Attachment 4 contains maps with information broken down by realm. A higher number of species is observed in the Mata Atlântica, Cerrado and Amazônia Biomes, as shown in Tables 3 and 4. The pattern identified for the fauna as a whole (Map 4) mainly reflects the high number of threatened species in the Marine-Coastal System, both due to the effect already described for the global data (point of overlap between terrestrial and marine species distributions) and by the pattern observed for some groups of threatened marine species, with a high number of them with extensive distributions along the coast.

In the case of flora threatened with extinction (Map 5), the highest concentrations are noted in the mountain and plateau regions of the country, such as in the Mata Atlântica Biome, in those close to the city of Rio de Janeiro, and in the mountainous regions, such as Serra do Espinhaço, already in the transition to the Cerrado Biome. In the Caatinga and Cerrado Biomes, the high number of threatened species in the Chapadas Diamantina and Veadeiros stands out. These concentrations are related to the high degree of endemism in these regions.

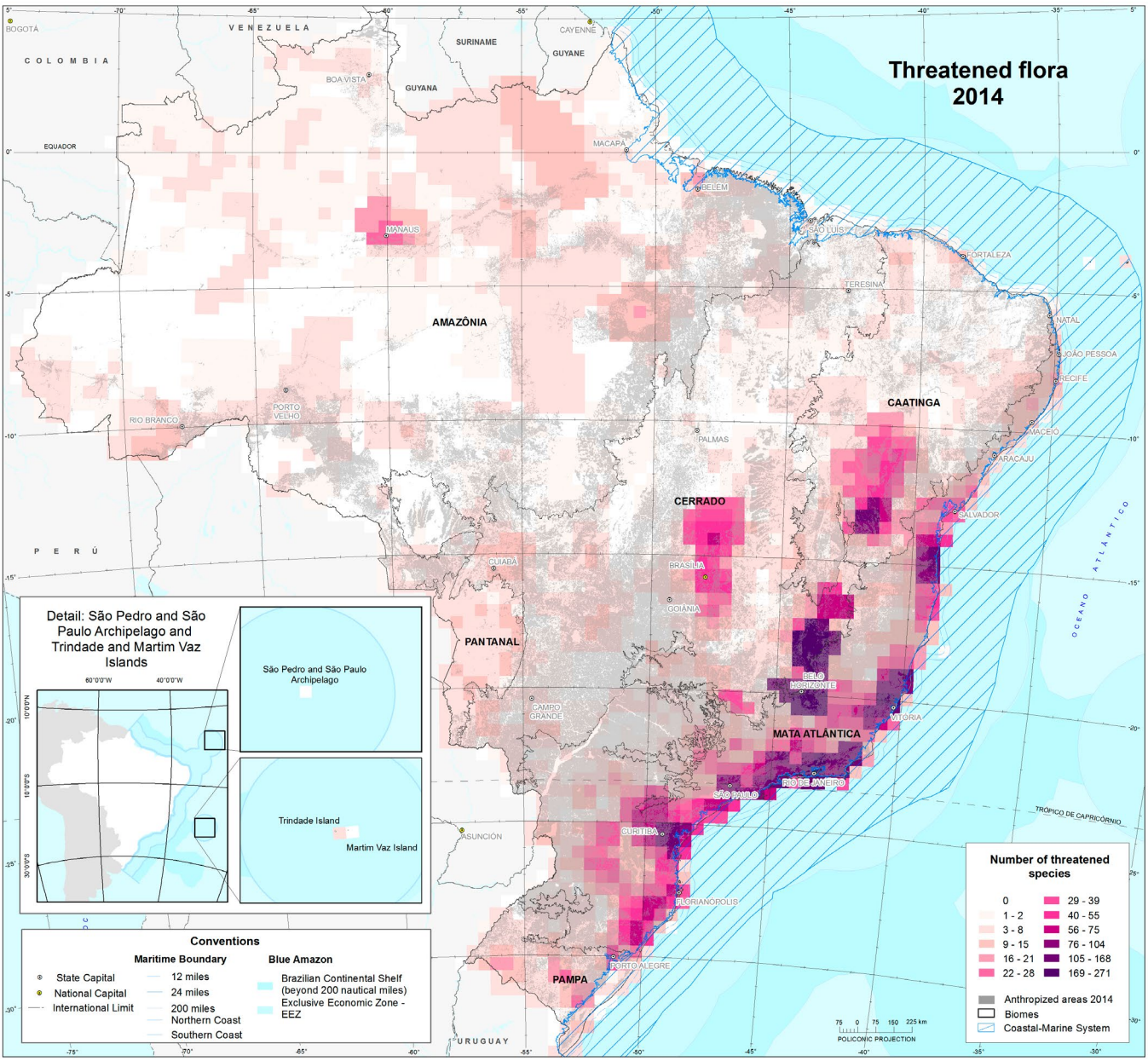
Map 4 - Number of fauna species threatened with extinction in Brazil - 2014



Sources: 1. INSTITUTO CHICO MENDES DE CONSERVAÇÃO DA BIODIVERSIDADE. *Livro vermelho da fauna brasileira ameaçada de extinção*. Brasília, DF: ICMBio, 2018a. 7 v. Available at: https://www.icmbio.gov.br/portal/component/content/article/10187. Accessed: August 2020. 2. CONTAS de ecossistemas: o uso da terra nos biomas brasileiros 2000-2018. Rio de Janeiro: IBGE, 2020. (Contas nacionais, n. 73). Available at: https://biblioteca.ibge.gov.br/visualizacao/livros/liv101753.pdf. Accessed: September 2020.

Notes: 1. The anthropized areas in 2014, according to the Ecosystem Extent Accounts, are shown in gray.
2. Species data organized by 50 km x 50 km cells and data of anthropized areas by 1 km x 1 km cells.

Map 5 - Number of flora species threatened with extinction in Brazil - 2014



Sources: 1. MARTINELLI, G.; MORAES, M. A. (org.). Livro vermelho da flora do Brasil 2013. Rio de Janeiro: Rio de Janeiro Botanic Garden Research Institute - JBRJ, National Center for Plant Conservation - CNCFlora, 2013. Available at: http://cncflora.jbrj.gov.br/arquivos/arquivos/pdfs/LivroVermelho.pdf. Accessed: August 2020. 2. CONTAS de ecossistemas: o uso da terra nos biomas brasileiros 2000-2018. Rio de Janeiro: IBGE, 2020. 95 p. (Contas nacionais, n. 73). Available at: https://biblioteca.ibge.gov.br/visualizacao/livros/liv101753.pdf. Accessed: September 2020.

Notes: 1. The anthropized areas in 2014, according to the Ecosystem Extent Accounts, are shown in gray.
2. Species data organized by 50 km x 50 km cells and data of anthropized areas by 1 km x 1 km cells.

It is important to note that, for both fauna and flora, some points of higher concentration of threatened species coincide with regions where the sampling effort is greater, such as areas close to major urban centers, where most research institutions are located, as well as access ways, such as highways or navigable rivers. Among the different gaps in knowledge about biodiversity (HORTAL et al., 2015), this pattern of geographical bias is well described in literature (MAGNUSSON et al., 2016; MEYER, 2016; OLIVEIRA et al., 2016) and reflects the need to make more efforts in the production of primary information to serve as a basis for better ecosystem management.

The spatialization of data on the occurrence of threatened species on the National Red List, on the biomes and types of land cover categories (natural and anthropized) contributes to bringing the species' conservation status closer to the Ecosystem Extent Accounts. However, this relationship does not necessarily indicate a causal relationship, i.e., it does not make it possible to affirm that the variations observed in the Extent Accounts, such as, for example, the conversion of forest coverage into agricultural coverage caused the changes in the species' conservation status.

Establishing such a causal link is a challenge for two main reasons. First, there may be differences between the area where the land use conversion took place and the location of the species distribution, which makes it difficult to directly link the threat factor and the change in the species' extinction risk. Second, there is a timeframe difference as a function of the response time of the effects of impacts on biodiversity and the time taken to evaluate the conservation status of the species. In any case, the recognition of important areas from the perspective of the conservation of threatened species, interpreted in conjunction with the distribution pattern of anthropism in the territory, allows different responses to be directed to the conservation challenge. The conservation of threatened species in areas with a high degree of anthropism, for example, depends on restoration initiatives and increased connectivity. On the other hand, places with a great richness of threatened species in broad natural areas are good candidates for the implementation of preventive measures, such as the creation of conservation units or stronger investments in existing units.

Final remarks

From a data access point of view, the production of the Threatened Species Accounts proposed in the System of Environmental-Economic Accounting 2012: Experimental Ecosystem Accounting manual, SEEA-EEA (UNITED NATIONS, 2014), proved feasible as long as the necessary information is accessible, which has been demonstrated here through IUCN data.

The availability of query tools, via API[29], made it feasible to compile information for large sets of species, both with regard to the countries of occurrence, assessment histories and information associated with the species, as well as with regard to taxonomic information and ecological data. However, the disclosure of information regarding the reasons for category changes on the IUCN portal, in tables in the form of a portable document (a pdf), makes its handling difficult. Although the smaller volume of data and the existence of automated extraction tools make this difficulty manageable, the provision of the categorization of changes, whether genuine or not, in a more directly accessible format would facilitate its use. In any case, the way in which data is available enables a highly automated workflow using statistical software, such as the R program (THE R FOUNDATION, 2019), which has several tools for obtaining, processing, analyzing and presenting the results.

[29] API (Application Programming Interface) is a set of routines and standards established by a software for the use of its features by applications that do not intend to get involved in the details of software implementation, but only use its services. IUCN provides an API that allows automated recovery of some data from its database. For further information, please visit: IUCN Red List of Threatened Species, Version 2020-1, at: www.iucnredlist.org.

With respect to the table proposed in the SEEA-EEA manual, possibilities for better detailing were identified for some types of accounting changes for species threatened with extinction. Considering the reassessments (updated assessment entry in the table proposed in the SEEA-EEA), it may be of interest to monitor their direction, in the sense of greater or lesser risk of extinction. At this point, it is suggested that changes between the Data Deficient category and the other categories are computed in specific entries. The rationale being that such changes cannot be categorized as improvements to, or worsening of, the conservation status, given that the real conservation status of the Data Deficient species is unknown.

In any case, the monitoring of changes in relation to the Data Deficient category is interesting because it provides information that demonstrates improvements to knowledge about the species' conservation status. In the same sense, the inclusion of an entry for stable reassessments is suggested or, alternatively, a subtotal with the number of species reassessed in the period. Taken together with the other changes, this information allows indicators related to the assessment effort employed in the period to be derived from the Threatened Species Accounts, thus allowing their use for monitoring the assessment process, such as, for example, changes in the frequency of evaluations in response to implemented policies. In addition to indicators related to the species' conservation status, indicators that reflect the assessment process itself and the evolution of associated knowledge can be broken down according to different spatial or thematic profiles.

Since the Threatened Species Accounts synthesize information about the conservation status of the species, highlighting the different types of change between the extinction risk categories, they facilitate the construction of indicators with different purposes, depending on the selected species, thematic focus and the types of changes considered. With respect to the monitoring of conservation status trends, a relevant indicator is the Red List Index. Since it only includes genuine category changes, considers the different levels of extinction risk, and is normalized in relation to the total set of species considered, this index allows the comparison of the conservation status trends of the species evaluated between different territorial or ecological profiles. This makes it possible to compare trends between delimitations with different numbers of species, such as, for example, the different realms and biomes considered in this study.

The amount of available information underscores the need for a clear definition of the intended use of the Threatened Species Accounts, in order to guarantee the relevant and direct disaggregation of data. This study adopted breakdowns by species groups and realms, which allows not only the identification of differences in the assessment process between groups, but also results in a related approximation of the types of ecosystems in which threatened species occur. When available, direct associations between the species assessed and the ecosystem typology adopted in the other Ecosystem Accounts will make possible a better integration between the indicators derived from the Threatened Species Accounts and the Ecosystem Extent, Condition and Services Accounts, especially if these associations are combined with information on the distribution area of the species considered. An example of disaggregation with a specific purpose can be seen in the use of data related to the freshwater realm in the production of indicators of the condition of continental aquatic ecosystems.

An important point to be considered when assessing the distribution patterns of threatened species concerns the assessment deficits that exist for various groups. Such deficits can be mainly associated to some factors, such as the high diversity of species present in Brazil, the complexity of the assessment process, and the scarcity of primary information, especially for less conspicuous groups. A possible solution is to prioritize complete assessments for certain groups of species with greater availability of information, such as vertebrates, in the case of fauna, and tree species, in the case of flora. However, less studied groups also prove to be important components for the functioning of many ecosystems. In these cases, assessment efforts focused on specific interest groups, or assessment strategies by sampling can be used to generate data capable of adequately informing the species' conservation status.

The Threatened Species Accounts and the presented indicators contribute to the compilation of the Biodiversity Condition Accounts. The use of global data from the IUCN Red List enabled an initial assessment of the condition of the conservation status of biodiversity species from the Threatened Species Account in two time periods and the calculation of the RLI by biomes. In the future, the publication of new updates to the National Red Lists can support the production of such indicators at the national level based on national data sources.

The indicators presented contribute to monitoring Aichi Target 12, which establishes that "By 2020, the risk of extinction of threatened species will be significantly reduced, tending to zero, and their conservation situation, especially those suffering the greatest decline, will have improved." (NATIONAL BIODIVERSITY COMMISSION, 2013). They also contribute to generating data for the construction of indicator 15.5.1 of the Sustainable Development Goals (SDGs), whose purpose is: "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss." This indicator considers the Red List Index for monitoring Goal 15.5, which, in turn, is defined as "Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species." By highlighting the possibilities for applying the information produced in the process of assessing the species' conservation status, it is expected that this study will contribute to a greater use of information on biodiversity in planning, especially as this information is increasingly integrated with the other components of the Ecosystem Accounts.

Considering the different approaches presented for the Species Accounts under development in the SEEA-EEA manual, future compilations can be conducted as a result of the increasing availability of data on integrated web platforms, which are committed to the dissemination of important information for monitoring Brazilian biodiversity. Examples of this are PortalBio[30] and SIBBr[31], or research and monitoring

[30] The Biodiversity Portal, (Portal Bio) provides data and information on Brazilian biodiversity generated or received by the Ministry of the Environment and the institutions linked to it. For further information on the topic, please visit: https://portaldabiodiversidade.icmbio.gov.br/portal/.

[31] The Brazilian Biodiversity Information System (SiBBr) is a platform that integrates data on biodiversity and ecosystems from different sources in Brazil and abroad. For further information on the topic, please visit: https://www.sibbr.gov.br/.

programs, such as PELD[32] and the Monitora Program[33]. Another possibility is the use of system data, such as SISBIO[34] and SISGEN[35], which manage records produced by researchers and biodiversity users. Species Accounts can also be related to the Timber Forest Products and Non-Timber Forest Products Accounts. Through the link between the use of biodiversity for economic purposes and the analysis of the species' conservation status, new indicators on the economic importance of species and the risks of extinction associated with their exploitation and land use conversions can be obtained.

