Appendix D: Brazil Indicators Testing Report

Report of the NCAVES Project

United Nations

System of Environmental Economic Accounting

System of
Environmental
Economic
Accounting

Report 2c - A short report describing results of deriving indicators

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Summary

1 Introduction

One of six project workflows of *Natural Capital Accounting and Valuation of Ecosystem Services* (NCAVES) refers to “Indicators: Development and testing of a set of indicators in the context of the post 2020 Biodiversity Agenda and other international initiatives”.

“The objective of the testing process is to better understand the feasibility of using System of Environmental-Economic Accounting Experimental Ecosystem Accounting (SEEA-EEA) to compile a selected set of Sustainable Development Goals (SDG) indicators and identify the key issues associated with such implementation.

The aim is to capture lessons learned and best practices for accounts compilation to improve the technical guidance and support other countries interested in implementing them to calculate the SDG indicators with case study examples” https://seea.un.org/fr/events/webinar-deriving-indicators-seea-eea.

According to an agreement within the scope of the NCAVES project, the objective of this report is to describe the status of the 4 monitoring indicators of the Sustainable Development Goals (SDGs) proposed for this test, considering the experience of Brazil. Are they:

- Indicator 6.6.1 - Change in the extent of water-related ecosystems over time.
- Indicator 11.7.1 - Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities.
- Indicator 15.1.1 - Forest area as a proportion of total land area.
- Indicator 15.3.1 - Proportion of land that is degraded over total land area.

To meet this objective, this report is structured in seven sections. The first refers to this introduction. Section two provides an overview of the production of indicators for monitoring the SDG targets in Brazil. Sections three, four, five and six are dedicated to each of the mentioned indicators. Section seven concerns bibliographic references.

This document constitutes the "2c" report provided for in the Term of Reference (ToR).

2 Production of the SDG indicators in Brazil: an overview

"The ability of the SEEA-EEA to organize and integrate data on the environment and the economy in a consistent manner makes it a key framework to assist countries in delivering on the SDGs" (UNEP-WCMC, UN, EU, 2019, presentation).

The Working Paper "Using the SEEA EEA for Calculating Selected SDG Indicators" (UNEP-WCMC, UN, EU, 2019) provides a set of suggested steps for the implementation of a national programme of work for calculating SDG target indicators using the SEEA-EEA framework, supporting testing note circulated to the NCAVES countries (*Short notes on Testing Selected SDG Indicators Using* SEEA-EEA).

The 2030 Agenda, adopted in 2015, provides for 17 SDGs and 169 corresponding global action targets to be reached from 2016 to 2030. Guided by global goals, countries are expected to define their national goals, according to their circumstances, and incorporate them into their government policies, programs, and government plans[1].

"On global scale, the SDGs and targets are monitored and revised based on a set of indicators developed by the Inter-Agency Expert Group on SDG Indicators (IAEG-SDG).

These indicators have been analyzed and validated by the United Nations Statistics Commission. Global targets and indicators are essential to ensure coordination, comparability and monitoring of countries' progress in relation to the achievement of the SDGs by the United Nations. Such monitoring allows this institution to identify the countries and thematic areas that need more assistance from international organizations and greater cooperation for development" (Instituto de Pesquisa Econômica Aplicada (IPEA), 2018, p.13).

The IAEG-SDG, where Brazil is represented by the Brazilian Institute of Geography and Statistics (IBGE), classifies the global indicators at three levels, based on their level of methodological development and data availability:

(i) Tier 1: indicator is conceptually clear, has an internationally established methodology and standards are available. The data is produced regularly by countries for at least 50 percent of countries and the population in all regions where the indicator is relevant.

[1] https://odsbrasil.gov.br/home/agenda

(ii) Tier 2: indicator is conceptually clear, has an internationally established methodology and standards are available, but data are not produced regularly by countries.

(iii) Tier 3: No internationally established methodology or standards are yet available for the indicator, but the methodology/standards are being (or will be) developed or tested.

In turn, "The UN, in several documents, encourages countries to take their national realities and priorities into account when defining the strategies to be adopted to achieve the objectives of the Agenda. However, the UN warns that, in this process, a reduction in the magnitude and scope of the global agenda must not be allowed" (IPEA, 2018, p.13).

In Brazil, in 2018 a platform[2] was launched, operated by IBGE, through which the indicators for monitoring the SDG targets are released.

It contains the country's first set of global indicators for monitoring these objectives, with methodological sheets, tables, graphs and maps. Through the platform, it is possible to find out what stage each indicator is in: (i) Produced; (ii) Under analysis (construction); (iii) Without data; and (iv) Not applicable in Brazil.

The launch of this tool was the result of the work carried out by IBGE in a collaborative manner with other institutions that produce data within the scope of the National Commission for the Sustainable Development Goals. Created through Decree No. 8,892, of October 27, 2016[3], it was intended to internalize, disseminate and give transparency to the process of implementing the 2030 Agenda for Sustainable Development[4].

One of the main contributions within the scope of the commission was the construction of an Action Plan (2017-2019), whose task was to adapt the global goals to the Brazilian reality and define indicators to monitor their compliance. In this context, IPEA released in 2018 the report "Agenda 2030. Sustainable Development Goals. Brazilian Goals".

In this document, it was proposed to adapt the global goals of the 2030 Agenda for Sustainable Development to the Brazilian reality, considering national strategies,

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[2] https://odsbrasil.gov.br/
[3] http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2016/decreto/D8892.htm
[4] https://www.mma.gov.br/informma/item/11694-comiss%C3%A3o-nacional-para-os-ods.html

plans and programs and the country's challenges to guarantee sustainable development in the next decade.

