Instituto Brasileiro de Geografia e Estatística

Brazil Report to the Twelfth Session of UN-GGIM

Country Report of Brazil

United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM)

Twelfth Session
New York, August 3-5, 2022

President

Jair Messias Bolsonaro

Economy Minister

Paulo Roberto Nunes Guedes

Special Secretary of Finance

Bruno Funchal

BRAZILIAN INSTITUTE OF GEOGRAPHY AND STATISTICS - IBGE

President

Eduardo Luiz G. Rios Neto

Executive Director

Marise Maria Ferreira

SINGULAR SPECIFIC BODIES

Directorate of Surveys

Cimar Azeredo Pereira

Directorate of Geosciences

Claudio Stenner

Directorate of Data Processing

Carlos Renato Pereira Cotovio

Center for Information Documentation and Dissemination

Carmen Danielle Lins Mendes Macedo

National School of Statistical Sciences

Maysa do Sacramento de Magalhães

UNIT RESPONSIBLE

Directorate of Geosciences

Ministry of Economy
Brazilian Institute of Geography and Statistics- IBGE
Directorate of Geosciences

Brazil Report to the Twelfth Session of UN-GGIM

Country Report of Brazil

United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM)

IBGE
New York
2022

Instituto Brasileiro de Geografia e Estatística - IBGE
Av. Franklin Roosevelt, 166 - Centro - 20021-120 - Rio de Janeiro, RJ - Brasil

Table of Contents

Summary

Brazil is a country of continental dimensions with over 8,500,000 km² of land area, varied environmental characteristics, and around 3,600,000 km² of sea area, which houses an enormous wealth of natural resources and biodiversity. At the time the Twelfth Session will be taking place, Brazil will be starting its Population Census after two years of postponement. The Brazilian census will visit more than 78 million households in 5,570 municipalities, giving it the status of the largest demographic survey in Latin America. During the census, Brazilian Institute of Geography and Statistics (IBGE) hires more than 200,000 people who, with mobile collection devices and tablets, carry out the updating of the census cartography ad the household interviews.

In this census, IBGE sought to integrate statistical information with the location using available technologies to guarantee the quality and coverage of the operation in real time. Geospatial information has been increasingly recognized as an ally in all phases of the census operation and surveys. Location has been used not only to increase the spatial accuracy of information through addresses and coordinates, but also for more innovative uses such as opening specific questionnaires for traditional peoples and communities (indigenous and quilombolas). The integration of the IBGE's "G" (Geography) and "E" (Statistics) is moving from institutional discourses to the day-to-day practice of the institution.

In addition to the use of geospatial information before and during the census, IBGE has advanced in providing statistical information in a spatialized, usable and accessible form for users. Examples of these initiatives are the Interactive Geographic Platform (PGI)[1], the Environmental Information Database (BDiA)[2] and the Continuous National Household Sample Survey (PNAD-C) Dashboard[3].

Another initiative worth mentioning is the Geographic Reference Framework for the Production, Analysis and Dissemination of Statistics (QG). Inspired by the principles of the Global Statistical Geospatial Framework (GSGF), QG is the Brazilian framework for the integration of geospatial and statistical information. In addition to a reference document with information on functional areas, the QG brings together statistical and geospatial systems and, therefore, an appreciation of "where " in the provision of information. Numbers are more relevant when associated with a location, especially for geographies of greater interest for public policies.

In recent years, despite the recent challenges of the pandemic and the postponement of the Census, IBGE has advanced in the geospatial area and in its integration with statistics inside and outside the Institute.In this context, we report Brazil`s developments with respect to geospatial information in various areas of expertise.

.....