The results presented here demonstrate an extensive potential for the Threatened Species Accounts, considering the amount of information that can be compiled. The application of the methodology proposed in the SEEA-EEA manual based on global data allowed an efficient workflow transferable for national data to be established. The spatial analyses of this study were based on a statistical grid with a resolution of 50 km. Future analyses, anchored in another type of basic spatial unit, such as, for example, physiographic profiles (hydrographic basins), grids with different resolutions, or even regionalizations based on the environmental characteristics of the territory may be used, depending on the objectives and availability of information. In the particular case of the Threatened Species Accounts, a promising approach would be an overlay between spatially explicit information on the distribution of ecosystems in the Brazilian territory and the species associated with them. A classification of the types of ecosystems in Brazil is required for that purpose, in addition to information about the association between each species evaluated and the ecosystems they comprise. The analysis of the threat factors and their relationship with economic production may also enhance the information compiled in the Threatened Species Accounts.

As new updates to the National Lists are produced, it will be possible to generate the evaluated indicators, as well as additional indicators. The proposed breakdowns for the different realms and biomes demonstrate an initial approximation. The specific association between the taxa assessed and the ecosystems in which they occur, combined with the increasingly accurate knowledge about the distribution of species in the territory, will favor the breakdown of information on the species' conservation status with increasing detail, thus strengthening its use based on the linkage with the other Ecosystem Accounts currently under development. In addition, the Threatened Species Accounts are expected to be a starting point for the necessary institutional arrangements to foster growing integration of biodiversity information in the decision-making processes, allowing the elaboration of other types of accounts.

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32 The Long Term Ecological Research Program (PELD) consists of a network of reference sites for scientific research on Ecosystem Ecology. For further information on the topic, please visit: http://cnpq.br/apresentacao-peld.

33 The National Biodiversity Monitoring Program (ICMBio Monitora Program) proposes to generate qualified information to support the management of conservation units, to provide subsidies for the implementation of conservation strategies for species threatened with extinction and to assess species responses to climate change. For further information on the topic, please visit: https://www.icmbio.gov.br/portal/monitoramento-2016/programas-de-monitoramento-da-biodiversidade-em-ucs.

34 The Biodiversity Authorization and Information System (SISBIO) is a remote service system that allows researchers to request authorization for the collection of biological material and to conduct research in conservation units. For further information on the topic, please visit: https://www.icmbio.gov.br/sisbio/.

35 The National System for the Management of Genetic Heritage and Associated Traditional Knowledge (SISGEN) is an electronic system created as a tool to assist the Genetic Heritage Management Council (CGen), including with regard to the traditional knowledge associated with the topic. For further information, please visit: https://sisgen.gov.br/.

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Attachments

1 - Correspondence between types of vegetation and realms

2 A - Threatened Species Accounts and Red List Index (RLI) values calculated for South America - 2010/2018

B - Threatened Species Accounts and Red List Index (RLI) values calculated for Brazil - 2010/2018

3 - Maps of threatened species in South America, according to the Red List Index (RLI), by realm - 2018

4 - Maps of threatened fauna and flora species in Brazil, according to the *Livro Vermelho da Fauna Brasileira Ameaçada de Extinção* (Red Book of Brazilian Fauna Threatened with Extinction) and the *Livro Vermelho da Flora do Brasil* (Red Book of Brazilian Flora), by realm - 2014

Attachment 1 - Association between types of vegetation and realms

Vegetation	Terrestrial realm	Continental freshwater realm	Marine realm
Ombrophilous Forest (= Rainforest) [Floresta Ombrófila (= Floresta Pluvial)]	X		
Ciliary or Gallery Forest [Floresta Ciliar ou Galeria]	X	X	
Non-flooded Forest [Floresta de Terra Firme]	X		
Restinga [Restinga]	X		X
Mixed Ombrophilous Forest [Floresta Ombrófila Mista]	X		
Semi-deciduous Seasonal Forest [Floresta Estacional Semidecidual]	X		
Brazilian Grasslands [Campo Limpo]	X		
Cerrado (lato sensu) [Cerrado (lato sensu)]	X		
Várzea Grasslands [Campo de Várzea]	X	X	
Deciduous Seasonal Forest [Floresta Estacional Decidual]	X		
Anthropic Area [Área Antrópica]	X		
Vegetation over Rocky Outcrops [Vegetação Sobre Afloramentos Rochosos]	X		
Rupestrian grasslands [Campo rupestre]	X		
Aquatic Vegetation [Vegetação Aquática]		X	
High-Altitude Grasslands [Campo de Altitude]	X		
Amazonian Savannah [Savana Amazônica]	X		
Caatinga (stricto sensu) [Caatinga (stricto sensu)]	X		
Campinarana [Campinarana]	X		
Carrasco [Carrasco]	X		
Várzea Forest [Floresta de Várzea]	X	X	
Igapó Forest [Floresta de Igapó]	X	X	
Mangrove Forest [Manguezal]	X	X	X
Evergreen Seasonal Forest [Floresta Estacional Perenifólia]	X		
Palm Grove [Palmeiral]	X		

Source: IBGE, Diretoria de Geociências, Coordenacão de Recursos Naturais e Estudos Ambientais.

Attachment 2A - Threatened Species Accounts and Red List Index (RLI) values calculated for South America - 2010/2018

Group	Accounts	Total								
		EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
Total	**Opening stock (2010)**	**22**	**1**	**306**	**501**	**576**	**457**	**4,647**	**984**	**84.81**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	6	6	35	40	-	-	
	categories (improvement in the conservation status)	-	-	-	1	4	-	-	-	
	Reassessments coming from lower risk categories	-	-	2	8	7	12	-	-	
	Reassessments coming from higher risk categories	-	-	-	5	9	7	13	-	
	Reassessments coming from the DD category and going to other categories	-	-	6	3	2	1	2	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	1	
	Species assessed for the first time during the period	1	-	17	21	16	43	229	32	
	Total additions	1	-	31	44	73	103	244	33	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	(-) 3	(-) 2	-	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	(-) 3	(-) 5	(-) 9	(-) 70	-	
	Reassessments going to lower risk categories	-	-	(-) 6	(-) 11	(-) 6	(-) 11	-	-	
	Reassessments going to higher risk categories	-	-	-	(-) 1	(-) 7	(-) 6	(-) 15	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	(-) 1	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	(-) 14	
	Total reductions	-	-	(-) 9	(-) 17	(-) 19	(-) 26	(-) 85	(-) 14	
	Species that were reassessed in the period and remained in the same category	10	1	118	165	246	265	3067	81	
	Opening/closing stock (2014)	**23**	**1**	**328**	**528**	**630**	**534**	**4,806**	**1,003**	**84.68**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	5	7	5	6	-	-	
	categories (improvement in the conservation status)	-	-	-	1	4	1	4	-	
	Reassessments coming from lower risk categories	-	-	14	39	21	17	-	-	
	Reassessments coming from higher risk categories	-	-	1	30	49	24	58	-	
	Reassessments coming from the DD category and going to other categories	-	-	10	35	7	6	43	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	28	
	Species assessed for the first time during the period	2	-	8	38	41	37	501	87	
	Total additions	2	-	38	150	127	91	606	115	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	(-) 3	(-) 2	(-) 2	(-) 3	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	(-) 2	(-) 7	(-) 4	(-) 10	-	
	Reassessments going to lower risk categories	(-) 1	-	(-) 36	(-) 55	(-) 43	(-) 27	-	-	
	Reassessments going to higher risk categories	-	-	-	(-) 8	(-) 30	(-) 24	(-) 29	-	
	Reassessments coming from other categories and going to the DD category	(-) 1	-	(-) 9	(-) 7	(-) 8	(-) 2	(-) 1	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	(-) 101	
	Total reductions	(-) 2	-	(-) 48	(-) 74	(-) 90	(-) 60	(-) 40	(-) 101	
	Species that were reassessed in the period and remained in the same category	12	1	135	235	331	355	3819	199	
	Closing stock (2018)	**23**	**1**	**318**	**604**	**667**	**565**	**5,372**	**1,017**	**83.44**

(continued)

Terrestrial Species										Freshwater species									Marine species								
EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
21	**1**	**294**	**481**	**557**	**445**	**4,556**	**912**	**86**	**5**	**-**	**142**	**144**	**157**	**105**	**1,323**	**445**	**83.92**	**1**	**-**	**9**	**31**	**47**	**37**	**326**	**60**	**85.44**
-	-	5	6	35	40	-	-		-	-	3	-	4	6	-	-		-	-	1	1	1	1	-	-	
-	-	-	1	4	-	-	-		-	-	-	-	3	-	-	-		-	-	-	-	-	-	-	-	
-	-	2	8	7	12	-	-		-	-	-	1	-	2	-	-		-	-	-	-	2	2	-	-	
-	-	-	5	9	7	13	-		-	-	-	3	3	1	2	-		-	-	-	-	1	3	-	-	
-	-	5	3	2	1	2	-		-	-	2	1	1	1	2	-		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	1		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
1	-	17	21	16	43	229	32		-	-	8	4	1	16	47	17		-	-	-	-	1	2	21	1	
1	-	29	44	73	103	244	33		-	-	13	9	12	26	51	17		-	-	1	1	5	8	21	1	
-	-	(-) 3	(-) 2	-	-	-	-		-	-	(-) 2	(-) 1	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	-	(-) 2	(-) 5	(-) 9	(-) 70	-		-	-	-	(-) 1	-	(-) 4	(-) 8	-		-	-	-	(-) 1	(-) 1	-	(-) 2	-	
-	-	(-) 6	(-) 11	(-) 6	(-) 11	-	-		-	-	(-) 4	(-) 3	(-) 2	-	-	-		-	-	-	(-) 3	(-) 1	-	-	-	
-	-	-	(-) 1	(-) 7	(-) 6	(-) 15	-		-	-	-	-	(-) 1	-	(-) 2	-		-	-	-	-	-	(-) 2	(-) 2	-	
-	-	-	-	(-) 1	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	(-) 13		-	-	-	-	-	-	-	(-) 7		-	-	-	-	-	-	-	-	
-	-	(-) 9	(-) 16	(-) 19	(-) 26	(-) 85	(-) 13		-	-	(-) 6	(-) 5	(-) 3	(-) 4	(-) 10	(-) 7		-	-	-	(-) 4	(-) 2	(-) 2	(-) 4	-	
9	1	112	160	240	255	3035	64		1	-	42	29	48	39	794	43		1	-	5	18	34	31	256	15	
22	**1**	**314**	**509**	**611**	**522**	**4,715**	**932**	**85.72**	**5**	**-**	**149**	**148**	**166**	**127**	**1,364**	**455**	**83.75**	**1**	**-**	**10**	**28**	**50**	**43**	**343**	**61**	**85.36**
-	-	5	7	5	6	-	-		-	-	2	3	2	3	-	-		-	-	-	2	1	4	-	-	
-	-	-	1	3	1	4	-		-	-	-	-	1	-	-	-		-	-	-	-	2	-	3	-	
-	-	14	39	21	17	-	-		-	-	4	10	7	2	-	-		-	-	-	-	-	2	-	-	
-	-	1	30	49	24	58	-		-	-	1	12	15	7	16	-		-	-	-	-	-	1	2	-	
-	-	9	34	7	2	32	-		-	-	8	13	1	2	6	-		-	-	-	-	-	4	11	-	
-	-	-	-	-	-	-	28		-	-	-	-	-	-	-	13		-	-	-	-	-	-	-	-	
2	-	7	38	41	37	501	85		-	-	6	14	6	7	73	5		-	-	-	1	2	2	5	1	
2	-	36	149	126	87	595	113		-	-	21	52	32	21	95	18		-	-	-	3	5	13	21	1	
-	-	(-) 3	(-) 1	(-) 2	(-) 3	-	-		-	-	(-) 1	-	-	-	-	-		-	-	-	(-) 2	-	(-) 3	-	-	
-	-	-	(-) 2	(-) 7	(-) 4	(-) 10	-		-	-	-	-	(-) 2	(-) 3	(-) 5	-		-	-	-	-	(-) 2	-	(-) 5	-	
(-) 1	-	(-) 36	(-) 55	(-) 43	(-) 27	-	-		(-) 1	-	(-) 15	(-) 17	(-) 13	(-) 5	-	-		-	-	-	-	(-) 1	(-) 2	-	-	
-	-	-	(-) 8	(-) 30	(-) 24	(-) 29	-		-	-	-	(-) 2	(-) 7	(-) 9	(-) 5	-		-	-	-	-	-	-	(-) 2	-	
(-) 1	-	(-) 9	(-) 7	(-) 8	(-) 2	(-) 1	-		-	-	(-) 6	(-) 4	(-) 2	(-) 1	-	-		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	(-) 84		-	-	-	-	-	-	-	(-) 30		-	-	-	-	-	-	-	(-) 15	
(-) 2	-	(-) 48	(-) 73	(-) 90	(-) 60	(-) 40	(-) 84		(-) 1	-	(-) 22	(-) 23	(-) 24	(-) 18	(-) 10	(-) 30		-	-	-	(-) 2	(-) 3	(-) 5	(-) 7	(-) 15	
11	1	128	227	325	345	3786	194		1	-	51	44	50	60	723	40		1	-	6	23	36	36	280	8	
22	**1**	**302**	**585**	**647**	**549**	**5,270**	**961**	**80.84**	**4**	**-**	**148**	**177**	**174**	**130**	**1449**	**443**	**83.66**	**1**	**-**	**10**	**29**	**52**	**51**	**357**	**47**	**85.41**

Attachment 2A - Threatened Species Accounts and Red List Index (RLI) values calculated for South America - 2010/2018

Group	Accounts	Total								
		EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
	Opening stock (2010)	**4**	**-**	**197**	**276**	**237**	**113**	**971**	**720**	**78.16**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	1	-	-	-	-	-	
	categories (improvement in the conservation status)	-	-	-	-	3	-	-	-	
	Reassessments coming from lower risk categories	-	-	-	2	-	-	-	-	
	Reassessments coming from higher risk categories	-	-	-	3	3	2	2	-	
	Reassessments coming from the DD category and going to other categories	-	-	4	3	2	1	2	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Species assessed for the first time during the period	-	-	8	7	1	7	24	28	
	Total additions	-	-	13	15	9	10	28	28	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	(-) 2	(-) 1	-	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	-	-	(-) 1	-	-	
	Reassessments going to lower risk categories	-	-	(-) 4	(-) 3	(-) 3	-	-	-	
	Reassessments going to higher risk categories	-	-	-	-	(-) 1	-	(-) 1	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	(-) 12	
	Total reductions	-	-	(-) 6	(-) 4	(-) 4	(-) 1	(-) 1	(-) 12	
	Species that were reassessed in the period and remained in the same category	-	-	48	31	38	13	270	50	
Amphibians	**Opening/closing stock (2014)**	**4**	**-**	**204**	**287**	**242**	**122**	**998**	**736**	**78.16**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	3	2	1	-	-	-	
	categories (improvement in the conservation status)	-	-	-	-	1	-	-	-	
	Reassessments coming from lower risk categories	-	-	11	23	8	1	-	-	
	Reassessments coming from higher risk categories	-	-	1	20	29	13	30	-	
	Reassessments coming from the DD category and going to other categories	-	-	10	31	4	1	22	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	24	
	Species assessed for the first time during the period	-	-	6	25	14	8	38	30	
	Total additions	-	-	31	101	57	23	90	54	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	(-) 1	-	-	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	-	(-) 2	(-) 2	(-) 2	-	
	Reassessments going to lower risk categories	(-) 1	-	(-) 24	(-) 36	(-) 24	(-) 8	-	-	
	Reassessments going to higher risk categories	-	-	-	(-) 5	(-) 21	(-) 12	(-) 5	-	
	Reassessments coming from other categories and going to the DD category	-	-	(-) 9	(-) 7	(-) 7	(-) 1	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	(-) 68	
	Total reductions	(-) 1	-	(-) 34	(-) 48	(-) 54	(-) 23	(-) 7	(-) 68	
	Species that were reassessed in the period and remained in the same category	-	-	52	55	31	17	164	87	
	Closing stock (2018)	**3**	**-**	**201**	**340**	**245**	**122**	**1081**	**722**	**78.00**