In addition to this advance, it is highlighted that the material offers instruments that guide the spatialization of the SDGs (that is, to estimate the indicators for monitoring the SDG targets by region), maintaining the scope and strategy of the original proposal.

However, with the repeal[5] of the decree that instituted the National Commission for the Sustainable Development Goals, after about 3 years of its creation, the work agenda in the country continued to be guided only by global goals.

3 Indicator 6.6.1 - Change in the extent of water-related ecosystems over time

One of the 17 SDGs refers to the SDG 6 “Ensure availability and sustainable management of water and sanitation for all”. This objective consists of 8 goals monitored by 11 indicators.

Among these goals, goal 6.6 stands out “By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes”.

In turn, this goal is monitored by indicator 6.6.1 “Change in the extent of water-related ecosystems over time”.

Brazil produces and disseminates this indicator. The National Water and Sanitation Agency (ANA) is the national focal point for this indicator, calculating and reporting to the UN custodian agency, the United Nations Environment Program (UNEP), and IBGE reports on the platform[6]. In addition, ANA also reports this indicator on its institutional website[7].

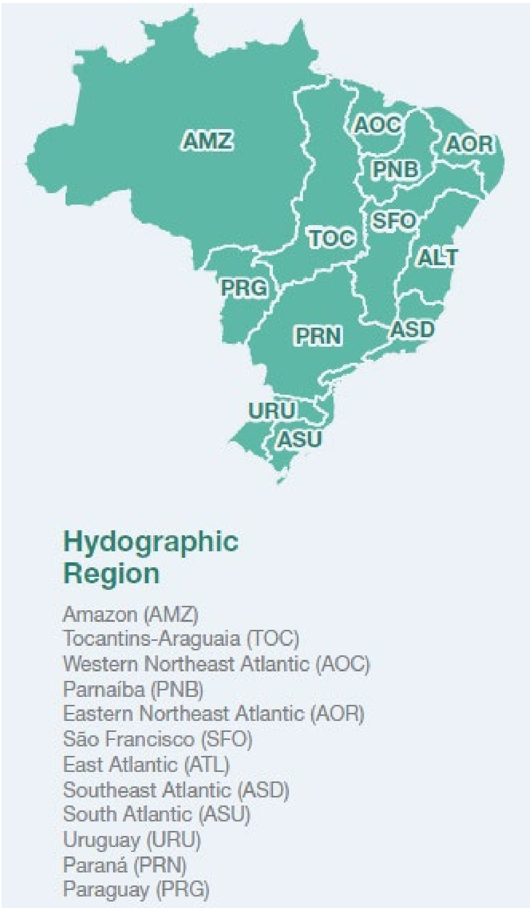
To date, data have been released on a national scale and by Hydrographic Region (HR) annually in the period between 2010 and 2015. It should be noted that, in 2020, there were changes in the indicator's methodology[8] (as mentioned in more detail in page 8), as informed by ANA in an interview conducted on the theme. With the change of methodology, UNEP data were collected from Member States in order to assess the results at the national level extracted from the global monitoring platform of the SDG

[5] http://www.planalto.gov.br/ccivil_03/_Ato2019-2022/2019/Decreto/D10179.htm#art1
[6] https://odsbrasil.gov.br/objetivo6/indicador661
[7] https://www.ana.gov.br/acesso-a-informacao/institucional/publicacoes/ods6/ods6.pdf
https://app.powerbi.com/view?r=eyJrIjoiNjI3NGNkYTktZjMwNS00YjYxLTkxZjItNDJmMDZkMGZhYTViIiwidCI6ImUwYmI0MDEyLTgxMGItNDY5YS04YjRkLTY2N2ZjZDFiYWY4OCJ9
[8] https://www.sdg6monitoring.org/indicator-661/

6.6.1 indicator, the https://www.sdg661.app/, denominated "*Freshwater Ecosystems Explorer*".

The following is a summary of the results released so far on indicator 6.6.1, estimated based on the methodology proposed by the Global Environmental Management Initiative (GEMI)/Water (ANA, 2019). The results obtained from the new methodology should be released soon.

Figure 1 – 12 Hydrographic Region of Brazil



Source: ANA, 2019.

The indicator aims to track changes in aquatic ecosystems over time - wetlands, peatlands, mangroves, rivers, flood plains and estuaries, lakes and artificial reservoirs and aquifers, considering the following sub-components: spatial extent; water quantity (associated with indicator 6.3.2 - Proportion of water bodies with good environmental quality) and water quality.

To estimate the indicator, until 2019 only national data were used, according to the sources presented below:

(i) Water quantity:

ANA: annual average flow balance, provided by data from the National Hydro meteorological Network (RHN), representing "inputs and outputs" of water in the Hydrographic Regions and in the country as whole. In 2017, RHN had 1,850 stream gage stations, data regarding these stations is available in the Hydrological Information System (Hydroweb) at http://www.snirh.gov.br/hidroweb.

(ii) Extent of aquatic ecosystems:

MapBiomas project, which provides annual data for 83 Brazilian Level 3 river basins. Classes considered (classification level 3): water bodies, non-forested wetlands and mangroves. Collection made available on May of 2018.

(iii) Water quality

ANA: for the calculation of indicator 6.3.2 of SDG 6.

In consultation with the focal points of this indicator in Brazil, additional information was gathered on the perspectives for the next estimates. Among them, the following stand out:

(i) Until 2019, the international methodology did not differentiate between natural and artificial water bodies (reservoirs). From 2020 onwards, the international methodology began to distinguish these types of water bodies in terms of extension.

