SDG 6 IN BRAZIL

ANA's Vision of the Indicators

ANA

NATIONAL WATER AGENCY - BRAZIL

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SDG 6 in Brazil: ANA's vision of the indicators

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CONTENTS

Presentation

The United Nations (UN) 2030 Agenda proposes 17 Sustainable Development Goals (SDGs) and 169 corresponding targets, as a result of the consensus reached by delegates from its Member-States in 2015. The SDGs are the essence of the 2030 Agenda and are to be implemented within the 2016-2030 period. The goals are monitored by indicators and each country's results and historical evolution can be compared, offering a global overview for the worldwide monitoring of the Agenda by the United Nations.

SDG 6, or *Sustainable Development Goal 6*, consists of 8 targets that aim to "ensure the availability and sustainable management of water and sanitation for all". The goal deals with sanitation and water resources in an integrated perspective. It allows for the evaluation of each country's scenario as to the availability of water resources, water demands and uses for human activities, aquatic ecosystems conservation actions, water loss reduction, access to water supply, sanitation and sewage treatment.

The National Water Agency (ANA) is the central institution in Brazil responsible for the integrated water resources management. ANA systematically monitors the conditions and the management of water resources in Brazil through statistics and indicators that feed the National Water Resources Information System (SNIRH).

In this document, ANA presents its contribution to the monitoring process of the eight SDG 6 targets, based on information produced in partnership with several institutions for the calculation of the indicators.

In 2019, ANA was linked to the Ministry of Regional Development (MDR), which adds value to the content of this document and its use. The newly created MDR brings together national sanitation, water resources, and water safety policies, and is therefore the main entity responsible for implementing the actions for achieving the SDG 6 targets within the federal framework.

The Board of the National Water Agency

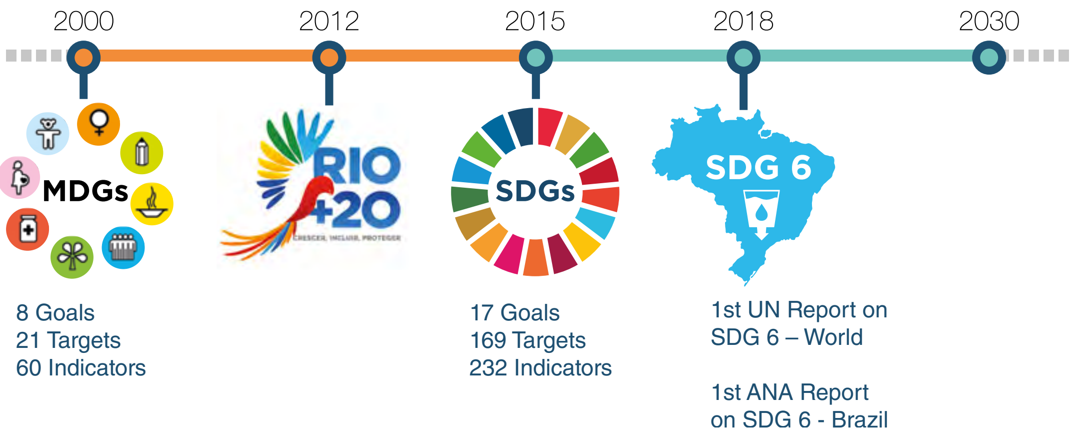
SDG 6: Clean Water and Sanitation

In September of 2000, world leaders gathered at the United Nations headquarters in New York to adopt the UN Millennium Declaration. With the Declaration, nations pledged to reduce extreme poverty through the achieving of eight goals by 2015, which became known as the Millennium Development Goals (MDGs). MDG 7 dealt with Quality of Life and Respect for the Environment, and included, among its targets, target 7c - Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation.

In 2012, the Rio+20 conference, held in Brazil, established the basic conditions for UN Member States to collectively build a new set of goals and targets, expanding on the successful experience of the MDGs. Thus, the 2030 Agenda was proposed, consisting of a set of programs, actions and guidelines that will guide the work of the UN and its Member States towards sustainable development, reflecting the recognition that all countries - developed and developing - have challenges to overcome when it comes to the promotion of sustainable development in its three dimensions: social, economic and environmental.

The negotiations for the 2030 Agenda, completed in September of 2015, in New York, culminated in the 17 Sustainable Development Goals (SDGs), based on the success achieved by the 8 MDGs and including new themes such as global climate change (SDG 13), socioeconomic inequality (SDG 10), technological innovation (SDG 9), sustainable consumption (SDG, 12), and peace and justice (SDG 16).

The SDGs are broader in scope than the MDGs, since they address the interlinked elements of sustainable development: economic growth, social inclusion and environmental protection. The MDGs gave more emphasis to the social agenda.



The goals for each SDG are monitored by indicators and each country's results and its evolution can be compared, offering a global overview for the worldwide monitoring of the 2030 Agenda by the United Nations.

The SDGs have experienced great progress in relation to the MDGs by bringing the water and sanitation issue to the center of the discussion, creating a specific goal to deal with the subject in detail, and considering a more comprehensive view of water as a resource, in terms of quantity and quality, while it was previously limited to the access to sanitation services (water and sewage treatment). The insertion of Integrated Water Resources Management (IWRM) reflects the United Nations' innovative vision and places water as a central element in themes that are interrelated with several other SDGs, such as public health and the environment.

The water theme's transversal nature, SDG 6 - ENSURE ACCESS TO WATER AND SANITATION FOR ALL - is integrated with other goals, such as SDG 2 (Zero Hunger and Sustainable Agriculture), SDG 3 (Good Health and Well-Being), SDG 7 (Affordable and Clean Energy), SDG 13 (Climate Change) and SDG 14 (Life on Land), among others. SDG 6 allows for the assessment of each country's scenario regarding water and sanitation treatment, water supply and water demands and uses for human activities, water quality, water resources management and aquatic ecosystems conservation actions. It consists of 8 targets, which are monitored by 11 indicators.

The Brazilian Institute of Geography and Statistics (IBGE) began addressing the SDG indicators in 2015, within the scope of the UN group responsible for proposing the global indicator framework. It held 3 Information Producer Meetings with a view to the 2030 Agenda and set up working groups by SDG, with the participation of ANA. In 2018, it launched the SDG Digital Platform, with the first set of global indicators, elaborated in partnership with other information producing institutions, this list available at https://ods.ibge.gov.br/

The Institute for Applied Economic Research (IPEA has prepared a Proposal for Adapting the Global Targets to the Brazilian Reality, mainly covering the nomenclature of the indicators and the relevant concepts. Available at goo.gl/HQH7BX

The methodologies for calculating the SDG targets indicators have been gradually refined by the UN, aiming to improve and facilitate the use of the recommended methods by all countries.

The concept of sanitation used by the UN consists in the provision of facilities and services for the management and disposal of liquid and solid waste generated by human activities. According to Brazilian legislation, the Law of National Directives for Basic Sanitation (Law No. 11,445 of 2007) includes the components of basic sanitation in addition to sanitation, water supply, urban cleaning and solid waste management, and drainage and management of rainwater.

The concept of sanitation used by the UN is adopted for the purposes of this Report.

The concern with the supply of drinking water for all is the focus of SDG 6 (targets 6.1 and 6.3). Access to sanitation (target 6.2) cannot be separated from the aforementioned concern, since not having access to proper sewage treatment leads to the contamination of soil, rivers, seas and water supply sources, damaging the quality of life and health.

The rational use of water by economic activities, with increase in efficiency and optimization of water supply in order to guarantee its multiple uses is also incorporated by SDG 6 (target 6.4). Another theme approached (target 6.5) is the efficient and integrated management of both national and transboundary surface and underground water resources.

Finally, institutional frameworks are necessary in order to promote social participation, control water uses and monitor the protection of aquatic ecosystems (targets 6.6, 6.a and 6.b).

The National Commission for Sustainable Development Goals (CNODS), created by Decree No. 8,892 of 2016, is the main institutional mechanism for the implementation of the 2030 Agenda in Brazil. The Commission is a joint advisory body responsible for conducting the process of articulation, mobilization and dialogue with the federation entities and civil society, with the aim of internalizing, disseminating and giving transparency to the 2030 Agenda. In 2018, the National Commission for the SDGs was composed of 16 members representing federal, state, district and municipal governments and civil society.

Water Resource Management is a relatively new concept in Brazil if compared to Sanitation Management. The National Water Resources Management System (SINGREH), created and established in the 1988 Brazilian Constitution, involves several organs, entities and civil society. It is regulated by Law No. 9,433 of 1997, which established the National Water Resources Policy (PNRH), along with its foundations, goals and instruments. ANA is the central institution that executes water management in the country and regularly presents statistics and indicators for the identification of the National Water Resources Policy's implementation results and the National Water Plan's monitoring.

This information is stored in the database that feeds the National Water Resources Information System (SNIRH) and supports the Brazilian Water Resources Annual Reports preparation. The Reports are the reference for monitoring and managing the water situation in the country and its preparation involves partners from over 50 organizations and entities that integrate the SINGREH as well as other federal and state public organizations that are part of the network for the calculation of the SDG 6 indicators.

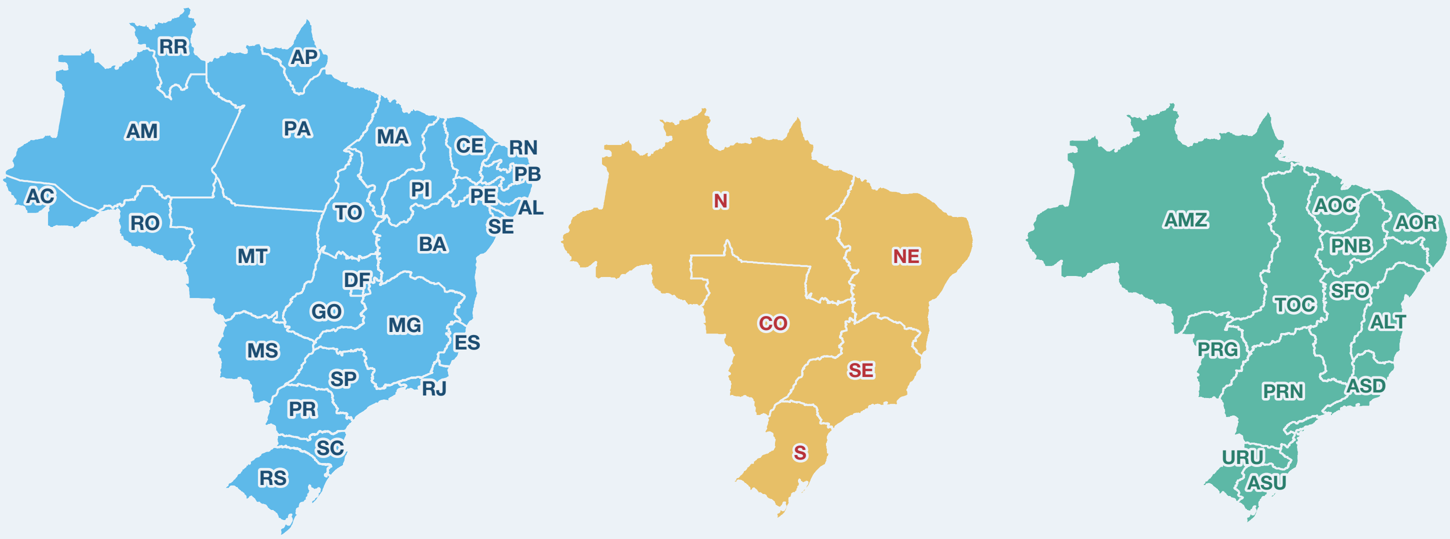
The SNIRH is one of the management instruments provided for in the PNRH. It is a comprehensive system for collecting, treating, storing and recovering information on water resources, as well as on the factors involved in its management, and it falls under the responsibility of ANA.

May be accessed at: http://www.snirh.gov.br/

As a contribution to SDG 6, ANA calculated the indicators through the observing of the time series and for different territorial unities. These goals were grouped here in three main thematic axes in order to facilitate the analysis and the monitoring of the 8 targets – which is the main purpose of this document:

- WATER SUPPLY AND SANITATION;
- WATER QUALITY AND QUANTITY; AND
- MANAGEMENT: SANITATION AND WATER RESOURCES.

Territorial groups adopted in the breakdown of the national indicators results



Federation Units

Acre (AC)
Alagoas (AL)
Amapá (AP)
Amazonas (AM)
Bahia (BA)
Ceará (CE)
Distrito Federal (DF)
Espírito Santo (ES)
Goiás (GO)
Maranhão (MA)
Mato Grosso (MT)
Mato Grosso do Sul (MS)
Minas Gerais (MG)
Paraná (PR)
Paraíba (PB)
Pará (PA)
Pernambuco (PE)
Piauí (PI)
Rio Grande do Norte (RN)
Rio Grande do Sul (RS)
Rio de Janeiro (RJ)
Rondônia (RO)
Roraima (RR)
Santa Catarina (SC)
Sergipe (SE)
São Paulo (SP)
Tocantins (TO)

Geographic Region

North (N)
Northeast (NE)
Southeast (SE)
South (S)
Midwest (CO)

Hydrographic Region

Amazon (AMZ)
Tocantins-Araguaia (TOC)
Western Northeast Atlantic (AOC)
Parnaíba (PNB)
Eastern Northeast Atlantic (AOR)
São Francisco (SFO)
East Atlantic (ATL)
Southeast Atlantic (ASD)
South Atlantic (ASU)
Uruguay (URU)
Paraná (PRN)
Paraguay (PRG)

Water Supply and Sanitation

The targets description presented in this report considers the adjustment made to the targets for Brazil coordinated by IPEA and approved by the National Commission for the SDGs at its 7th Extraordinary Meeting held on January 31st of 2019.

There are two SDG 6 targets that fall under the thematic axis of **Water Supply and Sanitation**, both aimed at the universalization of the supply of drinking water and sewage collection and treatment:

Target 6.1 - By 2030, achieve universal and equitable access to safe and affordable drinking water for all.

Target 6.2 - By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.

Target 6.1 has as a goal the universalization of water supply by providing safe drinking water to all households, i.e., water free from contamination, available where necessary in sufficient quantity and quality and in accordance with the population's consumption needs, in an equal and fair manner. In turn, target 6.2 deals with the removal of human contact (collection) and the treatment of domestic sewers, as well as the availability of adequate facilities that provide access to hygiene habits (such as hand washing) to the population, and ending open air defecation.

The term "sanitation" used in Target 6.2 is widely used in reference to what Brazilian legislation defines as sewage collection and treatment.


fortex

Target 6.1 is monitored by **Indicator 6.1.1- Proportion of the population using safely managed drinking water services.**

For calculating the indicator according to UN guidelines, one should include the proportion of the population that has access to an improved source of water located within or near the household (that is accessible within a 30-minute radius), available where necessary and free from fecal contamination and hazardous chemicals. Improved sources include piped water accessible within the household or premises, supplied by the general network or otherwise supplied (for example: protected wells and springs, public taps, rainwater and bottled water). An improved water source that is not readily accessible or with access not exceeding 30 minutes is categorized as "basic service", and when the access time exceeds 30 minutes, the service is categorized as "limited".

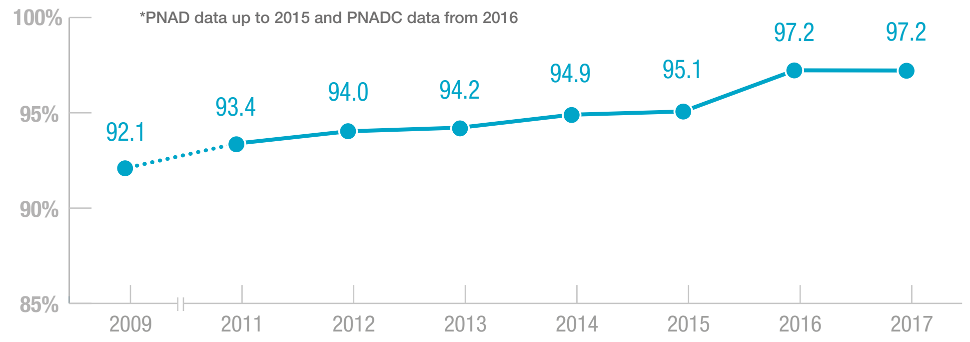
Water free from chemical and fecal contamination is water that meets the standards defined in national or local regulations. In the absence of a standard, the reference is the World Health Organization (WHO) guidelines on the quality of drinking water. For global reports, thermotolerant coliforms (or *E. coli*) are the preferred indicators for microbiological quality, and arsenic and fluorine are the priority chemicals.

The percentage of the Brazilian population that used safely managed drinking water services in 2017 was of around 97.2%. A 5% growth is observed between 2009 and 2017. In absolute numbers, this growth represents a quantity of 25.5 million inhabitants who began using safely managed drinking water services in the last eight years.

In the calculation of the indicator for Brazil, only sources with internal channeling to households were considered as "safe". In addition, no data is available to assess whether the service is basic or limited regarding the time of access to water by the population. In 2015, 84% of the Brazilian population was supplied through a general network (public supply network), and for 11% of the population, the water came from alternative supply sources, all of those house-holds had indoor plumbing. Data from the IBGE National Household Sample Survey (PNAD), available at goo.gl/TgNcQs

The South, Midwest and Southeast regions reached levels of over 99%, while the North and Northeast regions reached 92%. It is possible to observe expressive growth in the North and Northeast regions, which had the worst indicator at the beginning of the period. The difference between the regions with the worst and best indexes (North and South, respectively), which in 2009 was of 20%, was reduced to 7% in 2017.

Evolution of the population with safely managed drinking water services in Brazil – 2009-2017 (%)

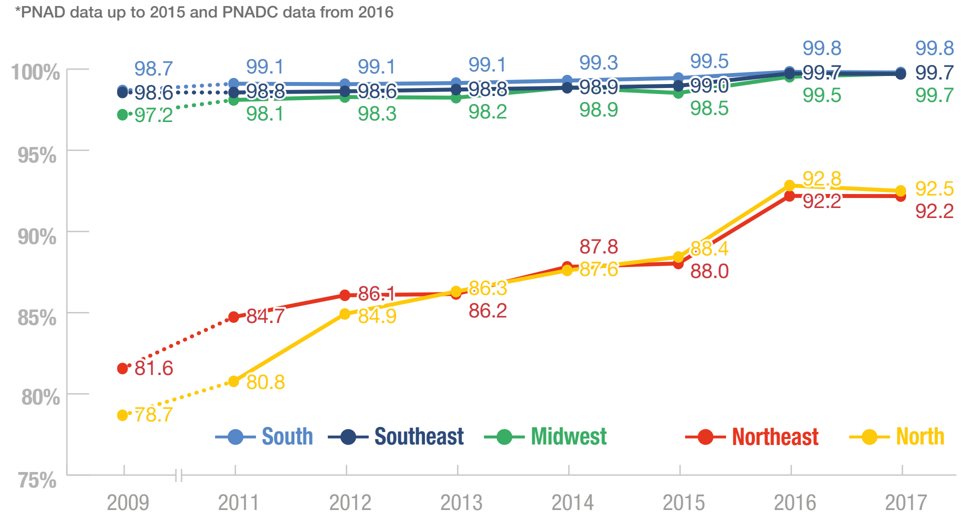


To make it easier to read, all SDG 6 indicators results are presented with a surrounding rectangle.

SDG 6 indicator 6.1.1 Results - Proportion of the Population Using Safely Managed Drinking Water Services.

Water quality was not considered in the calculation. The indicator was not calculated for 2010 due to methodological differences between the Demographic Census and the PNAD (not collected that year).

Evolution of the population with safely managed drinking water services in the Geographic Regions – 2009-2017 (%)



IBGE began to disseminate the Continuous PNAD between 2015 and 2016, which uses a different data collection methodology than the one adopted in previous years. The decrease of the indicator in the years 2016 and 2017 in relation to the ever-increasing behavior of the previous period analyzed is due precisely to this difference in methodology between the surveys undertaken by IBGE. The Continuous PNAD is available at goo.gl/a7M8EM

In spite of the high compliance level achieved by the indicator, it is necessary to make some observations regarding its calculation for Brazil. The first one concerns the lack of data on the quality assurance of the water supplied by the public supply network and consumed by the population or by alternative sources such as wells, springs and tanks or other forms.

In Brazil, the Ministry of Health's Ordinance No. 5/2017, Annex XX deals with the standards for water intended for human consumption, whether it comes from a collective system or an alternative supply solution. Thus, all water intended for human consumption (except bottled water and water used as a raw material to production) distributed through collective supply systems or alternative solutions must be subject to control and water quality monitoring. It is up to the entity responsible for the system or alternative solution for collective supply of drinking water to exercise control over the water quality and forward to the states' public health authorities, the federal district and/or the municipalities monthly, quarterly and semi-annual analysis reports with information about water quality control. Up to the present moment, ANA does not have enough data to calculate the indicator with certainty as to the quality of the water distributed; however, proceeding with this analysis is a priority for future reports. The Ministry of Health (MS) is currently working on a publication to show how the information contained in the Quality of Water for Human Consumption Information Monitoring System (SISAGUA) can be used for monitoring indicators related to safe water.

The criteria and supervision of this water are described in resolution (DRC) No. 274 of September 22nd of 2005 issued by the National Health Surveillance Agency (ANVISA).

SISAGUA is used to record data on the water supply sources and data relating to the monitoring of water quality carried out by service providers and also by the health sector. The data is available at http://dados.gov.br/dataset?q=sisagua and it will soon be possible to use this data to improve the calculation of the indicator, or to propose sub-indicators.

According to data from IBGE's Continuous PNAD.

Data collected for all municipalities of the country by Atlas Brazil - Urban Water Supply, published by ANA in 2010 and available at http://atlas.ana.gov.br/Atlas/forms/Home.aspx, and supplemented by ANA data from 2012 to 2013 released in the 2014 Brazilian Water Resources Report. Faced with the complexity and adverse conditions of water supply to the Brazilian urban population, ANA and the Ministry of Regional Development (MDR) are currently preparing the National Water Security Plan (PNSH). This plan should set out the main strategic and regionally relevant structuring interventions for the country (Dams, Systems, Adductors, Channels and Integration Axes) necessary to ensure water supply for human consumption and for use in productive activities, and reduce the risks associated to critical events (droughts and floods). In addition, the updating of the Atlas Brazil - Urban Water Supply, which brings the characterization and diagnosis of the water sources and water supply systems of the Brazilian municipalities is currently under way.

In 2010 the UN General Assembly recognized through its resolution 64/292 that access to clean and safe water and sanitation are fundamental human rights.

1 Minimum Wage (MW) equals BRL 954.00 (reference date 01/01/2018). PNAD data (IBGE).

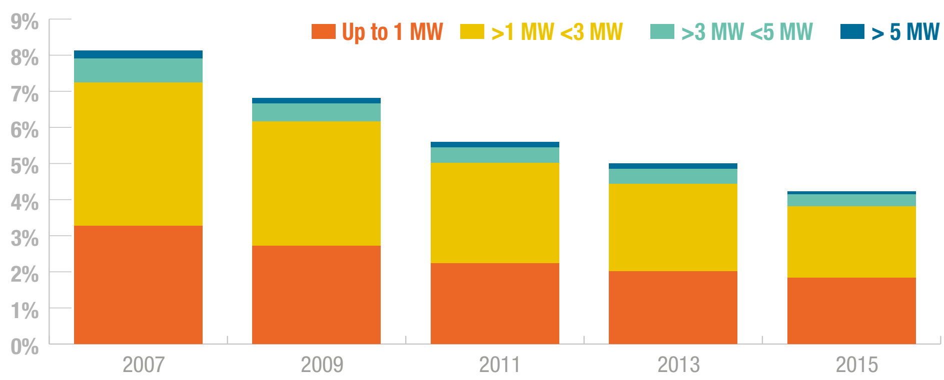
The second observation relates to water availability, since having access to the public network does not necessarily mean that water is always available to the users. It is well known that water supply intermittency and even the lack of water for distribution to the population is a reality for a significant part of the municipalities, especially the ones located in the Northeast region, which has been dealing with problems related to water scarcity for years. However, in recent years it has become evident that water supply was also critical in other Brazilian regions, especially in the larger populations of the Southeast and Midwest regions. Only 86.7% of households with access to the public network used do have daily access to water in 2017.

An analysis of water sources and of the water infrastructure used to supply the Brazilian municipalities showed that 31% of the country's population lives in areas that have low water assurance (facing rationing, collapse or alert in periods of drought, making it neces-sary to seek new water sources) and 41% live in areas whose production system requires expansion. Only 27% of the population lives in municipal areas whose supplies have been found satisfactory. Still in the water sources characterization used, 78% of the Brazilian population is predominantly supplied by surface water sources, while 22% is predominantly supplied by groundwater sources.

When it comes to the target of universal and equitable access to water, we are talking about ensuring that water is provided for all regardless of social, economic or cultural condition, gender or ethnicity. This concept is aligned with the premise of access to water as an essential human right. Therefore, it is important to monitor the deficit of care in different income ranges. From 2007 to 2015 it was observed that the supply deficit decreased in Brazil (from 8.1% of the population to 4.2%). However, when analyzing deficit distribution among income ranges the numbers remain the same, with an average of 40% of the unassisted population corresponding to the income range of up to 1 minimum wage. At the other extreme is the population with income above 5 minimum wages, which corresponds to approximately 2% of the total population not supplied by water.

When looking at the water supply access distribution (general network and alternatives with indoor plumbing) deficit percentage from 2007 to 2015 between the income ranges, it is observed that the deficit has been decreasing in general, however, its distribution among the income ranges remains stable, and the population receiving up to three minimum wages continues to be the most affected by the lack of water supply and indoor plumbing.

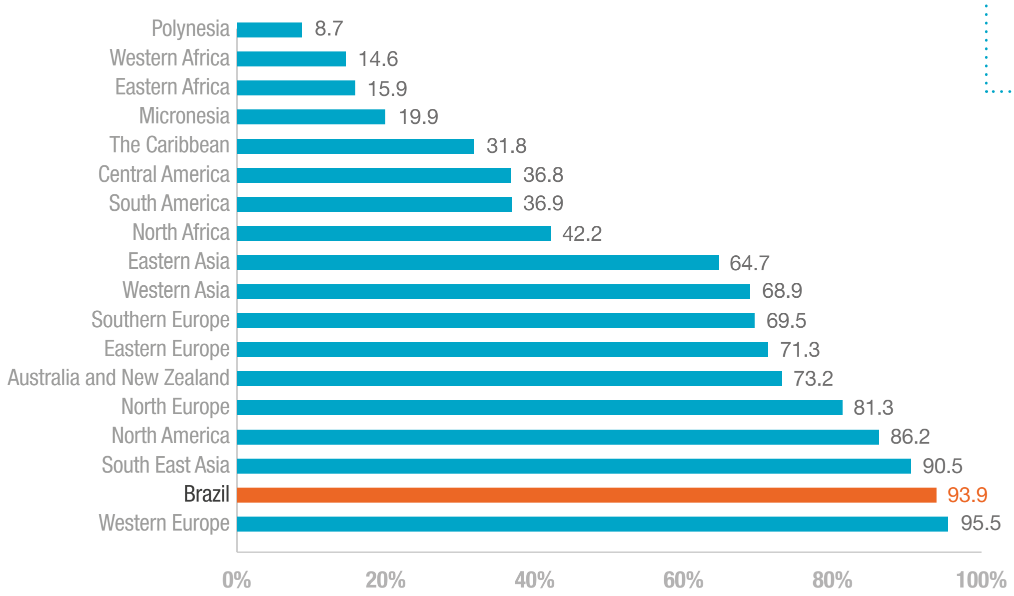
Water supply deficit by income range (%)



The global percentage of access to safely managed drinking water services is 71%.

According to data from the Sustainable Development Goal 6 - Synthesis Report on Water and Sanitation 2018. Available at goo.gl/SZN54g

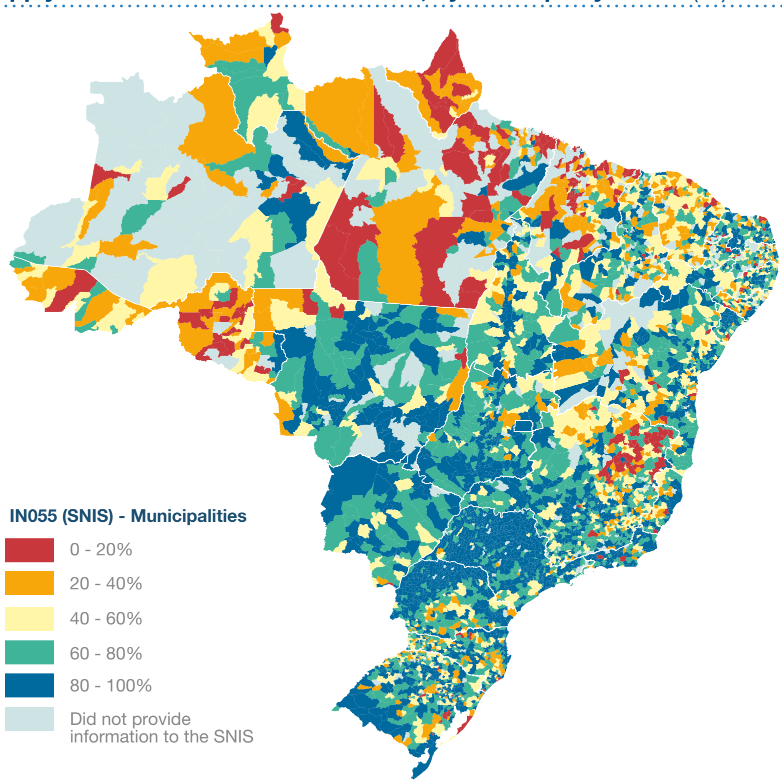
Safely managed drinking water services in the World and in Brazil - Population Served in Each Region - 2006-2015 Average (%) 2009-2015 Average for Brazil



The data on drinking water supply in the world (Indicator 6.1.1 ODS 6) is stored by the Joint Monitoring Program for Water Supply, Sanitation and Hygiene (JMP), and is available for the period of 2000-2015 at https://washdata.org/data/country. The high percentage for Brazil is probably due to the fact that the intermittency in the supply and water quality aspects have not been taken into account so far.

In addition to the data for the entire country or divided by geographical region and federation unit, the public water network's supply rates can be obtained by Brazilian municipality, based on the data provided by the National Sanitation Information System (SNIS). This year this number was an average of 83.3% for the country. It should be noted that the index does not include alternative supply solutions, which are very common in Brazil's North and Northeast regions and in less densely populated areas, such as rural areas.

Water Supply Network Service Index in Brazil, by Municipality – 2016 (%)



The overall water supply coverage can be analyzed by municipality (considering the municipalities who reported data to SNIS). IN055 Indicator: Total Water Service Supply to the Population Index. Available at http://www.snis.gov.br/

METHODOLOGICAL SHEET

INDICATOR 6.1.1

Concept

The indicator aims to quantify the proportion of a country's population that uses safely managed drinking water services, which are available where necessary and free from fecal contamination and hazardous chemicals.

The standards used as reference are associated with piped water for use in households or properties; public taps; shallow or tubular wells; protected springs and rainwater. In this way, the indicator incorporates three aspects: water availability when necessary, accessibility by the population and quality of the water used.

Methodology and Data Sources

For the calculation of indicator 6.1.1, data from the National Household Sample Survey – PNAD (2009 to 2015), considering the rural and urban population residing in households served by the general network or by collective alternatives, and data from Continuous PNAD (2016 and 2017), considering the households with indoor plumbing, supplied by the general network or alternative sources, such as deep or artesian wells, shallow wells, water tables, fountains or springs, and other forms of supply.