(continuation)

Terrestrial Species									Freshwater species									Marine species								
EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
4	**-**	**193**	**267**	**235**	**113**	**969**	**707**	**77.48**	**4**	**-**	**136**	**124**	**127**	**70**	**709**	**433**	**78.85**	..	..	..	..	..	..	..	..	..
-	-	1	-	-	-	-	-		-	-	1	-	-	-	-	-		..	..	..	..	..	..	..	..	
-	-	-	-	3	-	-	-		-	-	-	-	3	-	-	-		..	..	..	..	..	..	..	..	
-	-	-	2	-	-	-	-		-	-	-	1	-	-	-	-		..	..	..	..	..	..	..	..	
-	-	-	3	3	2	2	-		-	-	-	3	3	1	2	-		..	..	..	..	..	..	..	..	
-	-	3	3	2	1	2	-		-	-	2	1	1	1	2	-		..	..	..	..	..	..	..	..	
-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		..	..	..	..	..	..	..	..	
-	-	8	7	1	7	24	28		-	-	8	3	1	5	16	17		..	..	..	..	..	..	..	..	
-	-	12	15	9	10	28	28		-	-	11	8	8	7	20	17		..	..	..	..	..	..	..	..	
-	-	(-) 2	(-) 1	-	-	-	-		-	-	(-) 2	(-) 1	-	-	-	-		..	..	..	..	..	..	..	..	
-	-	-	-	-	(-) 1	-	-		-	-	-	-	-	(-) 1	-	-		..	..	..	..	..	..	..	..	
-	-	(-) 4	(-) 3	(-) 3	-	-	-		-	-	(-) 4	(-) 3	(-) 2	-	-	-		..	..	..	..	..	..	..	..	
-	-	-	-	(-) 1	-	(-) 1	-		-	-	-	-	(-) 1	-	-	-		..	..	..	..	..	..	..	..	
-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		..	..	..	..	..	..	..	..	
-	-	-	-	-	-	-	(-) 11		-	-	-	-	-	-	-	(-) 7		..	..	..	..	..	..	..	..	
-	-	(-) 6	(-) 4	(-) 4	(-) 1	(-) 1	(-) 11		-	-	(-) 6	(-) 4	(-) 3	(-) 1	-	(-) 7		..	..	..	..	..	..	..	..	
-	-	46	31	37	13	269	47		-	-	36	16	25	8	210	39		..	..	..	..	..	..	..	..	
4	**-**	**199**	**278**	**240**	**122**	**996**	**724**	**77.48**	**4**	**-**	**141**	**128**	**132**	**76**	**729**	**443**	**78.85**	..	..	..	..	..	..	..	..	..
-	-	3	2	1	-	-	-		-	-	2	2	1	-	-	-		..	..	..	..	..	..	..	..	
-	-	-	-	1	-	-	-		-	-	-	-	1	-	-	-		..	..	..	..	..	..	..	..	
-	-	11	23	8	1	-	-		-	-	4	9	7	1	-	-		..	..	..	..	..	..	..	..	
-	-	1	20	29	13	30	-		-	-	1	12	11	7	16	-		..	..	..	..	..	..	..	..	
-	-	9	31	4	1	22	-		-	-	8	12	1	-	6	-		..	..	..	..	..	..	..	..	
-	-	-	-	-	-	-	24		-	-	-	-	-	-	-	13		..	..	..	..	..	..	..	..	
-	-	5	25	14	8	38	29		-	-	5	12	6	5	16	5		..	..	..	..	..	..	..	..	
-	-	29	101	57	23	90	53		-	-	20	47	27	13	38	18		..	..	..	..	..	..	..	..	
-	-	(-) 1	-	-	-	-	-		-	-	(-) 1	-	-	-	-	-		..	..	..	..	..	..	..	..	
-	-	-	-	(-) 2	(-) 2	(-) 2	-		-	-	-	-	(-) 1	(-) 2	(-) 2	-		..	..	..	..	..	..	..	..	
(-) 1	-	(-) 24	(-) 36	(-) 24	(-) 8	-	-		(-) 1	-	(-) 15	(-) 13	(-) 13	(-) 5	-	-		..	..	..	..	..	..	..	..	
-	-	-	(-) 5	(-) 21	(-) 12	(-) 5	-		-	-	-	(-) 2	(-) 6	(-) 9	(-) 4	-		..	..	..	..	..	..	..	..	
-	-	(-) 9	(-) 7	(-) 7	(-) 1	-	-		-	-	(-) 6	(-) 4	(-) 2	(-) 1	-	-		..	..	..	..	..	..	..	..	
-	-	-	-	-	-	-	(-) 67		-	-	-	-	-	-	-	(-) 27		..	..	..	..	..	..	..	..	
(-) 1	-	(-) 34	(-) 48	(-) 54	(-) 23	(-) 7	(-) 67		(-) 1	-	(-) 22	(-) 19	(-) 22	(-) 17	(-) 6	(-) 27		..	..	..	..	..	..	..	..	
-	-	50	53	31	17	164	86		-	-	43	28	21	11	92	38		..	..	..	..	..	..	..	..	
3	**-**	**194**	**331**	**243**	**122**	**1079**	**710**	**77.33**	**3**	**-**	**139**	**156**	**137**	**72**	**761**	**434**	**78.67**	..	..	..	..	..	..	..	..	..

Attachment 2A - Threatened Species Accounts and Red List Index (RLI) values calculated for South America - 2010/2018

Group	Accounts	Total								
		EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
	Opening stock (2010)	**9**	**1**	**58**	**139**	**209**	**251**	**2,801**	**7**	**92.99**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	5	6	34	40	-	-	
	categories (improvement in the conservation status)	-	-	-	1	1	-	-	-	
	Reassessments coming from lower risk categories	-	-	1	6	7	11	-	-	
	Reassessments coming from higher risk categories	-	-	-	2	5	5	11	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Species assessed for the first time during the period	-	-	8	14	15	35	200	1	
	Total additions	-	-	14	29	62	91	211	1	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	(-) 1	(-) 1	-	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	(-) 3	(-) 5	(-) 7	(-) 70	-	
	Reassessments going to lower risk categories	-	-	(-) 2	(-) 7	(-) 3	(-) 11	-	-	
	Reassessments going to higher risk categories	-	-	-	-	(-) 6	(-) 6	(-) 13	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Total reductions	-	-	(-) 3	(-) 11	(-) 14	(-) 24	(-) 83	-	
	Species that were reassessed in the period and remained in the same category	9	1	55	128	195	227	2718	7	
Birds	**Opening/closing stock (2014)**	**9**	**1**	**69**	**157**	**257**	**318**	**2,929**	**8**	**92.48**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	2	4	3	4	-	-	
	categories (improvement in the conservation status)	-	-	-	1	2	1	3	-	
	Reassessments coming from lower risk categories	-	-	2	9	9	15	-	-	
	Reassessments coming from higher risk categories	-	-	-	6	12	3	13	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Species assessed for the first time during the period	1	-	2	10	18	25	381	2	
	Total additions	1	-	6	30	44	48	397	2	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	(-) 2	(-) 1	(-) 2	(-) 2	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	(-) 2	(-) 4	(-) 2	(-) 5	-	
	Reassessments going to lower risk categories	-	-	(-) 7	(-) 11	(-) 6	(-) 10	-	-	
	Reassessments going to higher risk categories	-	-	-	(-) 2	(-) 4	(-) 9	(-) 20	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Total reductions	-	-	(-) 9	(-) 16	(-) 16	(-) 23	(-) 25	-	
	Species that were reassessed in the period and remained in the same category	9	1	60	141	241	295	2,904	8	
	Closing stock (2018)	**10**	**1**	**66**	**171**	**285**	**343**	**3,301**	**10**	**87.63**

(continuation)

Terrestrial Species									Freshwater species									Marine species								
EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
8	**1**	**55**	**135**	**207**	**245**	**2,798**	**7**	**92.52**	**1**	**-**	**6**	**14**	**22**	**33**	**593**	**1**	**94.62**	**1**	**-**	**4**	**20**	**33**	**29**	**230**	**3**	**91.82**
-	-	4	6	34	40	-	-		-	-	2	-	4	6	-	-		-	-	1	1	1	1	-	-	
-	-	-	1	1	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	1	6	7	11	-	-		-	-	-	-	-	2	-	-		-	-	-	-	2	2	-	-	
-	-	-	2	5	5	11	-		-	-	-	-	-	-	-	-		-	-	-	-	1	3	-	-	
-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	8	14	15	35	200	1		-	-	-	1	-	11	31	-		-	-	-	-	1	2	21	1	
-	-	13	29	62	91	211	1		-	-	2	1	4	19	31	-		-	-	1	1	5	8	21	1	
-	-	(-) 1	(-) 1	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	-	(-) 2	(-) 5	(-) 7	(-) 70	-		-	-	-	(-) 1	-	(-) 3	(-) 8	-		-	-	-	(-) 1	(-) 1	-	(-) 2	-	
-	-	(-) 2	(-) 7	(-) 3	(-) 11	-	-		-	-	-	-	-	-	-	-		-	-	-	(-) 3	(-) 1	-	-	-	
-	-	-	-	(-) 6	(-) 6	(-) 13	-		-	-	-	-	-	-	(-) 2	-		-	-	-	-	-	(-) 2	(-) 2	-	
-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	(-) 3	(-) 10	(-) 14	(-) 24	(-) 83	-		-	-	-	(-) 1	-	(-) 3	(-) 10	-		-	-	-	(-) 4	(-) 2	(-) 2	(-) 4	-	
8	1	52	125	193	221	2715	7		1	-	6	13	22	30	583	1		1	-	4	16	31	27	226	3	
8	**1**	**65**	**154**	**255**	**312**	**2,926**	**8**	**91.73**	**1**	**-**	**8**	**14**	**26**	**49**	**614**	**1**	**94.11**	**1**	**-**	**5**	**17**	**36**	**35**	**247**	**4**	**91.59**
-	-	2	4	3	4	-	-		-	-	-	1	1	3	-	-		-	-	-	2	1	4	-	-	
-	-	-	1	2	1	3	-		-	-	-	-	-	-	-	-		-	-	-	-	1	-	2	-	
-	-	2	9	9	15	-	-		-	-	-	-	-	1	-	-		-	-	-	-	-	2	-	-	
-	-	-	6	12	3	13	-		-	-	-	-	3	-	-	-		-	-	-	-	-	1	1	-	
-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
1	-	2	10	18	25	381	2		-	-	1	2	-	2	57	-		-	-	-	1	2	2	5	-	
1	-	6	30	44	48	397	2		-	-	1	3	4	6	57	-		-	-	-	3	4	9	8	-	
-	-	(-) 2	(-) 1	(-) 2	(-) 2	-	-		-	-	-	-	-	-	-	-		-	-	-	(-) 1	-	(-) 2	-	-	
-	-	-	(-) 2	(-) 4	(-) 2	(-) 5	-		-	-	-	-	(-) 1	(-) 1	(-) 3	-		-	-	-	-	(-) 2	-	(-) 5	-	
-	-	(-) 7	(-) 11	(-) 6	(-) 10	-	-		-	-	-	(-) 3	-	-	-	-		-	-	-	-	(-) 1	(-) 1	-	-	
-	-	-	(-) 2	(-) 4	(-) 9	(-) 20	-		-	-	-	-	-	-	(-) 1	-		-	-	-	-	-	-	(-) 2	-	
-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	(-) 9	(-) 16	(-) 16	(-) 23	(-) 25	-		-	-	-	(-) 3	(-) 1	(-) 1	(-) 4	-		-	-	-	(-) 1	(-) 3	(-) 3	(-) 7	-	
8	1	56	138	239	289	2,901	8		1	-	8	11	25	48	610	1		1	-	5	16	33	32	240	4	
9	**1**	**62**	**168**	**283**	**337**	**3,298**	**10**	**91.71**	**1**	**-**	**9**	**14**	**29**	**54**	**667**	**1**	**94.02**	**1**	**-**	**5**	**19**	**37**	**41**	**248**	**4**	**91.56**

Attachment 2A - Threatened Species Accounts and Red List Index (RLI) values calculated for South America - 2010/2018

Group	Accounts	Total								
		EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
	Opening stock (2010)	**-**	**-**	**9**	**1**	**1**	**10**	**-**	**1**	..
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	-	-	-	-	-	-	
	categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Reassessments coming from lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Species assessed for the first time during the period	-	-	-	-	-	-	-	-	
	Total additions	-	-	-	-	-	-	-	-	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	-	-	-	-	-	
	Reassessments going to lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments going to higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Total reductions	-	-	-	-	-	-	-	-	
	Species that were reassessed in the period and remained in the same category	-	-	9	1	1	10	-	1	
Flora - Cycads	**Opening/closing stock (2014)**	**-**	**-**	**9**	**1**	**1**	**10**	**-**	**1**	..
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	-	-	-	-	-	-	
	categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Reassessments coming from lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Species assessed for the first time during the period	-	-	-	-	-	-	-	-	
	Total additions	-	-	-	-	-	-	-	-	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	-	-	-	-	-	
	Reassessments going to lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments going to higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Total reductions	-	-	-	-	-	-	-	-	
	Species that were reassessed in the period and remained in the same category	-	-	-	-	-	-	-	-	
	Closing stock (2018)	**-**	**-**	**9**	**1**	**1**	**10**	**-**	**1**	..