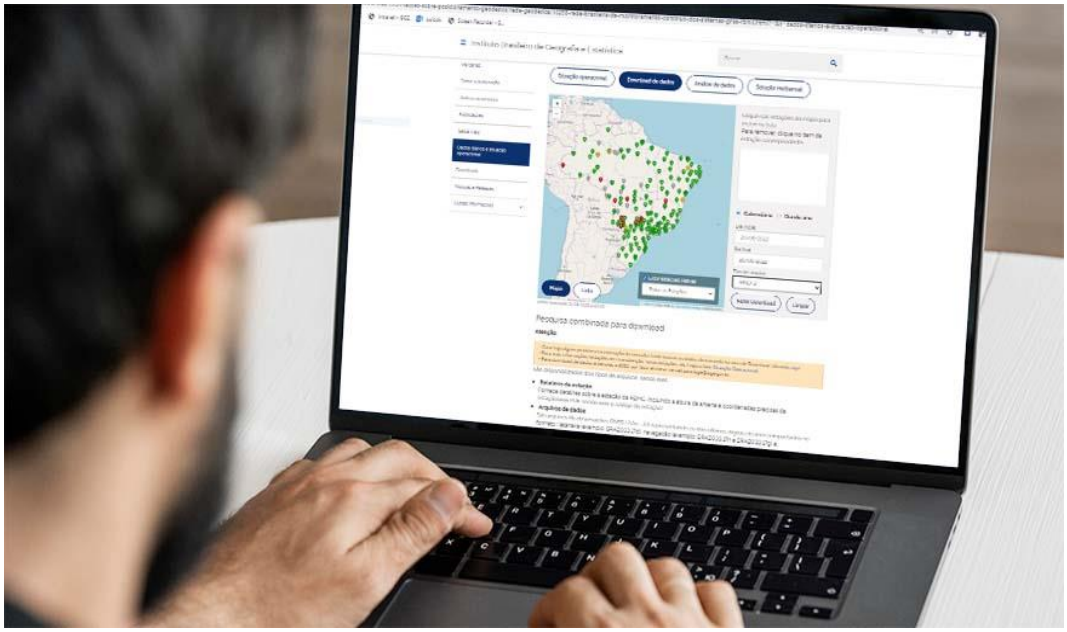
[1] https://www.ibge.gov.br/apps/atlas_nacional/.
[2] https://bdiaweb.ibge.gov.br/#/home.
[3] https://painel.ibge.gov.br/pnadc/.

Global geodetic reference frame

Brazilian Network for Continuous Monitoring of GNSS (RBMC)

Since the mid 1990's IBGE, along with several partner institutions in Brazil, has concentrated efforts towards establishing the Brazilian Network for Continuous Monitoring of GNSS (RBMC), the first national continuous operating GNSS network deployed in South America following standards recommended by the International GNSS Service (IGS). RBMC is the most accurate geodetic framework in the country, making the connection to the Geodetic Reference System for the Americas (SIRGAS) possible in Brazil.

In June 2022, IBGE improved and expanded the availability of information that can be obtained in a personalized way through a new web application[4] that aims to facilitate access to data tracked at the 144 RBMC geodetic stations spread across the Brazilian territory. Customization can be done according to the user's preferred format, (RINEX2 or RINEX3), length (ex: hourly), sampling rate, and constellations (GPS, GPS+GLONASS or multiconstellation). The availability of information in a more usable and accessible way meets the demand of users. For example, between 2021 and 2022 the search for information with an interval of one second increased by 35%. About 350,000 downloads are carried out monthly on the RBMC geodetic stations.



.....

[4] Brazilian Network for Continuous Monitoring of the GNSS Systems (RBMC): https://www.ibge.gov.br/geociencias/informacoes-sobre-posicionamento-geodesico/rede-geodesica/16258-rede-brasileira-de-monitoramento-continuo-dos-sistemas-gnss-rbmc.html?=&t=dados-diarios-e-situacao-operacional.

Another information that was made available to the public was the multiyear solution of RBMC stations positions from 2000 to 2019 (Solução Multianual das Estações da Rede Brasileira de Monitoramento Contínuo dos Sistemas GNSS no período de 2000 a 2019[5]). A technical report presents an overview of the analysis methodology and strategy adopted for processing of data from the network. Coordinate time series, velocities as well as coordinates were generated for 189 stations, including fiducial stations from the IGS. The position solutions have an internal accuracy of 1 mm and 3 mm in horizontal and vertical components, respectively, determined from position repeatability of the weekly solutions. This monitoring helps to determine the dynamics of the Earth's crust, local movements, effects caused by earthquakes, as well as displacements due to equipment changes and unidentified events, in addition to the vertical variations in the Amazon region.