Data sources:

IBGE/SIDRA – Table 1955 | **IBGE** – Continuous PNAD

Time series available for 2018:

2009-2017

Spatial unit for calculation

Federation Unit

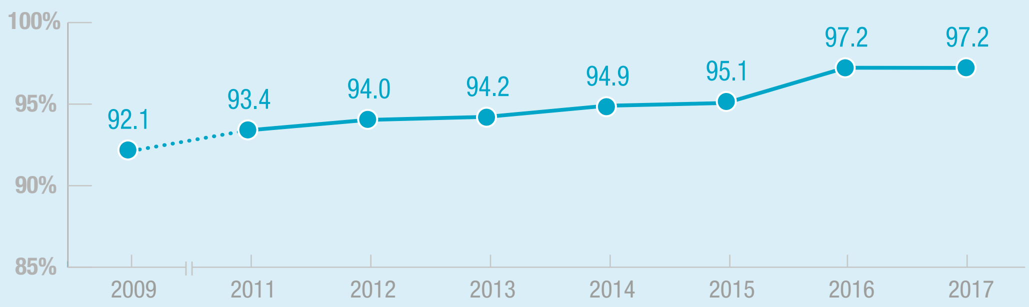
Spatial level

Federation Unit, Geographical Region, Brazil

Step by step

1. Consultation to the PNAD Time series by Federative Unit through the IBGE Automatic Recovery System (SIDRA) database, to obtain the total population and the proportion of the population residing in households with indoor plumbing serviced by the general network or by alternative sources.
2. Consultation to the Continuous PNAD by Federative Unit for the calculation of households with indoor plumbing supplied by the general network, independent of frequency, and by other sources (wells and springs).
3. The aggregation is made by Federative Unit, Geographical Region and for Brazil, per reference year, for the total population.

Evolution of indicator 6.1.1 in Brazil – 2009-2017 (%)



Proportion of the Population Using Safely Managed Drinking Water Services

Results: Time series of Indicator 6.1.1 (%)

Territorial Unit	2009	2011	2012	2013	2014	2015	2016	2017
Rondônia	91.3	91.1	97.3	94.8	97.5	99.0	99.0	98.3
Acre	65.7	72.7	72.0	71.0	72.9	78.6	88.2	85.3
Amazonas	84.7	82.1	87.8	87.0	88.5	87.7	91.8	92.6
Roraima	90.6	93.5	94.7	92.4	93.6	92.9	98.5	97.8
Pará	70.8	76.1	80.0	83.5	84.8	86.1	90.7	89.8
Amapá	94.6	85.6	90.1	92.1	90.9	87.6	95.9	97.6
Tocantins	86.2	88.2	90.4	92.6	92.6	94.5	97.0	97.8
North	**78.7**	**80.8**	**84.9**	**86.3**	**87.6**	**88.4**	**92.8**	**92.5**
Maranhão	66.8	70.9	73.8	70.4	76.4	76.7	89.8	90.0
Piauí	70.9	81.2	84.1	83.7	87.5	88.2	91.5	92.0
Ceará	84.7	83.9	85.0	86.1	89.2	88.2	91.3	92.6
Rio Grande do Norte	89.8	91.1	93.2	93.2	91.7	92.9	93.7	94.4
Paraíba	83.3	87.6	87.7	89.3	89.7	91.0	88.3	87.5
Pernambuco	83.1	87.6	88.2	87.5	88.2	87.9	91.3	90.6
Alagoas	78.5	84.2	84.0	87.5	87.1	87.0	91.5	91.1
Sergipe	89.9	88.2	89.3	90.3	91.2	90.5	94.3	93.9
Bahia	84.8	87.9	89.3	89.7	90.4	91.1	94.8	94.4
Northeast	**81.6**	**84.7**	**86.1**	**86.2**	**87.8**	**88.0**	**92.2**	**92.2**
Minas Gerais	96.8	98.0	98.1	98.5	98.9	98.8	99.6	99.7
Espírito Santo	99.7	99.5	99.6	99.4	99.8	99.1	99.9	99.9
Rio de Janeiro	99.3	98.7	97.6	97.9	97.4	98.3	99.3	99.6
São Paulo	99.0	99.3	99.2	99.2	99.3	99.3	99.9	99.8
Southeast	**98.6**	**98.8**	**98.6**	**98.8**	**98.9**	**99.0**	**99.7**	**99.8**
Paraná	98.6	99.0	98.9	99.2	99.5	99.5	99.8	99.8
Santa Catarina	99.0	99.1	98.5	99.0	99.2	99.3	99.9	99.9
Rio Grande do Sul	98.6	99.2	99.5	99.1	99.2	99.5	99.8	99.7
South	**98.7**	**99.1**	**99.1**	**99.1**	**99.3**	**99.6**	**99.8**	**99.8**
Mato Grosso do Sul	97.6	97.9	98.1	98.5	98.8	99.1	99.6	99.8
Mato Grosso	93.2	96.4	97.0	96.5	98.1	97.5	99.2	99.4
Goiás	98.2	98.6	98.8	98.7	99.3	98.5	99.8	99.7
Distrito Federal	99.2	99.1	98.8	99.0	98.8	99.3	99.3	100.0
Midwest	**97.2**	**98.1**	**98.2**	**98.2**	**98.9**	**98.5**	**99.5**	**99.7**
Brazil	**92.1**	**93.4**	**94.0**	**94.2**	**94.9**	**95.1**	**97.2**	**97.2**

The calculated Indicator includes only variables related to accessibility, not considering, in its calculation, the availability (existence of intermittences, for example) or quality (meeting of drinking water standards) dimensions.

The water used in the human consumption supply returns to the environment in the form of sewage. In spite of the sanitation sector's advances and the positive impacts on the living conditions of the Brazilian population, there is a marked difference between the levels of access to water supply and sanitation.

In contrast to what has historically happened with water services, which have been gradually expanded in the country since the 1960-70's, only in recent years has Brazil had more significant investments in sewage collection and treatment.

There are, to this date, important institutional differences between water and sanitation services in the country, reflecting policies adopted in the 1970s and 1980s, as was the case for the National Sanitation Plan (PLANASA) that favored investments in water supply, especially in regions where municipalities transferred the services to state companies. As a result, about half of the Brazilian municipalities do not currently have an institutionalized service provider to offer sanitation services.

Target 6.2 of SDG 6 aims to universalize the collection and treatment of the countries sewage by 2030. It is monitored by **Indicator 6.2.1: Proportion of the Population using safely managed sanitation services, including handwashing facilities with soap and water.**

The indicator seeks to measure the part of the population using safely managed sanitation services and facilities that provide adequate hygiene habits. As defined by the UN, the indicator is tracked through two sub-indicators: the proportion of the population that uses safely managed sanitary services (internal piping for conducting the wastewater from toilets to public sewage collecting networks and septic tanks or pit latrines, with treatment); and the proportion of the population that has hand washing facilities in their households.

The population that uses safely managed sanitation is defined by the UN as one that has an improved sanitation facility in their households that is not shared with other households, and whose sewage is treated and disposed of *in situ* (on-site), or transported and treated outside of the land or property. Improved sanitary facilities include private toilets with a flushing system or another form of adding liquids by the user so as to direct it to the sewage collection system, septic tanks or pit latrines, improved pit latrines (with slab or ventilated) and composting toilets. Improved sanitary facilities which do not meet the mentioned treatment criteria are characterized as "basic services", such as untreated pit latrines. As for the septic tanks, they are considered to be appropriate on-site treatment solutions.

The Brazilian technical standards require the absolute separation of rain and sewage networks, but older cities sometimes use the same network, which can launch directly into the receiving body or direct the effluent to the treatment plant.

The parcel of the Brazilian population that used safely managed sanitation services was 63.5% in 2016. The calculation considers the proportion of the population with access to the collection and treatment of sewage through the public network, including septic tanks that are connected to the network, which, together, reached 49.3% of the population, as well as the percentage of the population that had their sewage destined to septic tanks not connected to the network, which represented 14.2%.

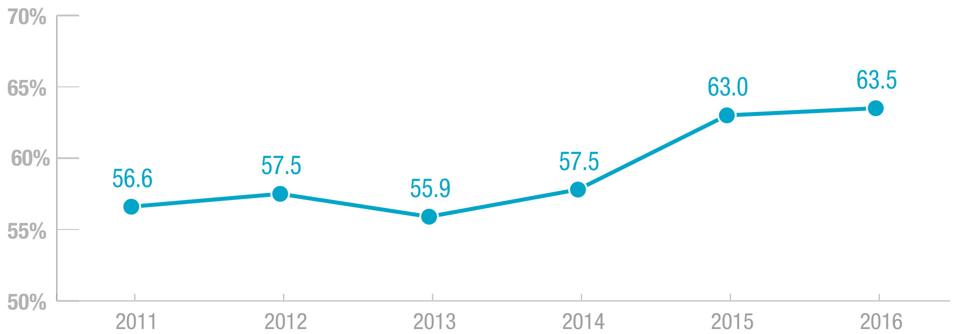
Although the methodology suggested by the UN considers that pit latrines represent a safe solution for the treatment of domestic effluents, it was decided not to include the portion of the population whose sewage is destined to pit latrines in the indicator calculation for Brazil, due to the absence of systematized information in the country about the disposal of the sewage collected at these pits, in addition to the risks associated with the possible contamination of water resources arising from the use of this type of solution.

SDG 6 Indicator 6.2.1: Proportion of the population using safely managed sanitation services, including handwashing facilities with soap and water results.

The PNAD data is adapted to the methodology from 2011 on, and comprises the total urban and rural population. It should be noted that the last year of the series was calculated from the "households" variable and not the "population" variable as was done for the previous years, since the Continuous PNAD restricted the data dissemination solely to the first category.

Evolution of the population using safely managed sanitation services in Brazil – 2011-2016 (%)

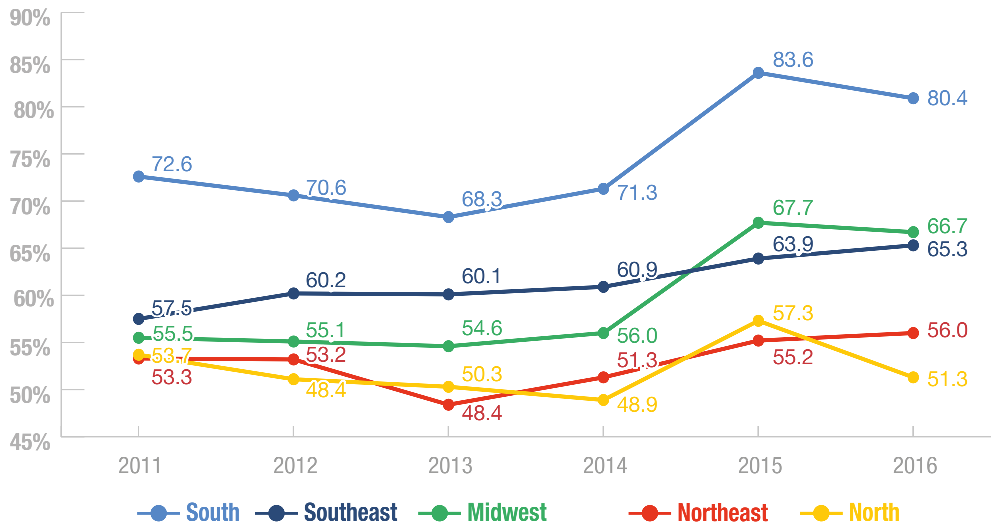
*SNIS data (2011-2016), PNAD data up to 2015 and PNADC data for 2016



Changes in the PNAD methodology for the Continuous PNAD may explain the indicator's decrease in some regions between 2015 and 2016.

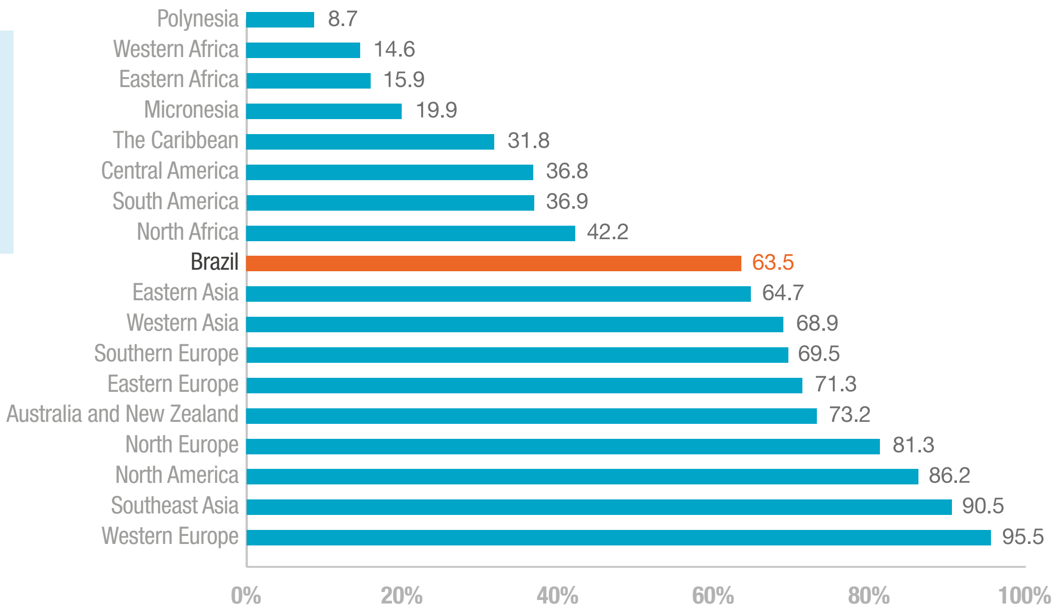
Evolution of the population using safely managed sanitation services the Geographical Regions – 2011-2016 (%)

*SNIS data (2011-2016), PNAD data up to 2015 and PNADC data for 2016



Data on the sanitation services all over the world (SDG 6 Indicator 6.2.1) is stored by JMP and is available for the period between 2000-2015 at https://washdata.org/data/country

Sanitation in the World and in Brazil - Population Served by Region - 2006-2015 Average (%) - 2011-2015 Average for Brazil



A 7% increase is observed in the proportion of the Brazilian population that used safely managed sanitation services between the years 2011 and 2016. This evolution represents 21.9 million who began enjoying safely managed sanitation sewage services in the last 6 years.

Improvements were observed in all geographical regions; however, the inter-regional differences are still quite expressive. The South Region was the only one that reached over 80% of the population.

Comparing the Brazilian situation with other regions of the world, the parcel of the population that uses safely managed sanitation services in the country is above that of South America and Central America, and below Asia, North America, Europe and Oceania.

In the same way as water supply, a few observations are necessary regarding the data sources and methodologies available for the calculation of indicator 6.2.1 in Brazil. With regard to the use of septic tanks, distortions in the results of surveys carried out at a household level can occur due to wrong information reported by the interviewees, who, in a lot of cases, do not know the differences between septic tank and pit latrine.

Septic tanks may be being computed as pit latrines. In the framework of collective solutions, the interview with the residents may, again, result in a wrong characterization of the household as having access to the collection network, when, in fact, the domicile is connected to the drainage network.

Classification errors may occur on the part of the interviewee. Furthermore, sample survey information tends to reveal some inconsistencies when analyzed from a historical perspective or even when compared to the demographic census, especially in federation units that have a large population in rural areas. In the case the state of Rondônia's case, for example, the 2010 census found that 16% of households had access to sanitation through septic tanks. But in the National Household Sample Survey (PNAD) just one year later, a percentage of 70% was recorded, and a percentage of 39% was recorded in 2015.

The data is inconsistent probably due to the separation of septic tanks and pit latrines made in the PNAD and to errors in information provided by the population interviewed.

Concerning the second sub-indicator proposed, the proportion of the population that has access to hand washing facilities in their households, Brazil does not have data that identifies the presence or absence of hand washing facilities and, additionally, whether these facilities have soap or not. It is also not a common practice in household surveys in Brazil to ask about the population's hygiene habits. Considering that the goal of target 6.2 of SDG 6 concerns access to sanitation and hygiene, the hygiene component cannot be measured at the moment for Brazil. However, it is worth noting that the practice of open defecation is not common in the country and the act of washing hands with soap and water is a culturally widespread habit. Education and health care programs existent in the country also guide the population in the adoption of this practice.

For the calculation of Indicator 6.2.1 it was not possible to consider the existence of a bathroom or toilet for exclusive household use, considering that the Continuous PNAD data did not allow for the crossing of this variable with the sanitation modality adopted at the household. By analyzing the variable in an isolated manner, one can verify that 1.56% of the population had no access to a bathroom or toilet for exclusive household use in 2016, a number that represented the amount of 3.2 million people without this basic access to the maintenance of hygienic habits.

Furthermore, target 6.2 also emphasizes the importance of paying special attention to specific groups in society according to special needs, such as women and girls, as well as more vulnerable populations. Even though there is no consolidated conceptual framework available, the vulnerability issue, when analyzed through a socioenvironmental approach, is directly related to the urbanization dynamics and the housing issue, considering that lower income social groups end up residing in areas with greater risk exposure, more susceptible to environmental degradation and with less access to goods and services provided by the government.

The data provided by the Continuous PNAD does not allow differentiation of the population's access to sanitation services by gender. However, taking as reference other surveys conducted by IBGE, there does not seem to be any relevant difference in the access to sanitation services between men and women that is deserving of special emphasis.

Unlike with water supply, it was not possible to analyze the results of indicator 6.2.1 by income range, because its calculation was built from data on sewage treatment volumes, which do not allow for the identification of the estimated household income, in addition to the PNAD and Continuous PNAD data.

National Water Supply and Sanitation Plan – PLANSAB

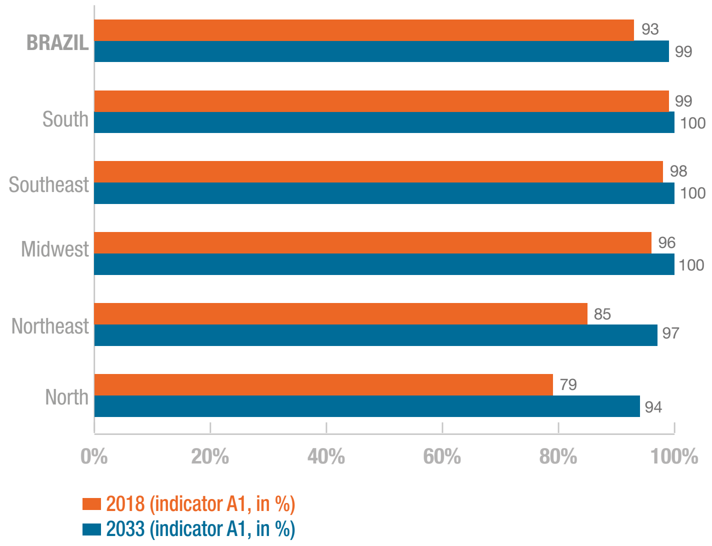
Goal	Year		
	2018	2023	2033
A1. % of urban and rural households supplied by a distribution network, a well or spring with internal piping	93	95	99
E1. % of urban and rural households supplied by collection network or septic tank for the sewage	76	81	92
E4. % of sewage collected and treated	69	77	93

The Water Supply and Sanitation Plan, which is determined by Law No. 11,445/2007, was approved in December of 2012. The Plan established the guidelines, goals and actions for water supply and sanitation in Brazil for the next 20 years.

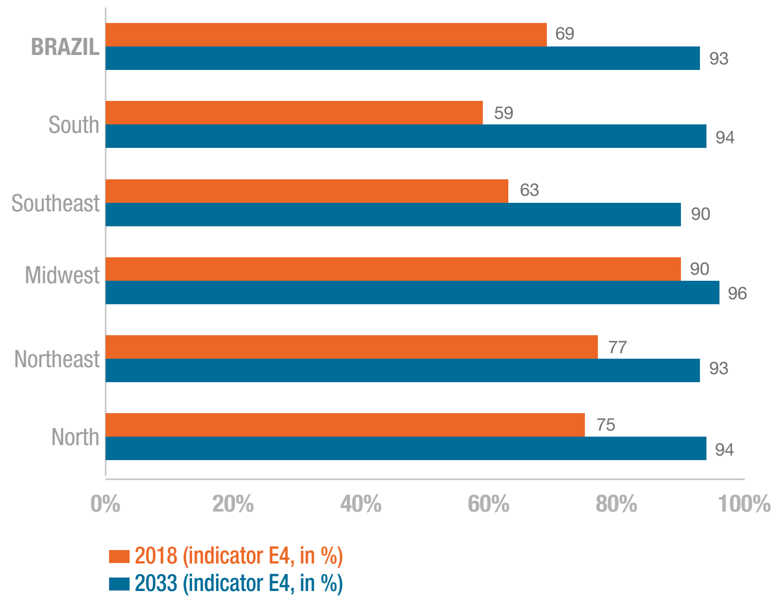
PLANSAB summarizes the situational analysis of water supply and sanitation in the country, and is composed of studies regarding deficits, programs and federal actions, as well as investments made and proposes short, medium and long-term goals, divided by macro-region.

It also presents the projection of investment necessary - by basic sanitation component - in order to meet the planned goals. Finally, macro-guidelines, strategies and government programs necessary for its effective materialization are also pointed out.

PLANSAB water supply goals



PLANSAB treatment of sewage collected goals



Ever since the first infrastructure actions at the beginning of the 20th century, sanitation in Brazil is often associated with the provision of exclusionary and low quality services that focus on the country's most dynamic areas, excluded a large part of the population (especially lower income populations in the large urban centers, and rural populations) and prioritizing water supply actions, to the detriment of sanitation systems.

The coverage of the country's sanitation services has significantly evolved in the last 10 years. However, the deficit in basic sanitation has not changed much. That is, even though we are able to observe a relative improvement in the indicators that measure access to these services, the number of households without access to water supply and sanitation has remained relatively stable, showing that the basic sanitation public policies have not been able to keep up with the pace of the country's growth, urbanization, and the formation of precarious settlements.

The public authorities play a central role to ensure that the SDG 6 targets are met. According to the Federal Constitution of 1988, the Federal Government, the states, the federal district and the municipalities have shared competences in policies of local interest. However, it is the responsibility of the municipality, as the sanitation services' holder, to manage the sanitation in its territory.

From an institutional perspective, the sanitation sector has been experiencing major challenges in recent years, arising from the approval and implementation of a new regulatory framework after a long political-legal battle with the promulgation of Law No. 11,445/2007. The Law, which establishes the national guidelines for basic sanitation and the Federal Sanitation Policy, assigns public authorities a series of obligations for organizing sanitation services. Thus, the public sanitation services holders will be able to choose to provide the services directly or to delegate them, in order to formulate the respective public sanitation policy and draw up the Municipal Sanitation Plans, among other tasks. After 10 years since the law's approval, only about 41.5% of the municipalities have had their plans drawn up, according to a survey conducted by IBGE in 2017.

The federal legislation entrusted the Federal Government with the responsibility of drawing up the Basic Sanitation National Plan (PLANSAB), which aims to establish a set of guidelines, targets and strategic actions to universalize the basic sanitation services in the national territory. Among a set of 23 targets presented and monitored by the Plan, targets A1, E1 and E4 are highlighted (see PLANSAB graphs on the previous page) due to its direct relationship with SDG 6 targets 6.1 and 6.2, in spite of some methodological differences observed in the construction of the indicators.

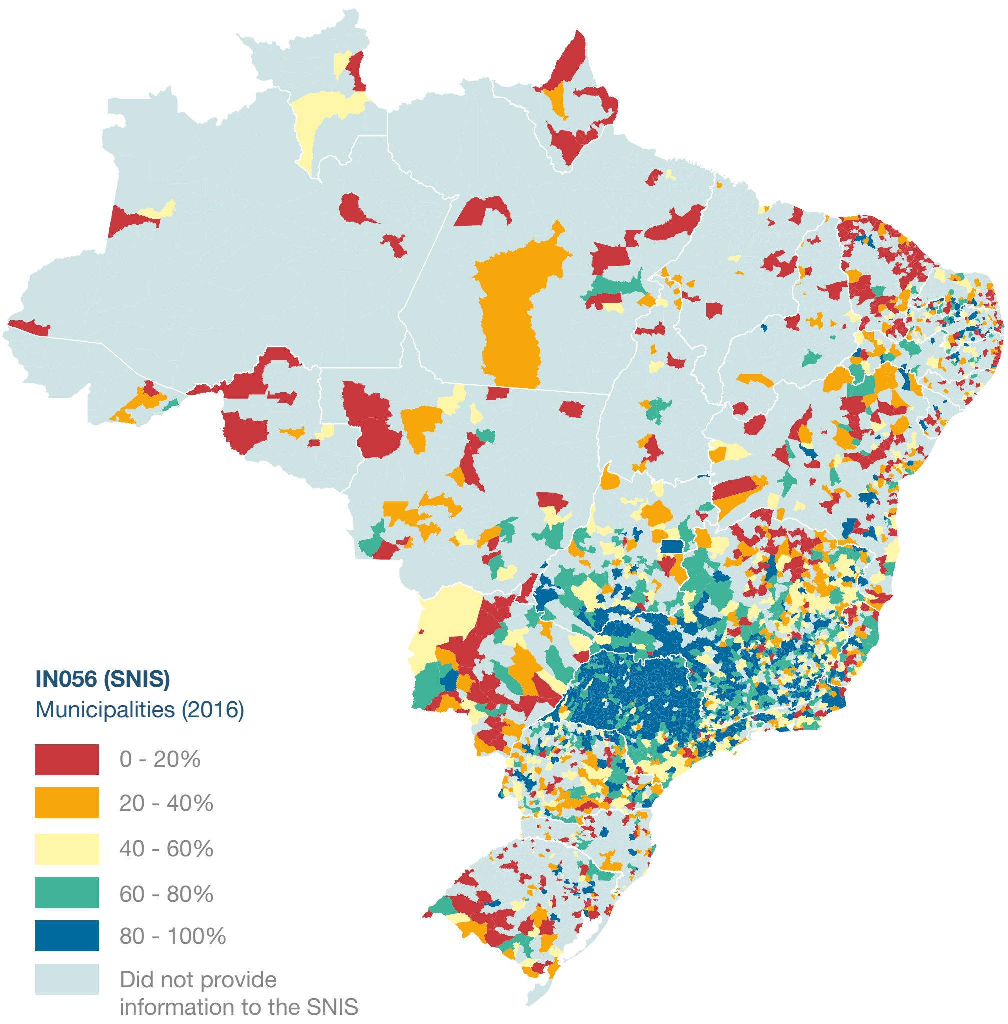
Currently, water and sewage services are provided by public and private institutions organized in different institutional models. Holders may provide the services directly (through the direct or indirect town hall administration structures) or delegate them to a service provider, whether that service provider is regional (state sanitation companies), micro-regional or local. The providers may work as private operators but must report to the public administration. According SNIS 2016 data, regional service providers were responsible for supplying water to 72.4% of the Brazilian municipalities and for providing sanitation services to 24.3% of the Brazilian municipalities, these figures correspond to percentages of 74.0% and 59.4% of the resident urban population, respectively.

Data obtained from the Basic Municipal Information Survey (MUNIC) 2017, carried out by IBGE.

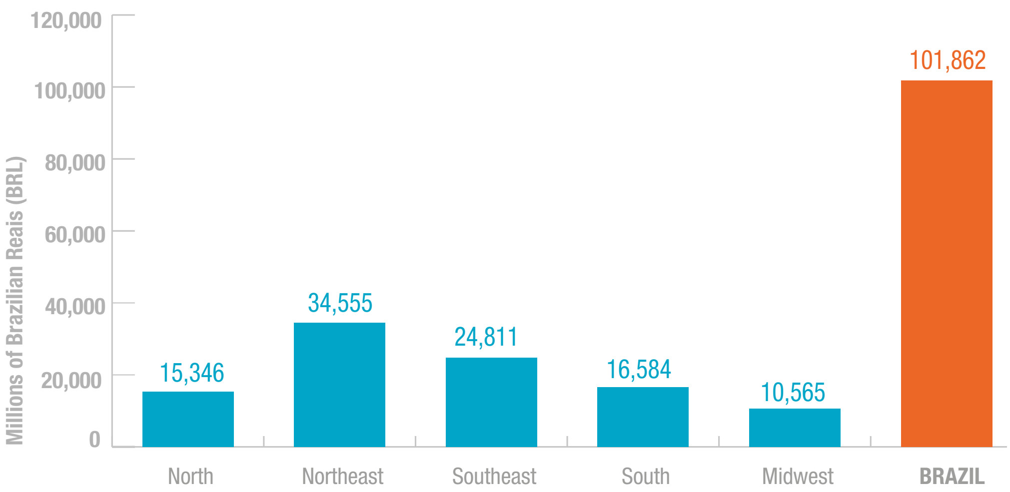
The sewage collection network coverage can be analyzed by municipality with data from SNIS - indicator IN056: Total Sewage Service Index Referred to the Water Supplied Municipalities.

Available at
http://www.snis.gov.br/

Sewage Collection Services Rate in the Municipalities in 2016 (%)



Necessary investments in sewage treatment for Brazil until 2035, according to the Sewage Atlas



Due to the absence of municipal data for the calculation of indicator 6.2.1 as suggested by the UN, we were able to obtain the data from the sewage collection public network total supply index by municipality, SNIS Indicator IN056, which was of an average of 51,9% for the country in 2016. However, it is noted that the index does not include individual sanitation solutions, such as septic tanks and pit latrines, nor does it contain information about sewage treatment, which will be addressed in more detail in target 6.3.

In 2017, ANA published the "Sewage Atlas - River Basin Cleanup" (In Portuguese: Atlas Esgotos - Despoluição de Bacias Hidrográficas), as the result of a detailed survey of the sanitation systems of all urban centers in Brazil, carried out in 2013. The Sewage Atlas results indicated that 61.4% of the Brazilian urban population had their sewage collected in 2013, however, 18.8% of the collected sewage was not treated, which can be considered as a poor quality, as rated by the PLANSAB; 12% of the population used individual solutions (septic tanks); and 27% was not served by collection or treatment services, that is, was devoid of any sanitation services. The best conditions have been identified in the Southeast Region.

The Sewage Atlas contemplated the diagnosis of the sanitation services in Brazil, based on a comprehensive and detailed survey carried out in all 5,570 Brazilian municipalities in 2013, highlighting its implications in the quality of the receiving water bodies. The necessary investments in sewage treatment were estimated and a proposal for guidelines and an integrated strategy for carrying out the established actions were presented. More information on the Sewage Atlas Is available at http://atlasesgotos.ana.gov.br/

Considering the collection of sewage via public network in Brazil, the Sewage Atlas's recommendations to achieve the universalization of the services point to a need for investment of about 100 billion BRL by 2035, which is over double the amount of investment required for sewage treatment, estimated at 47.6 billion BRL.

The investments were estimated on the basis of population projection and water quality modeling, which considered the interaction between the emissions from all cities and, using the river basins as units of analysis, provided subsidies for the definition of the level of sanitary waste removal efficiency required, based on the limits for the classes established by CONAMA Resolution No. 357/2005.

When considering sustainable development, the importance of sanitation treatment and water supply for public health, quality of life and the environment is widely recognized. For decades, several studies have shown the association between the lack of sanitation and high rates of hospital admissions, the proliferation of water-borne diseases and high mortality rates, especially for children. The interventions in basic sanitation are directly reflected in the improvement of public health conditions, reducing the incidence of water-borne diseases, whose rates have been decreasing in all regions of Brazil, especially since 2003 and mainly in the Northeast Region.

SDG 3 (Good Health and Well-Being) Indicator 3.9.2 - Mortality rate attributed to unsafe water sources, unsafe sanitation and poor hygiene is associated with SDG 6 targets 6.1 and 6.2

The effects of environmental degradation resulting from the absence of collection and proper treatment of domestic sewage are also widely known, and will be further addressed in Indicator 6.3.2. However, it was only in recent periods, especially through the spreading of sustainable development ideals, that the approaches to sanitation policies began to incorporate social justice aspects, without prejudice to the traditional approaches to sanitation, and to urban and environmental planning.

METHODOLOGICAL SHEET

INDICATOR 6.2.1

Concept

The indicator measures the parcel of the population using sanitation services and sanitary facilities with adequate safety criteria regarding hygiene habits.

As defined by the UN, the indicator is tracked through two sub-indicators: the proportion of the population that uses safely managed sanitary services (internal piping for the conduction of the wastewater from toilets to public sewage drains and septic tanks or pit latrines with treatment); and the proportion of the population that has hand washing facilities in their households.