(continuation)

Terrestrial Species									Freshwater species									Marine species								
EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
-	**-**	**9**	**1**	**1**	**10**	**-**	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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-	**-**	**9**	**1**	**1**	**10**	**-**	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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-	**-**	**9**	**1**	**1**	**10**	**-**	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Attachment 2A - Threatened Species Accounts and Red List Index (RLI) values calculated for South America - 2010/2018

Group	Accounts	Total								
		EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
Mammals	**Opening stock (2010)**	**9**	**-**	**38**	**82**	**118**	**78**	**805**	**235**	**81.35**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	-	-	1	-	-	-	
	categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Reassessments coming from lower risk categories	-	-	1	-	-	1	-	-	
	Reassessments coming from higher risk categories	-	-	-	-	1	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	2	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	1	
	Species assessed for the first time during the period	1	-	1	-	-	1	5	3	
	Total additions	1	-	4	-	2	2	5	4	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	-	-	(-) 1	-	-	
	Reassessments going to lower risk categories	-	-	-	(-) 1	-	-	-	-	
	Reassessments going to higher risk categories	-	-	-	(-) 1	-	-	(-) 1	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	(-) 1	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	(-) 2	
	Total reductions	-	-	-	(-) 2	(-) 1	(-) 1	(-) 1	(-) 2	
	Species that were reassessed in the period and remained in the same category	1	-	6	5	10	12	58	22	
	Opening/closing stock (2014)	**10**	**-**	**42**	**80**	**119**	**79**	**809**	**237**	**81.34**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	-	1	1	2	-	-	
	categories (improvement in the conservation status)	-	-	-	-	1	-	1	-	
	Reassessments coming from lower risk categories	-	-	1	7	4	1	-	-	
	Reassessments coming from higher risk categories	-	-	-	4	8	8	15	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	4	3	5	21	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	4	
	Species assessed for the first time during the period	1	-	-	3	9	4	82	55	
	Total additions	1	-	1	19	26	20	119	59	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	-	(-) 1	-	(-) 1	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	-	(-) 1	-	(-) 3	-	
	Reassessments going to lower risk categories	-	-	(-) 5	(-) 8	(-) 13	(-) 9	-	-	
	Reassessments going to higher risk categories	-	-	-	(-) 1	(-) 5	(-) 3	(-) 4	-	
	Reassessments coming from other categories and going to the DD category	(-) 1	-	-	-	(-) 1	(-) 1	(-) 1	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	(-) 33	
	Total reductions	(-) 1	-	(-) 5	(-) 10	(-) 20	(-) 14	(-) 8	(-) 33	
	Species that were reassessed in the period and remained in the same category	3	-	23	39	57	40	730	103	
	Closing stock (2018)	**10**	**-**	**38**	**89**	**125**	**85**	**920**	**263**	**81.37**

(continuation)

Terrestrial Species										Freshwater species									Marine species								
EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
9	**-**	**37**	**78**	**114**	**77**	**789**	**197**	**87.99**	**-**	**-**	**-**	**6**	**8**	**2**	**21**	**11**	**78.31**	**-**	**-**	**1**	**8**	**3**	**3**	**26**	**36**	**77.74**
-	-	-	-	1	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
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-	-	-	(-) 2	(-) 1	(-) 1	(-) 1	(-) 2		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
1	-	5	3	9	11	51	9		-	-	-	-	1	1	1	3		-	-	1	2	1	1	9	11	
10	**-**	**41**	**76**	**115**	**78**	**793**	**199**	**87.97**	**-**	**-**	**-**	**6**	**8**	**2**	**21**	**11**	**78.31**	**-**	**-**	**1**	**8**	**3**	**3**	**26**	**36**	**77.74**
-	-	-	1	1	2	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	-	-	-	-	1	-		-	-	-	-	-	-	-	-		-	-	-	-	1	-	1	-	
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-	-	-	4	8	8	15	-		-	-	-	-	1	-	-	-		-	-	-	-	-	-	1	-	
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1	-	1	18	25	16	108	58		-	-	-	2	1	2	-	-		-	-	-	-	1	4	13	1	
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-	-	(-) 5	(-) 8	(-) 13	(-) 9	-	-		-	-	-	(-) 1	-	-	-	-		-	-	-	-	-	(-) 1	-	-	
-	-	-	(-) 1	(-) 5	(-) 3	(-) 4	-		-	-	-	-	(-) 1	-	-	-		-	-	-	-	-	-	-	-	
(-) 1	-	-	-	(-) 1	(-) 1	(-) 1	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
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(-) 1	-	(-) 5	(-) 9	(-) 20	(-) 14	(-) 8	(-) 17		-	-	-	(-) 1	(-) 1	-	-	(-) 3		-	-	-	(-) 1	-	(-) 2	-	(-) 15	
3	-	22	36	55	39	721	100		-	-	-	5	4	1	21	1		-	-	1	7	1	1	19	3	
10	**-**	**37**	**85**	**120**	**80**	**893**	**240**	**87.88**	**-**	**-**	**-**	**7**	**8**	**4**	**21**	**8**	**78.31**	**-**	**-**	**1**	**7**	**4**	**5**	**39**	**22**	**77.91**

Attachment 2A - Threatened Species Accounts and Red List Index (RLI) values calculated for South America - 2010/2018

Group	Accounts	Total								
		EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
Coral reefs	**Opening stock (2010)**	**-**	**-**	**4**	**3**	**11**	**5**	**70**	**21**	**86.75**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	-	-	-	-	-	-	
	categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Reassessments coming from lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Species assessed for the first time during the period	-	-	-	-	-	-	-	-	
	Total additions	-	-	-	-	-	-	-	-	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	-	-	-	-	-	
	Reassessments going to lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments going to higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Total reductions	-	-	-	-	-	-	-	-	
	Species that were reassessed in the period and remained in the same category	-	-	-	-	2	3	21	1	
	Opening/closing stock (2014)	**-**	**-**	**4**	**3**	**11**	**5**	**70**	**21**	**86.75**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	-	-	-	-	-	-	
	categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Reassessments coming from lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Species assessed for the first time during the period	-	-	-	-	-	-	-	-	
	Total additions	-	-	-	-	-	-	-	-	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	-	-	-	-	-	
	Reassessments going to lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments going to higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Total reductions	-	-	-	-	-	-	-	-	
	Species that were reassessed in the period and remained in the same category	-	-	-	-	2	3	21	1	
	Closing stock (2018)	**-**	**-**	**4**	**3**	**11**	**5**	**70**	**21**	**86.75**

Source: INTERNATIONAL UNION FOR CONSERVATION OF NATURE. *The IUCN red list of threatened species* . Version 2018.2. Gland: IUCN, 2018.

Note: EX = Extinct; EW = Extinct in the Wild; CR = Critically Endangered; EN = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern; DD = Data Deficient; and RLI = Red List Index.

(conclusion)

Terrestrial Species									Freshwater species									Marine species								
EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	**-**	**-**	**4**	**3**	**11**	**5**	**70**	**21**	**86.75**
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Attachment 2B - Threatened Species Accounts and Red List Index (RLI) values calculated for Brazil - 2010/2018

Group	Accounts	Total								
		EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
	Opening stock (2010)	**3**	**1**	**33**	**72**	**117**	**152**	**2,206**	**347**	**91.50**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	3	3	21	27	-	-	
	categories (improvement in the conservation status)	-	-	-	-	1	-	-	-	
	Reassessments coming from lower risk categories	-	-	-	-	-	4	-	-	
	Reassessments coming from higher risk categories	-	-	-	1	2	3	8	-	
	Reassessments coming from the DD category and going to other categories	-	-	1	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Species assessed for the first time during the period	-	-	3	9	11	15	87	7	
	Total additions	-	-	7	13	35	49	95	7	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	-	(-) 1	-	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	(-) 1	(-) 1	(-) 7	(-) 45	-	
	Reassessments going to lower risk categories	-	-	(-) 1	(-) 3	(-) 2	(-) 8	-	-	
	Reassessments going to higher risk categories	-	-	-	-	-	-	(-) 4	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	(-) 1	
	Total reductions	-	-	(-) 1	(-) 5	(-) 3	(-) 15	(-) 49	(-) 1	
	Species that were reassessed in the period and remained in the same category	-	1	18	34	72	98	1,462	28	
Total	**Opening/closing stock (2014)**	**3**	**1**	**39**	**80**	**149**	**186**	**2,252**	**353**	**91.32**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	1	1	3	3	-	-	
	categories (improvement in the conservation status)	-	-	-	-	1	1	-	-	
	Reassessments coming from lower risk categories	-	-	1	8	4	3	-	-	
	Reassessments coming from higher risk categories	-	-	-	4	6	3	9	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	2	1	5	17	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	2	
	Species assessed for the first time during the period	1	-	2	3	5	5	189	22	
	Total additions	1	-	4	18	20	20	217	24	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	-	(-) 1	(-) 1	-	2	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	(-) 1	(-) 1	(-) 2	(-) 4	-	
	Reassessments going to lower risk categories	-	-	(-) 4	(-) 7	(-) 6	(-) 5	-	-	
	Reassessments going to higher risk categories	-	-	-	(-) 1	(-) 2	(-) 8	(-) 5	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	(-) 1	-	(-) 1	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	(-) 25	
	Total reductions	-	-	(-) 4	(-) 10	(-) 11	(-) 15	(-) 10	(-) 25	
	Species that were reassessed in the period and remained in the same category	-	1	24	50	103	135	1,761	53	
	Closing stock (2018)	**4**	**1**	**39**	**88**	**158**	**191**	**2,459**	**352**	**91.29**

(continued)

Terrestrial Species									Freshwater species									Marine species								
EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
3	**1**	**32**	**69**	**113**	**149**	**2,182**	**305**	**92.09**	**1**	**-**	**4**	**8**	**26**	**31**	**752**	**177**	**91.1**	**-**	**-**	**1**	**8**	**14**	**10**	**158**	**36**	**88.83**
-	-	3	3	21	27	-	-		-	-	2	-	3	4	-	-		-	-	-	1	-	1	-	-	
-	-	-	-	1	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	-	-	-	4	-	-		-	-	-	-	-	1	-	-		-	-	-	-	-	-	-	-	
-	-	-	1	2	3	8	-		-	-	-	-	-	-	-	-		-	-	-	-	-	2	-	-	
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-	-	3	9	11	15	87	7		-	-	1	1	-	4	19	5		-	-	-	-	1	-	10	-	
-	-	7	13	35	49	95	7		-	-	3	1	3	9	19	5		-	-	-	1	1	3	10	-	
-	-	-	(-) 1	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	-	(-) 1	(-) 1	(-) 7	(-) 45	-		-	-	-	-	-	(-) 4	(-) 5	-		-	-	-	-	(-) 1	-	(-) 1	-	
-	-	(-) 1	(-) 3	(-) 2	(-) 8	-	-		-	-	-	-	-	-	-	-		-	-	-	(-) 1	(-) 1	-	-	-	
-	-	-	-	-	-	(-) 4	-		-	-	-	-	-	-	(-) 1	-		-	-	-	-	-	-	-	-	
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-	-	(-) 1	(-) 5	(-) 3	(-) 15	(-) 49	(-) 1		-	-	-	-	-	(-) 4	(-) 6	-		-	-	-	(-) 1	(-) 2	-	(-) 1	-	
-	1	17	33	71	96	1,452	15		-	-	2	4	15	12	475	16		-	-	1	5	10	9	138	12	
3	**1**	**38**	**77**	**145**	**183**	**2,228**	**311**	**91.64**	**1**	**-**	**7**	**9**	**29**	**36**	**765**	**182**	**90.87**	**-**	**-**	**1**	**8**	**13**	**13**	**167**	**36**	**88.82**
-	-	1	1	3	3	-	-		-	-	-	1	1	2	-	-		-	-	-	-	-	2	-	-	
-	-	-	-	-	1	-	-		-	-	-	-	-	-	-	-		-	-	-	-	1	-	-	-	
-	-	1	8	4	3	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	-	4	6	3	9	-		-	-	-	-	1	-	-	-		-	-	-	-	-	-	1	-	
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-	-	(-) 4	(-) 7	(-) 6	(-) 5	-	-		-	-	-	(-) 1	-	-	-	-		-	-	-	-	-	(-) 1	-	-	
-	-	-	(-) 1	(-) 2	(-) 8	(-) 5	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
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-	-	(-) 4	(-) 9	(-) 11	(-) 15	(-) 10	(-) 10		-	-	-	(-) 1	(-) 1	(-) 1	(-) 2	(-) 3		-	-	-	(-) 1	-	(-) 1	(-) 2	(-) 14	
-	1	23	48	101	133	1,753	50		-	-	3	5	16	19	407	7		-	-	1	7	11	11	151	3	
4	**1**	**38**	**85**	**153**	**184**	**2,425**	**325**	**91.59**	**1**	**-**	**8**	**10**	**30**	**40**	**792**	**179**	**90.8**	**-**	**-**	**1**	**7**	**15**	**18**	**176**	**22**	**88.81**

Attachment 2B - Threatened Species Accounts and Red List Index (RLI) values calculated for Brazil - 2010/2018

Group	Accounts	Total								
		EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
	Opening stock (2010)	**1**	**-**	**5**	**5**	**15**	**21**	**451**	**234**	**95.97**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	1	-	-	-	-	-	
	categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Reassessments coming from lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Species assessed for the first time during the period	-	-	1	1	-	2	8	6	
	Total additions	-	-	2	1	-	2	8	6	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	-	-	(-) 1	-	-	
	Reassessments going to lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments going to higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Total reductions	-	-	-	-	-	(-) 1	-	-	
	Species that were reassessed in the period and remained in the same category	-	-	1	-	4	-	127	15	
Amphibians	**Opening/closing stock (2014)**	**1**	**-**	**7**	**6**	**15**	**22**	**459**	**240**	**95.89**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	-	-	-	-	-	-	
	categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Reassessments coming from lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Species assessed for the first time during the period	-	-	-	-	-	-	-	-	
	Total additions	-	-	-	-	-	-	2	-	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	-	-	-	-	2	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	-	-	-	-	-	
	Reassessments going to lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments going to higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Total reductions	-	-	-	-	-	-	-	-	
	Species that were reassessed in the period and remained in the same category	-	-	1	1	-	1	20	7	
	Closing stock (2018)	**1**	**-**	**7**	**6**	**15**	**22**	**461**	**240**	**95.89**

(continuation)

Terrestrial Species									Freshwater species									Marine species								
EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
1	**-**	**5**	**5**	**15**	**21**	**450**	**230**	**95.62**	**1**	**-**	**3**	**3**	**10**	**16**	**366**	**172**	**96.32**	..	..	..	..	..	..	..	..	..
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1	**-**	**7**	**6**	**15**	**22**	**458**	**236**	**95.47**	**1**	**-**	**5**	**3**	**10**	**17**	**374**	**177**	**96.32**	..	..	..	..	..	..	..	..	..
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1	**-**	**7**	**6**	**15**	**22**	**460**	**236**	**95.47**	**1**	**-**	**5**	**3**	**10**	**17**	**376**	**177**	**96.32**	..	..	..	..	..	..	..	..	..