(ii) As mentioned, in 2020 the international methodology for estimating indicator 6.6.1 was updated[9]. In this context, the United Nations Environment Program (UNEP) developed the platform *Freshwater Ecosystems Explorer*. "*The platform has free and easy-to-use data and provides geospatial data on the extent of freshwater ecosystems and water quality (trophic state and turbidity estimates) over time in the world. This tool allows many ways of using query filters. They are very interesting for monitoring the indicator by country, region, basin, type of water (natural or artificial), seasonality of water (permanent and seasonal), mangroves*

[9] https://www.sdg6monitoring.org/indicator-661/

and inland wetlands with vegetation, among other characteristics." (https://www.sdg661.app/about_1).

With the platform, it is possible to estimate the components "extension" (extension of aquatic ecosystems) and "quality" (so far, the information is on trophic state and turbidity), from earth observation data. According to the updated methodology, there is also a forecast of incorporating data on the variation in the quantity of surface and groundwater from on-site monitoring data.

Regarding the derivation of indicator 6.6.1 from the Ecosystem Accounts, the methodology proposed in UNEP-WCMC, UN, EU (2019), suggests that it can be derived from the Ecosystem Extent Accounts that consider the aquatic realm. In this context, it is important to highlight that Brazil released the first Ecosystem Extent Accounts in 2020. However, only the terrestrial[10] natural areas were examined[11] and to only two classifications of land areas: (i) Natural Areas; and (ii) Anthropized Areas.

In addition, it is important to highlight that ANA and IBGE do not work with aquatic ecosystem classifications. Thus, for it to be possible to develop Ecosystem Extent Accounts for that realm, an initial work to identify these classifications in Brazil would have to be carried out.

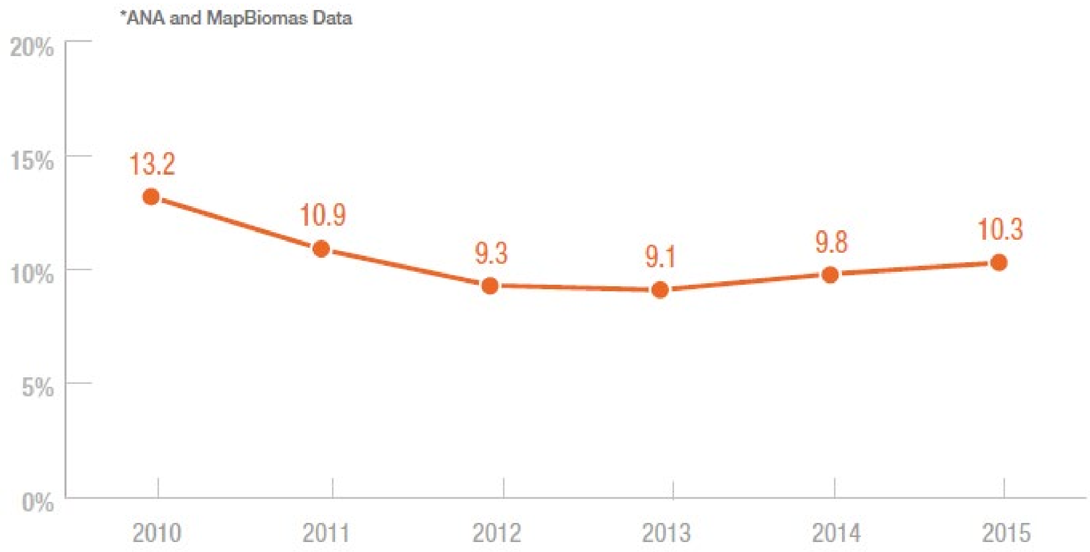
Regarding to the results, it is important to call the attention that the reference point for "changes over time" is the natural condition, that is, before the ecosystem experienced large-scale impacts. In this context, it appears that "Changes in the Brazilian aquatic ecosystems from 2010 to 2015 are not very expressive when considering the country as a whole. Regarding its three components, the biggest changes were relating to water quantity and water quality and not in the extension of water bodies. The joint analysis of these three factors resulted in a percentage change of only 2.7% over a period of 6 years[12]." (ANA, 2019, p. 73).

[10] "In the present scope, it is emphasized that only the terrestrial natural areas were examined, since the assessment of the aquatic environment does not integrate the proposed analysis, since, in the Monitoring mapping methodology, water body polygons are adopted of the official cartographic base, according to the updates present in the Continuous Cartographic Base on the scale 1: 250 000, BC250, from IBGE (BASE ..., 2017)" (IBGE, 2020a, p. 32).

[11] The Brazilian Ecosystem Accounts doesn't has information about aquatic realm or water bodies. In the "land cover/land use accounts", the extent of water bodies was essentially kepy fixed. These issues, associated with the fact that there is no information on the types of aquatic ecosystems, prevent the derivation of indicator 6.6.1 from these information systems.

[12] "Groundwater resources were not considered for this analysis due to the gaps in monitoring and the difficulties in obtaining the necessary data." (ANA, 2019, p. 73).

Figure 2 – Indicator 6.6.1: Changes in Brazilian Aquatic Ecosystems, from 2010 to 2015 (%)



Source: ANA, 2019.

The analysis of aquatic ecosystem changes from 2010 to 2015 by Hydrographic Region shows some differences in results for Brazil, mainly in specific components, due to Indicator 6.6.1 being represented by a single value for the entire country.