Since 2009, IBGE as a GNSS processing service called IBGE-PPP providing results in SIRGAS2000, the official reference system in the country. About 900 processings are submitted per day. This service makes use of GPSPACE developed by Geodetic Survey Division of Natural Resources of Canada (NRCan).

These initiatives, in addition to the Geodetic Database (BDG)[6], maintain IBGE's commitment to making geodetic information following FAIR (**Findable, Accessible, Interoperable and Reusable)** principles, and free to the public.

.....

[5] https://biblioteca.ibge.gov.br/index.php/biblioteca-catalogo?view=detalhes&id=2101895.

[6] http://www.bdg.ibge.gov.br/appbdg.

Integration of geospatial, statistical and other related information

2022 Census

The coverage of the 2022 Census will be obtained through more than 450,000 census tracts into which the national territory was divided in the years prior to the censos operation. Tracts allow the simultaneous work of collecting the more than 180,000 census takers during the three months of census operation to occur in an orderly manner.

Territorial Base: census cartography

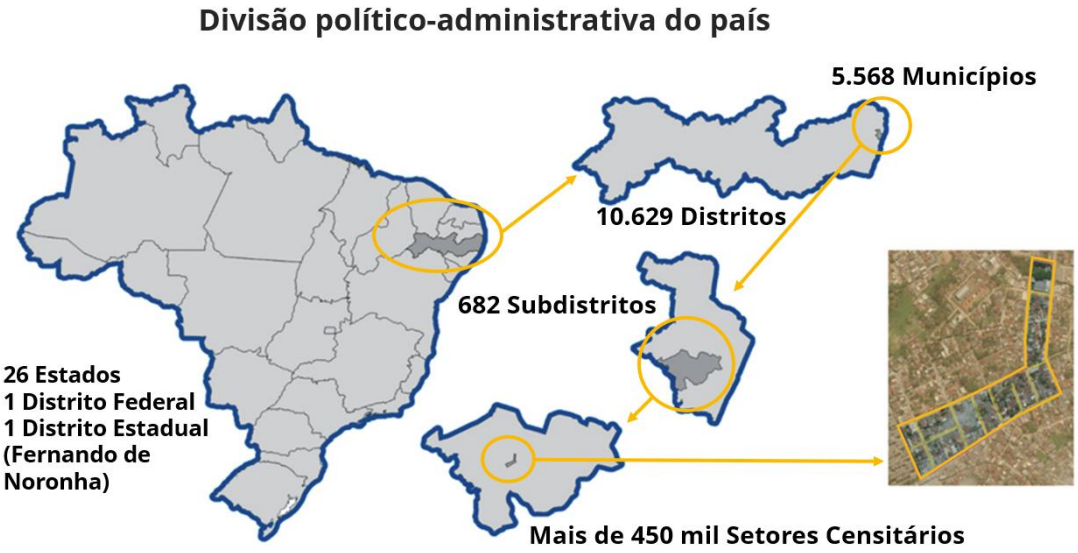
The IBGE Territorial Base is a spatial information system, designed to support IBGE surveys, both in its production aspect and in the collection and dissemination of statistical data. It is formed by a graphic base of georeferenced information, by representations of the functional areas[7] (of the political-administrative division, cities, villages, indigenous groups of the census sectors and of many other spatial elements) and integrated to a set of alphanumeric registers (geocodes) and to a collection of locality names stored in the Database of Territorial Structures (BET), maintained in a decentralized manner. By means of the cadastral databases and graphics of the Territorial Base, the mesh of census tracts of the IBGE is constituted.

To ensure that data collection and dissemination are consistent with the current political-administrative division, the IBGE monitors the evolution of territorial boundaries with the States and Municipalities. This entire organization is geographically represented through the census tracts.

The Territorial Base increased by 135,672 census tracts, from 316,574 in 2010 to 452,246 in the 2022 Census, a growth of approximately 42% that reflects the country's territorial dynamics and the improvement of mapping techniques by IBGE. This entire update operation was possible through QGIS Project (PrjQGIS), which consists of the interface for decentralized updating of the Territorial Base by the IBGE regional and local agencies, allowing the simultaneous editing of the territorial features, in a safe and consistent way, by several updaters dispersed throughout the country. Based on the free QGIS software, the project is fully developed by IBGE technicians, being an international reference of good practice in census cartography and in the systematization of territorial information for statistical purposes.