Attachment 2B - Threatened Species Accounts and Red List Index (RLI) values calculated for Brazil - 2010/2018

Group	Accounts	Total								
		EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
	Opening stock (2010)	**-**	**1**	**18**	**36**	**67**	**101**	**1,342**	**-**	**95.16**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	2	3	20	27	-	-	
	categories (improvement in the conservation status)	-	-	-	-	1	-	-	-	
	Reassessments coming from lower risk categories	-	-	-	-	-	4	-	-	
	Reassessments coming from higher risk categories	-	-	-	1	1	3	8	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Species assessed for the first time during the period	-	-	2	8	11	13	79	-	
	Total additions	-	-	4	12	33	47	87	-	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	-	(-) 1	-	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	(-) 1	(-) 1	(-) 5	(-) 45	-	
	Reassessments going to lower risk categories	-	-	(-) 1	(-) 2	(-) 2	(-) 8	-	-	
	Reassessments going to higher risk categories	-	-	-	-	-	-	(-) 4	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Total reductions	-	-	(-) 1	(-) 4	(-) 3	(-) 13	(-) 49	-	
	Species that were reassessed in the period and remained in the same category	-	1	17	32	64	88	1,293	-	
Birds	**Opening/closing stock (2014)**	**-**	**1**	**21**	**44**	**97**	**135**	**1,380**	**-**	**94.52**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	1	1	2	2	-	-	
	categories (improvement in the conservation status)	-	-	-	-	-	1	-	-	
	Reassessments coming from lower risk categories	-	-	1	7	4	2	-	-	
	Reassessments coming from higher risk categories	-	-	-	4	5	1	5	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Species assessed for the first time during the period	-	-	2	2	3	5	150	1	
	Total additions	-	-	4	14	14	11	155	1	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	-	-	(-) 1	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	(-) 1	(-) 1	(-) 2	(-) 2	-	
	Reassessments going to lower risk categories	-	-	(-) 4	(-) 5	(-) 2	(-) 4	-	-	
	Reassessments going to higher risk categories	-	-	-	(-) 1	(-) 2	(-) 7	(-) 4	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Total reductions	-	-	(-) 4	(-) 7	(-) 6	(-) 13	(-) 6	-	
	Species that were reassessed in the period and remained in the same category	-	1	17	37	91	122	1,374	-	
	Closing stock (2018)	**-**	**1**	**21**	**51**	**105**	**133**	**1,529**	**1**	**94.42**

(continuation)

Terrestrial Species									Freshwater species									Marine species								
EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
-	**1**	**17**	**36**	**67**	**99**	**1,340**	**-**	**92.07**	**-**	**-**	**1**	**4**	**12**	**15**	**376**	**-**	**95.33**	**-**	**-**	**1**	**5**	**11**	**9**	**131**	**-**	**98.07**
-	-	2	3	20	27	-	-		-	-	1	-	3	4	-	-		-	-	-	1	-	1	-	-	
-	-	-	-	1	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	-	-	-	4	-	-		-	-	-	-	-	1	-	-		-	-	-	-	-	-	-	-	
-	-	-	1	1	3	8	-		-	-	-	-	-	-	-	-		-	-	-	-	-	2	-	-	
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-	-	2	8	11	13	79	-		-	-	-	1	-	2	11	-		-	-	-	-	1	-	10	-	
-	-	4	12	33	47	87	-		-	-	1	1	3	7	11	-		-	-	-	1	1	3	10	-	
-	-	-	(-) 1	-	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	-	(-) 1	(-) 1	(-) 5	(-) 45	-		-	-	-	-	-	(-) 3	(-) 5	-		-	-	-	-	(-) 1	-	(-) 1	-	
-	-	(-) 1	(-) 2	(-) 2	(-) 8	-	-		-	-	-	-	-	-	-	-		-	-	-	(-) 1	(-) 1	-	-	-	
-	-	-	-	-	-	(-) 4	-		-	-	-	-	-	-	(-) 1	-		-	-	-	-	-	-	-	-	
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-	-	(-) 1	(-) 4	(-) 3	(-) 13	(-) 49	-		-	-	-	-	-	(-) 3	(-) 6	-		-	-	-	(-) 1	(-) 2	-	(-) 1	-	
-	1	16	32	64	86	1,291	-		-	-	1	4	12	12	370	-		-	-	1	4	9	9	130	-	
-	**1**	**20**	**44**	**97**	**133**	**1,378**	**-**	**90.91**	**-**	**-**	**2**	**5**	**15**	**19**	**381**	**-**	**94.62**	**-**	**-**	**1**	**5**	**10**	**12**	**140**	**-**	**98.04**
-	-	1	1	2	2	-	-		-	-	-	1	1	2	-	-		-	-	-	-	-	2	-	-	
-	-	-	-	-	1	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	1	7	4	2	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	-	4	5	1	5	-		-	-	-	-	1	-	-	-		-	-	-	-	-	-	1	-	
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-	-	2	2	3	5	150	1		-	-	1	-	-	1	27	-		-	-	-	-	1	-	-	-	
-	-	4	14	14	11	155	1		-	-	1	1	2	3	27	-		-	-	-	-	1	2	1	-	
-	-	-	-	(-) 1	-	-	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
-	-	-	(-) 1	(-) 1	(-) 2	(-) 2	-		-	-	-	-	(-) 1	(-) 1	(-) 2	-		-	-	-	-	-	-	(-) 2	-	
-	-	(-) 4	(-) 5	(-) 2	(-) 4	-	-		-	-	-	(-) 1	-	-	-	-		-	-	-	-	-	(-) 1	-	-	
-	-	-	(-) 1	(-) 2	(-) 7	(-) 4	-		-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	
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-	-	(-) 4	(-) 7	(-) 6	(-) 13	(-) 6	-		-	-	-	(-) 1	(-) 1	(-) 1	(-) 2	-		-	-	-	-	-	(-) 1	(-) 2	-	
-	1	16	37	91	120	1,372	-		-	-	2	4	14	18	379	-		-	-	1	5	10	11	138	-	
-	**1**	**20**	**51**	**105**	**131**	**1,527**	**1**	**90.88**	**-**	**-**	**3**	**5**	**16**	**21**	**406**	**-**	**94.42**	**-**	**-**	**1**	**5**	**11**	**13**	**139**	**-**	**97.98**

Attachment 2B - Threatened Species Accounts and Red List Index (RLI) values calculated for Brazil - 2010/2018

Group	Accounts	Total								
		EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
	Opening stock (2010)	**-**	**-**	**-**	**-**	**-**	**5**	**-**	**-**	..
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	-	-	-	-	-	-	
	categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Reassessments coming from lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Species assessed for the first time during the period	-	-	-	-	-	-	-	-	
	Total additions	-	-	-	-	-	-	-	-	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	-	-	-	-	-	
	Reassessments going to lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments going to higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Total reductions	-	-	-	-	-	-	-	-	
	Species that were reassessed in the period and remained in the same category	-	-	-	-	-	5	-	-	
Flora - Cycads	**Opening/closing stock (2014)**	**-**	**-**	**-**	**-**	**-**	**5**	**-**	**-**	..
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	-	-	-	-	-	-	
	categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Reassessments coming from lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Species assessed for the first time during the period	-	-	-	-	-	-	-	-	
	Total additions	-	-	-	-	-	-	-	-	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	-	-	-	-	-	
	Reassessments going to lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments going to higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Total reductions	-	-	-	-	-	-	-	-	
	Species that were reassessed in the period and remained in the same category	-	-	-	-	-	-	-	-	
	Closing stock (2018)	**-**	**-**	**-**	**-**	**-**	**5**	**-**	**-**	..

(continuation)

Terrestrial Species									Freshwater species									Marine species								
EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
-	**-**	**-**	**-**	**-**	**5**	**-**	**-**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**
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Attachment 2B - Threatened Species Accounts and Red List Index (RLI) values calculated for Brazil - 2010/2018

Group	Accounts	Total								
		EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
	Opening stock (2010)	**2**	**-**	**10**	**31**	**35**	**24**	**406**	**103**	**81.89**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	-	-	1	-	-	-	
	categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Reassessments coming from lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from higher risk categories	-	-	-	-	1	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	1	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Species assessed for the first time during the period	-	-	-	-	-	-	-	1	
	Total additions	-	-	1	-	2	-	-	1	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	-	-	(-) 1	-	-	
	Reassessments going to lower risk categories	-	-	-	(-) 1	-	-	-	-	
	Reassessments going to higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	(-) 1	
	Total reductions	-	-	-	(-) 1	-	(-) 1	-	(-) 1	
	Species that were reassessed in the period and remained in the same category	-	-	-	2	4	5	42	13	
Mammals	**Opening/closing stock (2014)**	**2**	**-**	**11**	**30**	**37**	**23**	**406**	**103**	**81.88**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	-	-	1	1	-	-	
	categories (improvement in the conservation status)	-	-	-	-	1	-	-	-	
	Reassessments coming from lower risk categories	-	-	-	1	-	1	-	-	
	Reassessments coming from higher risk categories	-	-	-	-	1	2	4	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	2	1	5	17	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	2	
	Species assessed for the first time during the period	1	-	-	1	2	-	39	21	
	Total additions	1	-	-	4	6	9	60	23	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	-	(-) 1	-	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	-	-	-	(-) 2	-	
	Reassessments going to lower risk categories	-	-	-	(-) 2	(-) 4	(-) 1	-	-	
	Reassessments going to higher risk categories	-	-	-	-	-	(-) 1	(-) 1	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	(-) 1	-	(-) 1	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	(-) 25	
	Total reductions	-	-	-	(-) 3	(-) 5	(-) 2	(-) 4	(-) 25	
	Species that were reassessed in the period and remained in the same category	-	-	6	12	12	12	367	45	
	Closing stock (2018)	**3**	**-**	**11**	**31**	**38**	**30**	**462**	**101**	**81.85**

(continuation)

Terrestrial Species									Freshwater species									Marine species								
EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
2	**-**	**10**	**28**	**31**	**24**	**392**	**75**	**88.57**	**-**	**-**	**-**	**1**	**4**	**-**	**10**	**5**	**81.66**	**-**	**-**	**-**	**3**	**3**	**-**	**20**	**26**	**75.43**
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2	**-**	**11**	**27**	**33**	**23**	**392**	**75**	**88.53**	**-**	**-**	**-**	**1**	**4**	**-**	**10**	**5**	**81.66**	**-**	**-**	**-**	**3**	**3**	**-**	**20**	**26**	**75.44**
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3	**-**	**11**	**28**	**33**	**26**	**438**	**88**	**88.41**	**-**	**-**	**-**	**2**	**4**	**2**	**10**	**2**	**81.66**	**-**	**-**	**-**	**2**	**4**	**4**	**30**	**12**	**75.48**

Attachment 2B - Threatened Species Accounts and Red List Index (RLI) values calculated for Brazil - 2010/2018

Group	Accounts	Total								
		EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
Coral reefs	**Opening stock (2010)**	**-**	**-**	**-**	**-**	**-**	**1**	**7**	**10**	**92.98**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	-	-	-	-	-	-	
	categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Reassessments coming from lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Species assessed for the first time during the period	-	-	-	-	-	-	-	-	
	Total additions	-	-	-	-	-	-	-	-	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	-	-	-	-	-	
	Reassessments going to lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments going to higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Total reductions	-	-	-	-	-	-	-	-	
	Species that were reassessed in the period and remained in the same category	-	-	-	-	-	-	-	-	
	Opening/closing stock (2014)	**-**	**-**	**-**	**-**	**-**	**1**	**7**	**10**	**92.98**
	Genuine additions coming from lower risk categories (worsening in the conservation status)	-	-	-	-	-	-	-	-	
	categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Reassessments coming from lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Species assessed for the first time during the period	-	-	-	-	-	-	-	-	
	Total additions	-	-	-	-	-	-	-	-	
	Genuine reductions going to lower risk categories (improvement in the conservation status)	-	-	-	-	-	-	-	-	
	Genuine risks going to higher risk categories (worsening)	-	-	-	-	-	-	-	-	
	Reassessments going to lower risk categories	-	-	-	-	-	-	-	-	
	Reassessments going to higher risk categories	-	-	-	-	-	-	-	-	
	Reassessments coming from other categories and going to the DD category	-	-	-	-	-	-	-	-	
	Reassessments coming from the DD category and going to other categories	-	-	-	-	-	-	-	-	
	Total reductions	-	-	-	-	-	-	-	-	
	Species that were reassessed in the period and remained in the same category	-	-	-	-	-	-	-	1	
	Closing stock (2018)	**-**	**-**	**-**	**-**	**-**	**1**	**7**	**10**	**92.98**

Source: INTERNATIONAL UNION FOR CONSERVATION OF NATURE. *The IUCN red list of threatened species* . Version 2018.2. Gland: IUCN, 2018.

Note: EX = Extinct; EW = Extinct in the Wild; CR = Critically Endangered; EN = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern; DD = Data Deficient; and RLI = Red List Index.

(conclusion)

Terrestrial Species									Freshwater species									Marine species								
EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)	EX	EW	CR	EN	VU	NT	LC	DD	RLI (%)
..	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**..**	**-**	**-**	**-**	**-**	**-**	**1**	**7**	**10**	**92.98**
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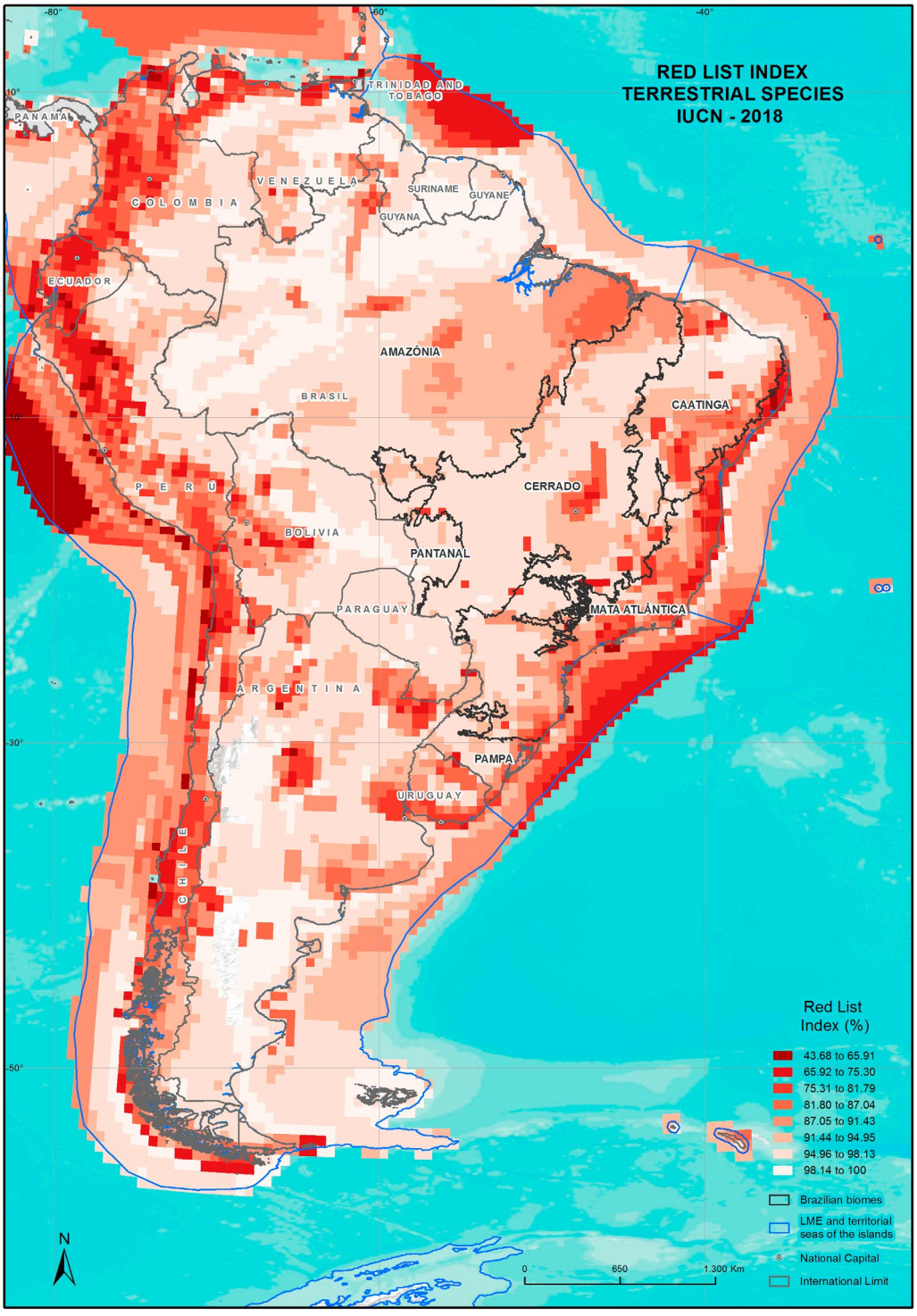
Attachment 3 - Maps of threatened species in South America, according to the Red List Index (RLI), by realm - 2018