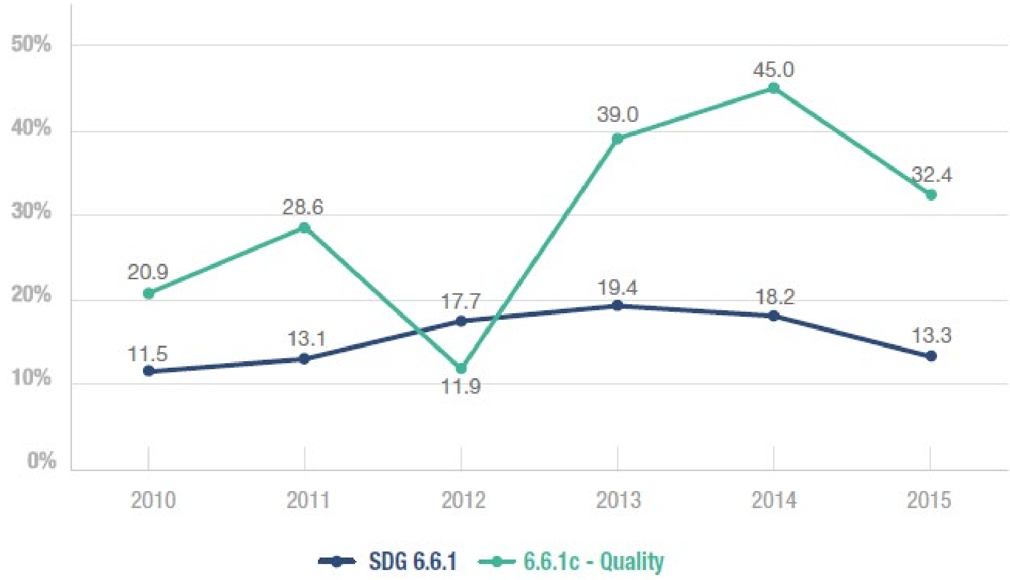
For example, the Paraguay Hydrographic Region, where the Pantanal is located, an ecosystem of great relevance to Brazil, presented relevant changes in the quality component of indicator 6.61. The São Francisco River Basin presented a reduction of 11.1% in the extent of aquatic ecosystems, highlighting the reduction for large reservoirs existing in the basin due to hydroelectric power generation existing in the basin during the water crisis, which affected the region more severely from 2012 to 2015.

Due to the water crisis, the reduction in water volumes as measured by Indicator 6.6.1 was also significant in the Eastern Northeast Atlantic Hydrographic Region, reaching the percentage of 36% in 2015. This Hydrographic Region was the one that presented the largest percentage of water bodies with water quality far from the standards considered as "good" quality according to Indicator 6.6.1 (over 60% in 2013 and 2014), reflecting the already discussed results obtained for Indicator 6.3.2. (ANA, 2019).

The changes in quantity and quality of water between 2010 and 2015 are due to the water crisis' impacts in Brazil, reflected in the reduction of stream flows and the deterioration of water quality, due to the smaller volumes of water available for the dilution of polluting loads in some regions of the country.

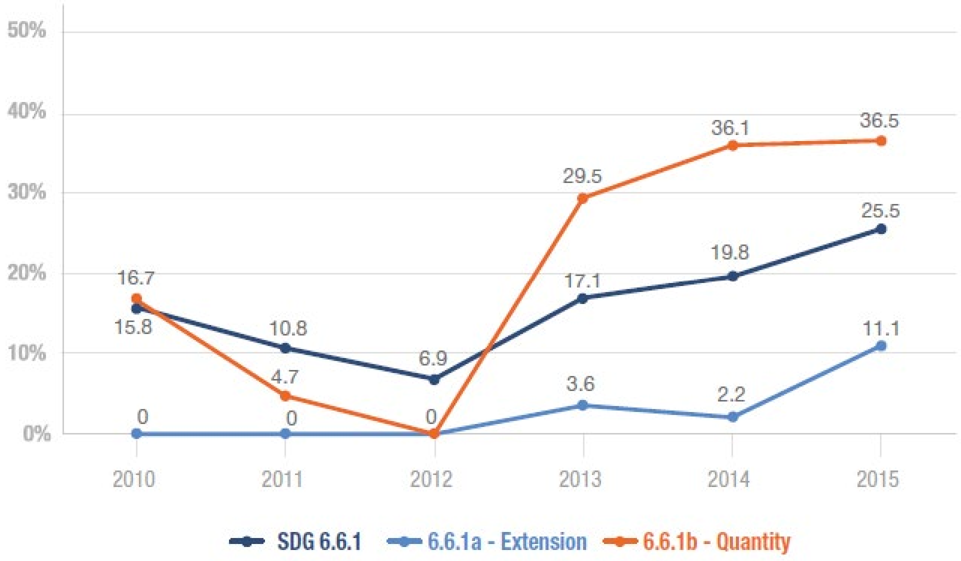
On the other hand, the fact that changes were not identified in the aquatic ecosystems extension (natural and artificial reservoirs, wetlands and mangroves) in the same period is due to the occurrence of significant rainfall in the South and North regions, which were affected by floods and inundations, offsetting the losses experienced in other regions when considering the national territory as a whole. In addition, new reservoirs were built throughout the time series in Brazil, contributing to counterbalance extension losses in other water bodies. (ANA, 2019, p. 75).