.....

[7] Functional Areas understood as the geographical extent of administrative, legislative, regulatory, electoral, statistical, governance, service delivery and activity management areas.



An important evolution in the 2022 Census Territorial Base update was the use of high-resolution orbital images for the entire country. The availability of these detailed cartographic inputs made possible the improvement of the boundaries of census tracts, the classification of urban and rural areas and the identification of rural and remote locations that otherwise could only be mapped in the field.

Another improvement for the 2022 Census was the implementation of an important tool for the systematic planning of collection and recording of operational difficulties faced by teams when traveling through the Brazilian territory. The Census Tract Operational Information Base (BIOS) aggregates a set of operationally relevant information, which aims to contribute to the planning of collection from the prior identification of characteristics of the census tracts that facilitate access to households by census agents. It gathers information that can only be collected from fieldwork and consultations carried out locally from different sources – state and municipal agencies, civil society organizations, community leaders, newspapers and the knowledge of the IBGE employees who accompany the daily activities of the local agencies.

Addresses, Coordinates and Tracks

The National Registry of Addresses for Statistical Purposes (CNEFE) is a nationwide repository of addresses maintained by IBGE. Created in 2005 from the systematization of data collected by the 2000 Census, this register includes information on households and establishments throughout the territory. At each Census it is fully updated.

Before a census operation, and to support it, the registry was updated in two different ways: a broader yet partial one, based on the incorporation of administrative records such as, for example, the addresses of the Brazilian Individual Taxpayer Registry (CPF), and a more focused one, supported by the fieldwork of the local agencies during surveys. Some analysis with the distribution database of the Brazilian Electricity Regulatory Agency (ANEEL) were also tested to improve CNEFE.

The capture of coordinates, started in the 2007 Agricultural Census for rural addresses, will be extended to all Brazilian households in the 2022 Census. The expectation is to capture coordinates for more than 78 million addresses. Capturing the coordinates will be used to monitor the work of census takers in real time and to manage the collection, including to improve coverage of the census operation in the territory.

The capture is done in three moments: in the confirmation of the address; on arrival at home on the first visit and on return, whenever the census taker does not find the resident the first time; and at the time of the interview. The census taker can return to the address up to three times to obtain the interview; and, for each attempt, the coordinate is captured.

After the census operation, the coordinates will be important inputs for IBGE surveys and geospatial bases, such as the Continuous PNAD, the Territorial Base of census tracts and the CNEFE. They can also be used to provide new geographic products such as the availability of the Census Takers' Tracks in the 2017 Agro Census results. Georeferencing at the most detailed geographic level meets the recommendations from the United Nations Statistics Division, always preserving statistical confidentiality.

Tracks are understood as the paths taken by census takers from the limit of their work area (census tracts) to agricultural establishments or, in the case of 2022 Census, to the households, using public roads, roads, rural paths, accesses in private areas, among others. These tracks were obtained from the capture of coordinates in the field by collection mobile device with GPS and underwent further processing in the office, ending with the production of digital files composed of lines in vector format. It is planned to use these tracks to improve the IBGE Census Mapping and IBGE's Systematic Terrestrial Mapping after the 2022 Census.