The population that uses safely managed sanitation services is defined by the UN as one that has an improved sanitation facility in their household that is not shared with other households, and whose sanitary waste is treated and disposed of *in situ* (on-site), or transported and treated outside the land or property. Improved sanitary facilities include private toilets with a flushing system or another form of adding liquids by the user so as to direct it to the sewage collection system, septic tanks or pit latrines, improved pit latrines (with slabs or ventilated) and composting toilets.

Improved sanitary facilities which do not meet the aforementioned treatment criteria are characterized as "basic services", such as pit latrines without sanitary waste collection for treatment. As for septic tanks, they are considered to be appropriate on site treatment solutions.

Methodology and data sources

Information from SNIS, PNAD and Continuous PNAD was used for calculating the indicator, in accordance with the following formulation:

$$\text{Indicator 6.2.1} = (\text{IN016} \times \text{PNAD}_A) + \text{PNAD}_B$$

where:

IN016 = sewage treatment Index (in %) given by the following formulation:

$$\frac{ES006 + ES014 + ES015}{ES005 + ES013}$$

Where:

ES005: Collected sewage volume

ES006: Treated sewage volume

ES013: Volume of imported raw sewage

ES014: Volume of imported sewage treated at the importer's premises

ES015: Volume of raw sewage treated at the importer's premises

$PNAD_A$ = Proportion of the population residing in households supplied by a general network or septic tank connected to the general network

$PNAD_B$ = Proportion of the population residing in households with septic tanks that are not connected to the public network

Obs. 1: The PNAD's result for the year of 2016 was calculated from the "proportion of households" variable and not from the "proportion of population" variable as was established for the previous years, since the Continuous PNAD restricted data dissemination exclusively to the first category.

Obs. 2: The PNAD's result for the year of 2016 regarding septic tanks was calculated from the time series' projection, since the data on septic tanks and pit latrines were no longer separated in the PNADC.

Data sources:

SNIS: Indicator IN016 - Sewage treatment index (%);
IBGE/SIDRA: PNAD 2011-2015 - Table 1956
IBGE/SIDRA: Continuous PNAD 2016

Time series available for 2018

2011-2016

Spatial unit for calculation

Federation Unit

Spatial level

Federation unit, Geographical Region, Brazil

Proportion of the population using safely managed sanitation services, including handwashing facilities with soap and water

Step by step

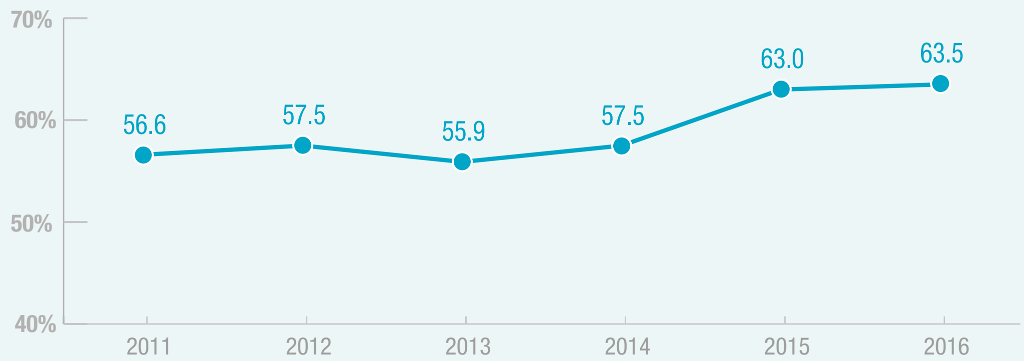
1. The data from SNIS IN016 is obtained in the "Summary table of Information and indicators per state", with the respective group totals and by year.
2. The percentage of urban and rural population served by septic tanks connected to the general network ($PNAD_A$) is obtained from SIDRA.
3. The percentage obtained in Step 2 is multiplied by the volume of treated sewage provided by SNIS IN016.
4. The percentage of urban and rural population supplied with septic tanks not connected to the general collection network ($PNAD_B$) is obtained
5. The urban and rural population supplied by septic tanks in each municipality is projected for 2016 through the extrapolation of its growth trend according to PNAD data for the period of 2011-2015, considering that the Continuous PNAD does not individualize septic tanks and pit latrines
6. Indicator 6.2.1 is calculated for the years 2011to 2016 in accordance with the above equation
7. The indicator is aggregated for each federative unit, geographical region, and for the country

Results: Time series for Indicator 6.2.1 (%)

Territorial Unit	Reference Year					
	2011	2012	2013	2014	2015	2016
North	53.7%	51.1%	50.3%	48.9%	57.3%	51.3%
Northeast	53.3%	53.2%	48.4%	51.3%	55.2%	56.0%
Southeast	57.5%	60.2%	60.1%	60.9%	63.9%	65.3%
South	72.5%	70,6%	68.3%	71.3%	83.6%	80.4%
Midwest	55.5%	55.1%	54.6%	56.0%	67.7%	66.7%
BRAZIL	**56.6%**	**57.5%**	**55.9%**	**57.5%**	**63.0%**	**63.5%**

The calculated indicator includes only variables related to the collection and treatment of sewage, not considering, in its calculation metric, the verification of the existence of hydro-sanitary installations (necessary for handwashing).

Evolution of indicator 6.2.1 in Brazil – 2011-2016 (%)

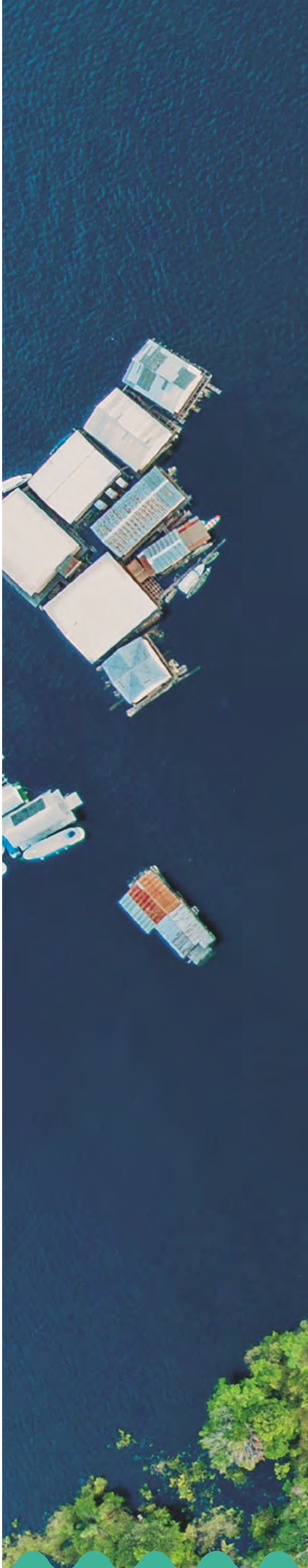


WATER QUALITY AND QUANTITY

In order to assess a country's conditions regarding the quality and quantity of water available for different uses, SDG 6 has set targets 6.3 and 6.4:

Target 6.3 – By 2030, improve water quality in water bodies by reducing pollution, eliminating dumping and minimizing the release of hazardous materials and substances, halving the proportion of untreated effluent discharges and substantially increasing the recycle and safe reuse locally.

Target 6.4 – By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.



Target 6.3 discusses the level of sewage treatment resulting from specific sources, such as household and industrial sewage, and diffuse pollution, such as from areas used for agriculture and livestock, and analyzes the rivers' water quality, reservoirs and aquifers in order to identify the improvements achieved over time and the issues that should be the object of management actions. It also highlights the need to increase recycling and reuse of water, which are important measures for the conservation of water resources. It is closely related to goal 6.2 for domestic source pollutants.

One of the indicators for monitoring target 6.3 is **indicator 6.3.1- Proportion of Wastewater Safely Treated**, which basically aims to quantify the portion of sewage collected by public networks or conducted to residential septic tanks or cesspits, which are treated, thus avoiding their *in natura* launching into water bodies.

This indicator is made up of two sub-indicators, one for domestic wastewater treatment, and the other for industrial wastewater. However, most countries, such as Brazil, do not submit systematic data (at national and regional level) regarding the treatment of industrial effluents that allows for the inclusion of this portion in the indicator's calculation.

In Brazil, the data used for the calculation of safely treated wastewater is derived from national local service providers survey, aggregated to data regarding septic tanks not connected to the public sewage treatment network. The service provider data pertains to urban users, covering urban economic activities (trade, services) and a small portion of industries located in urban areas. In this sense, the data available for calculating the indicator also considers urban wastewater treatment originated in facilities other than households.

At the household level, the indicator directly relates to indicator 6.2.1, which monitors the portion of the population that is served by sewage collection and treatment services. However, indicator 6.2.1 estimates the data in terms of the parcel of the population served. Here, efforts have been undertaken to present the data in terms of volume of sewage generated that is treated, which may include a portion of the sewage originating from economic activities.

In addition to the sewage collected and treated in Wastewater Treatment Plants (WWTP), the inclusion of facilities for sewage treatment at the local level considered by the indicator is crucial from a public health, environment and equality standpoint, considering that approximately two-thirds of the world's population uses facilities of this nature, which are also used by the rural population living in Brazil.

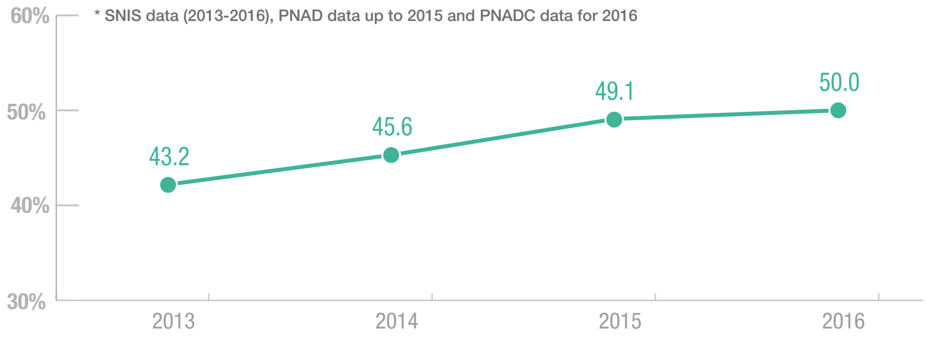
For the purposes of indicator 6.3.1, which aims to reduce the proportion of untreated wastewater, rudimentary cesspools are not considered "safe treatment", unless they are emptied by a method that limits human contact with the effluent, and the wastewater is transported to a designated place, or, should they not be emptied, the effluents be stored on site until they are safe for handling and reuse (as agricultural feedstock, for example). Considering there is no data available regarding cesspit sewage collection for the country, only septic tanks were considered, considering that they offer effluent treatment and are very relevant in the country's rural areas and in scattered urbanized areas, where the implementing of sewage collection networks is not economically justified.

In 2016, according to Indicator 6.3.1, about 50% of the sewage generated by the urban and rural population was treated in collective systems and in septic tanks, showing a positive percentage evolution of 6.8% since 2013. In the calculation the parcels of sewage volumes generated and processed in treatment plants are taken into account, as well as the parcels of sewage volumes generated and intended for individual solutions, treated in the user's own household in septic tanks.

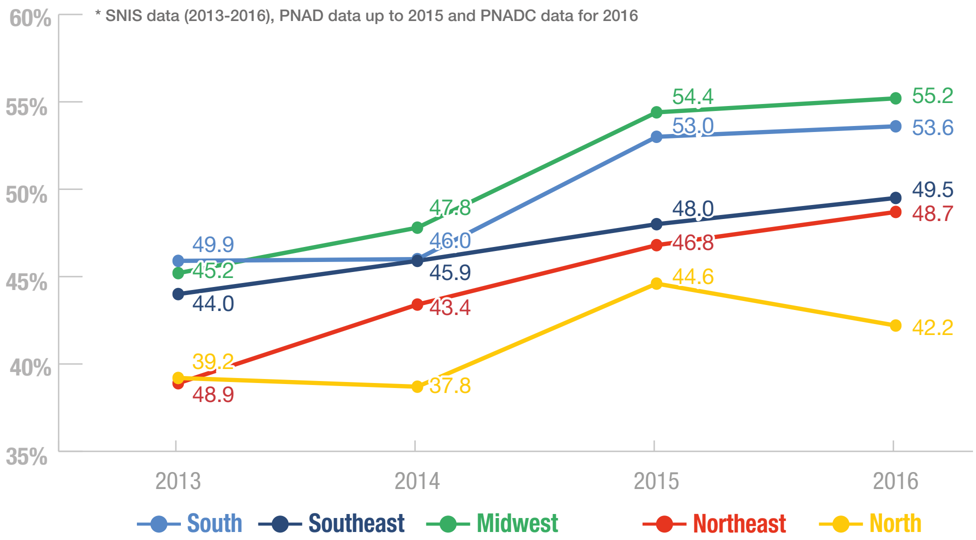
SDG 6 Indicator 6.3.1 - Proportion of safely treated wastewater results.

The indicator time series starts in 2013 and ends in 2016 due to the availability of data for its calculation - PNAD and SNIS.

Sewage treated parcel evolution in Brazil in urban and rural areas – 2013-2016 (%)



Indicator 6.3.1 evolution in geographical regions – 2013-2016 (%)



Unlike previous targets, which provided for universal access to water and sewage collection and treatment, target 6.3 aims to halve the proportion of untreated wastewater by 2030. Thus, the target for the country is to reach an indicator of safely treated wastewater of 75%.

In 2013, only 43% of the sewers generated in the country's urban areas was treated in collective systems (WWTPs). In 2000, this percentage was 21% and, despite having nearly doubled in 13 years, it is still low for reaching satisfactory levels for the country. Brazil's total domestic sewage load can be quantified by the Biochemical Oxygen Demand (BOD), estimated by the Sewage Atlas in 2013 at 9.1 thousand tons/day of BOD, out of which only 39% is removed via treatment processes.

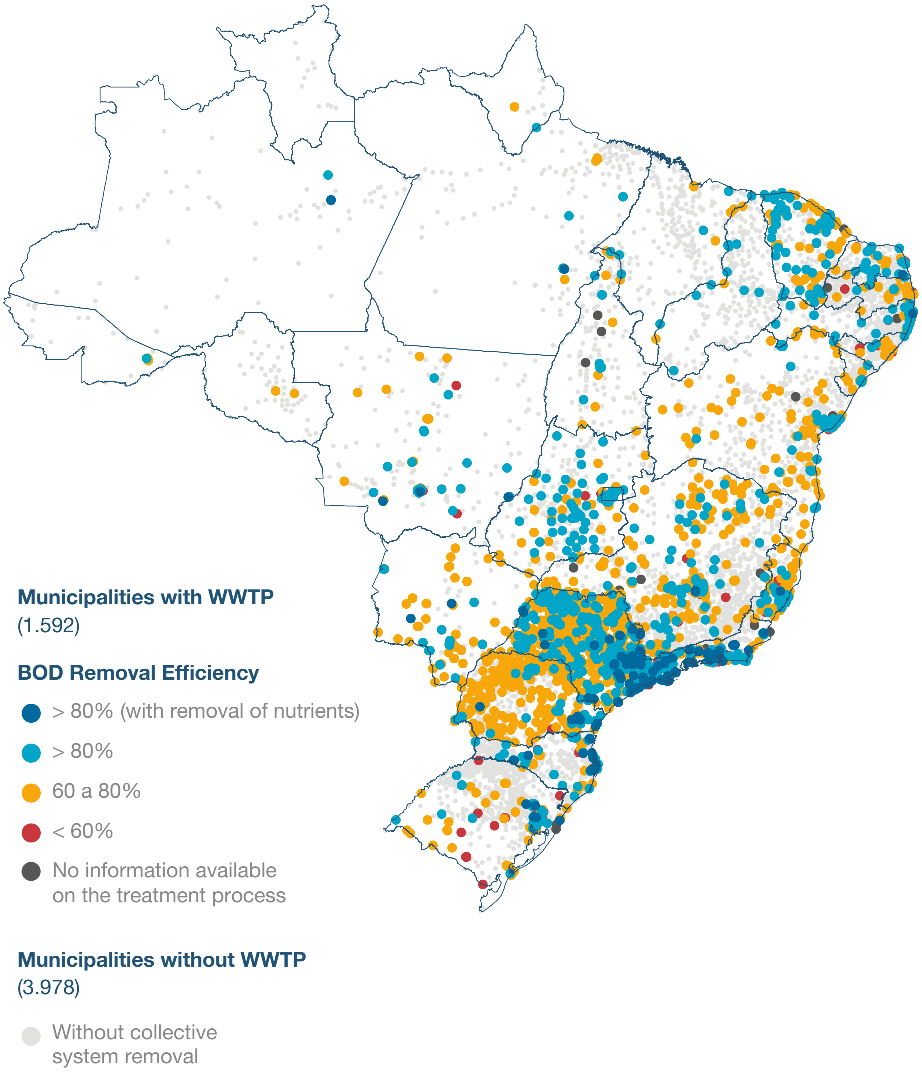
According to the Sewage Atlas, Brazil has 2,952 Wastewater Treatment Plants (WWTP), located in 30% of the country's cities. Data available at goo.gl/GrNgjy

According to the Sewage Atlas, the urban population of Brazil served by sewage collection and treatment systems in WWTPs is of about 38 million people, with the most efficient BOD removal systems located in the São Paulo state.

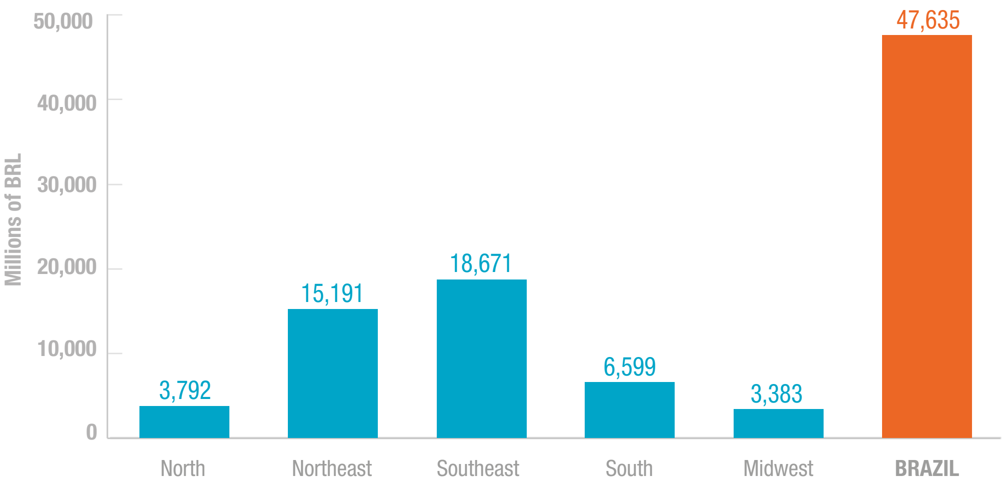
According to data from the Sewage Atlas, the investments in sewage treatment necessary for the universalization of services in Brazil shall reach almost 50 billion BRL by the year 2035, which represents about half of the investment necessary for sewage collection.

Wastewater Treatment Plants in Brazil

*Data from Sewage Atlas



Necessary investments in sewage treatment for Brazil until 2035, according to the Sewage Atlas



Sewage treatment costs were estimated taking into account the required efficiency of BOD removal according to the receiving body's dilution capacity. For each solution, regional cost curves were used considering the treatment process and the municipality's population size.

METHODOLOGICAL SHEET

INDICATOR 6.3.1

Concept

The indicator aims, in short, to quantify the volume of the sewage generated that is treated, avoiding its *in natura* discharge into water bodies. It is measured by the percentage of domestic and economic activities effluents that is safely handled in the country.

This indicator is made up of two sub-indicators, one for domestic wastewater treatment, and the other for industrial wastewater. However, like most countries, Brazil does not submit systematic data regarding the treatment of industrial effluents in order to include this portion of effluents in the indicator's calculation.

However, given that the data from SNIS used to calculate the indicator is obtained from information provided by the sanitation services operators, the volume of treated wastewater considered in the calculation also incorporates data from other sources of wastewater existing in the country's urban areas.

Methodology and data sources

Information from SNIS and PNAD was used for calculating the indicator, in accordance with the following formulation:

Indicator 6.3.1 = [ES006 + ES015 + (VM_rural x POP_tank)] / [(AG010 – AG019) + (VM_rural x POP_no water network)]

Where:

Indicator 6.3.1 = Proportion of safely treated wastewater (in % volume)

ES006 = Volume of sewage treated, in 1000 m³/year (SNIS)

ES015 = Volume of raw sewage treated at the importer's premises in 1000 m³/year (SNIS)

VM_rural = Average volume of water consumed *per capita* in rural areas, in L/house/day (Handbook of Consumptive Water Uses in Brazil-ANA)

AG010 = Volume of water consumed in thousand m³/year (SNIS)

AG019 = Volume of treated water exported in thousand m³/year (SNIS)

POP_tank = Population served by septic tanks not connected to the collection network, in % (PNAD)

POP_no network = Population not connected to the public water supply network, in % (PNAD)

Data sources:

IBGE/SIDRA: PNAD 2013-2015, Continuous PNAD 2016- Table 1956

SNIS 2013 – 2016

ANA: Handbook of Consumptive Water Uses in Brazil

Time series available in 2018

2013-2016

Spatial unit for calculation

Federation Unit

Spatial level

Federation unit, Geographical Region, Brazil

Step by step

1. Data collection:

1.1. Data is obtained from SNIS ES006, ES015, AG010 and AG019, in an aggregated basis, made available by Federation unit and representing the volumes of water consumed and sewage referring to the network for treatment.

1.2. The percentage of the urban and rural population served by septic tanks not connected to the network* (PNAD) is obtained and multiplied by a coefficient of water consumption per rural capita (Handbook of Consumptive Water Uses in Brazil).

*The urban and rural population supplied by septic tanks in each Federative Unit is projected for 2016 through the extrapolation of its growth trend according to PNAD data for the period of 2011-2015, considering that the Continuous PNAD does not individualize septic tanks and pit latrines.

Proportion of Safely Treated Wastewater

1.3. The population not supplied by the network (PNAD) is calculated and multiplied by the coefficient of water consumption per rural capita.

1.4. The treated sewage (added to the treated parcel of septic tanks not connected to the network) is divided by the volume of water consumed (added to the parcel that uses alternative supply sources). The volume of water consumed is used as a proxy for estimating the volume of sewage generated.

2. Indicator 6.2.1 is calculated for years 2011 to 2016 in accordance with the presented equation.

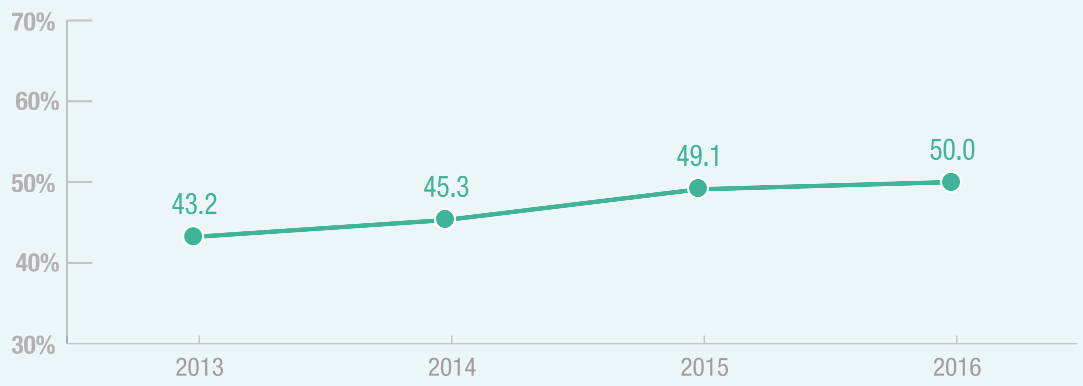
3. The indicator is aggregated for each Federative Unit, geographical region, and for the country

Results: Time series of Indicator 6.3.1 (%)

Territorial Unit	Referencia Year			
	2013	2014	2015	2016
North	39.2%	38.7%	44.6%	42.2%
Northeast	38.9%	43.4%	46.8%	48.7%
Southeast	44.0%	45.9%	48.0%	49.5%
South	45.9%	46.0%	53.0%	53.6%
Midwest	45.2%	47.8%	54.4%	55.2%
Brazil	**43.2%**	**45.3%**	**49.1%**	**50.0%**

The calculated indicator covers only variables relating to the treatment of sewage originated and/or with predominant characteristics relating to households, without considering in its calculation metric the treatment of industrial effluents by own systems.

Evolution of indicator 6.3.1 in Brazil – 2013-2016 (%)



The discharge of treated and untreated domestic and industrial sewage into the water bodies, associated with leaching from areas used for agricultural activities, drainage from urban, degraded and mining areas, etc. causes water pollution by various substances, some harmful to living beings.

Target 6.3 aims to assess a country's water quality conditions by monitoring **indicator 6.3.2 - Proportion of Water bodies with Good Ambient Water Quality.** The 'good' condition indicates quality that presents no harm to the ecosystem or to human health.

CONAMA establishes 5 quality classes for fresh waters in Brazil. For the purposes of the indicator, the areas that met Class 2 limits were considered to be of good quality, that is, appropriate for demanding uses in terms of water quality, such as urban supply through conventional water treatment.

For electrical conductivity (EC), which has no standard set forth in resolution No. 357/2005, an international reference was adopted, which recommends the adoption of values by a correlation with the total dissolved solid standards, obtaining as limit for EC the value of 782 uS/cm.

Source: goo.gl/uwqesH

The overall water quality is estimated (in accordance with the United Nations methodology) from a basic set of six parameters that inform about the most common deficiencies in water quality present in many regions of the world: electrical conductivity; dissolved oxygen (DO); inorganic nitrogen; total nitrogen; total phosphorus; and pH.

Considering the standards defined by the National Environment Council (CONAMA) Resolution No. 357/2005 for class 2, in 2015, 69.3% of the Brazilian water bodies had good water quality, assessed by the analysis of 198,034 records obtained from the monitoring by ANA and by the Federative Units (own networks and Qualiágua Program) carried out in 3,315 stations, for the following parameters: pH, DO, electrical conductivity, nitrogen ammonia and total phosphorus.

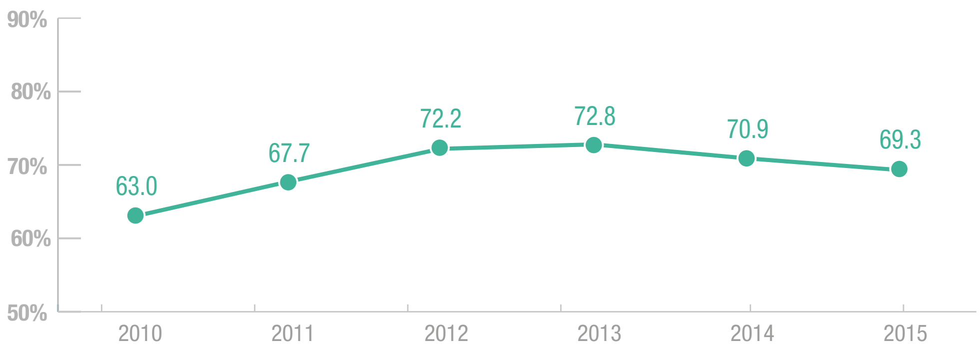
The water was considered to be of "good" quality when 80% or more of the monitoring records assessed met the established benchmarks.

In the case of reservoirs, whose parameters are related to lentic environments, only 37% of the data for total phosphorus met class 2 standards. This suggests that a significant portion of the water bodies monitored, the majority of which was located in the Northeast region, may have presented eutrophic conditions between 2010 and 2015.

Out of the nearly 200,000 water quality-monitoring records made available between 2010 and 2015 in the country, only 7% were collected in reservoirs.

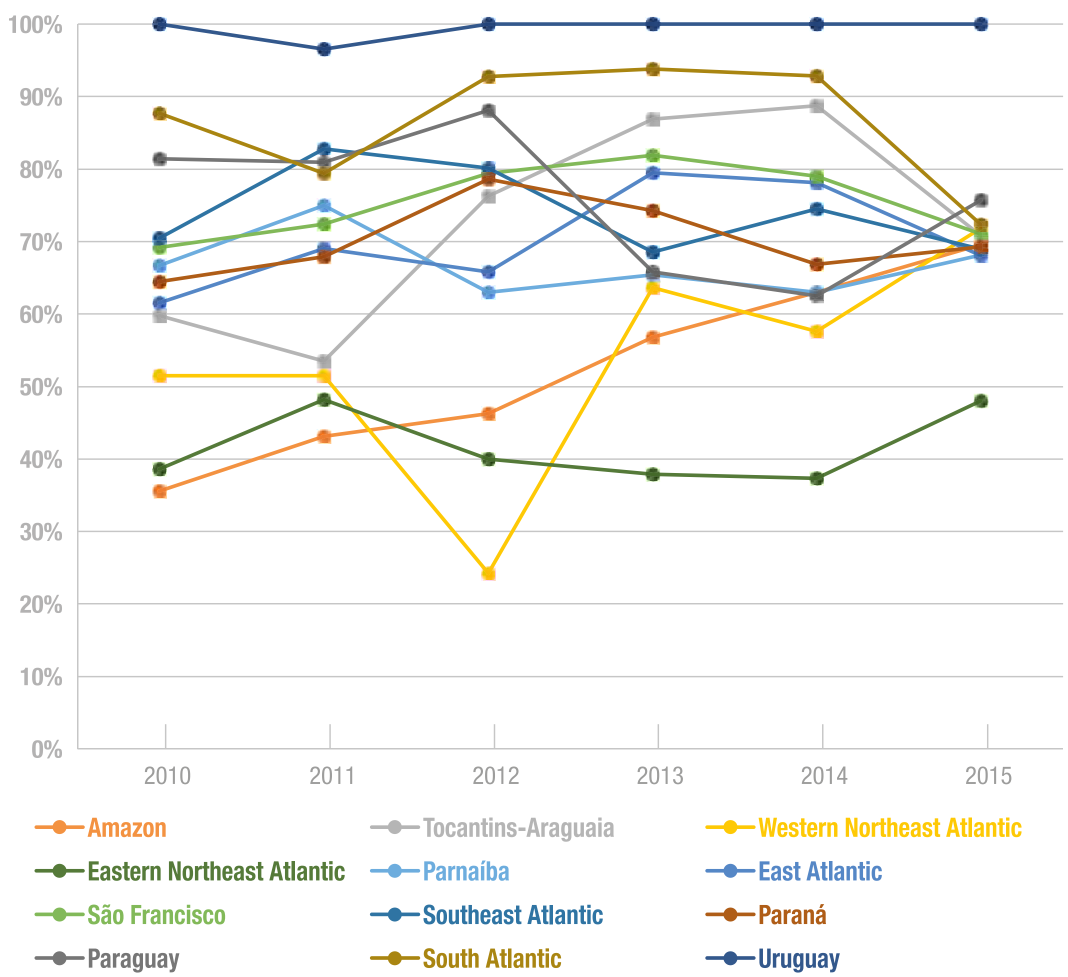
The behavior of rivers (lotic environments) and reservoirs (lentic environments) is different, and it is necessary to monitor them considering such differences, including in regards to the admissible water quality standards, which may vary depending on the type of water environment.

Proportion of water bodies with good ambient water quality in Brazil – 2010-2015 (%)



SDG 6 Indicator 6.3.2 results: Proportion of Water Bodies with Good Water Ambient Quality.

Evolution of indicator 6.3.2 at monitoring points in Hydrographic Regions – 2010-2015 (%)



The waters in the Brazilian territory run through several basins, taking into account different uses. The hydrography of the country is divided into 12 Hydrographic Regions as a way to support planning on a national scale. These regions were defined by the National Water Resources Council (CNRH) in Resolution 32 of 2003.