Figure 3 – Changes in the component and indicator 6.6.1 in the Paraguay Hydrographic Region – 2010-2015 (%)



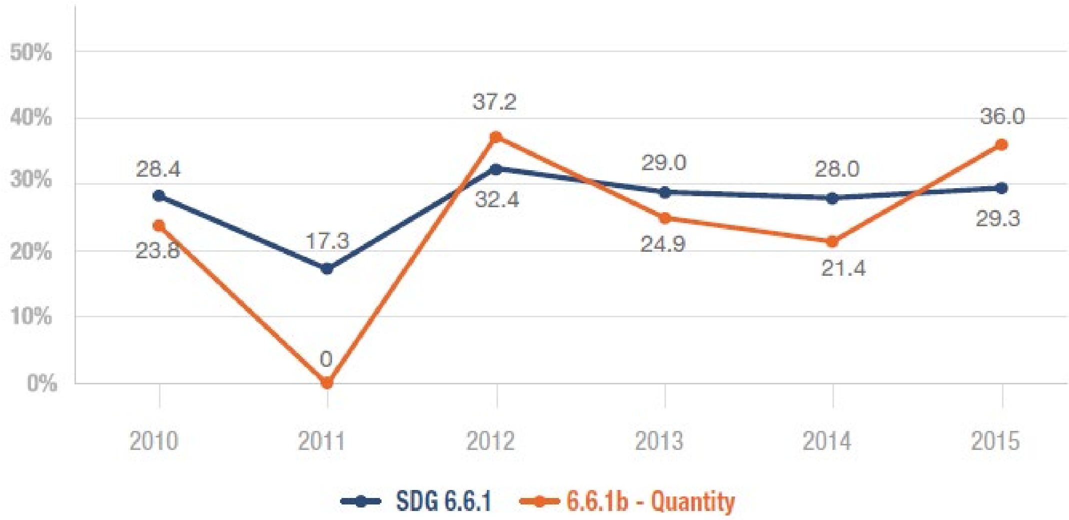
Source: ANA, 2019.

Figure 4 – Changes in the component and indicator 6.6.1 in the São Francisco Hydrographic Region – 2010-2015 (%)



Source: ANA, 2019.

Figure 5 – Changes in the component and indicator 6.6.1 in the Eastern Northeast Atlantic – 2010-2015 (%)



Source: ANA, 2019.

4 Indicator 11.7.1 – Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities

One of the 17 SDGs refers to the SDG 11 "Make cities and human settlements inclusive, safe, resilient and sustainable". This objective consists of 10 goals monitored by 15 indicators.

Among these goals, goal 11.7 stands out “By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities”.

In turn, this goal is monitored by two indicators, one of which is 11.7.1 “Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities”.

To date, Brazil has not released information for the two monitoring indicators for target 11.7. According to the platform through which the indicators are released in the country, indicator 11.7.1 is the one classified as “without data”[13].

However, some indicators with this classification have been evaluated and studied and are the subject of internal studies. Indicator 11.7.1 is an example.

In consultation with the IBGE team, it was found that the estimation of indicator 11.7.1 is one of the institution's priorities within the activities that involve SDG 11.

In turn, this priority is given the importance of this metric for public policies and the difficulty in the availability of data. Additionally, its estimation involves an effort towards a statistical, geospatial and technological modernization, adhering to the competence of IBGE. That is, the integration between statistical and geospatial information using technological tools of remote sensing, GIS, automated capture of statistical data, etc.

In that consultation, indicator 11.7.1 was presented as one of the most challenging of SDG 11. It is possible to identify public spaces of greater proportion through remote sensing, but the quality of public spaces open to all and their typologies depends on administrative records (municipal cadastres) and/or field work. Additionally, it is noteworthy that identifying the public spaces of a city and identifying the sex, age and condition of the people who have access to these spaces, brings a series of challenges that involve the use of administrative records that qualify the space and the people using it.

Since the IBGE is concerned with working nationwide, producing this information for about 5,570 municipalities in Brazil is even more challenging.

In addition, it is important to highlight that the challenges for advancing the estimation of the indicator in 2020 came up against the fact that in 2020 the Covid-19 pandemic is occurring, in addition to difficulties with access to more human and financial resources.

[13] https://odsbrasil.gov.br/objetivo/objetivo?n=11.

Having made these considerations, there are perspectives for estimation and disclosure of indicator 11.7.1 according to three lines of work:

(i) Conduct case studies for some of the largest cities in Brazil, such as São Paulo, Rio de Janeiro and / or Porto Alegre, by 2030. For cases like these, more information is available.

In this context, IBGE is analyzing automated methodologies for extracting relevant features from satellite images.

Then, it would be opportune for this work to be validated by the city halls by consulting the municipal registers, applying questionnaires and/or observing the field, which have not yet started its development.

The advantage of carrying out these case studies is that such studies can produce results faster and can help to overcome operational challenges, generating useful knowledge for a broader exercise.

(ii) In partnership with IBGE, the National Institute for Space Research (INPE), bodies linked to the Ministry of Science, Technology, Innovations and Communications (MCTIC), are working on a pilot study in order to develop a methodology that allows estimating the indicator 11.7.1. It is noteworthy that this research is at an academic level in the postgraduate program at INPE.

The objective of this research is to build information on urban and suburban areas, among others, that can be useful for estimating the indicator.

In this context, work has been developed from a "data cube". Where an algorithm is applied to extract features of interest such as streets, green spaces and blue spaces. It is added that these classes are of paramount importance to build the accounts of urban ecosystems, which currently do not have databases in scale of detail to be executed.