A - Terrestrial realm



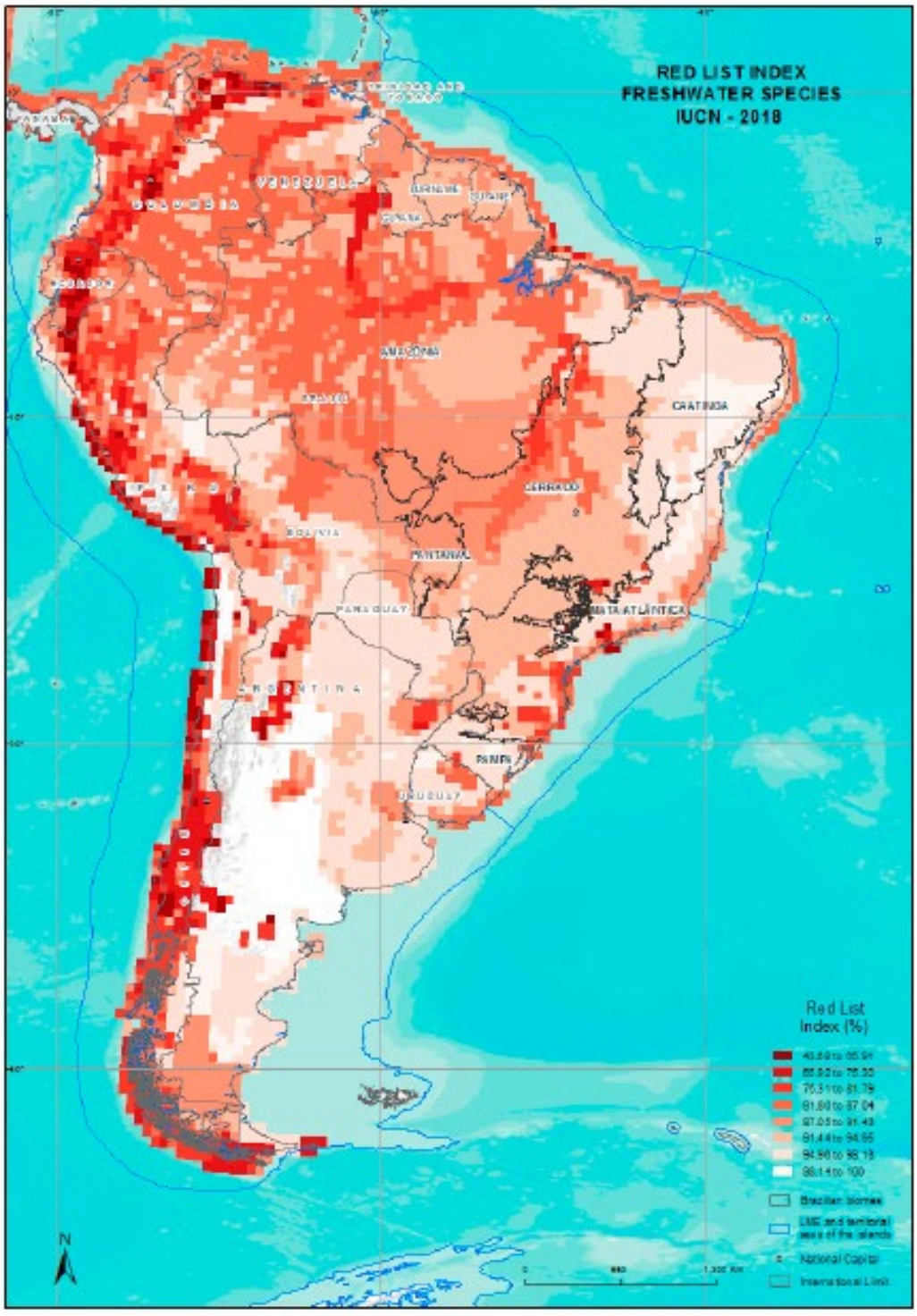
Sources: 1. INTERNATIONAL UNION FOR CONSERVATION OF NATURE. The IUCN red list of threatened species. Version 2019.3. Gland: IUCN, 2019. 2. BIRDLIFE INTERNATIONAL. 2. Bird species distribution maps of the world. Version 2019.1. In: BIRDLIFE INTERNATIONAL. Data Zone. Cambridge [United Kingdom], 2020. Available at: http://datazone.birdlife.org/species/ requestdis. Accessed: August 2020

Notes: 1. The groups represented are amphibians, birds, reef-forming corals and mammals.

2. RLI values can be interpreted as a proportion between the number of species in each extinction risk category (with higher weights for those of higher risk) and an ideal scenario where all species evaluated are in the Least Concern (LC) category. In this interpretation, the values vary from 0% to 100%: the value 100 corresponds to all species categorized as Least Concern, and the value 0, to the extinction of all species.

3. Data organized by 50 km x 50 km cells.

Attachment 3 - Maps of threatened species in South America, according to the Red List Index (RLI), by realm - 2018
B - Freshwater realm



Sources: 1. INTERNATIONAL UNION FOR CONSERVATION OF NATURE. The IUCN red list of threatened species. Version 2019.3. Gland: IUCN, 2019. 2. BIRDLIFE INTERNATIONAL. 2. Bird species distribution maps of the world. Version 2019.1. In: BIRDLIFE INTERNATIONAL. Data Zone. Cambridge [United Kingdom], 2020. Available at: http://datazone.birdlife.org/species/ requestdis. Accessed: August 2020

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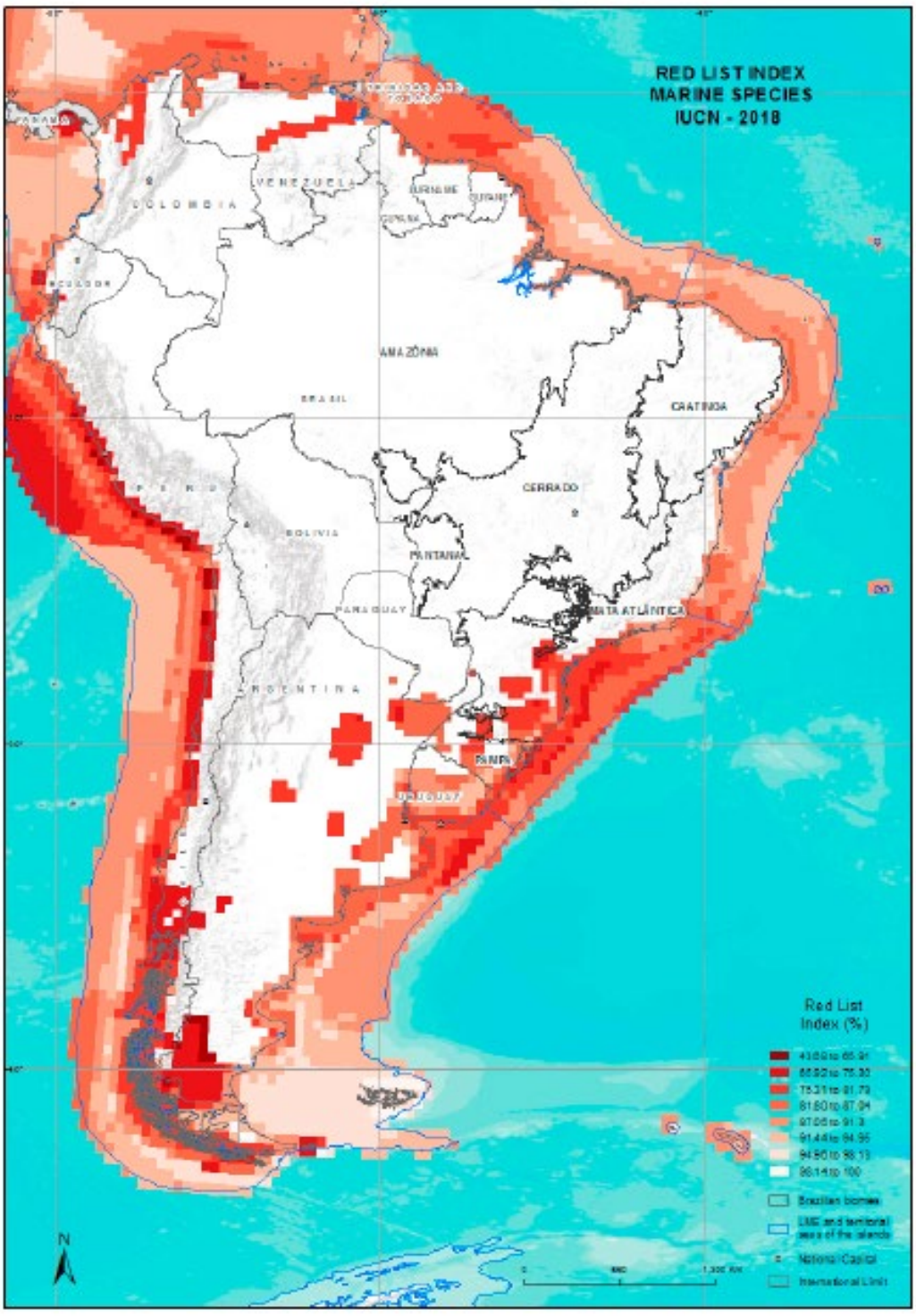
3. Data organized by 50 km x 50 km cells.

Attachment 3 - Maps of threatened species in South America, according to the Red List Index (RLI), by realm - 2018

C - Marine realm



Sources: 1. INTERNATIONAL UNION FOR CONSERVATION OF NATURE. The IUCN red list of threatened species. Version 2019.3. Gland: IUCN, 2019. 2. BIRDLIFE INTERNATIONAL. 2. Bird species distribution maps of the world. Version 2019.1. In: BIRDLIFE INTERNATIONAL. Data Zone. Cambridge [United Kingdom], 2020. Available at: http://datazone.birdlife.org/species/ requestdis. Accessed: August 2020

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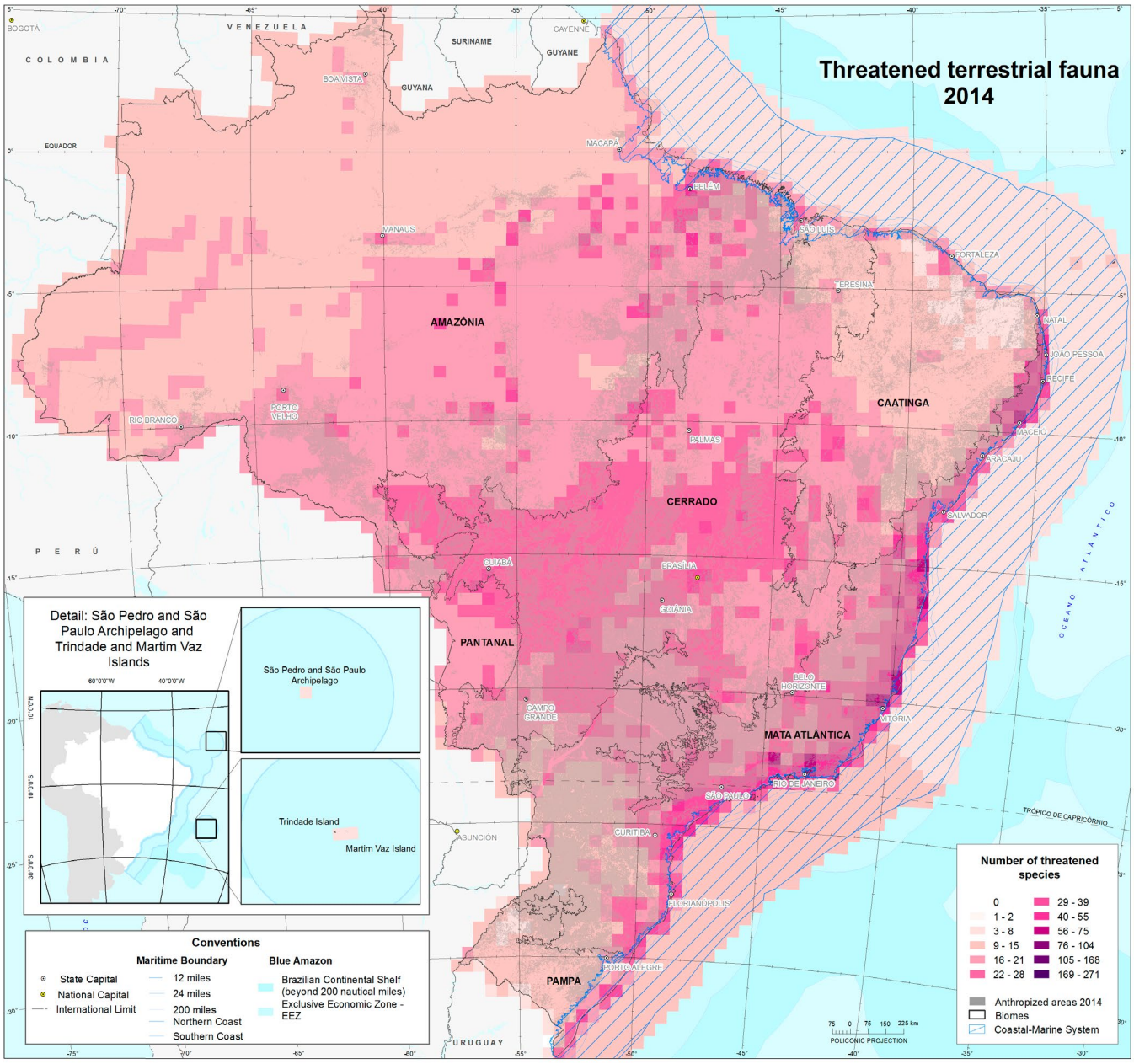
3. Data organized by 50 km x 50 km cells.