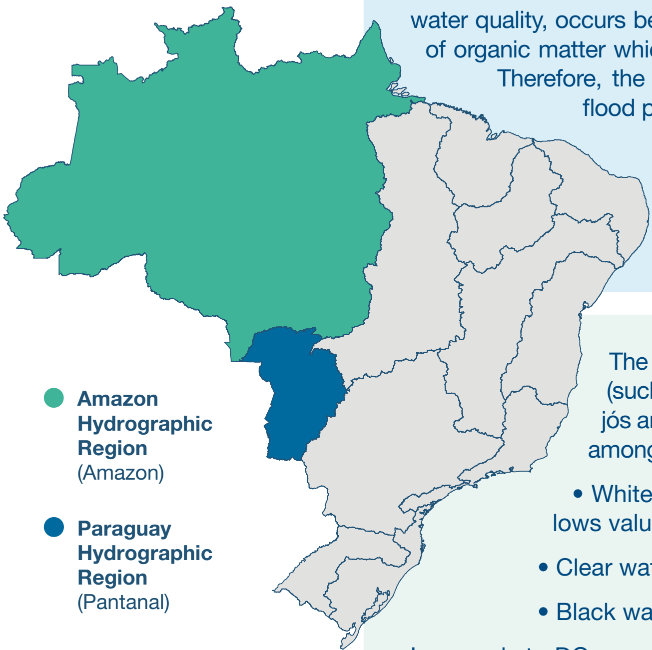
The aggregate results for Brazil are stem from each Hydrographic Region's result, which mainly depends on the density of the existing monitoring points, the amount of logged data, and the variability of the incidence of rainfall, which is reflected in the greater or lesser availability of water for dilution of polluting loads.

Due to the great natural diversity of Brazil, water quality varies greatly from one Hydrographic Region to another, accompanying the climatic variations and also the seasonality of natural phenomena due to the pulses of water stream flows in the periods of ebb and flow. These intrinsic characteristics of specific environments were considered to determine the natural water quality situation in the Pantanal and Amazon regions for calculating the indicator.

In the **Pantanal** swamp, low levels of DO occur due to the decoada phenomenon, which is natural and occurs in some watercourses of the region in periods of flood, such as on the Paraguay River.

The decoada is characterized by a death of fish due to the sudden decrease in DO levels in the water. This reduction, which is accompanied by other changes in water quality, occurs because of DO consumption in the processes of degradation of organic matter which is submerged during lowland floods in the rainy season. Therefore, the phenomenon is associated to the natural Pantanal plain's flood pulses.

Source: *Oliveira, M.D.; Calheiros, D. F.; Padovani, C. Mapeamento e descrição das áreas de ocorrência dos eventos de decoada no Pantanal. Boletim de Pesquisa e Desenvolvimento n° 121. Corumbá: Embrapa Pantanal, 2013.*



The **Amazon** waters are divided into three main types: white waters (such as the Solimões and Purus rivers); clear waters (such as the Tapajós and Xingu rivers); black waters (such as the Negro and Urubu rivers, among others). These waters naturally present the following pH values:

- White waters: pH from 6.4 to 6.9 (compatible with Class 2, which allows values between 6 and 9);
- Clear waters: pH 5.2 to 5.8 (would not meet the class 2 standard);
- Black waters: pH from 4.0 to 4.8 (would not meet the class 2 standard).

In regards to DO, a reduction occurs in values in the periods of floods detected in areas subject to seasonal flooding of the plains situated on the banks of white waters or muddy rivers, such as the Solimões river, which reaches the lowest value of 1.24 mg/L. In these periods, due to the significant input of the total solids suspended in the rivers, the input of light decreases, followed by a decrease in productivity and a decrease in DO concentration, which reaches values below the concentration permitted by Class 2 (of at least 5 mg/L).

Sources:

Junk, W. J. 1979. Recursos hídricos da região amazônica: utilização e preservação. In: Suplemento Acta Amazônica 9 (4):37-51

Pantoja, N. G. 2015. A Utilização da Água de Rio Para o Consumo Humano nas Comunidades Ribeirinhas na Região de Coari a Itacoatiara / Amazonas – Brasil. Plano de Dissertação apresentado ao Programa de Pós-Graduação em Química da Universidade Federal do Amazonas. Manaus, 2015.

Furthermore, there are areas in Brazil, intensely affected by humans, especially in the metropolitan regions and large urban agglomerations, where the surrounding watercourses do not always have the capacity to dilute the polluting loads that are released in them. On the other hand, there are regions with low population density and high water availability, which contributes to better water quality conditions.

Therefore, a single value for Indicator 6.3.2 does not represent the national territory's reality. It is important to identify the Hydrographic Regions that most require interventions for the improving of water quality and, within them, the most critical basins, in view of the heterogeneous spatial distribution of population and economic activities, in addition to the still insufficient sewage collection and treatment services coverage in urban areas.

The most critical Brazilian basins and special interest areas for the management of water resources are presented in goo.gl/NuCSpG

Precisely for basins with the aforementioned conditions, the monitoring of water quality has been more systematic, aiming to support management actions, and generating more robust and consistent results. On the other hand, in basins with a higher availability of water and a smaller population, the monitoring networks are more dispersed, making an accurate diagnosis more difficult, as is the case with the Amazon Hydrographic Region.

One of the procedures used in Brazil to diagnose water quality is to compare the concentration levels of pollutants with the water body classes, in order to map the areas in greater need of management actions.

The classification framework for water bodies is one of the instruments for Water Resource Management provided for by the Brazilian Federal Law No 9,433 of 1997. Its basic objective is to identify the uses the society has for a certain river basin and to define, based on these decisions, compatible quality standards, which are divided into 5 classes for fresh waters. Special classes 1 and 2 are intended for most demanding water uses, while classes 3 and 4 are intended for least demanding water uses.

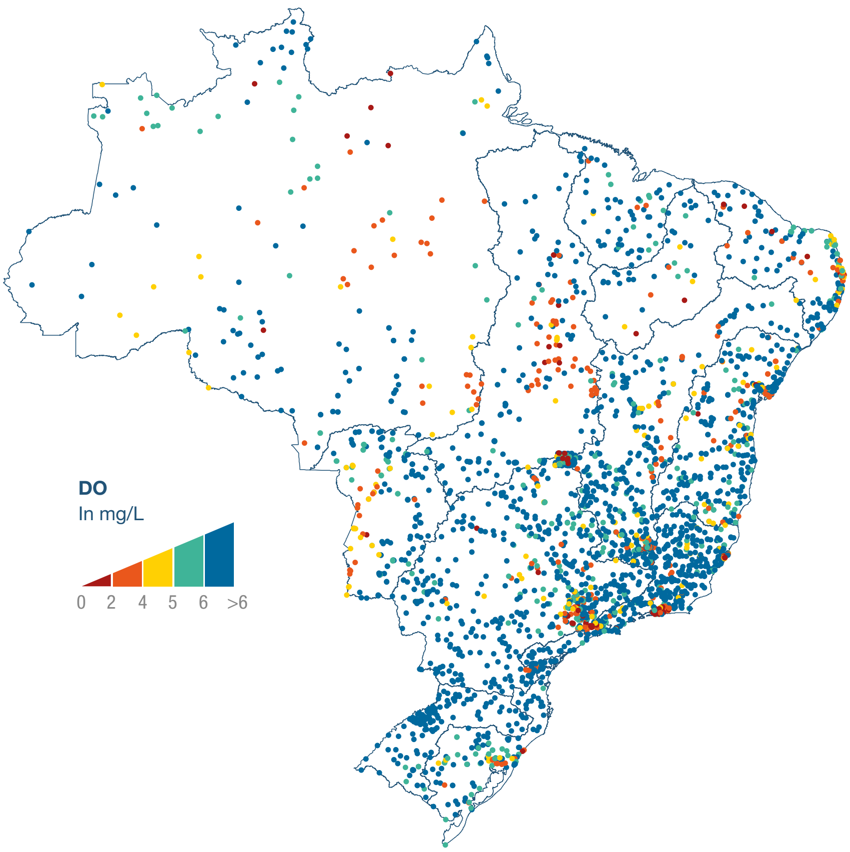
Water quality standards can be achieved over time by setting progressive targets for improving water quality, based on management actions implemented where deemed necessary.

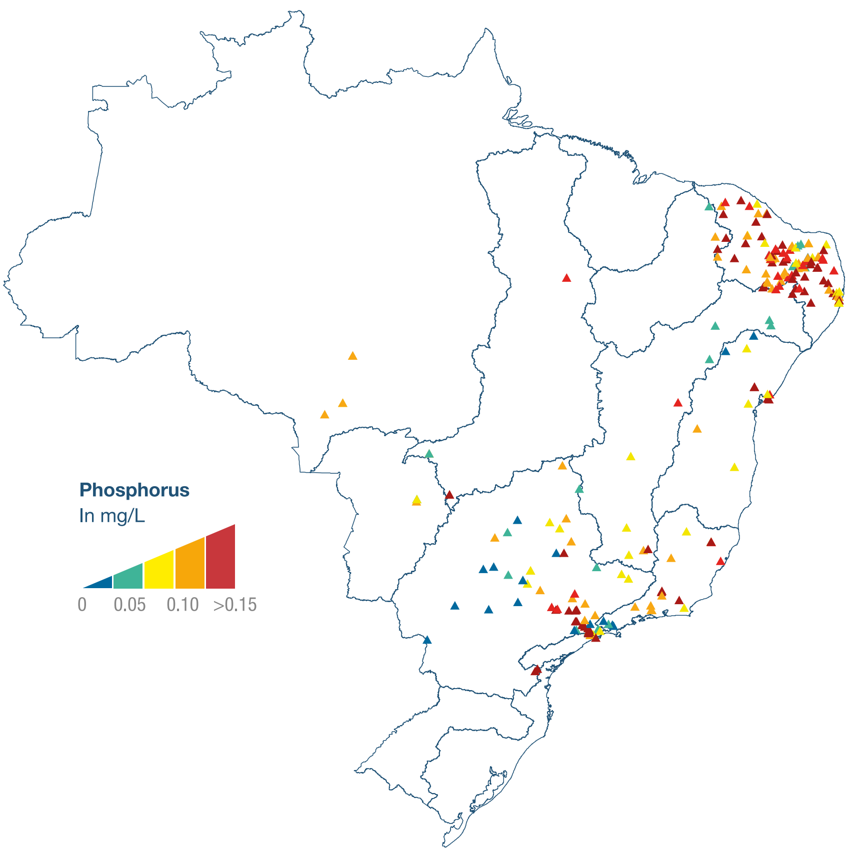
The framework is standardized by resolution No. 357 by the National Environment Council (CONAMA) of 2005, supplemented by Resolution No. 430 of 2011 by the same council.

The water quality computational modeling prepared in the Sewage Atlas estimated that about 4.5% (83,450 km) of the Brazilian waterways' extension has a concentration of organic matter equivalent to the limits established for the framework's class 4, which significantly limits the water use possibilities.

The compromised stretches are located near the densest urban areas or in stretches with very low dilution capacity. The largest urban populations in Brazil are not located in the regions with higher water availability, which highlights the challenges faced by the sanitation services and its impact on the receiving water bodies.

Average concentration of dissolved oxygen (DO) in rivers (total of 3,064 points) and phosphorus in reservoirs (total of 251 stations) in the period from 2001 to 2015





The monitoring of water quality in rivers and reservoirs in Brazil is carried out by the National Water Agency (ANA) and by the Federation Units (FU), and the available data is from 2001 to 2015. Even though many advances have been made in recent years, the country's surface water quality monitoring network is still in the process of improvement and consolidation. In 2015, there were over 2,700 water quality monitoring points in operation in 17 federation units, not yet linked to the National Hydrometeorological Network.

The monitoring networks maintained by the federation units operate independently, and produce information with their own collection frequencies and sets of parameters. Some of the 27 Brazilian Federation Units do not perform any water quality monitoring. Where the monitoring is carried out there are deficiencies regarding temporal and spatial representativeness. There are marked differences between the FUs at the national monitoring level as regards operational capacity, dissemination and availability of monitoring results.

Every year, new monitoring stations are installed in the country, which favors progressive control of water quality. In the period between 2010-2015 there was an increase in the number of stations that operated every year, resulting in a more consistent database.

Indicator 6.3.2 provides for groundwater inclusion into the quality evaluation of the country's water bodies, which was not possible at the time for Brazil, since, in general, the monitoring of aquifers is still rather incipient in the country.

With the extension of the monitoring and the proper results systematization, indicator 6.3.2 may also begin to incorporate groundwater quality, increasingly adhering to UN concepts related to target 6.3.

In addition to the existing databases, ANA articulates with the Ministry of Health the use of raw water quality data that is entered into SISAGUA regarding the monitoring of surface and groundwater sources used by suppliers.

Data available at goo.gl/6fcpEz

Data from Brazil's National Hydrometeorological network is available at http://www.snirh.gov.br/hidroweb/

The Program to Stimulate the Dissemination of Water Quality Data (Qualiagua) launched by ANA in July of 2014, incorporated all the components of the National Water Quality Assessment Program (PNQA): National Water Quality Monitoring Network (RNQA), standardization, labs, capacity building and evaluation. Qualiagua aims to guarantee the financial sustainability of the RNQA operation in the FUs through the rewarding of goals achieved by the monitored points and through the use of parameters standardized on a national scale. Its activities must be carried out without prejudice to already existing monitoring tools.

The Geological Survey of Brazil (CPRM) has been implementing the Integrated Groundwater Monitoring Network (RIMAS), which may, in the future, become a national network through an articulated action between different institutions. RIMAS is an essentially quantitative network, with daily water level measuring, quarterly electrical conductivity and temperature measuring, and the five-year chemical analysis of another 43 parameters. In 2016, RIMAS had 7 years of data on 379 wells.

METHODOLOGICAL SHEET

INDICATOR 6.3.2

Concept

The indicator aims to quantify the percentage of water bodies of a country, including rivers, reservoirs and groundwater with good ambient water quality. 'Good' indicates that it does not affect the ecosystem and human health.

Methodology and data sources

For the purposes of calculating the indicator, the points that met the Class 2 standards (of CONAMA resolution No. 357/2005) were considered to be of good quality. It is verified that the records of the pollutant parameters approved meet the established quality standards. If 80% or more meet the quality standard, good water quality is assigned to the monitored water body.

Data sources:

Qualitative Monitoring Databases (ANA)

Time series available for 2018

2001-2016 (Calculation made for 2006-2015)

Spatial unit for calculation

Water quality Monitoring Station

Spatial level

Water Body, Hydrographic Region

Step by step

1. Qualitative monitoring stations are consolidated and the water body and the Hydrographic Region are identified.
2. The data series of qualitative monitoring records for each station is consolidated.
3. For each record the meeting equality standards is verified for the following parameters: 0D, pH, electric conductivity total ammonical nitrogen and total phosphorus.

   CE: Electrical Conductivity: < 782 μS/cm.

   OD: Dissolved oxygen: > 5 mg/L, except for Pantanal rivers affected by the *decoada*.

   N Am: Total Ammonical Nitrogen: < 3.7 mg/L p/ pH < 7.5; < 2.0 mg/L for pH between 7.5 and 8.0; < 1.0 mg/L for pH between 8.0 and 8.5 in; < 0.5 mg/L for pH > 8.5.

   PT: Total Phosphorus: < 0.030 mg / L for lentic environments (reservoirs), < 0.10 mg / L for lotic environments.

   pH: 6.0 to 9.0, except for Amazon rivers, where the limit may be lower, according to the different types of water in the Region.

4. For each river or reservoir, in each year of the series, the percentage of monitored parameters met is verified (number of records that meet the quality standard/number of total records). It is assumed that the water body has good ambient quality if the calculated value is over 80%.
5. Information is aggregated by Hydrographic Region such as the proportion between the number of good ambient quality rivers and the total number of rivers.

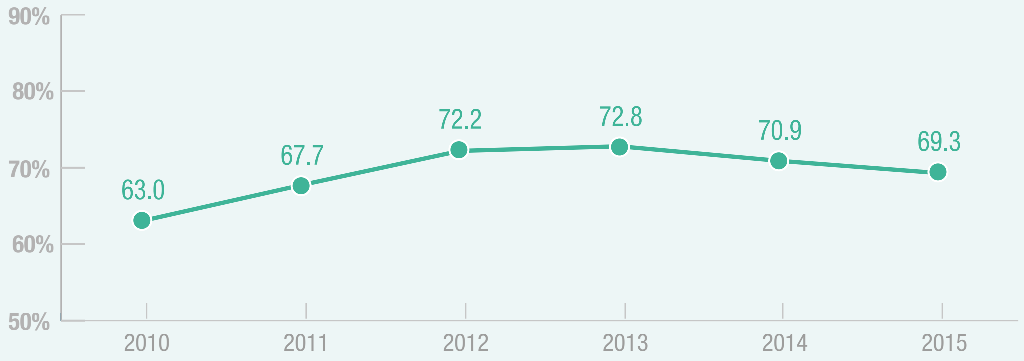
Proportion of Water Bodies with Good Ambient Water Quality

Results: Time series for Indicator 6.3.2 (%)

Hydrographic Region /Brazil	Reference Year					
	2010	2011	2012	2013	2014	2015
Amazon	35.6	43.2	46.2	56.8	63.0	69.6
Tocantins-Araguaia	59.8	53.5	76.3	86.9	88.8	70.8
Western Northeast Atlantic	51.5	51.5	24.2	63.6	57.6	71.9
Eastern Northeast Atlantic	38.6	48.2	40.0	37.9	37.3	48.0
Parnaíba	66.7	75.0	63.0	65.4	63.0	68.2
Eastern Atlantic	61.5	69.0	65.8	79.5	78.2	68.1
São Francisco	69.2	72.4	79.4	81.9	79.0	71.1
Southeast Atlantic	70.4	82.8	80.1	68.5	74.5	69.0
Paraná	64.5	67.9	78.6	74.3	66.9	69.3
Paraguay	81.4	81.0	88.1	65.9	62.5	75.7
South Atlantic	87.7	79.4	92.8	93.8	92.9	72.3
Uruguay	100.0	96.6	100.0	100.0	100.0	100.0
Brazil	**63.0**	**67.7**	**72.2**	**72.8**	**70.9**	**69.3**

The calculated indicator includes the assessment of water quality in rivers and reservoirs, not including groundwater data.

Evolution of indicator 6.3.2 in Brazil - 2010-2015 (%)



Together with the improvement of water quality obtained by effluent treatment, it is important to analyze the evolution of water quantity and its consumptive uses to ensure the protection of ecosystems, human health and water security.

The natural resources in Brazil are abundant and diverse, with one of the largest fresh water supplies in the world, which, however, is not equally distributed in the national territory. While 80% of the water resources are concentrated in the Amazon, which occupies 45% of the Brazilian territory, in another 13% of the country's area there are semiarid regions, with intermittent rivers, and subject to long periods of drought.

The population distribution in the country is also uneven, and there are areas intensively affected by humans where the quantity and quality of water are compromised, as opposed to areas with low population density and high water availability. The regional inequalities scenario is reflected in the water use, requiring specific actions in the Brazilian territory in order to manage the supply and demand for water resources.

Target 6.4 aims to monitor the water use efficiency in economic activities and to assess the water availability stress compared to the existing demands, thus providing an overview of the degree of water resource appropriation of a country for the supply of water to the population and to productive activities. It proposes to substantially increase water-use efficiency and to reduce the number of people suffering from water scarcity.

Indicator 6.4.1: Change in water-use efficiency over time, from Target 6.4, provides information on "increasing the water use efficiency in all sectors". It highlights to what extent a country's economic growth depends on the use of water resources, allowing decision-makers to direct interventions in sectors with high water consumption and low efficiency levels.

The relationship between the gross value added (GVA) and the volume of water demand is measured for agriculture, industry and services over time, allowing for the identification of trends in water use efficiency in the period considered. In order to allow for a comparison between indicator values of all countries, the results are also provided in USD/m³.

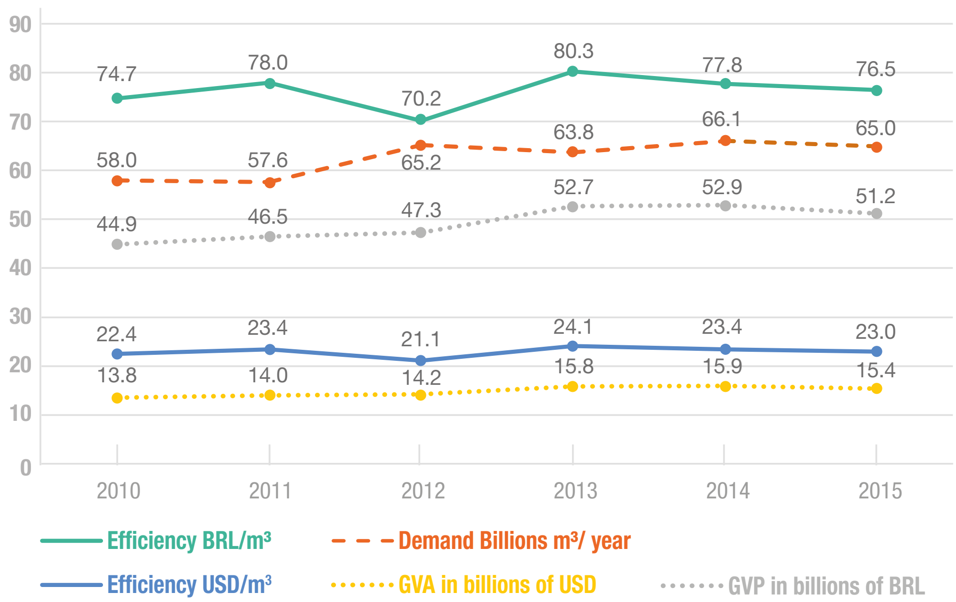
Added Value or Gross Added Value (GVA) is the value of 'production without duplication'. It is obtained by discounting from the gross value of production (GVP) the value of inputs used in the production process.

The concern about water use efficiency, which has been attracting more attention globally since the beginning of the 21st Century, shows positive reflexes in Brazil in the period between 2010 and 2015. In this period, there is an increase in the average water use efficiency in economic activities (agriculture, industry and services sectors), ranging from 74,71 BRL/m³ in 2010 to 76,45 BRL/m³ in 2015, with an average of 76,23 BRL/m³ in the period.

The water demand for withdrawal refers to the total water captured in a source to satisfy a certain use, for example, withdrawn for supplying a city or an industry.

Evolution of water use efficiency in Brazil – 2010-2015 (BRL/m³ and USD/m³)

**Calculated from ANA and IBGE data



SDG 6 Indicator 6.4.1 results: Changes in Water Use Efficiency.

It is not possible to present the results of efficiency by sector by geographical region given the methodological difference in the breakdown/aggregation of economic activities in the tables of national accounts produced by IBGE.

In Brazil, the main water uses are for irrigation, human and animal supply, power generation, mining, aquaculture, navigation, tourism and recreation. The need to preserve water resources and avoid losses in the use of water by the population and by the economic activities was more evident during the severe water crisis that the country went through between 2013 and 2016. In this period 48 million people were affected by droughts, mainly in the Northeast Region and also in the Southeast and Midwest regions, which are not commonly affected by water scarcity.

Detailed information on the recent water crises in Brazil can be obtained in the 2017 Brazilian Water Resources Report at http://conjuntura.ana.gov.br/crisehidrica

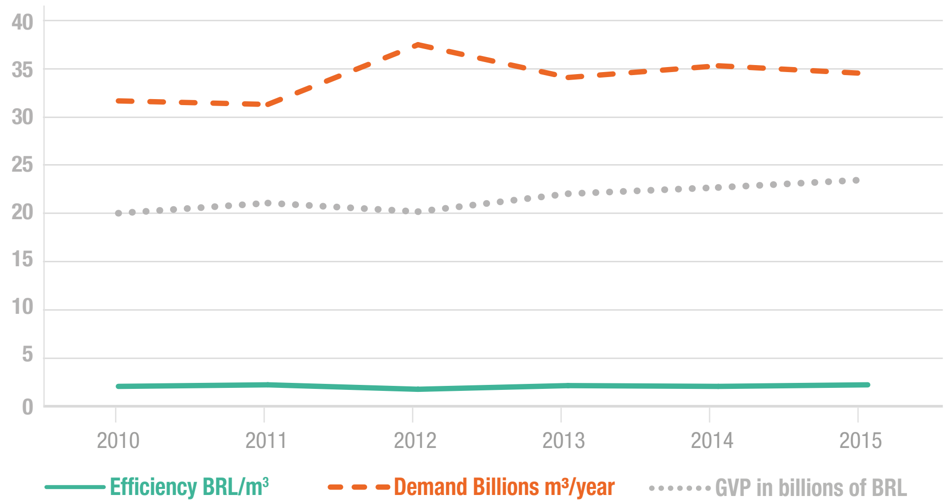
During this period, faced with the risk of collapse, the population began to adopt procedures to prevent the incurring of losses in their daily activities, and numerous cities were subjected to water supply cuts and water rationing regimes. In the Northeast region, several reservoirs - the only water sources serving the population's supply and economic activities - have completely dried up.

Economic activities were grouped according to the methodology proposed by the UN based on the *International Standard Industrial Classification of All Economic Activities* (ISIC).

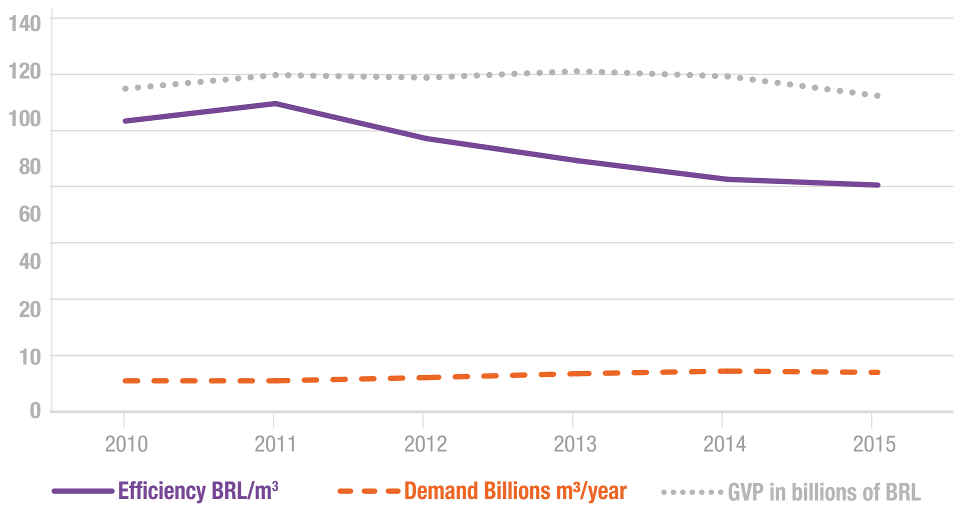
Evolution of water use efficiency by sector (Agriculture, Industry and Services) - 2010-2015 (BRL/m³)

*Calculated from ANA and IBGE data

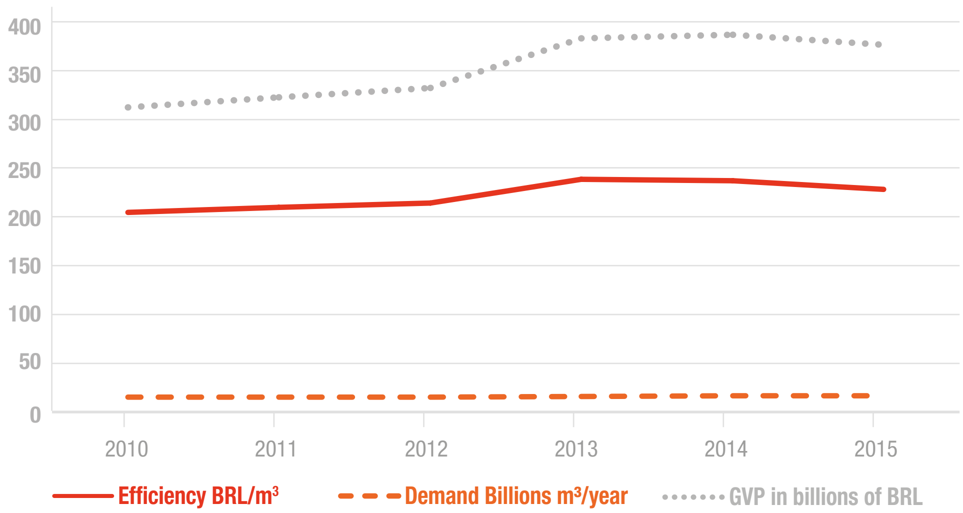
Agriculture



Industry



Services



The possible reasons for the improvement in water use efficiency in Brazil are mainly associated with the hydric demand management actions, such as; the progressive reduction of water use for irrigation, which is promoted by the substitution of inefficient methods with technologies that minimize waste, the implementation of water reuse processes and the implementing of more efficient technologies by industries. More possible reasons include: the water charges implementation in some Brazilian regions, water scarcity and the population's changing habits, changes in the economic sectors, among others. The reduction of water use efficiency in Brazil can be a reflection of the drop in Brazilian economic growth in recent years or of changes in the participation of different economic activities in the country as a whole.

Water charge is one of the instruments of Water Resources Management provided for in Federal Law No. 9,433 of 1997 and in the related state laws, which aims to recognize water as an economic good and to raise awareness of its real value, encouraging the rationalization of its use. The financial resources generated by the collection are applied in the river basin where they were collected, for the financing of programs and interventions contemplated in the Water Resources Plans.

The services sector, which has the highest aggregated values and the lowest water consumption, is the one that presents the most efficient water use in the country. In 2015, the value of indicator 6.4.1 for this sector reached 228.48 BRL/m³. The economic services sector's GVA is the largest in the country: in 2015, it reached 3.7 trillion BRL.

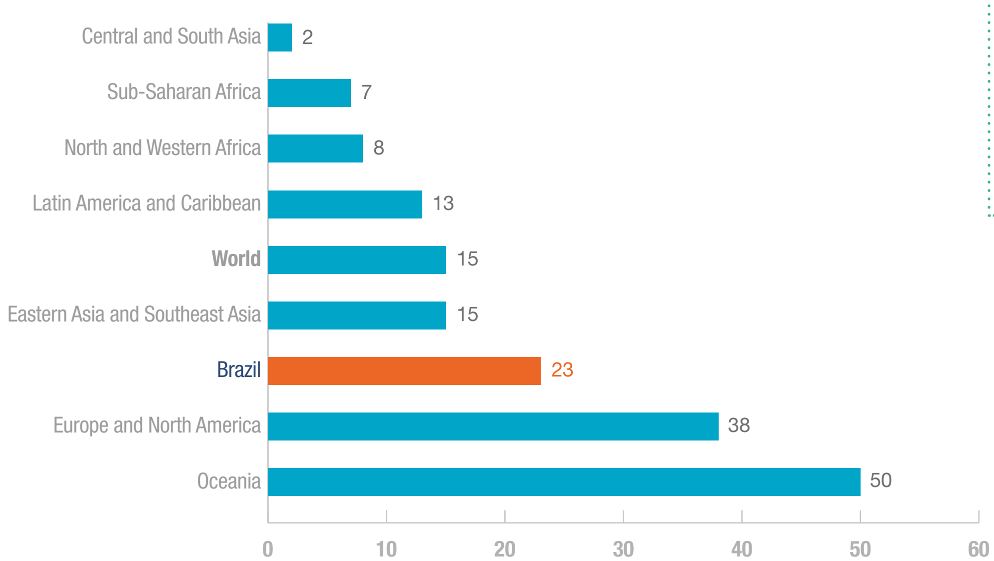
It should be pointed out that different water uses have distinct intrinsic characteristics, and it is not possible to compare the efficiency of one economic sector with that of another. Irrigated agriculture, for example, which is incorporated into agricultural economic activity, is a highly water-intensive activity compared to other activities, being the most water-consuming activity in the world. In general terms, food production may not be "water efficient" but it is important for feeding a growing world population, for job generation, among other factors. Therefore, this indicator should be assessed with caution.

According to the UN, most of the water consumed in the world is for agriculture, with emphasis on irrigated agriculture (70%), followed by industry, including the Energy Sector (19%), and household use (10%). Data available at goo.gl/1ngV4b

The counterpoint between the GVA and the values of water withdrawal demands is the main condition for the water use efficiency results in Brazil. However, it should be interpreted considering the variations in the same economic sector's efficiency from one year to the next.