For now, the biggest challenges have been:

(a) Identify all public spaces, because while there are large areas and therefore easy to identify, but there are also very small areas; and

(b) Identify urban areas. One of the ways to identify urban areas is through the application of the legal definition, that is, political-administrative. Another way, which has been used for international comparisons and monitoring the urbanization phenomenon, is the mapping of built or morphologically urban areas. IBGE carried out this mapping in 2015 for urban concentrations with more than 100,000 inhabitants. For the dissemination of the Census it is intended to have all urbanized areas of the country with a reference date in 2020.

Additionally, it is important to highlight that the definition/identification of urban areas is important and can impact investments, for example.

It is important to highlight that there is interest in the continuation of this study and that, in order to validate the results, it will be necessary to carry out fieldwork (if possible, in partnership with city halls) in order to assist in the investigation. This partnership would be important, for example, to study the impact of private areas with public access on the indicator.

The idea is that the (more generic) monitoring mentioned in item (i) is integrated with the (more specific) information from this study.

(iii) The Ministry of the Environment (MMA) is building the Urban Environmental Register (CAU), a tool of the Cities + Green Program, launched under the National Agenda for Urban Environmental Quality.

This app allows access to the location, information and characteristics of the green areas registered by the municipalities and the Federal District (DF), in order to encourage the use of these spaces.

The information made available at “CAU Cidadão” is the responsibility of the technicians and managers of the municipalities and the DF, who perform the registration. As it is a voluntary, dynamic registration that is under construction, it is possible that not all green areas are still available for viewing in the app.

The methodology on which the three lines of work are based concerns the “Metadata on SDGs Indicator 11.7.1” (UN Habitat, 2018). Therefore, these initiatives can be integrated.

In the same consultation with IBGE, it was stated that other countries, such as Mexico, Colombia, the United States and the United Kingdom also face methodological difficulties and related to the availability of data for the estimation of the referred indicator.

Regarding the derivation of the indicator from the Ecosystem Accounts, the methodology proposed in UN-WCMC, UN, EU (2019), suggests that it can be derived from the Urban Ecosystem Extent Accounts.

In this context, it is important to note that Brazil released the first Extension Accounts in 2020. However, the urban areas[14] and, therefore, the different classifications of this ecosystem, are not explicitly identified[15]. This fact, associated with the question that the scale of the Extension Accounts is incompatible for the calculation of this indicator, makes it impossible at this time to test the proposed methodology.

5 Indicator 15.1.1 - Forest area as a proportion of total land area

One of the 17 SDGs refers to the SDG 15 "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 objective consists of 12 goals monitored by 14 indicators.

Among these goals, goal 15.1 stands out "By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements".

In turn, this goal is monitored by two indicators, one of which is 15.1.1 "Forest area as a proportion of total land area".

[14] "Conceptually, urban and built-up areas are a type of ecosystem. Consequently, these areas are within scope of ecosystem accounting and may be of interest for particular purposes (e.g., analysis of the role of public "green spaces" in cities). It is also to be noted that urban populations use significant quantities of ecosystem services, both directly and indirectly. While urban ecosystems may be of interest, often they may not be considered a focus of ecosystem accounting. Hence, care should be taken to ensure that the geographical boundaries being applied in the measurement of ecosystem assets enable appropriate coverage of economic and ecosystem assets in urban areas." (UN, 2014, p. 141).

[15] The first Extension Account for Brazil (IBGE, 2020a) considers only two classifications. They are: (i) Natural Areas; and (ii) Anthropized Areas. In turn, they refer to the aggregation of 10 classifications, out of the 12 available, in the series of studies produced by IBGE called "Monitoring of land cover and use in Brazil". Natural Areas is an aggregation of the following classes: forest vegetation, wetland, countryside vegetation and uncovered areas. The Anthropized Areas is an aggregation of the following classes: artificial area, agricultural area, managed pasture, mosaic of occupations in forest and countryside areas and silviculture. In this context, it is important to highlight that the artificial areas refer to "Areas where non-agricultural anthropic surfaces predominate. They are those structured by buildings and road system, **which include metropolises, cities, towns, indigenous villages and quilombola communities, areas occupied by industrial and commercial complexes and buildings that may**, in some cases, be located in peri-urban areas. Also belonging to this class are the areas where mining or extraction of mineral substances occurs, through mining"(IBGE, 2020b p.19).

The calculation of this indicator is the responsibility of the Brazilian Forest Service (SFB), for its insertion and monitoring with the FAO. All indicators are incorporated into the platform by IBGE, since this institution is responsible for the platform[16].

The data were released on a national scale for the years 1990, 2000, 2005, 2010 and 2015. Therefore, from 2000, the indicator started to have a five-year periodicity.

For the calculation of this indicator, the methodology proposed by the Food and Agriculture Organization (FAO) (2020) was used and the national data summarized below:

$$\left(\frac{\text{Forest area (reference year))}}{\mathit{land\ area\ of\ the\ country}\ (2015)}\right) * 100 \qquad (1)$$

(i) Deforested area in the Amazon Biome.
Source: Satellite Monitoring Project for the Brazilian Amazon Forest (PRODES) / INPE.

(ii) Deforested area in the Caatinga, Cerrado, Atlantic Forest, Pampa and Pantanal biomes.
Source: Satellite Deforestation Monitoring Program for Brazilian Biomes. Institution (PMDBBS)/Brazilian Institute of Environment and Renewable Natural Resources (IBAMA).

(iii) Area of the Brazilian territory.
Source: Resolution Nº PR-01, of January 15, 2013. Institution: IBGE.

(iv) Inland water area.
Source: direct contact. Institution: ANA.

(v) Area of planted forest.
Source: Statistical Yearbook. Institution: Brazilian Tree Industry.