Attachment 4 - Maps of threatened fauna and flora species in Brazil, according to the *Livro Vermelho da Fauna Brasileira Ameaçada de Extinção* (Red Book of Brazilian Fauna Threatened with Extinction) and the *Livro Vermelho da Flora do Brasil* (Red Book of Brazilian Flora), by realm - 2014

A - Terrestrial fauna

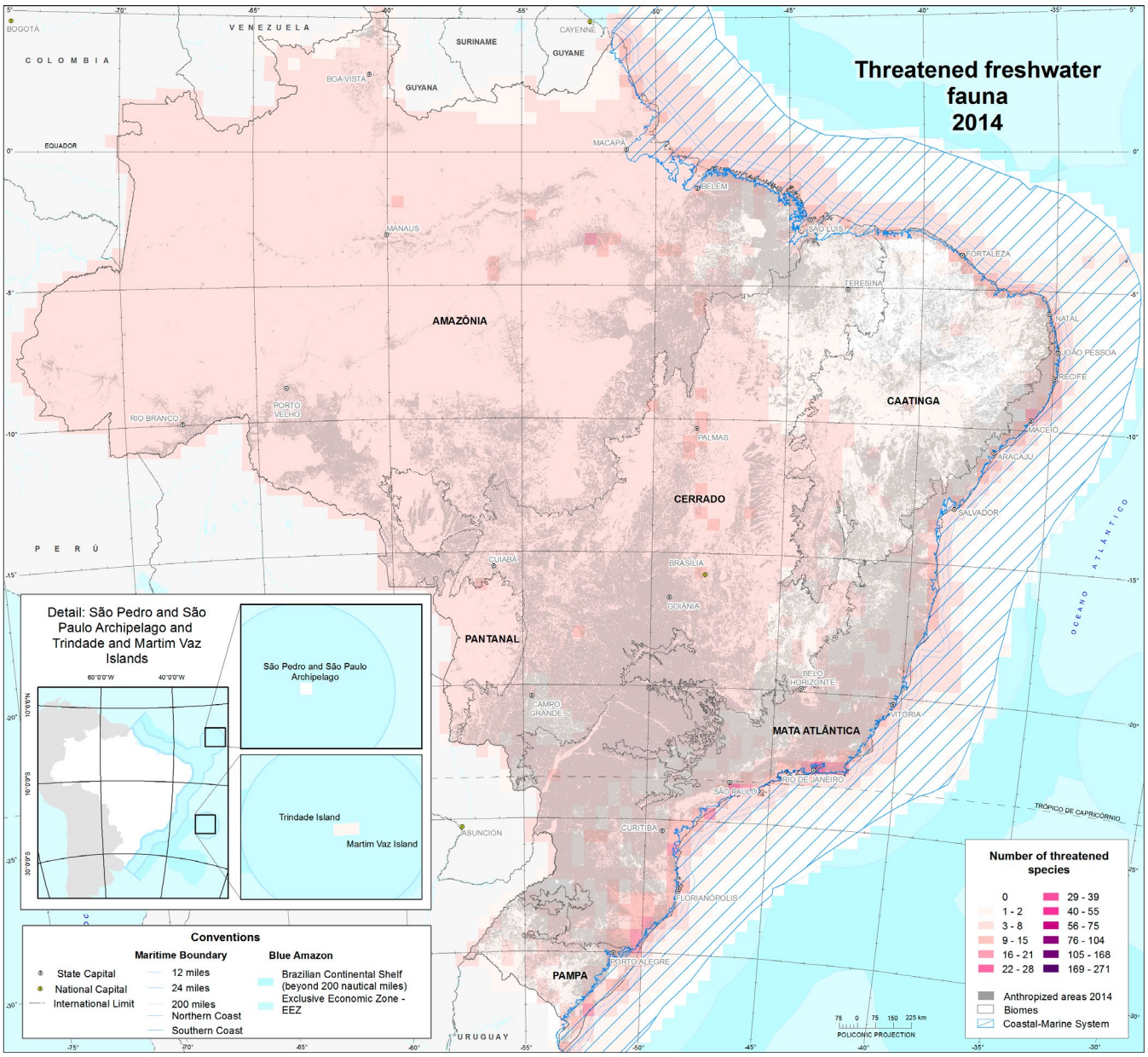


Sources: 1. INSTITUTO CHICO MENDES DE CONSERVAÇÃO DA BIODIVERSIDADE. Livro vermelho da fauna brasileira ameaçada de extinção. Brasília, DF: ICMBio, 2018a. 7 v. Available at: https://www.icmbio.gov.br/portal/component/content/ article/10187. Accessed: August 2020. 2. CONTAS de ecossistemas: o uso da terra nos biomas brasileiros 2000-2018. Rio de Janeiro: IBGE, 2020. (Contas nacionais, n. 73). Available at: https://biblioteca.ibge.gov.br/visualizacao/livros/liv101753. pdf. Accessed: September 2020.

Notes: 1. The anthropized areas in 2014, according to the Ecosystem Extent Accounts, are shown in gray.
2. Species data organized by 50 km x 50 km cells and data of anthropized areas by 1 km x 1 km cells.

Attachment 4 - Maps of threatened fauna and flora species in Brazil, according to the *Livro Vermelho da Fauna Brasileira Ameaçada de Extinção* (Red Book of Brazilian Fauna Threatened with Extinction) and the *Livro Vermelho da Flora do Brasil* (Red Book of Brazilian Flora), by realm - 2014

B - Freshwater fauna



Sources: 1. INSTITUTO CHICO MENDES DE CONSERVAÇÃO DA BIODIVERSIDADE. Livro vermelho da fauna brasileira ameaçada de extinção. Brasília, DF: ICMBio, 2018a. 7 v. Available at: https://www.icmbio.gov.br/portal/component/content/ article/10187. Accessed: August 2020. 2. CONTAS de ecossistemas: o uso da terra nos biomas brasileiros 2000-2018. Rio de Janeiro: IBGE, 2020. (Contas nacionais, n. 73). Available at: https://biblioteca.ibge.gov.br/visualizacao/livros/liv101753. pdf. Accessed: September 2020.

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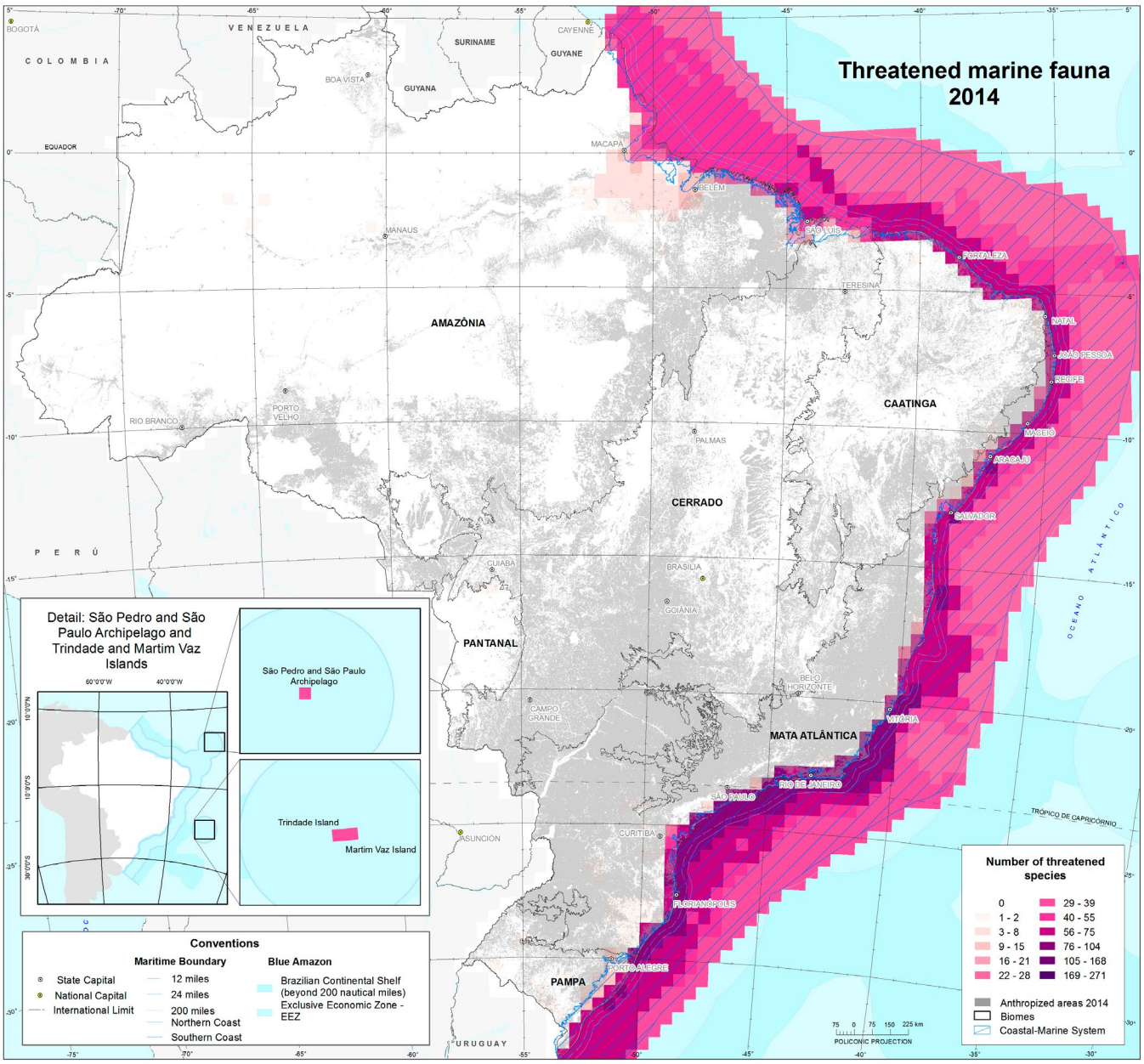
C - Marine fauna

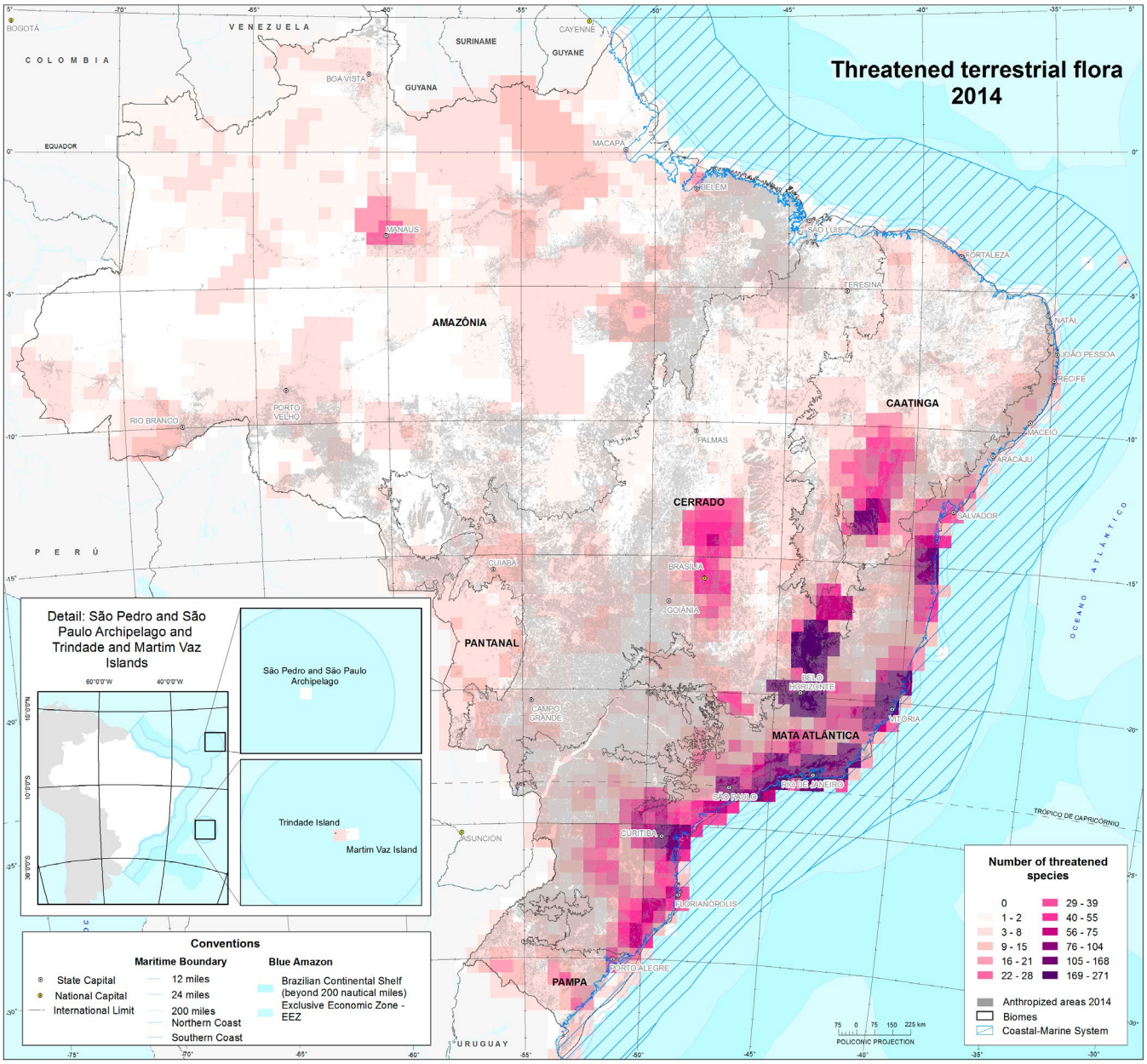


Sources: 1. INSTITUTO CHICO MENDES DE CONSERVAÇÃO DA BIODIVERSIDADE. Livro vermelho da fauna brasileira ameaçada de extinção. Brasília, DF: ICMBio, 2018a. 7 v. Available at: https://www.icmbio.gov.br/portal/component/content/ article/10187. Accessed: August 2020. 2. CONTAS de ecossistemas: o uso da terra nos biomas brasileiros 2000-2018. Rio de Janeiro: IBGE, 2020. (Contas nacionais, n. 73). Available at: https://biblioteca.ibge.gov.br/visualizacao/livros/liv101753. pdf. Accessed: September 2020.

Notes: 1. The anthropized areas in 2014, according to the Ecosystem Extent Accounts, are shown in gray.
2. Species data organized by 50 km x 50 km cells and data of anthropized areas by 1 km x 1 km cells.

Attachment 4 - Maps of threatened fauna and flora species in Brazil, according to the *Livro Vermelho da Fauna Brasileira Ameaçada de Extinção* (Red Book of Brazilian Fauna Threatened with Extinction) and the *Livro Vermelho da Flora do Brasil* (Red Book of Brazilian Flora), by realm - 2014

D - Terrestrial flora



Sources: 1. MARTINELLI, G.; MORAES, M. A. (org.). Livro vermelho da flora do Brasil 2013. Rio de Janeiro: Rio de Janeiro Botanic Garden Research Institute - JBRJ, National Center for Plant Conservation - CNCFlora, 2013. Available at: http://cncflora.jbrj.gov.br/arquivos/arquivos/pdfs/LivroVermelho.pdf. Accessed: August 2020. 2. CONTAS de ecossistemas: o uso da terra nos biomas brasileiros 2000-2018. Rio de Janeiro: IBGE, 2020. 95 p. (Contas nacionais, n. 73). Available at: https://biblioteca.ibge.gov.br/visualizacao/livros/liv101753.pdf. Accessed: September 2020.