In 2018, ANA published, in partnership with IBGE and the former Department of Water Resources and Environmental Quality of the Ministry of the Environment (SRHQ/MMA) the Environmental Economic Accounting for Water in Brazil (EEAW) for the period of 2013-2015. This document relates to SDG 6 Indicator 6.4.1, even though the methodologies adopted are not the same, considering that EEAW follows the standardization of the United Nations Statistical Division (UNSD) "SEEA - Water" (System of Environmental-Economic Accounts for Water). Available at goo.gl/hxjCEz

Water use efficiency in other regions of the world, in 2015 (USD/m³)



Data from SDG 6 indicator 6.4.1 published by the UN in 2018. Available at goo.gl/ecWcij

METHODOLOGICAL SHEET

INDICATOR 6.4.1

Concept

The indicator aims to evaluate water use efficiency in the following user sectors: agriculture, industry and services.

Evaluating the indicator's dynamics allows one to observe changes in water use efficiency over time, which may reflect reductions in demand or increases in gross value added.

Methodology and data sources

The indicator's calculation methodology is stipulated in the United Nations Organization for Food and Agriculture (FAO)'s worksheet, which considers the added results in water use efficiency by the three economic sectors, obtained through the ratio between the GVAs of the Agricultural, Industrial and Services areas and the water withdrawal demands for use by the respective economic activities.

Data sources:

IBGE: Gross values added (GVAs) for the economy sectors (tab10_2); time series of planted areas by municipality (table 5457)

ANA: Time series of irrigated areas by municipality and by crop types (Irrigation Atlas, 2017); average conversion coefficients of equipped areas in irrigated areas by municipality; time series of demands by use type by municipality (Handbook of Consumptive Water Uses in Brazil).

Time series available in 2018

2010-2015

Spatial unit for calculation

Brazil

Spatial level

Brazil

Step by step

For calculating the GVA by sector, the economic activities were grouped according to the methodology proposed by the UN based on the ISIC classification. For the grouping of the services sector's activities, the "water supply" activity was excluded because it was a non-consumptive use.

For the grouping of activities in the agricultural sector, the activity "forest production, fishing and aquaculture" was excluded because it had no estimated associated demand.

A deflator was applied in the current (nominal) GVA values for the base year of 2015. In the conversion to the US dollar (USD), the exchange rate of 2015 was always used (annual average USD calculated from the value on the last day of each month).

In order to calculate the demands by sector, the urban and rural human demands in the "services" sector, the demand for animal feed and irrigation in the "agriculture and livestock" sector and the demand for thermoelectric, mining and transformation industry plants in the "industrial" sector were grouped together.

For the calculation of agriculture and livestock efficiency, municipal agricultural production (MAP) planted areas according to IBGE were adopted if they were higher than the irrigated areas for a given municipality, where the irrigated area adopted is provided by Irrigation Atlas (ANA).

The Ai and Cr coefficients defined by the FAO spreadsheet are calculated for the agriculture and livestock indicator.

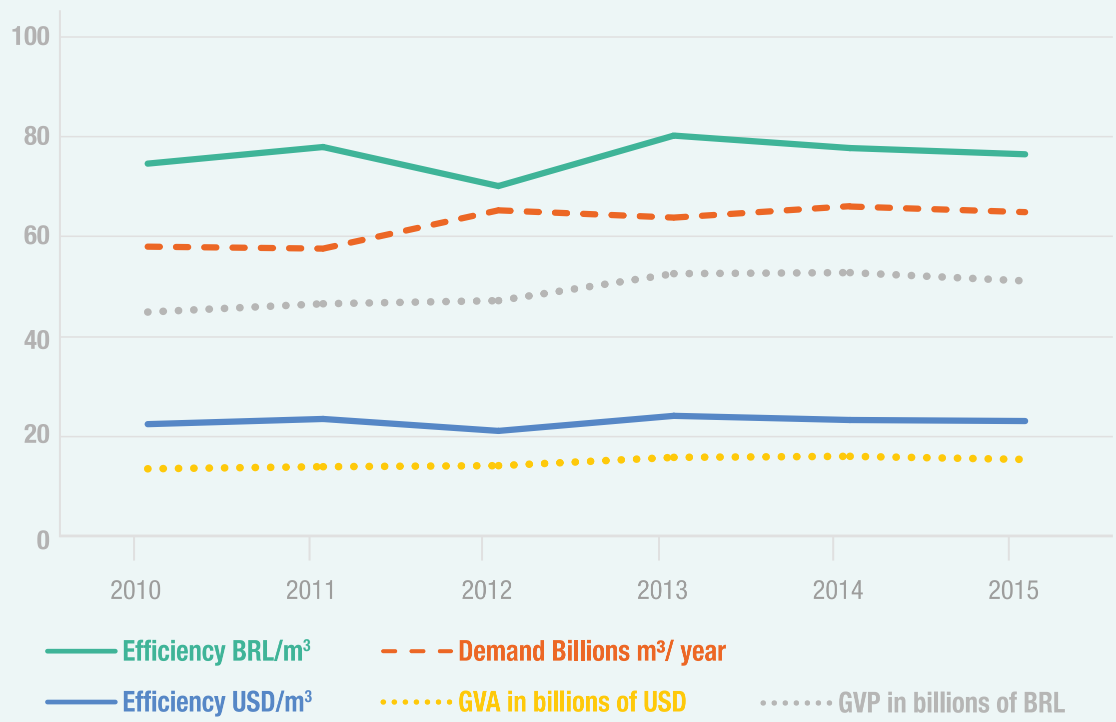
The efficiency values of water resources use for each economic sector are calculated by the GVA quotient/water withdrawal demand.

Changes in Water Use Efficiency

Results: Time series of indicator 6.4.1 - Brazil (BRL/m³ and USD/m³)

	Reference Year					
	2010	2011	2012	2013	2014	2015
R$/m³	74.7	78.0	70.2	80.3	77.8	76.5
US$/m³	22.4	23.4	21.1	24.1	23.4	23.0

Evolution of indicator 6.4.1 in Brazil – 2010-2015 (BRL/m³ and US$/m³)



The relationship between water availability and water demands in a country allows one to verify the level of water stress exerted by the population and by economic activities on surface and groundwater resources.

This ratio is measured by a water stress indicator, which is predicted by Goal 6.4, **Indicator 6.4.2: Water stress level: Proportion between Freshwater Withdrawal and Total Freshwater Resources Available in the Country**

In addition to providing an estimate for the renewable freshwater resources pressure exerted by the country's total demands for all uses, indicator 6.4.2 also considers the environmental water needs, that is, the amount of water that is essential to the conservation of aquatic ecosystems.

The environmental need for water refers to the minimum portion of the water volume that must be kept in a river for the maintenance of water biota. This is called ecological flow.

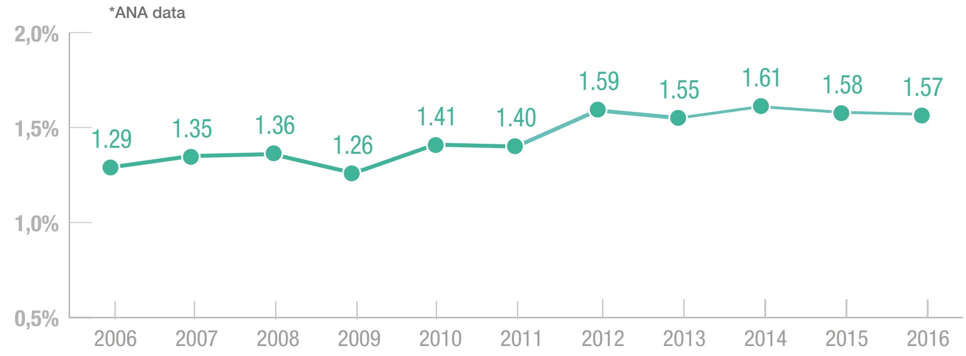
Brazil has no defined methodology for environmental flow calculation. On the other hand, regular uses in the country are only allowed based on minimum flows: a percentage of water availability, in the case of federal rivers (rivers regulated by ANA, for example). The federation units also adopt percentage drought flows in order to permit or prohibit water withdrawal. Therefore, the remaining flow is considered for ecological uses.

Water availability is an estimate of the quantity of water available for diverse uses, which for management purposes, usually considers a certain level of guarantee. In order to perform water balances in river reaches, ANA adopts as water availability the flow rate of Q95% (flow which passes through the river in at least 95% of the time, that is, in 95% of the time the flow of the river is equal to or greater than that value). In rivers with regularization, the effect of artificial reservoirs is also considered.

For the purpose of using ecological flow in the calculation of indicator 6.4.2 for Brazil, 50% of the average flow obtained from the National Hydrometeorological Monitoring's time series data - managed by ANA - was adopted for each year. For future reports, different ecological flow values can be adopted for Brazil's Hydrographic Regions, should they be available.

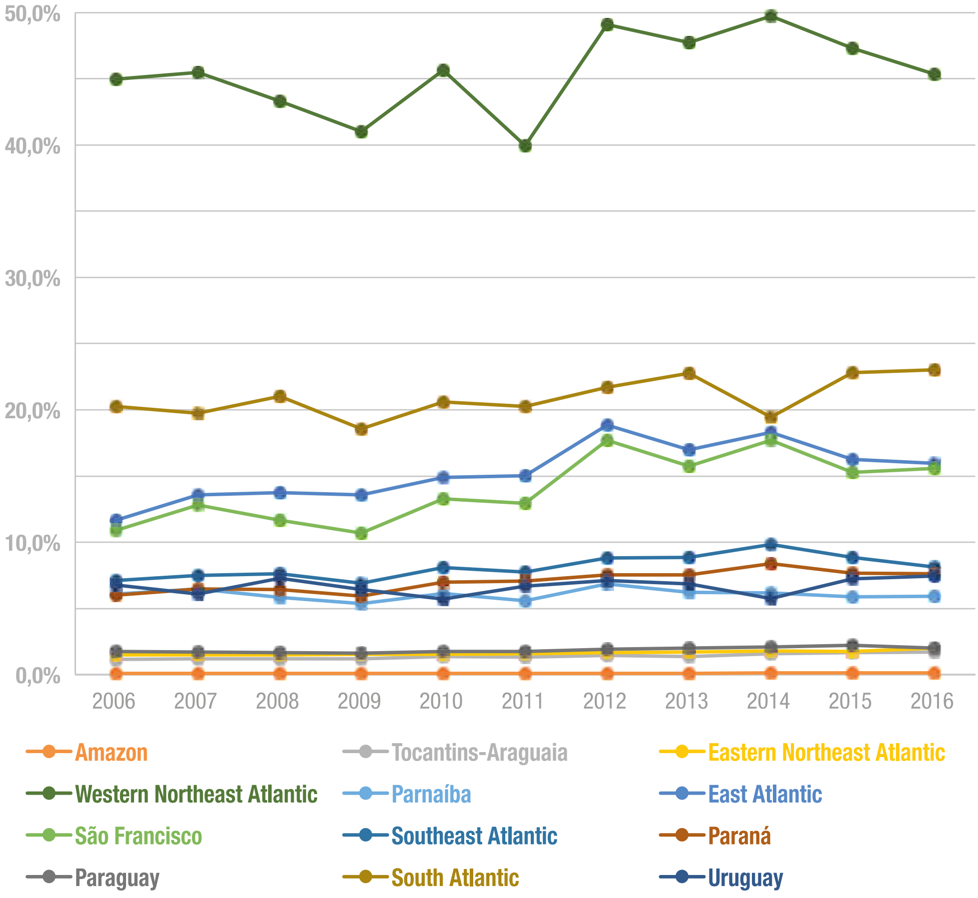
The growth in water demands, which stems from increases in population and economic activities that demand water, contributes to a yearly increase in water stress, even though when examining the country's water balances as a whole, the relationship between water demand and availability tends to be "very satisfactory" (according to the UN below 10%), ranging from 1.29% to 1.57% (from 2006 to 2016).

Evolution of water stress in Brazil - 2006-2016 (%)



SDG 6 Indicator 6.4.2 Results: Water Stress Level – Proportion between Freshwater Withdrawal and Total Freshwater Resources Available for the Country.

Indicator 6.4.2 by Hydrographic Region - 2006-2016 (%)



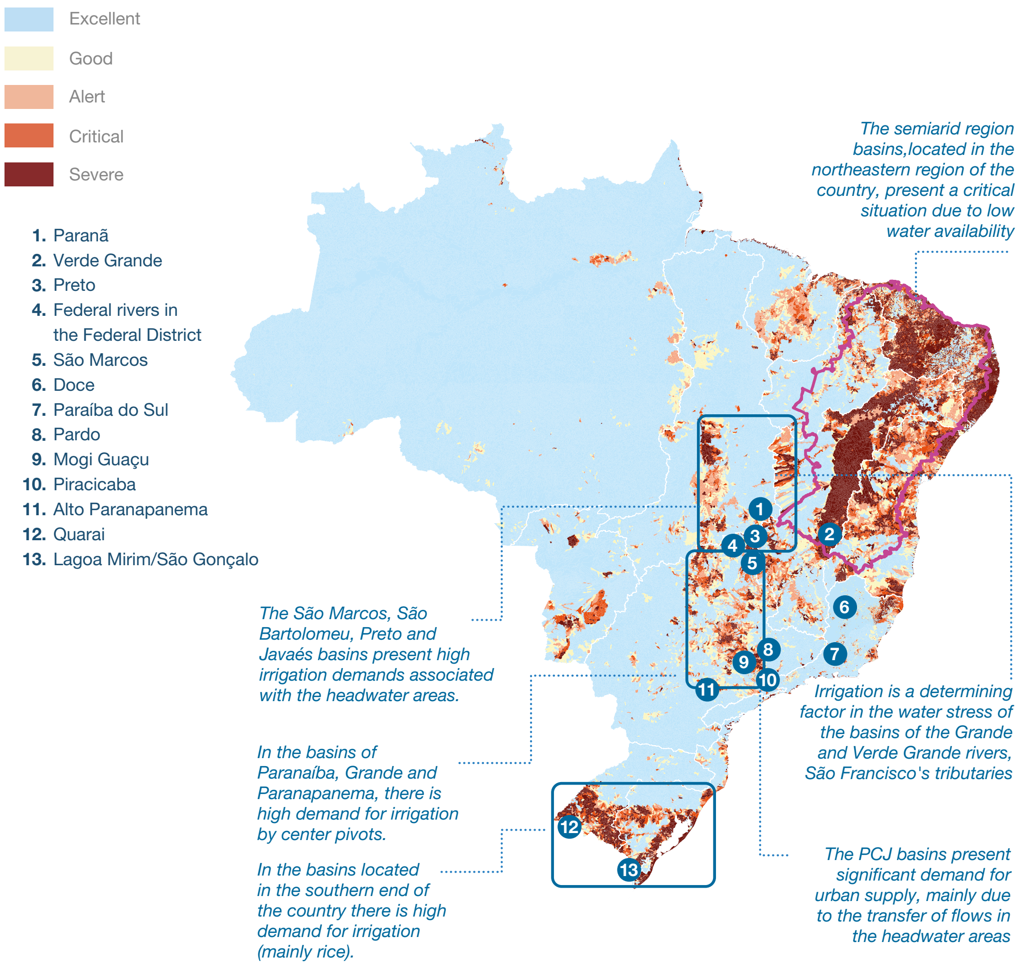
Due to the large differences that characterize the national territory, a single value for indicator 6.4.2 does not reflect the specificities of all 12 Brazilian Hydrographic Regions. It is possible to identify the areas that more urgently need management actions from the relationship between water demand and availability.

The most critical regions are the Eastern Northeast Atlantic, inserted in Brazil's semi-arid region, and the South Atlantic, in which water withdrawal for rice crop irrigation by flooding is expressive. Attention should also be paid to the East Atlantic and the São Francisco situations, regions which have considerable demands in relation to water availability.

The water balance by micro-basin is presented in the Brazilian Water Resources Report 2017, available at http://conjuntura.ana.gov.br/.

In 2012, ANA prepared a study for the development of a methodology for the identification of water bodies with higher stress levels, in order to prioritize actions in basins that require more management and considering the commitment of Water Re-sources in all Brazilian Hydrographic Regions. The results obtained indicated 29 critical basins located in several Hydrographic Regions. The entire semiarid region was classified as critical by ANA.

Water balance by micro-basin and critical river basins in Brazil



Complete information about water use in Brazil is available at goo.gl/ooJdzj

In addition, even though the water balances by Hydrographic Region indicate more critical situations in the Northeast Atlantic and South Atlantic, there are problems located in several Brazilian basins, which require interventions to resolve conflicts connected to multiple uses of water resources.

In Brazil, the water use that presents the highest withdrawal demands is irrigation, with an annual average of 46.2%, followed by urban supply, which corresponds to 23.3% of the yearly total. Other uses are thermoelectric plants, industries, supplies for livestock, rural population supply and mining.

In 2017, ANA published the Irrigation Atlas: Water Use in Irrigated Agriculture. A total of 6.95 million irrigated hectares was identified in Brazil in 2015, and the expansion potential for another 3.14 million until 2030, totaling 10.03 million hectares, was also identified, that is, an increase of 47% over 15 years. Available at http://atlasirrigacao.ana.gov.br/

In 2015, the demand for irrigation withdrawal in Brazil reached 969 m³/s, it is expected that this value will reach 1,338 m3/s in 2030, that is, a 38% increase over a period of 15 years.

Urban supply is the second largest water resources use in Brazil, the sector is responsible for supplying water to over 80% of the Brazilian population. In 2015, 46% of the Brazilian cities had vulnerabilities associated with water production and 9% needed new water sources. The Northeast region proportionally concentrates more cities that need new springs due to the low water availability in the region, mainly in the semi-arid area. In the Southeast region, however, this demand stems from high urban population concentrations.

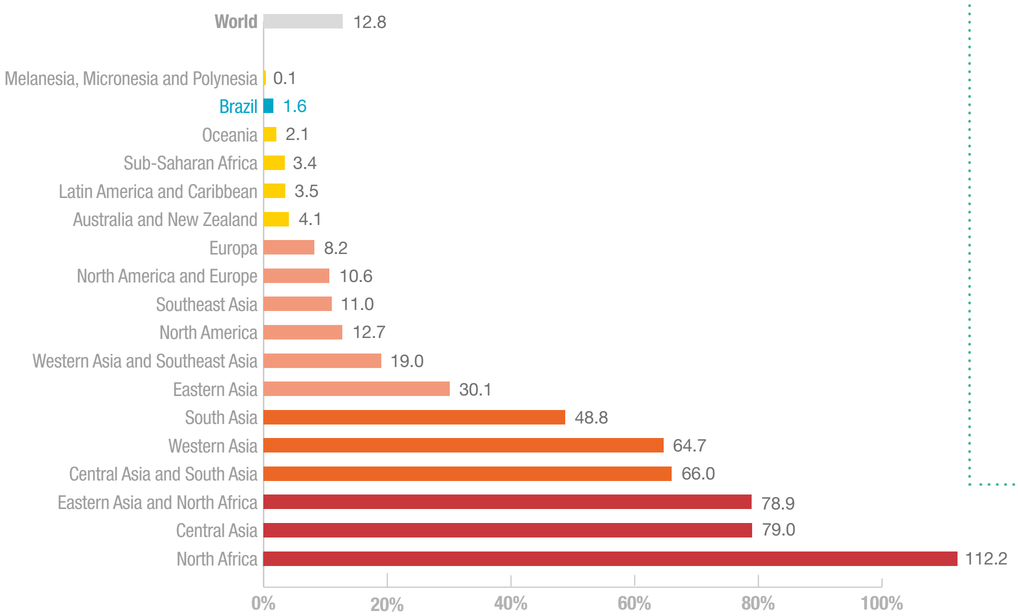
Solutions to guarantee water supply to Brazilian cities between the years of 2015 and 2025 were proposed in the Brazil Atlas: Urban Water Supply, available at goo.gl/CNUw85

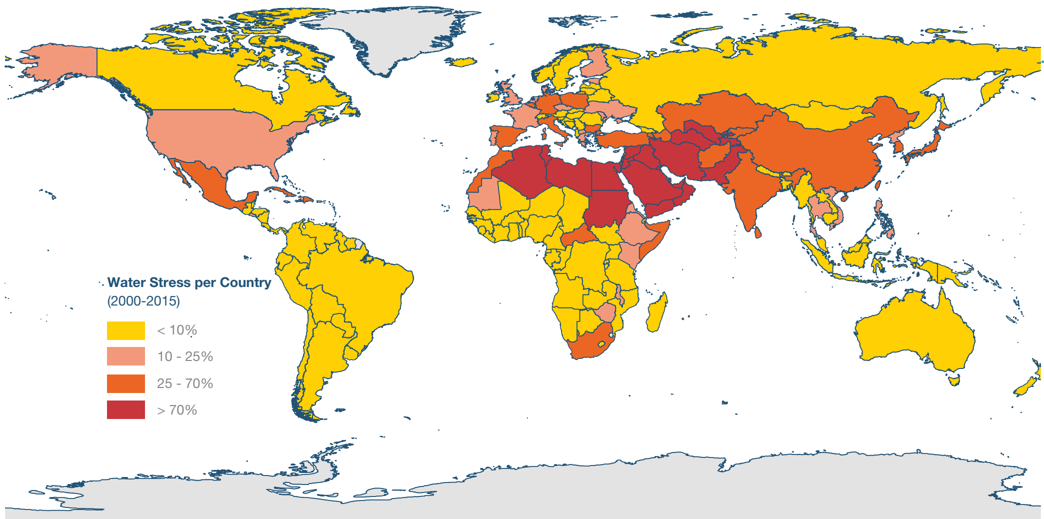
In the basins with less abundant or even inexistent water availability, or where the demands are very high in periods of water crisis, the actions to prevent or minimize water shortage should focus on the management of demand, associated with the implementation of infrastructure to increase water supply to multiple users. These undertakings should be of a structural nature and based on water security concepts.

Important measures to decrease water stress include the reuse of treated effluents project, the establishing of priority uses for the permiting of water withdrawal, the definition of restricted use areas aiming at water resources protection, the adoption of collective water withdrawal for users located in critical basins, and the establishing of guidelines for the water allocation agreements and water delivery in river basins and reservoirs throughout the country aiming to the guarantee the multiple uses in situations of water scarcity.

Brazil's high water availability results in much lower water stress than that of several regions of the world and even lower than the global average in 2015, calculated by the UN at 12.8%.

Average water stress levels in the world in 2015 (%)





ANA is currently elaborating, in partnership with the Ministry of Regional Development (MDR), the National Water Security Plan (PNSH), which seeks to identify the main structuring and strategic water resource interventions to ensure water security throughout the country and reduce the risks associated with critical events (floods and droughts).

The gross water reuse capacity from treated sanitary effluents installed in Brazil was estimated to be of about 2 m^3/s in 2017, considering that only 1.6 m^3/s would be used. Data from the "Elaboration of an Action Plan Proposal for the Reuse of Treated Sanitary Effluents in Brazil" study conducted by the Ministry of Cities and available at http://interaguas.ana.gov.br/

The UN recognizes that this number does not represent the real conditions of the countries and that values disaggregated by Hydrographic Region are necessary, such as is presented for Brazil in this publication.

SDG 6 Indicator 6.4.2 data published by the UN at http://www.unwater.org/publications/progress-on-level-of-waterstress-642/

For calculating the indicator for all countries the average natural water availability and ecological flow yearly percentage was adopted, based on the International Water Management Institute (IWMI) study and as published by the UN at goo.gl/MvUYQo

METHODOLOGICAL SHEET

INDICADOR 6.4.2

Concept

This indicator provides an estimate of the renewable fresh water resources stress due to the pressure exerted by the country's total demands for all use purposes; it also considers the environmental variable, essential to the conservation of aquatic ecosystems. It is, in short, a global water balance between water supply and water demand in a country.

Methodology and data sources

The indicator is calculated by the ratio between the total demand for freshwater withdrawal for population and economic activities supply, and the total renewable freshwater resources available in the country. It also considers environmental requirements represented by an ecological flow, that is, a portion of surface water resources that should be reserved for the maintenance of the aquatic ecosystems.

Its formulation is as follows:

$$Sh = \frac{Dt}{(Erh - Qeco)}$$

Where:

Sh = Water stress level in %;

Dt = Total water withdrawal demands in m^3/s;

Erh = total fresh water stock for the country, including sur-face and groundwater and water inputs from other countries; in m^3/s

Q_{eco} = ecological flow in m^3/s.

Data sources:

ANA: time series of demands for use purposes by Otto Micro Basins of the Ottocodified Hydrographic Database - in the period between 2006-2016. Series of long-term average flows obtained from the Brazilian Water Resources Report 2017.

Groundwater reserves were not considered in the indicator' calculation as they are considered to contribute to the base flow of surface water bodies

Time series available in 2018

2006-2016

Spatial unit for calculation

Hydrographic Region

Spatial level

Hydrographic Region, Brazil

Step by step

1. The otto micro basin is associated to each Hydrographic Region.
2. Average long-term flow is obtained for each Hydrographic Region (average Q).
3. 50% of the average Q is calculated as indicative of ecological flow.
4. The demands are grouped by purpose for each Hydrographic Region and for each year.
5. The indicator is calculated for each year by the total demand ratio / $[E_{rh} - (Q_{eco})]$

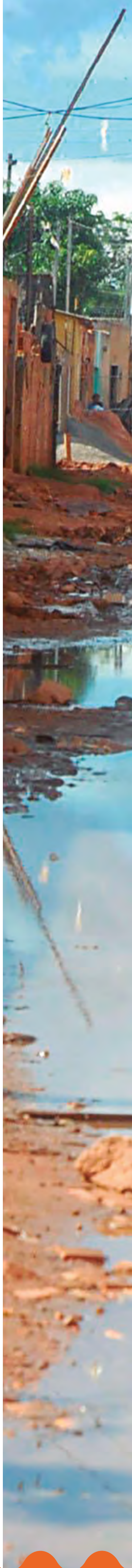
Water Stress level: Proportion of Freshwater Withdrawal Compared to Total Freshwater Resources Available in the Country

Water Stress Level: Proportion of Freshwater Withdrawal and Total Freshwater Resources Available in the Country (%)

Hydrographic Region/ Brazil	Reference year										
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Amazon	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Tocantins-Araguaia	1.1	1.2	1.2	1.2	1.4	1.3	1.4	1.4	1.6	1.7	1.7
Western Northeast Atlantic	1.5	1.5	1.5	1.5	1.5	1.6	1.7	1.7	1.8	1.7	2.0
Eastern Northeast Atlantic	45.0	45.5	43.3	41.0	45.6	39.9	49.1	47.7	49.7	47.3	45.3
Parnaíba	6.1	6.5	5.8	5.4	6.1	5.6	6.9	6.2	6.2	5.9	5.9
East Atlantic	11.7	13.6	13.7	13.6	14.9	15.0	18.8	17.0	18.3	16.3	16.0
São Francisco	10.9	12.8	11.7	10.7	13.3	13.0	17.7	15.8	17.7	15.3	15.6
Southeast Atlantic	7.1	7.5	7.6	6.9	8.1	7.7	8.8	8.8	9.8	8.9	8.1
Paraná	6.0	6.5	6.5	5.9	7.0	7.1	7.5	7.5	8.4	7.7	7.6
Paraguay	1.8	1.7	1.6	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.0
South Atlantic	20.3	19.7	21.0	18.6	20.6	20.3	21.7	22.8	19.5	22.8	23.0
Uruguay	6.8	6.1	7.3	6.4	5.7	6.7	7.1	6.8	5.8	7.2	7.4
Brazil	**1.3**	**1.3**	**1.4**	**1.3**	**1.4**	**1.4**	**1.6**	**1.6**	**1.6**	**1.6**	**1.6**

Time series for Indicator 6.4.2 (%)

MANAGEMENT: SANITATION AND WATER RESOURCES



The numerous issues involving water availability and water demands and its consequences for sanitation services require efficient management supported by adequate governance, which depends on a solid basis for inter-institutional articulation, which, in turn, requires permanent discussions and a comprehensive dialogue towards the identification of common goals and targets.

In view of the necessity of managing water resources in an integrated manner, SDG 6 provides a specific target, which deals with both surface and underground water resources located in the country and cross-borders:

Target 6.5 - By 2030, implement integrated water resources management at all levels, including through transboundary cooperation.

In this way, SDG 6 includes three other targets, which seek to monitor aquatic ecosystems, control investments from external financial resources received by the countries in relation to projects and actions relating to water and sanitation, and monitor the level of participation of society in Water Resources and Sanitation Management:

Target 6.6 - By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes, reducing the impacts of human action.

The protection of forests and mountains is included in SDG 15 of Agenda 2030: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, stop and reverse land degradation and stop biodiversity loss.

Target 6.A - By 2030, expand international cooperation and capacity-building support to developing countries in water and sanitation-related activities and programs, including, among others, water resources management, water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies.

Target 6.b - Support and strengthen the participation of local communities in improving water and sanitation management.

Integrated Water Resources Management (IWRM) is defined by the UN as a process that promotes the coordinated development and management of water, land and related natural resources, in order to maximize the economic and social well-being in an equitable manner without compromising the sustainability of vital ecosystems, taking into account climatic and hydrological aspects, as well as economic, political, and environmental aspects.

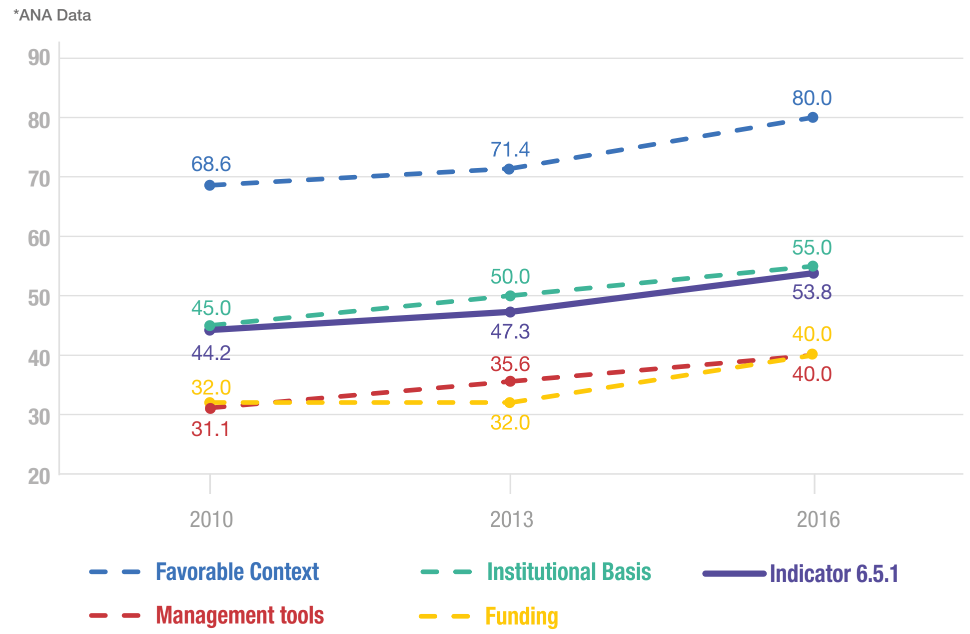
Target 6.5 is monitored by **Indicator 6.5.1: Implementation Degree of Integrated Water Resources Management**. This indicator assesses the status of IWRM in a country, considering the following themes: the existence of a favorable context; the institutional basis and the participatory process to support the implementation of IWRM; management and monitoring tools geared to supporting the decision-making process in the context of IWRM; and the status of the existent funding mechanisms for the operationalization of IWRM.

The evolution of IWRM is evaluated by the UN every three years, and each country informs its conditions by answering a specific questionnaire containing questions that enable the setting of scores for the four main topics addressed on a scale from 0 to 100. The final score for the country is obtained by the scores' arithmetic average for each theme, whose 33 questions are grouped into four sections.

The UN predicts that, for the new updating cycle of the indicator, the questionnaire should be answered in a participatory manner and with the involvement of various sectors of society.