Regarding to the available results, indicator 15.1.1 has shown a reduction in the proportion of the forest area in relation to the total area of the Brazilian territory, between 1990 and 2015.

[16] https://odsbrasil.gov.br/objetivo15/indicador1511

Table 1 - Indicator 15.1.1 - Forest area as a proportion of total land area

	1990	2000	2005	2010	2015
Forest area as a proportion of total land area (%)	65,41	62,37	60,63	59,64	59,05
Forest area as a proportion of total area (%)	64,20	61,21	59,51	58,53	57,96

Source: https://odsbrasil.gov.br/objetivo15/indicator1511

Regarding the derivation of indicator 15.1.1 from the Ecosystem Accounts, the methodology proposed in UNEP-WCMC, UN, EU (2019), suggests that it can be derived from the Extension Accounts. In this context, it is important to note that Brazil released the first Extension Accounts in 2020. However, it addressed only two classifications of land areas. They are: (i) Natural Areas; and (ii) Anthropized Areas. Therefore, at this moment there is no information, derived from the Extension Accounts, to test the proposed methodology.

An alternative, however, was to perform the aforementioned test from the main data source of the Extension Accounts, the Monitoring of Land Cover and Use (IBGE, 2020b), since this study works with different classes of coverage and use, among which stands out the "Forest vegetation".

Although the test also produced results on a national scale (since the monitoring disseminates data on this scale), one contribution is that the test result proved to be very similar to indicator 15.1.1, showing a small difference of about 0.86 percentage points in 2010, the only one in which the IBGE and SFB databases coincide.

This result is interesting because it indicates that even though the SFB working with a different database from the IBGE monitoring (IBGE, 2020b), it appears that these different databases did not significantly impact the indicator 15.1.1 on a national scale for the year 2010.

Table 2 - Indicator 15.1.1 - Forest area as a proportion of total area (%) – Brazil, 2010

Test	57,84%
Official indicator	58,53%
Difference between test and official indicator	-0,69%

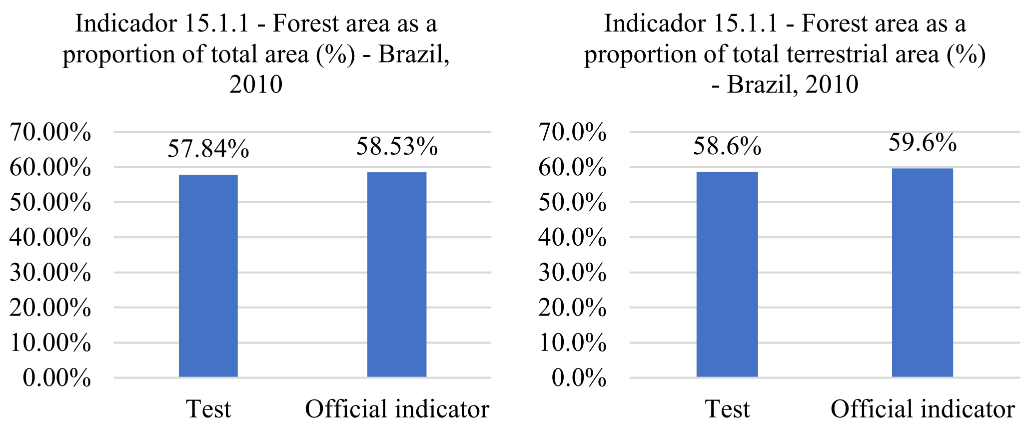
Source: authors elaboration.

Table 3 - Indicator 15.1.1 - Forest area as a proportion of total terrestrial area (%) – Brazil, 2010

Test	58,6%
Official indicator	59,6%
Difference between test and official indicator	-1,02%

Source: authors elaboration.

Figure 6



Source: authors elaboration.

If in the next Brazil Extension Accounts it is possible to present the results for the classification "Forest ecosystems", the derivation of indicator 15.1.1 will be possible. In this context, some contributions of this method of calculation stand out:

(i) Since the calculation of the indicator from the Extension Accounts seems to be simpler, when compared to the method currently used, calculating in according this way can give a scale gain.

(ii) Possible increase in the periodicity of estimation and disclosure of the indicator, since the production and disclosure of the Extension Accounts became part of the work and disclosure agenda of IBGE.

The production and disclosure of these accounts are expected to be biannual, thus ensuring a higher frequency of disclosure of the indicator, when compared to the current frequency of 5 years.

(iii) As the Extension Accounts are produced by biomes, it would be possible to estimate indicator 15.1.1 also by biome.

(iv) With the potential development of the work to classify and identify the types of terrestrial ecosystems in Brazil, to be incorporated in future Extension Accounts, indicator 15.1.1 can be estimated by ecosystem.

However, it is important to highlight that one of the challenges of this work agenda pointed out by IBGE, concerns the availability of human resources.

6 Indicator 15.3.1 - Proportion of land that is degraded over total land area

Among the goals of SDG 15, goal 15.3 stands out "By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world".

In turn, this goal is monitored by indicator 15.3.1 "Proportion of land that is degraded over total land area".

To date, Brazil has not released information on this indicator. According to the platform through which the indicators are disseminated in the country, the stage of indicator 15.3.1 is called "Under analysis/construction[17]".

In consultation with the IBGE team involved in the estimation of this indicator, information was gathered on the internal work that is under development.

Among this information, it is highlighted that the referred work has been carried out by IBGE, in partnership with the Brazilian Agricultural Research Corporation (Embrapa).

To present a summary of this work, it is important to highlight that this indicator is composed of three sub-indicators:

(i) Land cover[18];

(ii) Land productivity[19]; and

(iii) Carbon stock[20].