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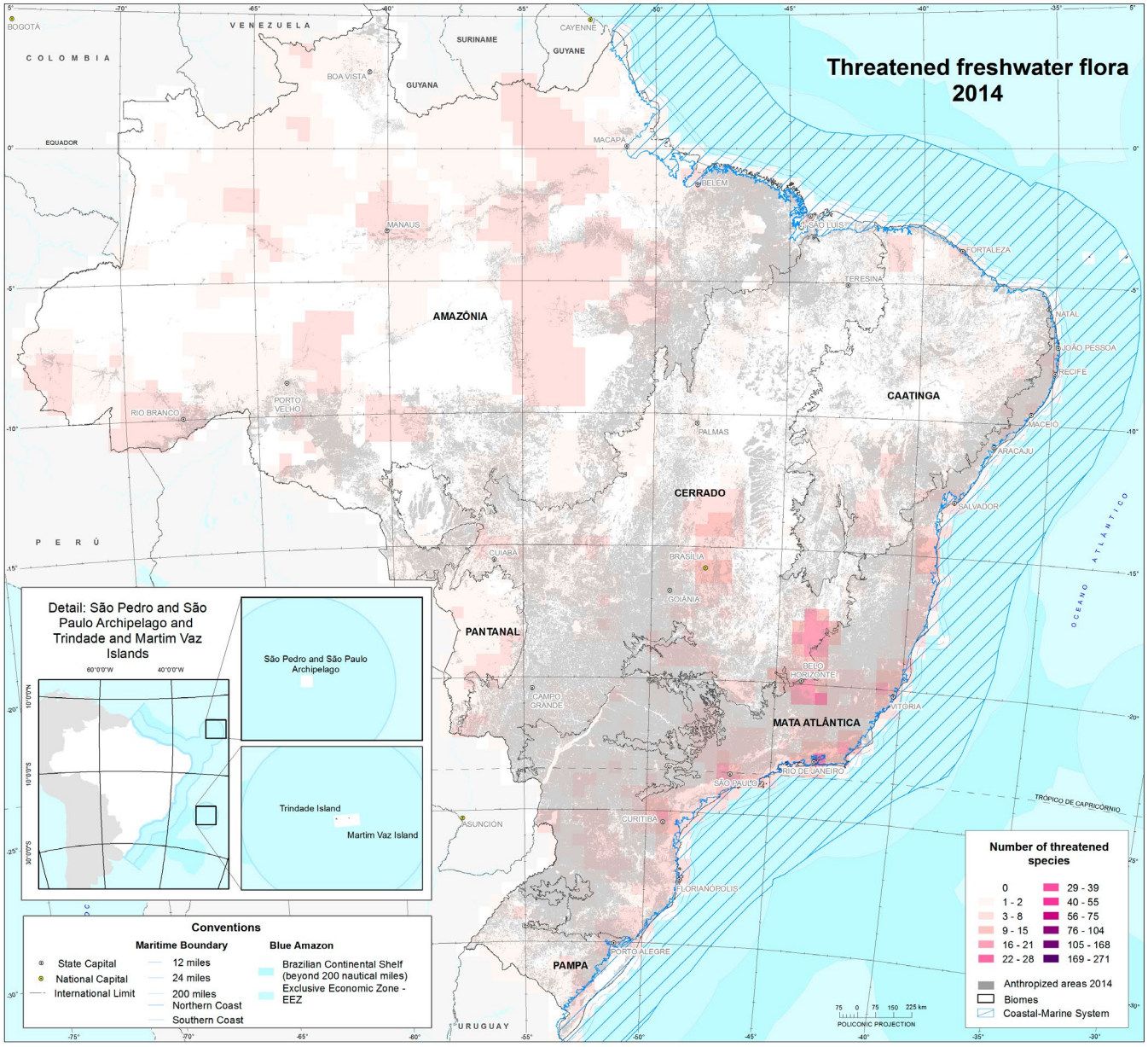
E - Freshwater flora



Sources: 1. MARTINELLI, G.; MORAES, M. A. (org.). Livro vermelho da flora do Brasil 2013. Rio de Janeiro: Rio de Janeiro Botanic Garden Research Institute - JBRJ, National Center for Plant Conservation - CNCFlora, 2013. Available at: http://cncflora.jbrj.gov.br/arquivos/arquivos/pdfs/LivroVermelho.pdf. Accessed: August 2020. 2. CONTAS de ecossistemas: o uso da terra nos biomas brasileiros 2000-2018. Rio de Janeiro: IBGE, 2020. 95 p. (Contas nacionais, n. 73). Available at: https://biblioteca.ibge.gov.br/visualizacao/livros/liv101753.pdf. Accessed: September 2020.

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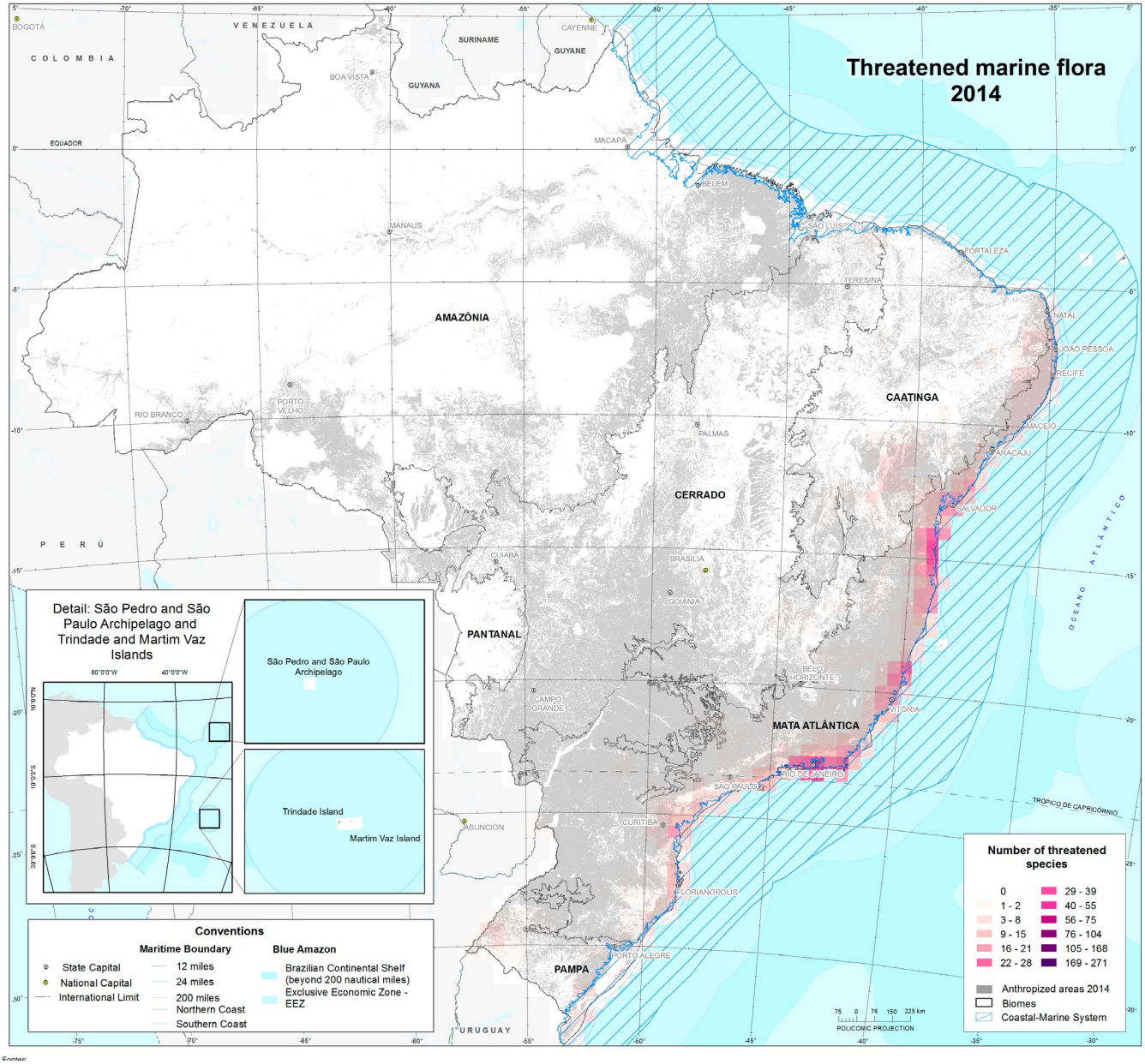
F - Marine flora



Sources: 1. MARTINELLI, G.; MORAES, M. A. (org.). Livro vermelho da flora do Brasil 2013. Rio de Janeiro: Rio de Janeiro Botanic Garden Research Institute - JBRJ, National Center for Plant Conservation - CNCFlora, 2013. Available at: http://cncflora.jbrj.gov.br/arquivos/arquivos/pdfs/LivroVermelho.pdf. Accessed: August 2020. 2. CONTAS de ecossistemas: o uso da terra nos biomas brasileiros 2000-2018. Rio de Janeiro: IBGE, 2020. 95 p. (Contas nacionais, n. 73). Available at: https://biblioteca.ibge.gov.br/visualizacao/livros/liv101753.pdf. Accessed: September 2020.

Notes: 1. The anthropized areas in 2014, according to the Ecosystem Extent Accounts, are shown in gray.
2. Species data organized by 50 km x 50 km cells and data of anthropized areas by 1 km x 1 km cells.

Glossary

The following are the definitions of the main terms and concepts described in the *System of environmental-economic accounting 2012: central framework* (UNITED NATIONS, 2014a) and *System of environmental-economic accounting 2012: experimental ecosystem accounting* (UNITED NATIONS, 2014b) manuals. In some cases, the entries contain external references, transversal comments among the terms and/or a small note after the descriptions.

To learn more about the other entries that are part of the methodological scope of the Ecosystem Accounts, consult the other volumes of the **Environmental Economic Accounts** series also available on the IBGE website.

basic spatial unit (BSU) Geometric unit that provides a disaggregated level to which different pieces of information can be attributed. The basic spatial unit can be formed by a reference grid or through the delimitation of polygons. It must be stated that, in ecosystem accounting, this unit is not a conceptual unit; it comprises the approach of measuring spatial data.

biodiversity 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. (Convention on Biological Diversity, article 2, entitled "Use of Terms") The diversity of ecosystems is also an important element which, in the Experimental Ecosystem Accounts, can be informed by the measurement of changes in the extent and condition of ecosystems.

ecosystem Dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit, as provided in Art. 2 in the Convention on Biological Diversity - CBD. Ecosystems can be identified at different scales; for accounting purposes, the ecosystem assets are defined upon the delimitation of unique and contiguous spatial areas.

ecosystem accounting area (EAA): Geographic territory for which an Ecosystem Account is compiled. The ecosystem accounting area determines which ecosystem assets are included in an account. Usually, these accounting areas are: national jurisdictions/groups of countries, subnational administrative areas, environmentally defined areas within a country, among other areas of political or analytical interest.

ecosystem assets (EA) Contiguous spaces of a specific ecosystem type characterized by a distinct set of biotic and abiotic components and their interactions for the purposes of ecosystem accounting, this unit of analysis is considered as a statistical unit.

ecosystem characteristics System properties of the ecosystem and its major abiotic and biotic components (water, soil, topography, vegetation, biomass, habitat and species) with examples of characteristics including vegetation type, water quality and soil type.

ecosystem condition Quality of an ecosystem measured in terms of its abiotic and biotic characteristics. Condition measures the ecologic integrity of the ecosystem that sustains the capacity of an asset to generate ecosystem services. Therefore, the changes in the conditions of the ecosystems have an impact on the expected flow of their services.

ecosystem degradation Decrease in the value of an ecosystem asset over an accounting period that is associated with a decline in the condition of an ecosystem asset during that accounting period. It usually reflects the decrease of the condition of the ecosystem and/or the expected flow of ecosystem services. The measures of ecosystem degradation are influenced by the scale of the analysis and the characteristics of the ecosystem asset. The degradation of the ecosystem can be measured in both physical and monetary terms and is connected to the capacity of the ecosystem to offer benefits to people.

ecosystem extent Size of an ecosystem asset in terms of spatial area, usually accounted for in terms of specifying the size of ecosystem types within an ecosystem accounting area.

ecosystem services Contributions of ecosystems to the benefits that are used in economic and other human activity; therefore, they exclude the set of flows usually referred to as supporting or intermediary services that contribute to the intra- and inter-ecosystem processes. In the Brazilian literature, references are found to the term environmental services.

ecosystem type (ET) Specific category in which the ecosystem assets are ecologically comparable. The type of ecosystem can be interpreted

as aggregations of ecosystem assets of a similar type or with contiguous areas of a specific type of ecosystem; in practical terms, the classification of types of ecosystems is required in order to define the ecosystem assets.

environmental assets The naturally occurring living and non-living components of the Earth, together constituting the biophysical environment, which may provide benefits to humanity (SEEA Central Framework, para. 2.17). The scope of environmental assets is not equal to that of ecosystem assets, as the former includes mineral and energy resources. In addition, the broad scope of the environmental assets extends beyond natural resources, since it includes produced assets, such as crops; cultivated plants, including wood, cattle and fish. The measurement of environmental assets is broader in physical terms than in monetary ones, since the latter is limited to assets that hold economic value, following the principles of market evaluation from the System of National Accounts.

environmental indicator Quantitative or qualitative factor or variable that, upon a measurable method, provides an objective and communicable answer of a change in the condition, process, or function of ecosystems.

environmental services *See* ecosystem services

geographic distribution Area where a particular species can be found. The geographic distribution can include areas used by migratory individuals and the local abundance can vary over the geographic distribution, including places where conditions do not allow the species to be established.

land cover The observed physical and biological cover of the Earth's surface and includes natural vegetation and abiotic (non-living) surfaces. (SEEA Central Framework, para. 5.257)

land use Human use of land in a specific spatial area for a given purpose (residential, farming, among others). The change in the land use is related to a change in the use or management of the land by human beings.

natural capital Term used to describe the stock of renewable and non-renewable natural resources that combine to generate a flow of benefits to people.

natural resources Include all natural biological resources (including timber and aquatic resources), mineral and energy resources, soil resources and water resources.

protected area Geographic space clearly defined and managed by legal means, or other efficient means, to reach the objectives of preservation of nature, with associated ecosystem services and also cultural values.

resilience Magnitude of the disturbance an ecosystem can experience without exceeding the critical threshold and thereby shift to a different state in terms of structure and functions. Resilience depends on factors in both physical and ecologic dynamics, but also on the organizational capacity to generate and respond to those dynamics.

restoration Any intentional activity that starts or accelerates the recovery of an ecosystem in a degraded state.

SDG *See* sustainable development goals

sustainability Characteristic or state through which the needs of the current and local population can be met without compromising the capacity of meeting the needs of future generations and populations in other locations.

sustainable development goals Set of goals adopted by the United Nations in 2015 to end poverty, protect the planet, and ensure prosperity to humanity, as part of Agenda 2030 for Sustainable Development.

taxon Named taxonomic unit (for example, *Homo sapiens*, Hominidae or Mammalia) by which individuals or sets of species are assigned. Its plural is the term taxa, in Latin.

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Ecosystem Accounts

Species Threatened with Extinction in Brazil

2014

Natural Capital Accounting is an accounting framework that allows measuring and comparing, through time, the contribution of natural resources and ecosystems to the social and economic aspects of a given territory, as well as providing dynamic and standardized statistics for planning and decision-making in order to promote more efficient and sustainable choices in resource management.

By recognizing the importance of integrating environmental data to the System of National Accounts - SNA, in order to account for ecosystem service use and register how this use by the economic system impacts the biodiversity assets, IBGE presents, in this publication, the results of the Threatened Species Accounts, developed in the context of the System of Environmental-Economic Accounts - SEEA. This first version is based on the Red List of Threatened Species, from the International Union for Conservation of Nature - IUCN, for assessed species in South America. Specifically for the data analysis on Brasil, a compilation for the years 2010, 2014, and 2018 was made and a simplifyied version of the Red List Index - RLI was computed in different ecological and spatial profiles.

As a starting point for future editions, a synthesis of the data from the National Lists of Threatened Species of Brazilian fauna and flora is presented, resulting from the assessments of the conservation status of the species of fauna and flora published by ICMBio and CNCFlora/JBRJ, respectively. Based on the data from the National Lists, the numbers of species by threat category are presented, disaggregated by the different Brazilian biomes and realms (terrestrial, freshwater and marine), as well as synthesis maps of information on the distribution of threatened species in the national territory.

The present study, also made available on the IBGE website, contributes to the effort to apply the international recommendations contained in the *System of environmental-economic accounting 2012: experimental ecosystem accounting manual*, known as SEEA-EEA, developed by the United Nations, in the context of the Natural Capital Accounting and Valuation of Ecosystem Services (NCAVES) project in partnership with the European Union.

The results presented here are expected to be a starting point for the necessary institutional arrangements to foster growing integration of biodiversity information in the decision-making processes, allowing the elaboration of other types of accounts and favouring the production of environmental statistics and indicators based on the best scientific knowledge available.

Important observation

In the publication previously released, the labels of the Caatinga and Cerrado Biomes were inverted in Charts 6 to 11. Therefore, in each one of them, under the column of data where it is read Caatinga Biome, read Cerrado Biome, and, under the column where it is read Cerrado Biome, read Caatinga Biome.

The current version solves these problems.

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