Based on the data and information provided by the Water Resources Situation Reports concerning, for example, the legislation in force, the level of implementation of water resources management instruments in Brazil, among others, the country's IWRM score was 54 points in 2016, representing an increase of approximately 22% since the year 2010, going from a medium to low score to a medium score, according to the classification methods adopted by the UN.

Evolution of Integrated Water Resources Management in Brazil – 2010-2016



SDG 6 Indicator 6.5.1 Results: Implementation Degree of Integrated Water Resources Management.

Federal Law No. 9,433/97 was instituted the National System of Water Resources Management (SINGREH) in Brazil, which aggregates a set of bodies and committees that design and implement the National Water Resources Policy, having as main role to promote the democratic and participatory management of water uses.

SINGREH is composed by the Water Resources National Council (CNRH), the Water Security Secretariat of the Ministry of Regional Development (SSH/MDR), the National Waters Agency (ANA), the State Water Resources Councils (CERH), the State Water Resources Management Bodies, River Basin Committees and Water Agencies.

The progress in water management processes in Brazil depends on an efficient state management system, due to the necessary integration of actions between the federal entities (federal government and state governments) established by Hydrographic Region. In order to strengthen institutional articulation and cooperation within the SINGREH framework and strengthen the state management systems, the National Water Management Pact consolidation program (Progestão) was created in 2013, more information about the Pact is available at http://progestao.ana.gov.br/

The same Federal Law No. 9,433/97 also created five water resources management instruments, which aim to organize the integrated management at federal and state level through planning, regulation, supervision and disclosure of information programs.

The five management instruments for the National Water Resources Policy are interrelated. For example, for permitting water resources use in a certain stretch of river, it is necessary to observe the classification framework, which is preferably defined in the Water Resources Plan. The plan is a tool that largely guides the application of the instruments because of its great influence on all of them. In turn, user registration and the monitoring of water resource uses are management actions that support the efficient application of management instruments, especially water permits and water charges.

After the creation of ANA, in 2000, the experiences in the implementation of water resources management tools have gained greater impulse in the country, as well as the evaluation and dissemination of the implemented actions results via the yearly Brazilian Water Resources Report, which has existed since 2009 and also includes lessons learned and challenges to overcome.

ANA produces the Report with the participation of over 50 partner institutions, covering the water and environment management bodies in all Federation Units as well as other Federal Government partners. Over the years, the report has subsidized different government actions, such as the Water Environmental Accounts System, the monitoring of the Federal Government's Multi-Annual Plan, and the calculation of SDG 6 indicators, among other actions by non-governmental institutions. Available at goo.gl/bYUDFA

The National Water Resources Plan was first drawn up in 2006, and underwent a careful analysis in 2017 with a view to improving the planning and monitoring of its implementation by 2020, as well as proposing guidelines to be followed by 2021. At the federation units' level, all states have already drawn up their State Water Resources Plans, which are currently being revised, concluded or contracted.

All water permits for consumptive uses issued in Brazil until July 2016, including those which have already expired through the years, comprise a total of 115,092 water withdrawals, 88% of which have been permitted by the federative units (state permits). ANA accounts for only 12% of the total number of withdrawal permits issued (federal permits), however, the total flow permitted by ANA is close to the sum of the flows permitted by the federative units. Irrigation is the use that accounts for 63% of the total (ANA and FUs) withdrawals permitted in the country, which amounted to 5,239 m^3/s in July of 2016. The permitted outflows sum is greater than the withdrawal flows due to the fact that the permits generally consider a maximum use flow. On the other hand, there are users that are not yet regularized, that is, they capture water, but did not request a permit in spite of this being legally required to do so. It is, therefore, concluded that the total volume permitted does not represent the total use of water.

Every user subject to the permit can be subject to the charging for the use of water resources, and in Brazil there is a specific fee for the use of water resources in hydropower generation. In 2016, 295.17 million BRL were collected in hydrographic basins with water charge implemented and 208.8 million BRL were collected with hydropower generation charges.

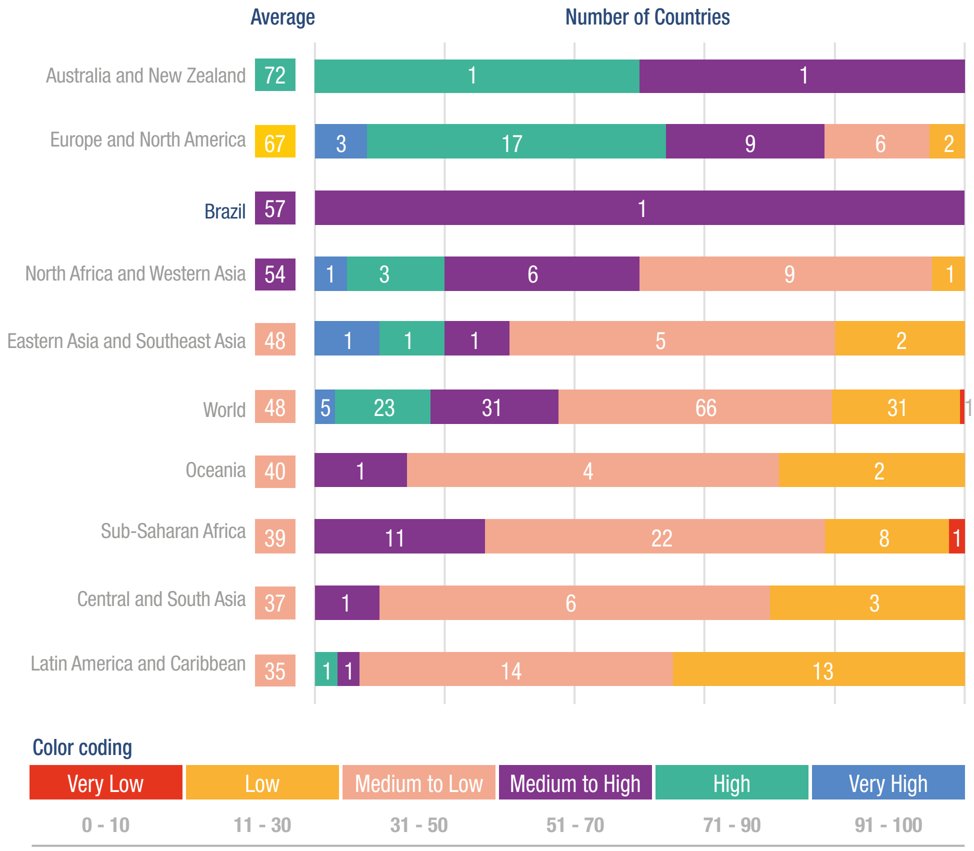
Detailed information on the charging of fees for the use of Water Resources in Brazil is available at goo.gl/W11Brq

In 2016, 12 Federation Units had legislative acts that fully or partially inserted their water bodies in a classification framework according to water quality objectives.

When comparing the degree of IWRM implementation in Brazil with that of other countries, the Brazilian scenario is equivalent to North African and West Asian countries, but it is much higher than the Latin American and the Caribbean average.

All regions include groups of countries with medium to high IWRM implementation degrees, even though there are regional differences. This indicates that a country's level of socio-economic development does not necessarily constitute an absolute barrier to IWRM's progress, but is a condition that influences performance.

Average percentage of IWRM implementation and number of countries in each implementation category



Data from SDG 6 Indicator 6.5.1 published by the UN in 2018, available at goo.gl/te3CYw

Even though there have been many advances in water resources integrated management, there still are several gaps for Brazil to overcome, especially regarding the funding mechanisms and the effective application of financial resources in actions directed to the implementation of IWRM. Among these gaps are the inclusion of gender issues in the legislation, which is not explicit in Law No. 9,433/97 (although the norm does stipulate that water resources management should be decentralized and have the participation from the government, users and communities), as well as adaptations to the legislation due to new views that have arisen on the theme after 21 years of the National Water Resources Policy's creation, and considering the SDGs (especially SDG 6).

In order to establish a political agenda for the improvement of Water Management in the country, ANA developed the Legacy Project for Water Management in Brazil in 2017, involving experts, lawyers and representatives of various segments that make up the SINGREH.

The Legacy project presents proposals for the improvement of institutional, legal and infra-legal frameworks for Water Resources Management in Brazil. The Project is available at goo.gl/en72Uw and was presented at the 8th World Water Forum, which took place in Brasilia, from March 17th to March 23rd of 2018.

In addition, there are also some bottlenecks to deal with relating to groundwater management, which has been addressed by federal and state institutions only in more recent years. Studies and guidelines for the shared management of aquifers of Regional occurrence have been carried out, in addition to the realization of integrated water resource balances considering both surface and groundwater.

METHODOLOGICAL SHEET

INDICATOR 6.5.1

Concept

Integrated Water Resources Management (IWRM) is defined as a process that promotes the coordinated development and management of water, land and related resources, in order to maximize the economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems, taking into account climatic and hydrological aspects, as well as economic, political, and environmental aspects.

The indicator aims to identify the degree of IWRM implementation in a country, including the following items:

- Favorable Context for Integrated Water Resources Management (IWRM), considering:
  - Status of policies, laws and plans at country level;
  - Status of policies, laws and plans at river basin and aquifer level, including transboundary water resources;
  - Institutional basis and participatory process to support IWRM implementation, including:
  - Status of institutions involved at country level;
  - Status of the institutions involved at river basins and aquifers level, including transboundary water resources, and level of society participation;
- Management and monitoring tools for supporting the decision-making process in IWRM, including:
  - Status of existing management tools at country level;
  - Status of existing management tools at river basin and aquifer level, including transboundary water resources;
- Funding for IWRM, including:
  - Status of funding mechanisms for IWRM at country level;
  - Status of IWRM funding mechanisms at river basins and aquifers level, including transboundary water resources.

The indicator must be calculated every three years.

Data sources:

ANA: Brazilian Water Resources Reports.

Methodology and data sources

The indicator is calculated by filling in the survey (Country Survey for Indicator 6.5.1), prepared by the United Nations Environment Program (UNEP), divided into four sections, each one containing specific questions on the aforementioned topics, totaling 33 questions.

Time series available for 2018

2010-2016

Spatial units for calculation

The survey presents questions for analysis at national and at river basins and/or federation unit levels

Spatial level

Brazil

Step by step

For each survey question, a score with the following classification is assigned:

Very low: 0 / low: 20 / low to medium: 40/ medium to high: 60 / high: 80 / Very High: 100

The scores of each question are summed up and the sum divided by the total of questions in the Session, and the scores the S1, S2, S3 and S4 are obtained.

Indicator 6.5.1 is calculated by the equation below:

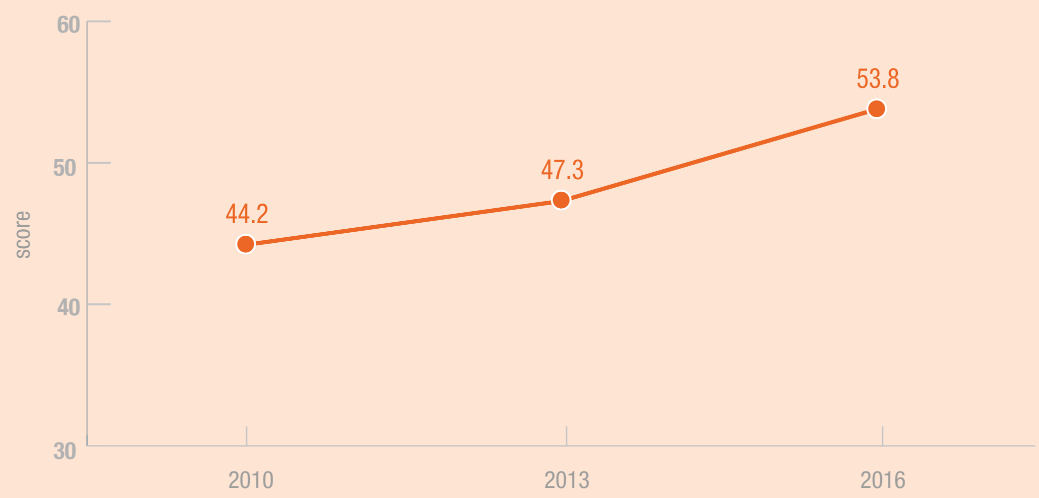
$$\text{Indicator 6.5.1} = \frac{S1 + S2 + S3 + S4}{4}$$

Degree of Implementation of Integrated Water Resources Management

Time series of Indicator 6.5.1 – 2010-2016

Survey Section	2010	2013	2016
1 - Legal framework and planning environment for IWRM implementation	68.6	71.4	80.0
2 - Institutional basis and participatory process to support IWRM implementation	45.0	50.0	55.0
3 - Management tools to support decision-making in IWRM	31.1	35.6	40.0
4 - Funding for IWRM	32.0	32.0	40.0
Indicator 6.5.1 – Final score	**44.2**	**47.3**	**53.8**

Evolution of indicator 6.5.1 in Brazil – 2010-2016



Target 6.5 aims to monitor the progress of countries' transboundary actions of water resource management via **Indicator 6.5.2: Proportion of transboundary water basins and aquifers with an operational arrangement for water cooperation**.

This indicator assesses the progress of shared management of Transboundary Water Resources through the monitoring of agreements signed between countries over time, considering the areas covered by the agreements in relation to the total area of the country's transboundary water basins and aquifers.

Due to its great territorial extension, Brazil shares river basins (including for the largest river in the world, the Amazon river) and aquifers, with a number of other countries in South America. This requires the formalization of international agreements for the integrated management of water resources that cross national borders.

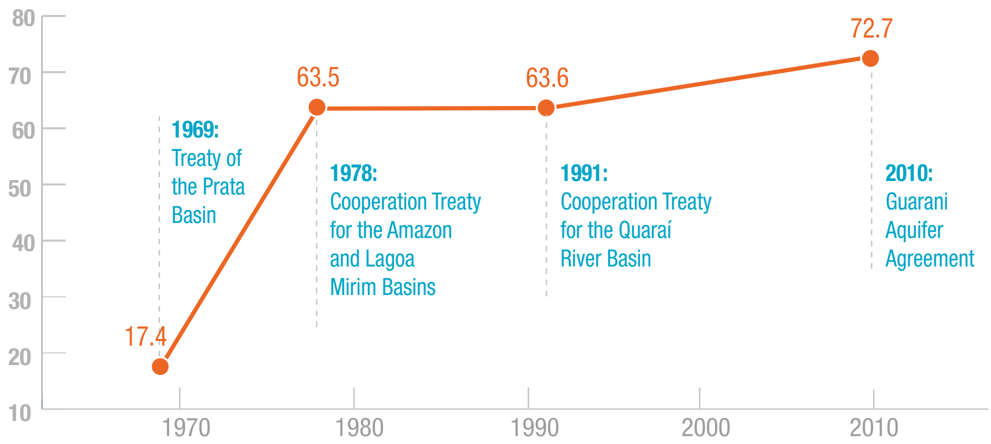
In 2010, the proportion of all Brazilian transboundary water resources covered by international cooperation agreements was of 73%, with emphasis on river basins. Ever since, no new agreements have been signed between Brazil and the countries that share these water resources.

For 100% of Brazil's transboundary water resources to be covered by shared management agreements, it is necessary to conclude agreements for 97% of the country's aquifers (2,842,055 km^2) and only 0.2% of its river basins (12,838 km^2).

The Treaty of the Prata River Basin, signed in 1969 between the Argentina, Bolivia, Brazil, Paraguay and Uruguay governments was the first international agreement signed for the shared management of Brazilian transboundary water resources.

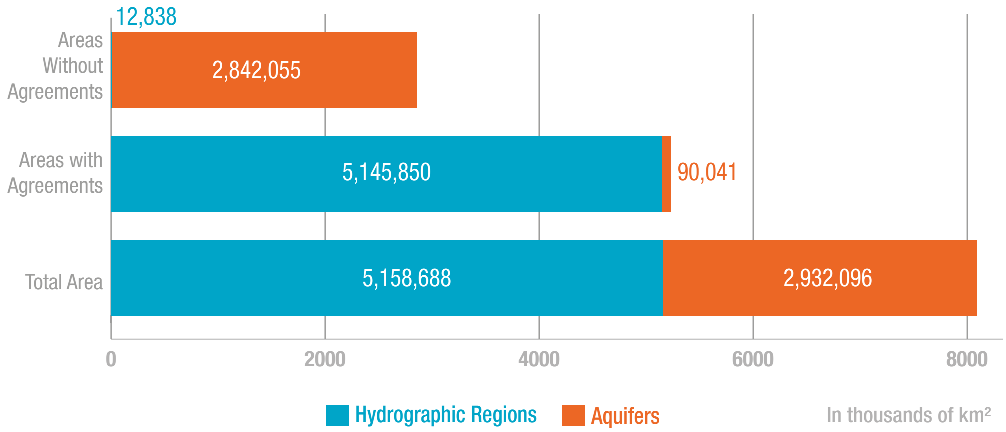
The Prata river covers both the Paraguay Basin and the Paraná and Uruguay basins, including the Quaraí river basin, which is a tributary of the Uruguay River.

Evolution of the signing of international cooperation agreements for the management of transboundary water resources in Brazil - 1969-2010 (% of the area)



SDG 6 Indicator 6.5.2 Results: Proportion of the transboundary basin area with an operational arrangement for water cooperation.

Area of transboundary river basins and aquifers covered and not covered by international agreements in Brazil in 2010 (km²)**,** em 2010



In 1978, the Amazonian Cooperation Treaty signed by Bolivia, Brazil, Colombia, Ecuador, Guiana, Peru and Venezuela and the Cooperation Agreement to promote the Lagoa Mirim Basin's integral development, located on the border of Brazil and Uruguay were both signed. In March of 1991, Brazil and Uruguay signed the cooperation agreement for the Exploring of Natural Resources and the Development of the Quaraí River Basin.

In 1998, member countries signed the Amendment Protocol to the Amazon Cooperation Treaty, in Caracas, creating the OTCA, an international organization with a permanent secretariat and its own budget.

Several projects for the Amazon Basin are currently underway in topics such as the environment, indigenous affairs, science and technology, health, tourism and social inclusion. The "Regional Action in Water Resources" (Amazon Project) coordinated by the ANA since 2012 is relevant within this context.

At the moment, the only transboundary river basins devoid of any international shared management agreements are the basins of the Oiapoque river - that extends into the Brazilian territory and into the overseas department of French Guiana (France), and the Arroio Chuí basin, of small territorial extension and shared with Uruguay.

As for transboundary aquifers, only Guarani was the subject of an agreement signed between Brazil, Argentina, Paraguay and Uruguay in 2010.

The Guarani Aquifer occupies a total area of 736,000 km² in Brazil, this area mostly overlaps with the Serra Geral and Bauru-Caiuá aquifers that have an area of only 90,000 km². The area which is object to the agreement corresponds to the entire aquifer area in the Brazili-an territory, distributed through-out the States of Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Paraná, Rio Grande do Sul, Santa Catarina and São Paulo.

In 2014 the Study on Natural Vulnerability to Contamination and Strategies for Protection of the Guarani Aquifer System (GAS) in the Outcrop Areas was completed by ANA, with the aim of assessing the GAS's natural vulnerability to contamination, as well as defining the contamination risks, and establishing the technical basis for the planning of actions and measures for the protection and control of groundwater from the aquifer.

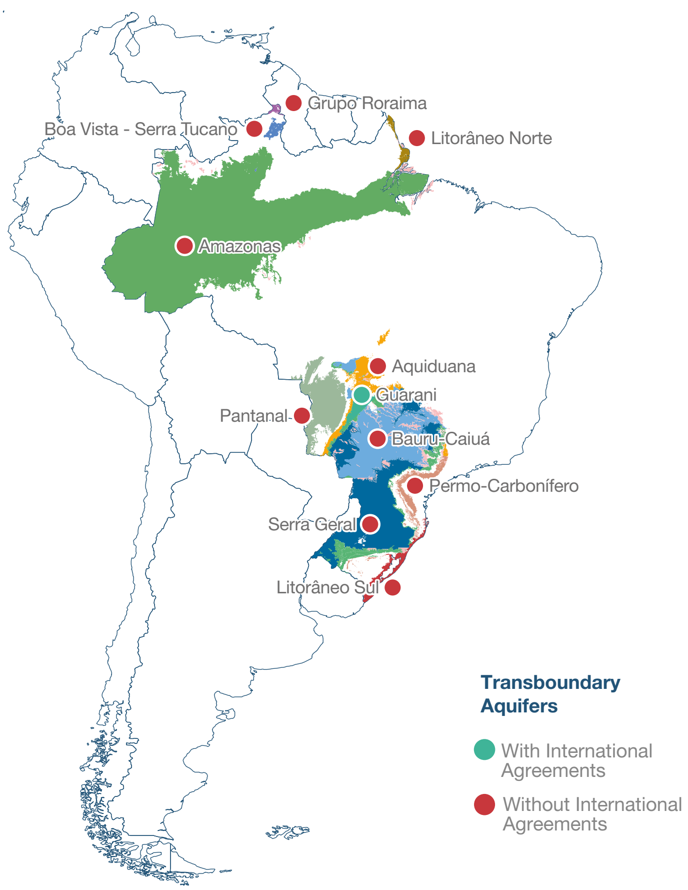
Transboundary River Basins

Transboundary river basins and areas in the Brazilian territory

Transboundary River Basin	Shared Coutries	Basin Area within the Brazilian Territory (km²)
Amazon	Bolívia, Colombia, Guiana, Peru, Venezuela, Ecuador	3,700,000
Paraná	Argentina, Paraguay	878,000
Paraguay	Bolívia, Paraguay	361,000
Uruguay	Uruguay, Argentina	171,000
Lagoa Mirim	Uruguay	29,250
Oiapoque	France (French Guiana)	12,407
Quaraí	Uruguay	6,600
Chuí	Uruguay	431
Total		**5,158,688**

**The Quaraí Basin is a Uruguay sub-basin that, in its turn, together with the Paraguay and Paraná basins, form the Prata river basin.*

Transboundary aquifers



Transboundary aquifers and areas in the Brazilian territory

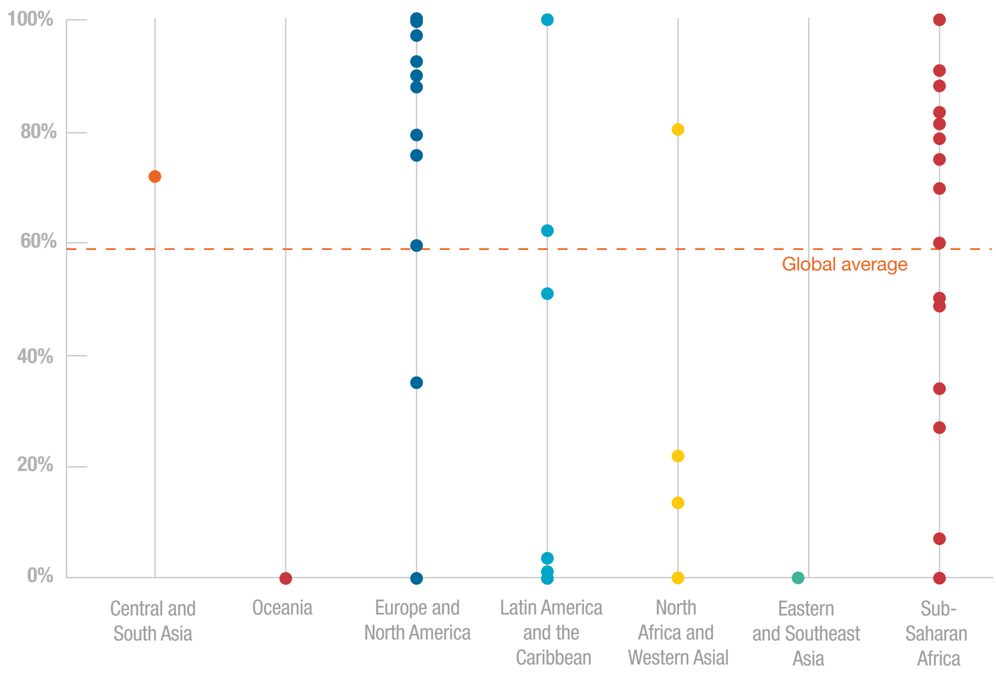
Transboundary Aquifers	Shared Countries	Area of the Aquifer within the Brazilian Territory (km²)
Amazonas	Bolívia, Colombia Ecuador, Peru, Venezuela	1,743,105
Serra Geral	Argentina Paraguay, Uruguay	424,197
Bauru-Caiuá	Paraguay	356,953
Pantanal	Bolivia, Paraguay	162,318
Guarani	Argentina, Paraguay, Uruguay	90,041
Aquidauana	Paraguay	73,027
Permo-Carbonífero	Uruguay	45,124
Litorâneo Sul	Uruguay	26,564
Litorâneo Norte	France (French Guiana)	5,351
Grupo Roraima	Guiana, Venezuela	5,010
Serra do Tucano	Guiana	406
Total:		**2,932,096**

**The polygons correspond to the outcrop areas of aquifer systems within the Brazilian territory. Not available for other countries.*

Even though there is still a significant portion of transboundary Brazilian aquifers without international cooperation and shared management agreements, Brazil has a share of its transboundary river basins covered by a mechanism that is comparable to that of Europe and North America, and which scores much higher than the global average, according to data recently released by the UN.

Proportion of transboundary river basin areas with operational agreement for cooperation in Water Resources Management in countries by region of the world, in 2017/2018

Data from SDG 6 Indicator 6.5.2 published by the UN in 2018, available at goo.gl/4k8oza



The operation of the existing agreements in accordance with the four measurements proposed by the UN: the existence of a joint body, mechanism or commission (for example, a river basin organization) for transboundary cooperation; the existence of regular formal communication meetings between the countries (at the political or technical levels) at least once a year; the existence of a joint water management plan or the definition of common objectives, and; the regular sharing of data and information at least once a year, is under evaluation, and will be presented by the ANA in the next indicator update.

METHODOLOGICAL SHEET

INDICATOR 6.5.2

Concept

This indicator assesses the proportion of river basins and aquifers in the country with international technical cooperation agreements for Water Resources Management.

A cooperation agreement for water management may be a treaty, convention, or other formal bilateral or multilateral instrument between neighboring countries, which provides a reference for cooperation in transboundary water management.

The criteria for the arrangement to be considered "operating" is based on the substantive cooperation in water management's key aspects: the existence of a formally created group with representatives from the countries; the formal communication between the countries involved (at least once per year); the existence of objectives and management plans set; and a regular exchange of data and information (at least once a year).

Methodology and data sources

This indicator is calculated at the national level, adding together transboundary water resources areas with an operational water resource management arrangement and dividing the result by the total area of all transboundary water resources within the country. For the purpose of this indicator, "area" is defined, for surface water, as river basin extent, and for groundwater, as aquifer extent.

Countries must answer a specific survey for the indicator prepared by UN Water.

The final indicator is calculated as follows:

$$\text{Indicator 6.5.2} = [(A + C) / (B + D)] \times 100$$

Where:

A = total area of transboundary river basins covered by technical cooperation agreements, in km^2
B = Total Area of Transboundary River Basins in km^2
C = Total Area of transboundary aquifers covered by technical cooperation agreement in km^2
D = total area of transboundary aquifers, in km^2

Data sources:
Information from ANA, SRHQ/MMA and the Ministry of Foreign Affairs.

Time series available for 2018

1969-2010

Spatial unit for calculation

The survey presents questions for analysis at the national level, considering the areas of transboundary river basins and aquifers as the basis for the calculation.

Spatial level

Brazil

Step by step

1. The country's transboundary river basins and aquifers total areas are verified
2. Transboundary river basins and aquifers in the country with and without international cooperation agreements are considered
3. A, B, C and D are calculated
4. The default equation for calculating the indicator is applied

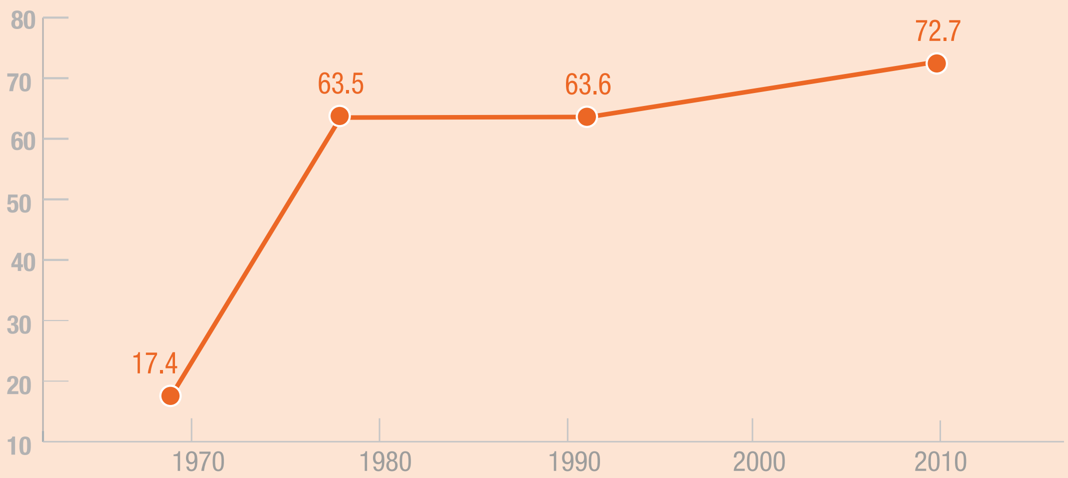
Proportion Of Transboundary River Basins and Aquifers With An Operational Arrangement For Water Cooperation

Time series of indicator 6.5.2 – 1969-2010

Year	Indicator 6.5.2 (% of area)
1969	17.4
1978	63.5
1991	63.6
2010	72.7

The indicator calculated does not yet consider the operability of the existing transboundary cooperation agreements.

Evolution of Indicator 6.5.2 in Brazil – 1969-2010 (% da área)



One of the numerous issues included in UN 2030 Agenda is the concern about the degradation of aquatic ecosystems over time, in quantity, quality and loss of wet areas and water bodies due to water resource exploitation undertaken without the incorporation of environmental conservation criteria. Without water related ecosystem services, human society would collapse.

An emblematic example of water mismanagement is the Aral Sea case, located in Central Asia, which has lost about 90% of its water surface due to uncontrolled water withdrawal for irrigation, and is currently in the process of desertification. Due to the impact of human activities and climate change the Chad Lake, in Africa, shared by Niger, Nigeria, Chad and Cameroon, has also been showing significant losses in its water surface area, and the Azraq Oasis, located in the eastern desert of Jordan has suffered a severe reduction in its wetlands.

The natural vegetation of a river basin influences water quantity and quality. In areas affected by humans, where vegetation has been suppressed to give way to activities such as agriculture and urban development, without adequate criteria for maintaining riparian forests and vegetationin headwater basins/springs and in aquifer recharging areas, surface and groundwater are more vulnerable to pollution and volume losses.

In order to create a mechanism for this assessment to be implemented by the countries, Goal 6.6 provides for **Indicator 6.6.1: Change in the extent of water-related ecosystems over time**, which aims to trace the successive changes in aquatic ecosystems, considering the following sub-components: spatial extent; water quantity; water quality (associated with Indicator 6.3.2); and ecosystem “health”; When assessing changes over time, the sub-component values are aggregated to compose the final indicator.

Actions such as the suppression of native vegetation made without due care for water resources conservation can result in irreparable damage, therefore, aquatic systems' conditions should be assessed over time, so as to avoid or mitigate undesirable effects through timely implemented interventions.