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[17] https://odsbrasil.gov.br/objetivo/objetivo?n=15

[18] "[...] refers to the observed physical cover of the Earth's surface which describes the distribution of vegetation types, water bodies and human-made infrastructure. It also reflects the use of land resources (i.e., soil, water and biodiversity) for agriculture, forestry, human settlements and other purposes.8 This subindicator serves two functions for SDG indicator 15.3.1: (1) changes in land cover may point to land degradation when there is a loss of ecosystem services that are considered desirable in a local or national context; and (2) a land cover classification system can be used to disaggregate the other two sub indicators, thus increasing the indicator's policy relevance. This sub-indicator is also expected to be used for reporting on SDG indicators 6.6.1, 11.3.1 and 15.1.1." (UNCCD, 2018, p. 3).

[19] "[...] refers to the total above-ground net primary production (NPP) defined as the energy fixed by plants minus their respiration which translates into the rate of biomass accumulation that delivers a suite of ecosystem services.10 This sub-indicator points to changes in the health and productive capacity of the land and reflects the net effects of changes in ecosystem functioning on plant and biomass growth, where declining trends are often a defining characteristic of land degradation." (UNCCD, 2018, p. 4).

[20] "[...] is the quantity of carbon in a "pool": a reservoir which has the capacity to accumulate or release carbon and is comprised of above- and below-ground biomass, dead organic matter, and soil organic carbon.14 In UNCCD decision 22/COP.11, soil organic carbon (SOC) stock was adopted as the metric to be used with the understanding that this metric will be replaced by total terrestrial system carbon stocks, once operational. SOC is an indicator of overall soil quality associated with nutrient cycling and its aggregate stability and structure with direct implications for water infiltration, soil biodiversity, vulnerability to erosion, and ultimately the productivity of vegetation, and in agricultural contexts, yields. SOC stocks reflect the balance between organic matter gains, dependent on plant productivity and

The methodology recommended in UNCCD et al. (2018), highlights that this indicator can be estimated from the Trends Earth platform[21].

For the platform calibration in order to estimate the indicator 15.3.1, three test rounds were carried out.

The use of global data for the three sub-indicators was initially tested. However, this first exercise produced results that overestimated the degradation data, mainly in the Northeast of Brazil, in the Caatinga biome.

In a second stage of platform calibration, national data were used for sub-indicator (i) and global data for sub-indicators (ii) and (iii). Still, the results continued to be overestimated.

Among the main activities of this stage, we highlight the adaptation of the land cover legend (IBGE, 2020b) with the platform legend and estimation of land use change.

Finally, a third stage of platform calibration is being carried out. At this stage, national data are being used for the three sub-indicators. Among the main activities of this process, the following stand out:

(a) On land productivity:

We work with the set of MODIS images, by calculating the NDVI.

There was a climate correction for the Caatinga (rain efficiency index) and Cerrado (Restrend) biomes, which translated into an adjustment in the sub-indicator.

Data from 2008 and 2018 are being considered. The Trends. Earth model does not indicate that data on changes in productivity are evaluated in a period of less than 10 years and less than 10 years.

(b) On the carbon stock:

MCTIC data was not used because the scale is not compatible with the platform.

Embrapa carbon data (base 2017) is being used.

Additionally, it is important to note that initially this work was being carried out through a collaboration between IBGE and the MMA Secretariat for Extractivism, Rural

management practices, and losses due to decomposition through the action of soil organisms and physical export through leaching and erosion." (UNCCD, 2018, p. 4).

[21] http://trends.earth/docs/pt/about/general_info.html

Development and Combat Desertification. However, with the extinction of the secretariat[22], estimation of indicator 15.3.1 has become more challenging.

Still, there are perspectives for the validation and dissemination of the results found. In this context, work is underway to verify and validate the results by IBGE and Embrapa Solos.

Regarding the derivation of indicator 15.3.1 from Ecosystem Accounts, the methodology proposed in UN-WCMC, UN, EU (2019) suggests that component (i) can be derived from Extension Accounts - more specific to the ecosystem type change matrix[23].

Additionally, this methodology also provides that components (ii) and (iii) can be derived from Ecosystem condition accounts for the terrestrial realm.

The first Extension Accounts in Brazil were released in 2020 (IBGE, 2020) and the first Condition Accounts, on an experimental basis, are in the process of being released. However, those of extension covered only two classifications of terrestrial areas (Natural Areas and Anthropized Areas) and those of condition concern only the aquatic realm. Therefore, at this moment there is no information, derived from the Ecosystem Accounts, to test the proposed methodology.

However, it should be noted that both the calculation of indicator 15.3.1 and the Extension Accounts for Brazil used the same database as a reference for land cover and use. Therefore, it is not expected that these statistics will present conflicting or divergent results.

In general, it can be concluded that while in some cases it is not possible to derived SDG indicator from Extent Account due to no information, there are potential and possibility to do so if disaggregated information becomes available.

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[22] https://www.socioambiental.org/pt-br/noticias-socioambientais/o-que-muda-ou-resta-no-meio-ambiente-com-a-reforma-de-bolsonaro

[23] "*Compilation of the ecosystem extent account (or a land cover account as a proxy) is fundamental to calculating the land cover change sub-indicator for SDG 15.3.1. This also requires identifying the areas where ecosystem type changes have occurred and then identifying which changes are representative of degradation. These changes can then be presented using an ecosystem type change matrix.*" (UN-WCMC, UN, EU, 2019, p. 28).

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