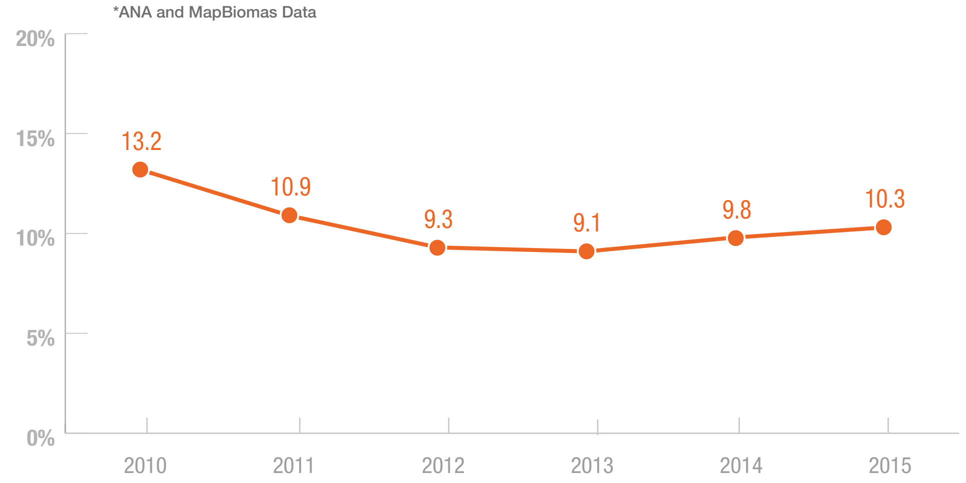
Ecosystem health is commonly measured via biological indicators, but the UN recommends no specific method since its choice must be determined by local ecological conditions.

Standardized procedures for the use of biological indicators for aquatic ecosystem monitoring are not yet systematized in Brazil, this occurs due to the great variability of environments existing in the country, which would require specific studies and guidelines to incorporate local ecological conditions.

Changes in the Brazilian aquatic ecosystems from 2010 to 2015 are not very expressive when considering the country as a whole. 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.

Groundwater resources were not considered for this analysis due to the gaps in monitoring and the difficulties in obtaining the necessary data.

Changes in Brazilian Aquatic Ecosystems, from 2010 to 2015 (%)



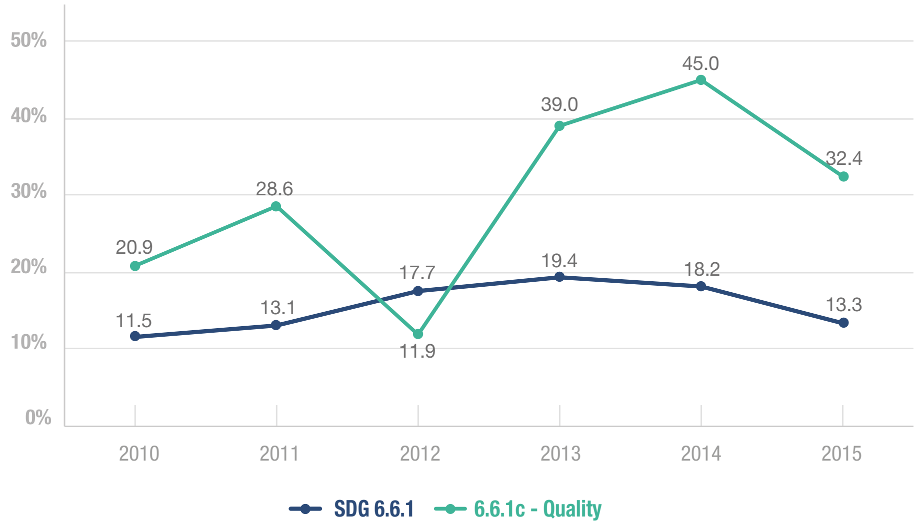
SDG Indicator 6.6.1 Results: Change in the extent of water-related ecosystems over time.

Evolution of the components of Indicator 6.6.1 in Brazil – 2010-2015 (%)

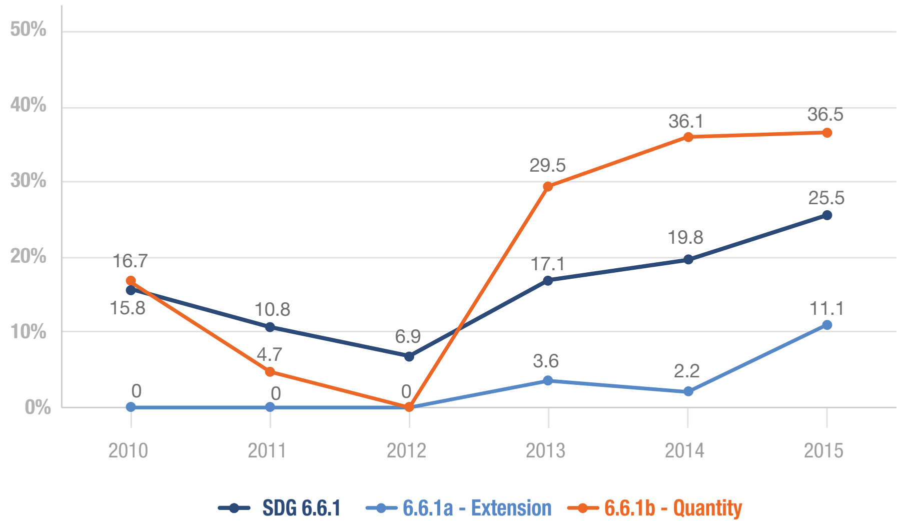
The indicator's time series starts in the year 2010 because it is necessary to make it compatible with the time series of indicator 6.3.2, calculated for the same period of 2010-2015. However, the initial reference for assessing changes in the aquatic ecosystems in regards to extension and quantity was the year of 2000.

Changes in water quality quantify the percentage of a specific water body (obtained from indicator 6.3.2) so that its quality is classified as 100% good, equivalent to that of natural conditions. The changes in quantity and extent of aquatic ecosystems respectively represent losses in water volumes and water surface areas computed since the year 2000, even though they are represented only from 2010 to 2015.

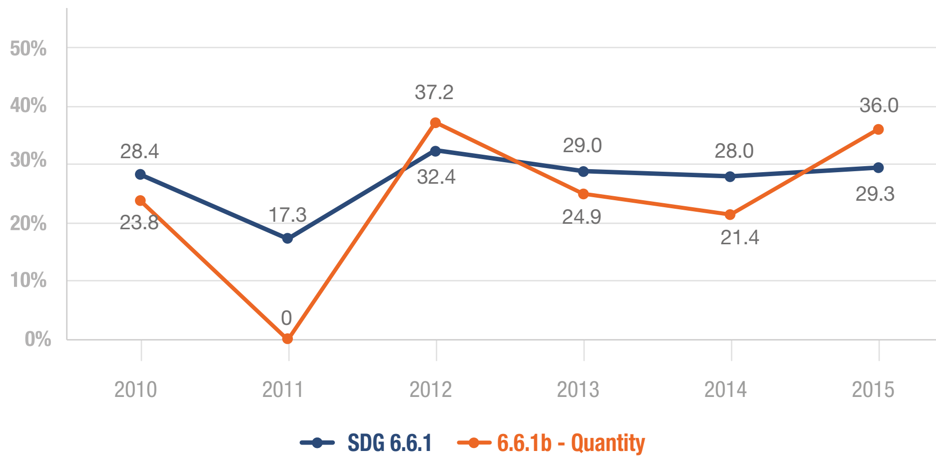
Changes in the component and indicator 6.6.1 in the Paraguay Hydrographic Region – 2010-2015 (%)



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



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



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.

The Pantanal is considered one of the largest continuous wetlands on the planet. Its approximate area is of 150,355 km², occupying 1.76% of the Brazilian territory. An interesting feature of this biome, which gives it even more relevance, is that many species that are endangered in other regions of Brazil persist in large numbers in this region. The Water Resources Plan for the Paraguay River Basin in Brazilian territory was published in 2018 and is available at goo.gl/DFAiwN

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.

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.

Brazil had 172,837 artificial reservoirs mapped in 2017, which occupied a surface area of almost 45,000 km². The spatial database is available at goo.gl/y7xyir. However, the methodology adopted in this indicator considered the annual data water bodies extension obtained from the processing of Landsat images of the MapBiomas project. Satellite images can detect both the appearance of new water bodies, mainly artificial reservoirs, and the disappearance of others, mainly natural water bodies.

The results of indicator 6.6.1 for Brazil are attributed to the fact that the period of only 6 years is very unrepresentative of the real changes that occurred in the country’s surface water bodies; greater change would certainly be identified should the initial reference time frame for the analyses correspond to a longer period.

Furthermore, grouping natural and artificial water bodies can induce errors and may have caused the absence of changes in extension according to the indicator’s methodology, since many countries are losing their water-related natural ecosystems while, at the same time, registering an increase in the number of artificial water bodies. To address this deficiency, the UN is preparing a new global data set with the classification of water bodies into natural and artificial, in order to separately calculate changes in extension. It should be noted that this classification is already available in ANA’s water bodies spatial database for Brazil.

According to information relating to Indicator 6.6.1 available in the UN Water and UN Environment Report available at goo.gl/dzG7V7

Biomes constitute ecosystem groups with their own biological diversity. Since vegetation is one of the most important components of the biota, its state of conservation and continuity defines the existence or non-existence of habitats for species, the maintenance of environmental services and the supply of essential goods to the survival of human populations.

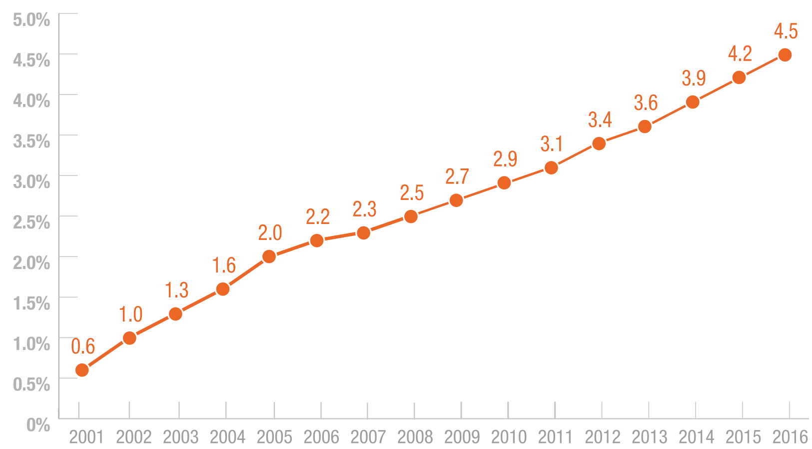
When assessing the suppression of natural vegetation in Brazil over a longer period, from 2001 to 2016, it is possible to see a total loss of 4%, suggesting that changes in aquatic ecosystems could be higher than 2.7% (which was the result for indicator 6.6.1) if the analysis period were longer.

The great diversity in Brazil can be observed by the variety of biomes and vegetation types present in the country, and is also reflected in different characteristics of the country's water resources.

Distribution of Brazilian biomes in the Hydrographic Regions

Estimated data from the MapBiomas project, a multi-institutional initiative involving universities, NGOs, and technology enterprises that joined forces to contribute to the understanding of the transformations in the Brazilian territory through the annual land cover and use mapping in Brazil, using remote sensing images. Information and databases available at http://mapbiomas.org/

Loss of natural vegetation in Brazil between 2001 and 2016 (%)



In any case, it is possible to continue monitoring changes in aquatic ecosystems until 2030 from the available data used for the calculation of indicator 6.6.1 in 2018, thus subsidizing management actions that may prove necessary over time.

The UN allows countries to adopt the available data for the implementation of the calculation of indicator 6.6.1, considering the compatible period for the assembling the time series. It also evaluates that annual earth observation data over a five-year period allows for the assessment of climate and seasonal fluctuations in water-related ecosystems.

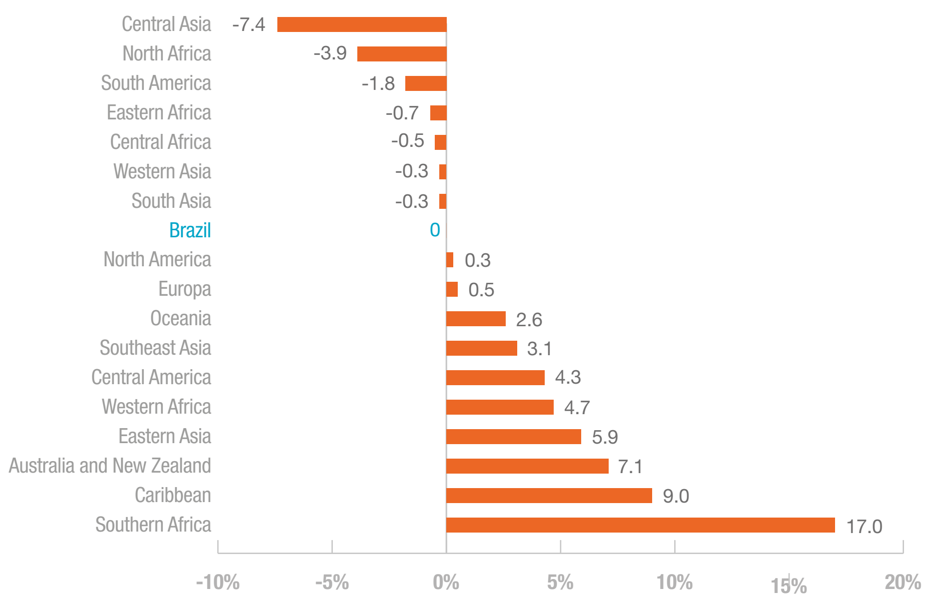
It should be noted that Brazil has sufficient data to monitor changes in aquatic ecosystems over time by Hydrographic Regions, with gaps only for groundwater, which demands the improvement of the mechanisms used to record quantitative and qualitative monitoring data.

Currently, there is no worldwide data set that allows for the monitoring and reporting on groundwater. In Brazil, CPRM has been implementing the Integrated groundwater monitoring network (RIMAS), which may be expanded into a national network through an articulated action among different institutions.

Even though the changes in aquatic ecosystems have not proven to be very significant for Brazil over the period of five years adopted for the time series of indicator 6.6.1 preparation, some issues deserve special attention and specific studies for the identification of their root causes and the proposal of appropriate steps. Such measures include progressive expansion in the application of surface and groundwater permits, intensification of oversight, inspection, and evaluation of the causes for the progressive water surface reduction in lagoons located in coastal areas, for example, so that there the losses of aquatic ecosystems in the country may be reduced over time.

At the global level, the UN data indicates losses in the extent of water bodies between 2001 and 2015 that reach 7.4% in Central Asia, and almost 4% in North Africa and 2% in South America, while other regions show gains of up to 17%, as is the case in Southern Africa.

Analysis of average loss and gain trends in the water bodies extension in the world (natural and artificial reservoirs, including flooded areas for irrigation) between 2001 and 2015



Data from SDG 6 Indicator 6.6.1 published by the UN in 2018, available at goo.gl/ubmcXA

The gains are not necessarily positive, as they may represent loss of natural area for the filling of artificial reservoirs, for example.

METHODOLOGICAL SHEET

INDICATOR 6.6.1

Concept

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; water quality (associated with indicator 6.3.2); and ecosystem "health".

When assessing changes over time, the sub-component values are aggregated to compose the final indicator.

The reference point for "changes over time" is the natural condition, that is, before the ecosystem experienced large-scale impacts. Should the information on the natural condition not be available, an estimate may be made based on the extrapolation of data from neighboring sites, historical data, models and expert judgement.

The appropriate reference conditions may be defined by the countries according to the available data, and may correspond to a given year - baseline - even if previous changes are not included due to the absence of past data.

Methodology and data sources

The indicator's calculation is systematized in a spreadsheet proposed by the GEMI (Global Environmental Management Initiative) / Water, and is linked to Indicator 6.3.2 in regards to water quality.

In this spreadsheet, data on the quantity and quality of aquifers is requested, however, this data was not considered in this work due to the unavailability of systematic data for groundwater, mainly regarding its quality and possible changes in quantity over time.

The indicator is calculated for the three sub-components, and the results for the Hydrographic Regions and for Brazil as a whole are as follows:

$$\text{Indicator 6.6.1} = \frac{Ext + Qual + Quan}{3}$$

Where: indicator 6.6.1, calculated in %;

Ext = changes in the extent of aquatic ecosystems, in %;
Qual = changes in water quality, in % (based on indicator 6.3.2);
Quan = changes in water quantity, in %.

In order to evaluate the changes in the extent of ecosystems, the earliest year with available data is the year 2000; therefore, the variation obtained in each year of the indicator's time series refers to the situation identified in the year 2000.

The baseline scenario for calculating changes in water quantity corresponds to a five-year average of the most recent past as a way to mitigate effects of short-term variability. Therefore, for 2006, for example, the reference scenario shall correspond to the average water quantity (annual average Hydrographic Regions' flows) from 2001 to 2015.

The baseline scenario for quantifying changes in water quality derives from indicator 6.3.2, and corresponds to a good water quality of 100%; so, if a water body has a good water quality of 40%, indicator 6.6.1 considers a 60% change.

Data sources:

- 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;

- 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.

- Water quality

ANA: for the calculation of indicator 6.3.2 of SDG 6

Change in water-related ecosystems over time

Time series available for 2018

Water quantity: 2001-2015

Extent of aquatic ecosystems: 2000-2016

Water quality: 2010-2015 (period adopted for the calculation of indicator 6.3.2)

Spatial unit for calculation

Hydrographic Region

Spatial level

Brazil

Step by step

Quantity: the reference scenario corresponds to a 5-year moving average of the recent past as a way to mitigate short-term variability effects. Therefore, for 2006, for example, the baseline scenario shall correspond to the average between years 2001 to 2005.

The difference between the annual value and the reference flow is then calculated. Only the negative variation value is of interest. Should the flow rate for the year in question be higher than the reference year's flow rate, the sub-component will be 0%.

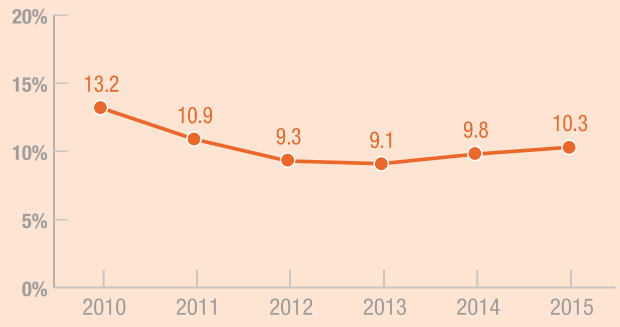
Extension: the reference scenario adopted corresponds to the year 2000 (the oldest in the series). Therefore, for all years, the difference between the added areas of the MapBiomas classes selected by Hydrographic Region is verified in relation to the year 2000.

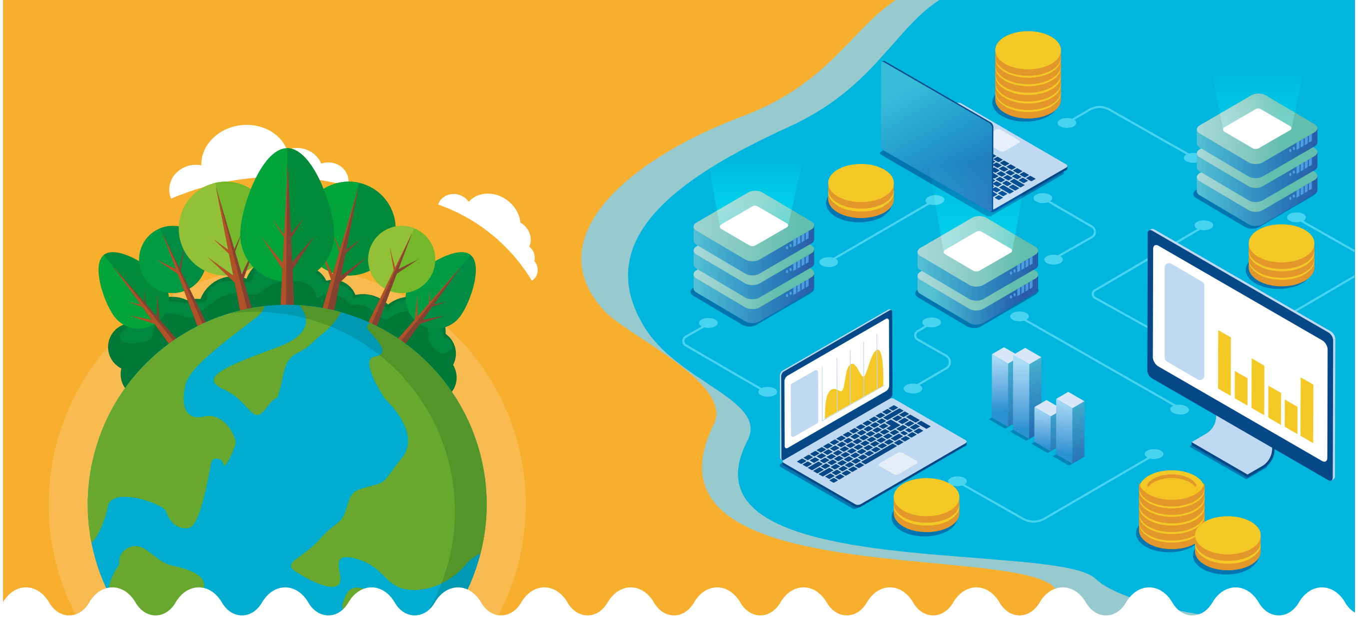
Quality: the reference scenario corresponds to that of 100% quality, compatible with natural conditions. Therefore, if the quality of a Hydrographic Region for a given year is 36%, according to Indicator 6.3.2, the change in relation to the reference scenario corresponds to the complement, i.e., 64%.

Time series for indicator 6.6.1 – 2010-2016 (%)

Hydrographic Region/ Brazil	Reference year					
	2010	2011	2012	2013	2014	2015
Amazon	23.2	19.9	18.0	14.4	12.3	10.1
Tocantins-Araguaia	14.9	15.5	8.1	6.1	3.7	16.7
Western Northeast Atlantic	24.9	17.0	39.3	21.9	22.6	23.0
Northeast Eastern Atlantic	28.4	17.3	32.4	29.0	28.0	29.3
Parnaíba	19.0	8.3	24.7	20.2	19.8	23.4
East Atlantic	19.1	10.3	17.8	11.8	16.9	12.7
São Francisco	15.8	10.8	6.9	17.1	19.8	25.5
Southeast Atlantic	10.0	5.7	15.1	15.3	8.5	10.8
Paraná	11.8	10.7	9.8	8.6	17.8	10.2
Paraguay	11.5	13.1	17.7	19.4	18.2	13.3
South Atlantic	4.7	7.9	15.9	9.0	2.4	10.3
Uruguay	0.6	1.2	14.2	0.0	0.0	0.8
Brazil	**13.2**	**10.9**	**9.3**	**9.1**	**9.8**	**10.3**

Evolution of indicator 6.6.1 in Brazil – 2010-2015 (%)





The necessity of greater financial resources to achieve SDG goals 6.1 to 6.6 is clear. The capital investments necessary for achieving drinking, sanitation and hygiene water supply goals (Targets 6.1 and 6.2) are expressive, since they include a number of infrastructure works. Similarly, funding to achieve the SDG targets 6.3 to 6.6 requires the expansion of international cooperation and support for the development capacity, on topics such as sewage treatment, monitoring of water quality and quantity, and improving of water resource management.

Target 6.a is monitored by **Indicator 6.a.1 - Amount of official development assistance for water and sanitation as part of a government expenditure plan**.

The indicator is defined by the amount and percentage of official development assistance (ODA) for water and sanitation included in a government investment plan and part of its budget, with the main goal of promoting the economic development and welfare of developing countries.

By convention, ODA flows comprise contributions from donor government agencies to developing countries at all levels, either bilaterally or through multilateral institutions.

ODA is a quantifiable proxy to evaluate international cooperation and support to capacity building in developing countries, but does not capture all types of international support provided, given the wide range of stakeholders involved.

It is essential to assess whether ODA flows to a country for water and sanitation are effectively included in the government budget in its different spheres, considering the degree of dependence of that country on external support.

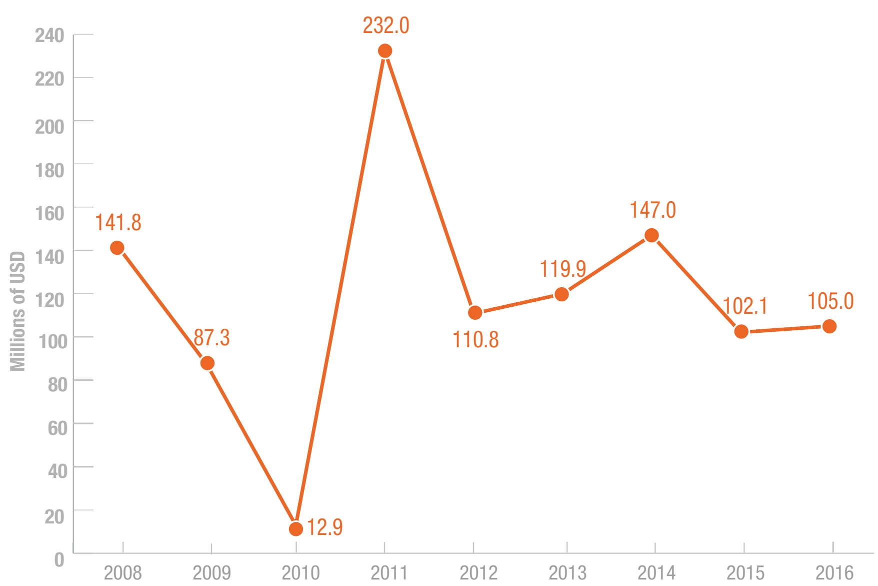
Currently, the monitoring of this indicator is based on the control of ODA resources destined to the water and sanitation sector for developing countries. However, the available data is insufficient for evaluating the results obtained by all countries and there is great difficulty in obtaining this data and in defining the variables involved in calculating the indicator. It is expected that these results are better defined and detailed over time.

Description and methodology of indicator 6.a.1 published by the UN in 2018, available at goo.gl/ifXqCL

According to the UN methodology, ODA for the water sector includes support for water supply for drinking, sanitation and hygiene, as well as irrigation, flood protection and hydroelectric power generation.

ODA received by Brazil for the water and sanitation sector – 2008 to 2016

*OCDE Data



ODA values for water and sanitation are recorded by the Creditor Reporting System of the Organization for Economic Cooperation and Development (OECD), which collects data on ODA financial flows (commitments and disbursements) to developing countries. Available at goo.gl/cKABJG

The main difficulty in calculating the indicator is to obtain Federal and sub-national budget values that are effectively internalized yearly for investments in water and sanitation, given the large amount of programs and projects financed with external resources, especially from sub-national entities. The Modernization Program for the Sanitation Sector - PMSS, Semi-Arid PROAGUA, National PROAGUA and INTERAGUAS may be cited as Brazilian examples.

The organization and collection of data through the GLAAS TrackFin7 initiative (UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water) is planned.

The Development Program for the Water Sector - INTERAGUAS is the result of a loan agreement between Brazil and the World Bank, and was created due to the necessity of having better articulation and coordination of actions in the water sector. The Program includes Water Management, Regional Development, Irrigation, Water Supply and Sanitation, Integrated Planning and Monitoring.

These components were executed through MMA, ANA, the Ministry of National Integration (MI) and the Ministry of Cities (MCidades). During the course of the project (2012-2018) resources of the order of 75 million BRL (50 million BRL loan and 25 million BRL national counterpart) were invested.

METHODOLOGICAL SHEET

INDICATOR 6.a.1

Concept

This indicator assesses the proportion of water and sanitation-related Official Development Assistance (ODA) resources that are included in government-coordinated expenditure plans. Thus, indicating the level of alignment and cooperation between donor and recipient countries.

ODA means official development assistance and includes contributions from government agencies in the form of donations to developing countries, at all levels, either bilaterally or through multilateral institutions.

A government-coordinated expenditure plan is defined as a financial plan/budget at national or sub-national level, with a clear assessment of the available financial resources and strategies to finance future demands.

Methodology and data sources

ODA:

In order to calculate the indicator, it is necessary to consider all ODA donations made from all donor countries to Brazil, this information is available on the Creditor Reporting System website and is made available by the OECD (goo.gl/4o41ke)

The search is made by gross "Disbursement" from "all donor countries" in millions of US dollars and constant prices (in 2016), for the following sectors: drinking water, sanitation and hygiene water supply, irrigation, flood protection and hydroelectric power generation.

ODA included in the government budget:

Data on the amount of water and sanitation-related ODA included in government coordinated spending plans is not available and shall be compiled via data collection through the GLAAS TrackFin7 initiative (UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water).

Time series available in 2018

2008 to 2016

Spatial unit for calculation

Brazil

Spatial level

Brazil

Step by step

Access the Creditor Reporting System website made available by OECD (goo.gl/HxQePt)

Search using the following filters:

- All Donors
- Sectors: TOTAL water supply and sanitation (CRS 140), Hydroelectric power plants (CRS 23220), Agricultural water resources (CRS 31140), Flood prevention/control (CRS 41050)
- Official Development Assistance
- All Channels
- Gross Disbursements
- All Types of Aid
- Constant Prices

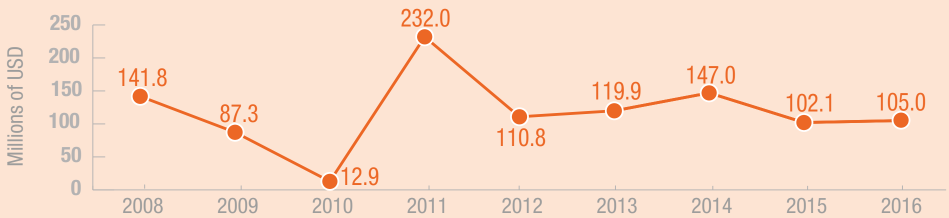
Add the mentioned sectors' ODA and get the total ODA for the water sector.

Amount of official development assistance for water and sanitation as part of a government spending plan

Gross ODA Disbursement to Brazil, in millions of dollars (USD)

	2008	2009	2010	2011	2012	2013	2014	2015	2016
Water Sector Policy and Administrative Management (CRS 14010)	0.562	0.504	1,024	0.537	0.819	0.857	0.445	0.352	0.658
Water Resources Conservation (including data collection) (CRS 14015)	0.347	0.437	0.268	0.392	0.412	1,508	1,510	3,148	1,971
Water supply and Sanitation - large systems (CRS 14020)	136,320	60,561	0.156	0.886	4,484	21,225	54,843	18,402	3,737
Water Supply - large systems (CRS 014021)			1,851	0.180	0.191	57,799	77,052	69,068	54,180
Water and Sanitation Treatment - large systems (CRS 14022)			1,205	182,926	5,345	34,230	9,373	9,237	36,827
Basic Drinking Water Supply and	3,421	1,412	4,359	1,346	1,423	3,449	1,830	0.985	5,021
Basic Sanitation (CRS 14030)				0.022	0.066	0.006	0.007	0.080	0.029
Basic Drinking Water Supply (CRS 14031)			0.251		0.448	0.005	0.417		
Basic Sanitation (CRS 14032)	0.100	22,931	0.170	0.067	0.012	0.059	0.342	0.375	0.253
River Basins Development (CRS 14040)	0.523	0.797	1.286	0.492	0.663	0.595	0.984	0.451	2.214
Waste Management/Disposal (CRS 14050)	0.089	0.074	0.046		0.053				0.022
Education and Training in Water Supply and Sanitation (CRS 14081)	**141,362**	**86,715**	**10,615**	**186,847**	**13,916**	**119,733**	**146,804**	**102,100**	**104,912**
Hydroelectric Power Plants (CRS 23220)	0.050		1,931	43,974	96,678				
Agricultural Water Resources (CRS 31140)	0.382	0.562	0.376	0.018	0.207	0.205	0.237		0.076
Flood prevention/control (CRS 41050)				1,164					
TOTAL - Water Sector	**141,794**	**87,277**	**12,922**	**232,003**	**110,801**	**119,938**	**147,041**	**102,100**	**104,988**

ODA received by Brazil for the water and sanitation sector – 2008 to 2016



The calculated indicator does not yet consider the amounts included in government expenditure plans

The active participation of institutions and communities in water resources management and sanitation management is essential to give legitimacy to public policies and initiatives aimed at the sustainable use of water. In the context of SDG 6, **Target 6.b** aims to assess the level of participation of local authorities in the management of water resources and sanitation.

The monitoring of target 6.b is performed via **indicator 6.b. 1 - Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management**

In the indicator's context, local participation policies and procedures are conceptualized as mechanisms by which individuals and communities can significantly contribute to decisions about the management of water and sanitation, including, for example: choose solutions that are adequate to a given social and economic context; acquire full understanding of the impacts of a decision on the local population; and have a degree of local responsibility in relation to the chosen solutions.

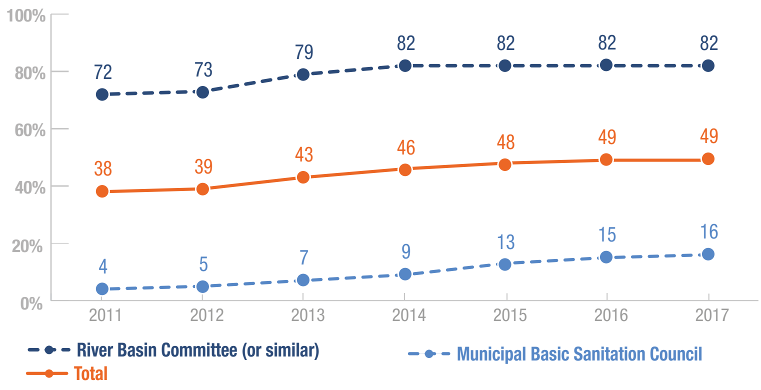
For the indicator's calculation the Brazilian municipalities were considered as local administrative units. Two aspects of popular participation were considered: water resources management at the river basin level and sanitation services management at the municipal level.

The River Basin committees (CBHs) are collegiate bodies that are part of the National Water Resources Management System (SINGREH) and have existed in Brazil since 1988. The diverse and democratic composition of the committees contributes to the representation and decision-making ability of all sectors of society that are interested parties in the basin management.

The first Brazilian Basin Committee, the Rio dos Sinos Basin Committee in Rio Grande do Sul State, was created during the promulgation of the National Constituent Assembly of 1988. Source: Brazilian Water Resources Report 2009, goo.gl/9eYNn9

Evolution of the participation of local entities (municipalities) in actions of Water Resources Management (GRH) and Sanitation Management (GSA) in Brazil – 2011- 2017 (%)

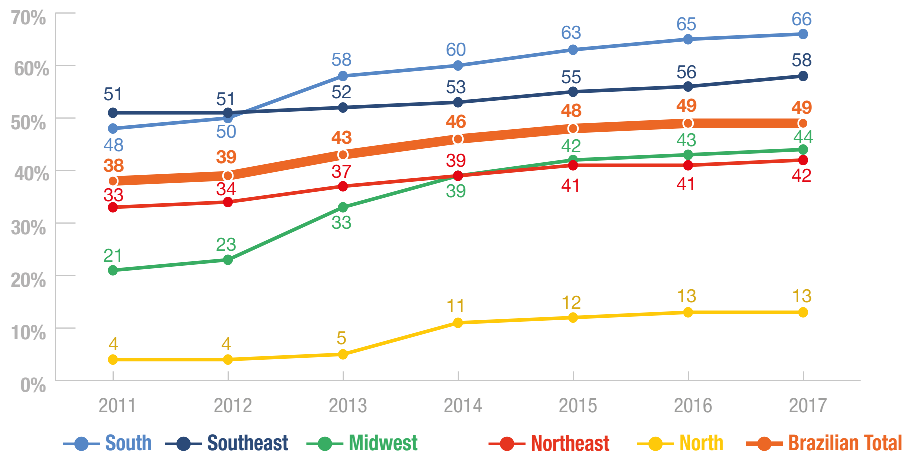
*Data from ANA and IBGE



SDG 6 Indicator 6.b.1 Results - Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management

Evolution of the participation of municipalities in water resources and sanitation management in Brazil and its geographical regions – 2011-2017 (%)

*Data from ANA and IBGE



As for the population covered by the committees' area of activity, about 25.5% are located in the federal committees' area and 75% of state committees. Considering the overlap between them, 49% of the Brazilian population lives in a CBH area.

The collegiate body members are chosen among their peers, be they from the various water-using sectors, civil society organizations or public authorities. Its main competencies are: to approve the River Basin Water Resources Plan; to arbitrate conflicts for water use in the first administrative instance; to establish mechanisms and suggest fees to charge; and to approve the river basin's water bodies classification framework.

The CBHs can be interstate or federal, when covering river basins located in more than one federation unit, or state committees when they cover one or more basins located in the same FU. There are also "single committees" that act in the federal and state levels.

The Paraguay Hydrographic Region has no Basin Committee. A specific Working Group (GT) covering 78 municipalities was set up in 2013 to monitor the region's Water Resources Plan, completed in 2018. In the state of Ceará and in some specific river basins, several entities participate in the allocation agreements for reservoir water, all of which are members of Basin Committees.

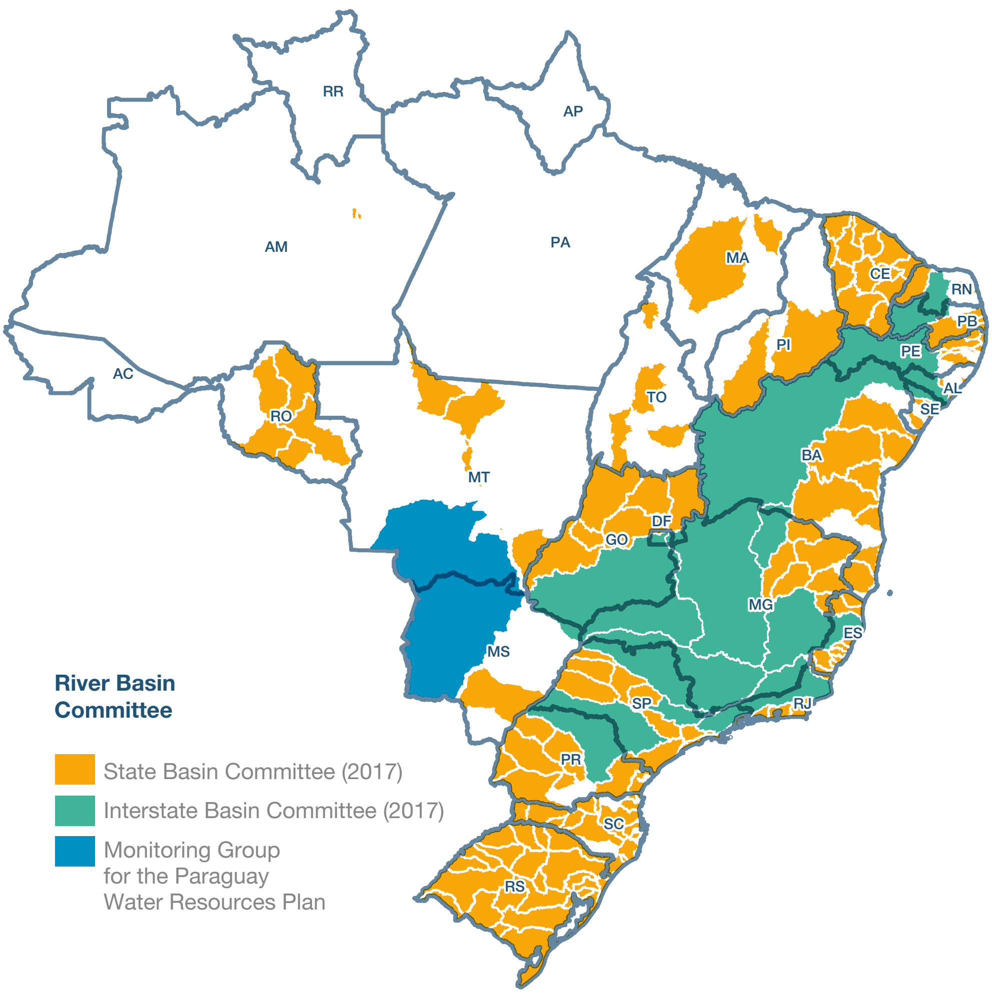
Other SINGREH participating entities that act similarly to CBHs are the Working Groups created to monitor the development of River Basin Water Resource Plans, entities participating in negotiations for water allocation agreements in reservoirs, and dam management commissions.

CBHs are usually created in Brazilian basins characterized by the occurrence of quanti-qualitative conflicts for multiple uses of water resources; therefore, they do not represent the totality of the Brazilian basins. However, it is precisely in these basins that stakeholder participation in water resources management is most needed. Therefore, it is valid for Brazil to consider the municipalities that are members of committees as appropriate forums for local participation in the management of water resources. It might not be necessary to pursue the universalization of this indicator in Brazil, but rather to guarantee that it becomes more robust, in order to achieve better results in critical areas.

With the publication of Law N°. 11,445/2007, the Basic Sanitation Law, regulated by Decree No. 7,217/2010, all Brazilian municipalities became obligated to institute social controls for public sanitation services in order to have access to federal resources intended for works and other actions in this area.

Basic sanitation works and services in the municipalities are now monitored by the society. The participation of the population can be exercised via collegiate body, such as the Basic Sanitation Municipal Council (CMSB), or take advantage of the existence of a Municipal Council for Health or for the Environment, making the necessary adaptations.

River Basin Committees in Brazil



The Council should have representatives such as service owners; government bodies related to the basic sanitation sectors; public basic sanitation service providers; basic sanitation service users; technical agencies; civil society organizations; and consumer protection entities related to the basic sanitation sector.

The services, defined by Law No. 11,445/2007, are: water supply; sanitation; urban cleaning and management of solid waste; and drainage and management of urban rainwater.

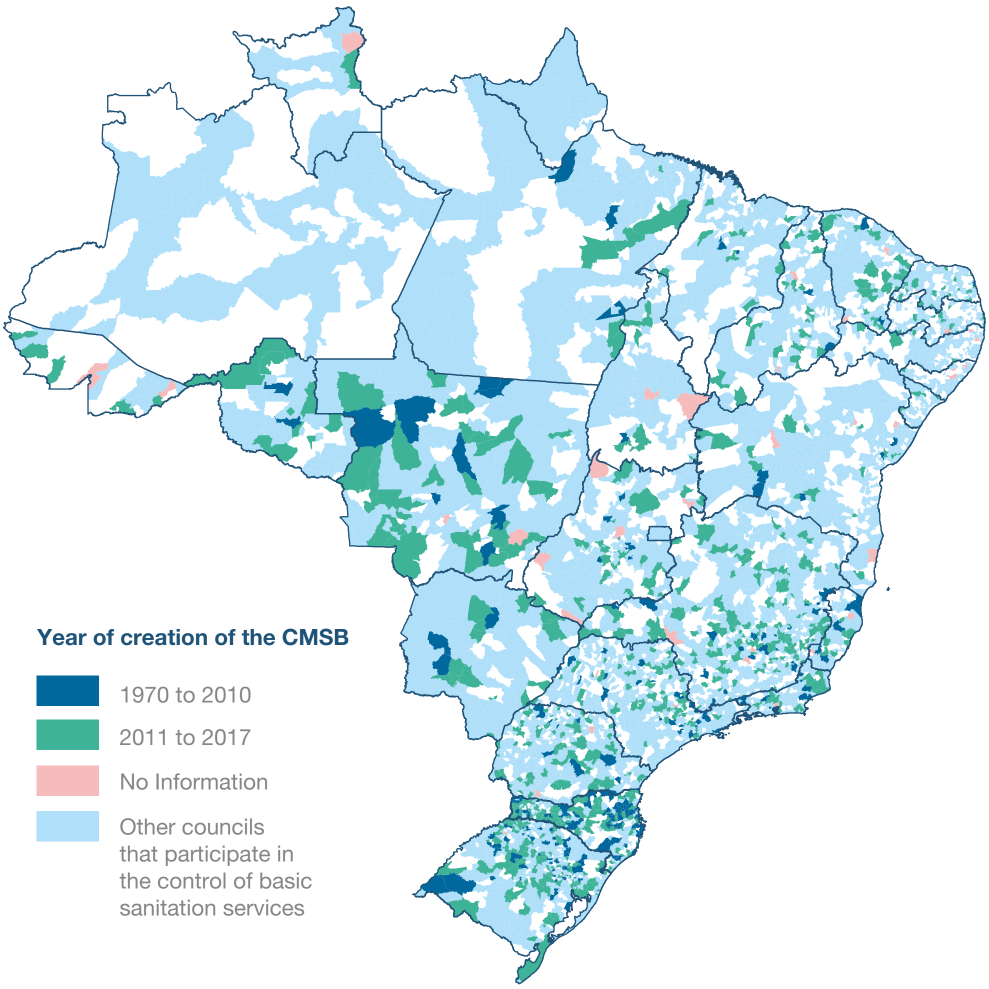
However, even though the evolution of the municipalities' participation in water resources and sanitation management actions in Brazil was positive between 2011 and 2017, it was registered last year that 4,581 municipalities out of a total of 5,570 (82%) were part of CBHs or similar collegiate, while only 919 municipalities (16%) had Basic Sanitation Municipal Councils (CMSBs), demonstrating a particular lack of articulation by the local authorities around issues that involve basic sanitation in the country.

A possible reason for this is the fact that committees have existed ever since 1988, while the requirement for implementing CMSBs for the provision of resources for sanitation works and actions only dates back to 2010.

When adding the municipalities with CMSBs (919) that had an informed creation date, the municipalities that did not inform the sanitation council's creation date (39) and the municipalities that have other sanitation services councils (2,965), the percentage increases to 70% for 2017.

It was not possible to consider the municipalities that do not have CMSBs but have other councils that participate in the yearly control of the basic sanitation services because there is no available data on the dates when they were formed.

Brazilian municipalities with Municipal Basic Sanitation Council (CMSB) or other councils that participate in the control of sanitation services, created up to 2017



Data extracted from IBGE's basic sanitation supplement of the Basic Municipal Information Survey (Munic) of 2017, available at goo.gl/b71vZE

METHODOLOGICAL SHEET

INDICATOR 6.b.1

Concept

The indicator assesses the percentage of local administrative units in a country that can contribute to water and sanitation management through local participation. "Local administrative units" refer to municipalities, sub-districts, communities or other places, covering urban and rural areas, to be defined by the government.

In the indicator's context, local participation policies and procedures are conceptualized as mechanisms by which individuals and communities can significantly contribute to decisions about the management of water and sanitation, including, for example: choose solutions that are adequate to a given social and economic context; acquire full understanding of a decision's impacts on the local population; and degree of local appropriation in relation to the chosen solutions. This indicator is not necessarily intended to be universal, but rather to be more advanced in areas with higher water stress and/or major sanitation problems.

Methodology and data sources

The indicator is calculated as follows:

Two subcomponents were considered for calculating the indicator:

- For water resources management - GRH: represented by Brazilian municipalities inserted in the River Basin Committees and other entities that act as Committees such as the Working Group created for the monitoring of the PRH-Paraguay River Basin Water Resources Plan (includes 78 municipalities) and entities participating in the negotiations for water allocation agreements in reservoirs. The municipal headquarters location in the yearly time series data, in relation to the total number of municipalities in the country in the same year were adopted as reference for the calculating the percentage of local bodies and GRH participants;
- For sanitation management - GSA: it is represented by the municipalities with Municipal Sanitation Councils (CMSB), year by year, and the total number of municipalities in the country in the same year.

The indicator was calculated as follows:

$$\text{Indicator 6.b.1} = \frac{GRH + GSA}{2}, \text{ in \%}$$

Data sources:

ANA: spatial delimitation of the CBHs and other entities with similar actions existent in Brazil, checking each creation date and the urban headquarters inserted within the limits of each river basin.

IBGE: MUNIC Survey 2017 (Municipal Basic Information Survey) with data from municipal sanitation councils; and digital files with the municipal headquarters location in Brazil.

Time series available in 2018

2011-2017

Spatial unit for calculation

Municipality

Spatial level

Federation units, geographical region and Brazil

Step by step

1. GRH: Water Resources Management - existence of CBH or similar entity

The existence of each CBH (River Basin Committee) in the national territory is consulted for each year of the time series. For each CBH and reference year, the municipalities whose municipal headquarters falls within the river basin limit are verified adopting the existence of a CBH for the municipality in the same year. For the others not included in a CBH in that year, the absence of CBH in the municipality is considered

2. GSA: Sanitation Management - existence of CMSB

The time series data for each municipality is consulted in the MUNIC survey (IBGE) results. For each municipality, it is verified whether there is information regarding the existence of CMSB for each reference year, adopting "yes" or "no". Municipalities that did not inform the council's creation date were excluded.

Indicator 6.b.1 - Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management

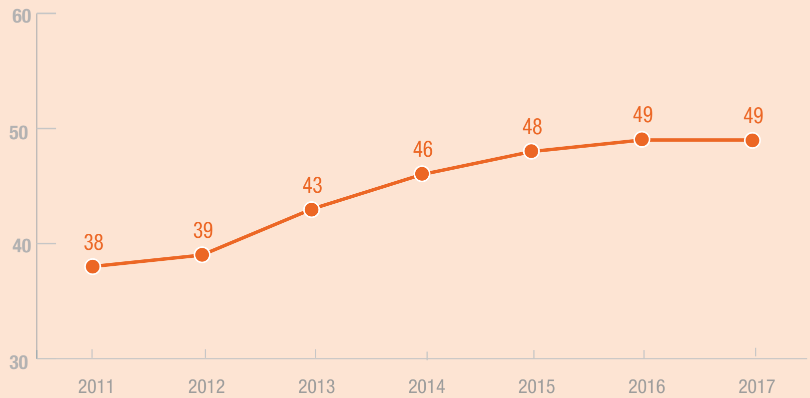
3. Calculation

The existence of municipal CBHs and CMSBs was considered of equal importance. In this way, each municipality in each reference year receives a score ranging from 0 to 1,0: 0- No CMSB and no CBH; 0,5 - existence of a CMSB or a CBH; 1,0 - existence of a CMSB and a CBH. The result is aggregated by territorial unit based on the sum of the scores of all municipalities inserted in that territorial unit, the percentage of local units with water resources and sanitation management policies and procedures is calculated in relation to the total number of Brazilian municipalities. It should be noted that the municipality is the smallest political and administrative unit in Brazil.

Time Series for Indicator 6.b.1 – 2011-2017 (%)

Territorial Unit	2011	2012	2013	2014	2015	2016	2017
Midwest Region	21	23	33	39	42	43	44
Northeast Region	33	34	37	39	41	41	42
North Region	4	4	5	11	12	13	13
Southeast Region	51	51	52	53	55	56	58
South Region	48	50	58	60	63	65	66
Brazil	**38**	**39**	**43**	**46**	**48**	**49**	**49**

Evolution of indicator 6.b.1 in Brazil –2011-2017 (%)



FINAL CONSIDERATIONS

The SDG 6 goals towards the 2030 Agenda for Sustainable Development, agreed among the 193 member states of the United Nations in 2015, represent a major challenge to be overcome by all countries.

The work of adapting the targets set by the UN to Brazil's priorities has been coordinated by IPEA, based on critical analysis and cross-checking with the national strategies, plans and programs and the challenges that the country faces in ensuring sustainable development. The preparation of the proposal in 2018 and is adoption in January of 2019 by the SDGs National Commission is the result of collective work involving 75 government agencies and over 600 federal government managers and technicians who participated in discussions and submitted suggestions to be incorporated into the national targets, in addition to public consultation.

The obstacles to be overcome in order to "ensure availability and sustainable management of water and sanitation for all" are especially challenging for Brazil considering its continental dimensions and great inter-regional differences, which are evidenced in a territory that covers 8.5 million km^2.

However, the goals are being thoroughly pursued, as can be proven by the comparisons between the country's performance and the performance of other countries with equivalent socio-economic contexts, presented throughout this report.

It was concluded that the results presented for the SDG 6 indicators for Brazil show a generally positive evolution in the historical period adopted to represent each indicator, with the identification of only one negative result, of small magnitude, concerning the monitoring of changes in aquatic ecosystems from the first to the last year of the series.

Even the water stress indicator (6.4.2), whose upward values in the historical period represent an increase in pressure, showed a small difference between 2006 and 2016, which is to be expected considering the population and economic growth that occurred in the country. In any case, the small increase in water stress in the country demonstrates control over water demands, which is highly dependent, among other measures, on the implementation of Water Resources Management Instruments, especially the water permits.

The indicators related to water supply and sanitation also showed advances in the historical period evaluated, with greater deficiencies in the percentage of sewage treatment, emphasizing the maintenance of past conditions, and requiring urgent measures. For this purpose, the detailed Sewage Atlas guidelines and recommendations are available to all Brazilian municipalities, with the year 2035 as the planning horizon.

Lack of sewage treatment has an impact on the population's health and on water quality, and represents one of the biggest challenges in Brazil regarding the achievement of the SDG 6 targets towards the 2030 Agenda.

In spite of the high scores achieved by indicator 6.1.1, it is necessary to make some observations regarding the calculation for this indicator for the country, highlighting the gaps in the database regarding the quality of the water consumed by the population. In this context, SISAGUA is an instrument of the Ministry of Health (MS) that aims to assist in the management of health risks associated with the quality of drinking water. It is a national system made available online for the data recording on the water supply sources, in addition to data relating to the water quality monitoring carried out by the service providers, and the monitoring data collected by the health sector.

The system takes as reference the Brazilian Drinking Water Standard (Annex XX of Consolidation Ordinance No. 5/2017, issued by the Ministry of Health) and has input data about the water quality monitoring of over 100 parameters established in the standard, such as: Escherichia coli, Fluoride and Arsenic, which are listed as priority parameters in the indicator 6.1.1 form. The data is entered by supply modality and separated by point of extraction, post-filtration, treatment exit and distribution system or point of consumption.

According to information from the Ministry of Health (MS), in 2018 97% of the Brazilian municipalities entered data on the water supply modality (approximately 80% of the population) and 93% of the country's municipalities entered data on water quality. In short, it is understood that SISAGUA has a critical database on access to safe water in the country.

The improvement in water use efficiency, measured by Indicator 6.4.1, can also be attributed, in part, to interventions on water demand, such as the implementation of water charges in some river basins in Brazil, among other economic factors involved.

However, it is necessary to note that the results obtained for Indicator 6.4.1 are derived from gross value added (GVA) calculations for the services sector, a sector that consumes a much smaller amount of water if compared to other economic activities, with emphasis on irrigation, the largest consumptive use in the country; the GVA for Agriculture is lower than the Industrial GVA and much lower than the Services GVA.

This confirmation, associated with the growth prospects for the irrigated area in Brazil estimated by the Irrigation Atlas at about 47% until 2030, signals that special attention needs to be oriented to irrigation in Brazil. In addition, it is necessary to adopt more efficient methods for waste reduction and greater utilization of available water resources in order to achieve SDG 6 Goal 6.4, both for water stress reduction and for increasing improvement in water use efficiency in the country.

As for water quality, evaluated by Indicator 6.3.2, it is essential to improve surface water and groundwater monitoring networks, through the National Water Quality Monitoring Network (RNQA) guidelines launched by ANA in 2013, and based on a cooperation strategy between the monitoring networks operators for the standardization and expansion of monitoring at the national level.

As for the monitoring of groundwater, the inter-institutional link between the Geological Survey of Brazil (CPRM), ANA and the federation units emerges as a fundamental mechanism for the expansion of the available database and its large-scale dissemination. It is also important that the existing monitoring programs be continued and that new wells be incorporated, aiming at improving data quality.

According to the criteria adopted by the UN to assess the degree of implementation of integrated water resources management in the countries, the issues related to funding for the relevant actions were the ones that exhibited the greatest weakness, pointing to the need for a resource-intensive allocation in water infrastructure (water supply and sanitation), as well as in monitoring and other available instruments at the federal level towards SDG 6 Goal 6.5.

Variations observed within intra-historical periods for the indicators, mainly between 2012 and 2015, are mostly due to the water crisis that Brazil experienced in those years, which had severe consequences to several regions, notably in the Northeast, Southeast and Midwest regions.

However, it is noted that, due to the climatic differences that characterize the 12 Hydrographic Regions in Brazil, in addition to the unequal distribution of population and of economic activities throughout the vast national territory, the different patterns of land use and occupation, and the varying institutional profiles of the entities assigned to manage water resources and sanitation, it is possible that the SDG 6 indicators when summarized in a single number may not be able to accurately represent the Brazilian reality.

On the other hand, the indicators' calculation for smaller territorial units, such as municipalities, regions and river basins (as is stimulated by the UN) allows for the identification of critical issues that need to be examined, signaling towards increasingly efficient water and sanitation sustainable management in Brazil.

Thus, even though the SDG 6 indicators are presented for the country as a whole, the calculations made at Federation Unit, Geographical Region and Hydrographic Region level may be appropriated as a basis for the establishing of management measures geared to the most critical areas, towards achieving the SDG 6 Targets.

The UN has been releasing the results for the 17 2030 Agenda Goals indicators based on the gathering of information released by various national and international statistics institutions who provide the data in their online platforms, while, at same time, assessing the difficulties faced by countries in the collection and systematization of the required information. This initiative has resulted in a dynamic process of identifying and consolidating the most efficient methods that may be applied by all countries, as appropriate.

In order to guide the improvement of the methodologies that are recommended for calculating the indicators and facilitate the procedures to be adopted, the evaluation is carried out by the UN and supported by the feedback given by the countries during meetings held between national and international entities responsible for the collection and organization of the statistical data necessary for the calculating the indicators. ANA has constantly participated in these meeting, discussing the difficulties faced and making suggestions.

In recognition of the obstacles that may be faced by the countries, the UN recommends feasible calculation alternatives for SDG 6 and encourages the countries to carry out specific monitoring procedures for water uses and sanitation services, so as to allow the indicators' calculation over time and their consequent monitoring of the eight pre-established targets.

In some cases, specific approaches and strategies have been adopted, both to supply data not yet available in order to meet the methodologies recommended by the UN in full, as well as to promote greater proximity between the results and the Brazilian reality, considering that not all recommended methods are applicable without restrictions to Brazil, and that some methods present specific features that are incompatible with the country's territorial coverage.

The careful analysis of the UN's predefined methodologies, which include, in addition to the concepts of each indicator, the establishing of a detailed "step-by-step" for their calculation, has subsidized the selection of the data used by ANA, in addition to also implying the use of information that could generate the best results and the most consistent time series and the most complete and updated references.

In this way, a working platform was created that has consolidated technical expertise, and that relies on fully justifiable procedures when considering the current availability of data for the country, ensuring that the main requirements set by the UN for producing the indicators were met, and that the results obtained are consistent with the Brazilian reality in regards to water and sanitation management.

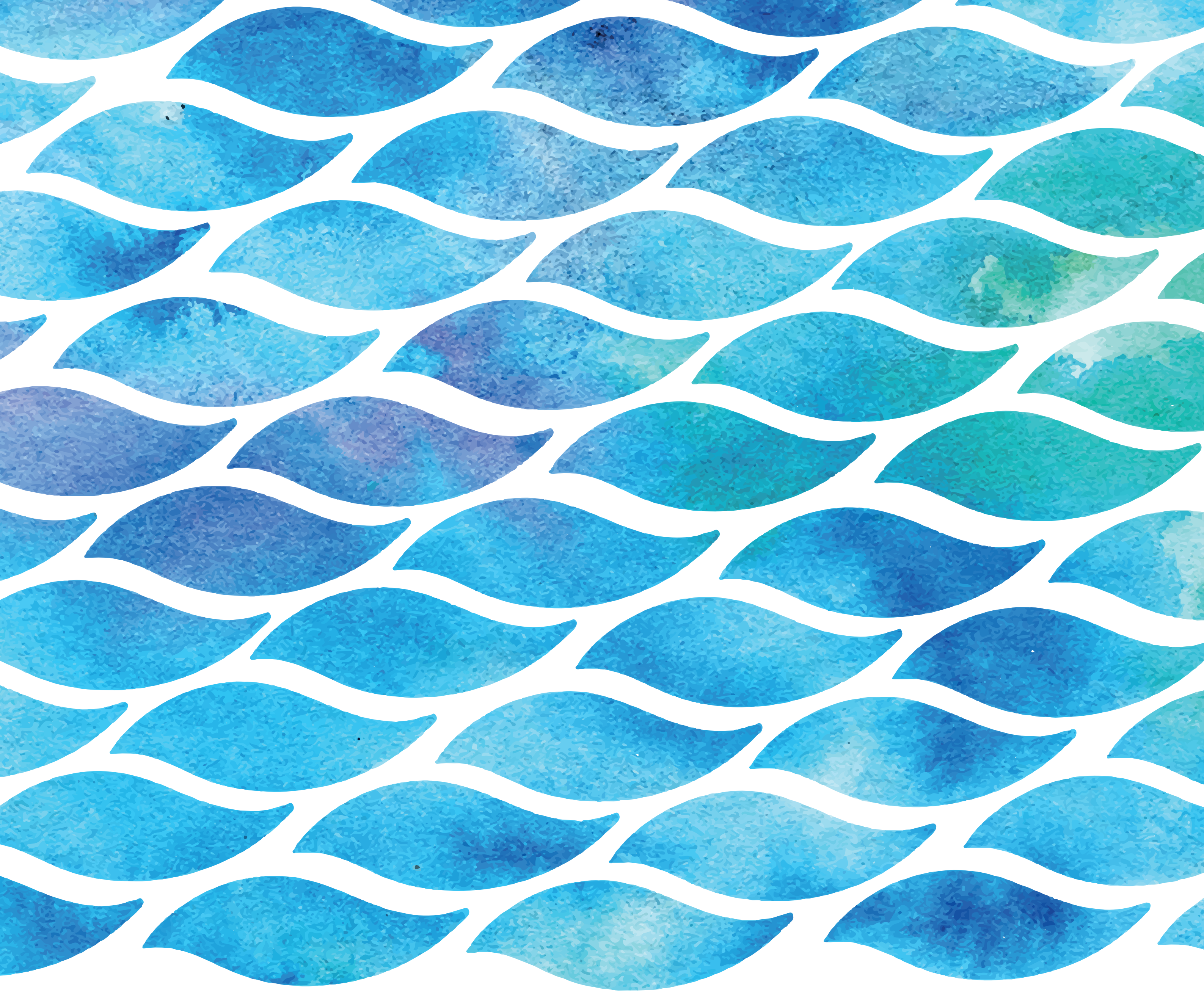
ANA is aware that the calculation methods adopted may be improved over time through the adding of new data as it is collected and systematized, and the elements that were not included in this calculation round for the SDG 6 indicators were duly registered.

ANA's contribution to the monitoring of targets and the calculation of SDG 6 indicators, as reflected in this report, is part of a set of Agency actions towards the 2030 Agenda. Among these actions, two other projects completed in 2018 may also be highlighted, the "SDG 6 - Water and Sanitation: Studies and Proposition of Implementation and Monitoring Actions", the result of a partnership between ANA, IPEA, the United Nations Program for Development (UNDP), and the International Policy Centre for Inclusive Growth (IPC-IG/UNDP), and the "Global Agenda Post-2015: Water and Human Rights" Project, a partnership between ANA and the Oswaldo Cruz Foundation (FIOCRUZ). Initial recommendations for improvements in institutional, technical, legal, and economic arrangements for the implementation and monitoring of targets 6.1 and 6.2 in Brazil were drawn up based on this project, considering both verified international trends and specific literature on the topic.

The information produced by ANA may be appropriated by the 2030 Agenda Digital Platform designed by IBGE, which has information on all 17 SDGs. IBGE is Mercosur's representative in the Inter-agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs) and is responsible for technical advice in the SDGs National Commission.

The work systematically initiated by ANA and materialized the "SDG 6 in Brazil: ANA's Vision of the Indicators' Report, relies on the permanent partnership with other national authorities producing data for the 2030 Agenda, aiming at overcoming the identified gaps and the progressive improvement of the SDG 6 indicators results and its updating over time.

The new linkage of ANA to the Regional Development Ministry (MDR) also represents an important opportunity for alignment between the monitoring of the indicators and the gearing of actions towards the achievement of the SDG 6 goals, considering that the Ministry is now responsible for the water security, sanitation, and water resources national policies.



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