Urban Survey of the Surroundings of Households

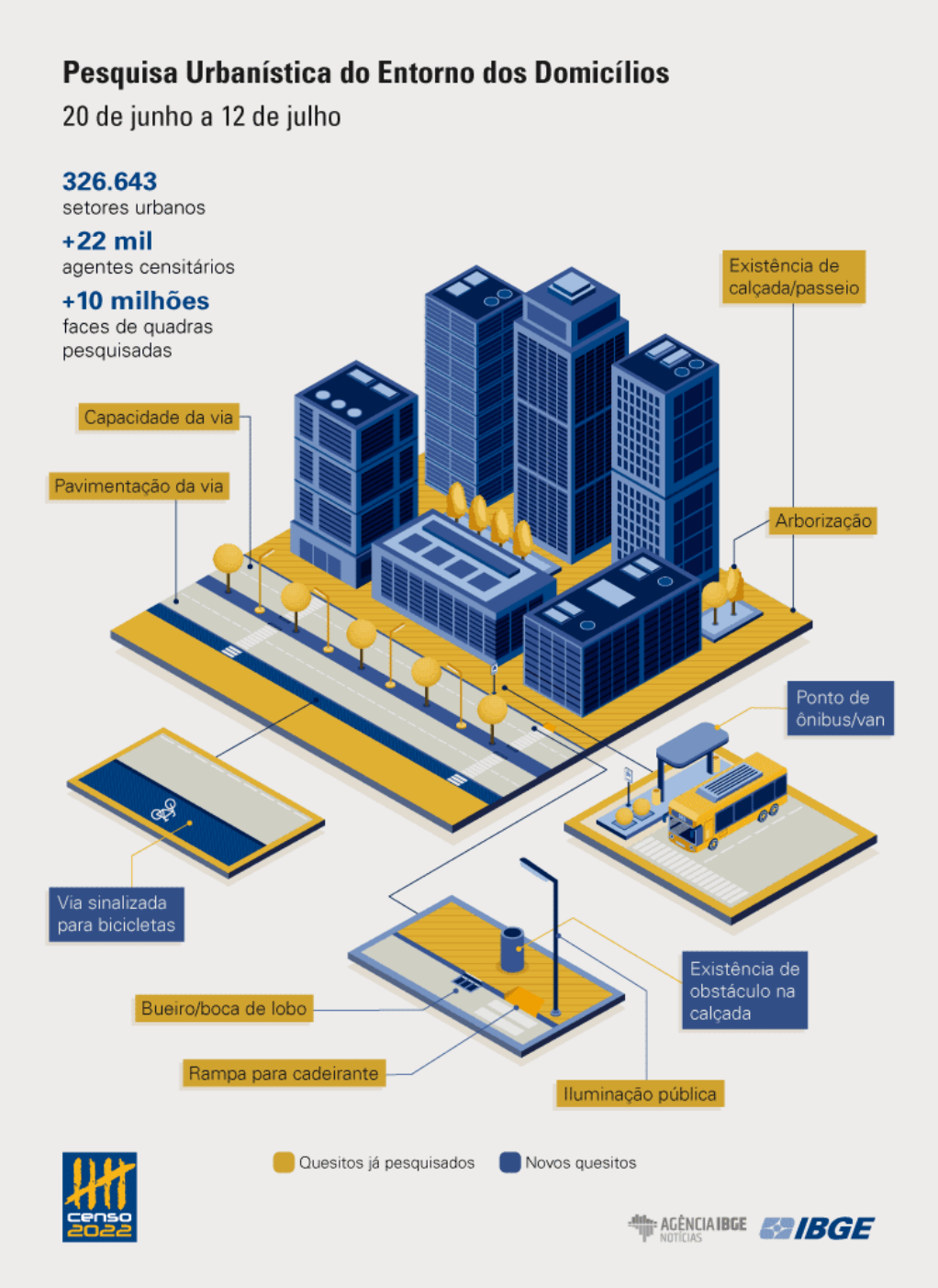
Before the household collection of the 2022 Census, IBGE teams traveled through the (urban) territory to update the mapping in the field. The Recognition of the Census Tracts is an important step to ensure that changes resulting from the recent dynamics of occupation of the territory (the emergence of a new building or settlement, for example) are identified and that these households are not ignored by the census taker. It is at this time that the Urban Survey of the Surroundings of Households is collected by the Collection Supervisor (temporary contractor who heads the census taker's work).

In the Urban Survey of the Surroundings of Households 2022, held between June and July 2022, information was collected on the circulation capacity and paving of the road, public lighting, road infrastructure, urban mobility and accessibility, rainwater runoff and afforestation. The questions will be raised through direct observation carried out by the Collection Supervisor according to three types of criteria. The existence criterion (minimum) meets seven (7) itens, predominance two (2) and count one (1).

The objectives of the Urban Survey of the Household Surroundings are to provide inputs to improve the coverage of the 2022 Census and generate geospatial information

for the urban areas. In addition to generating important geospatial and statistical information, they are also important subsidies for the public planning agencies and for the private sector. The combination of the household information (statistical) with the household sorroundings (geospatial) provides a broader and more complete picture of the conditions of the population.

The survey also has the potential to generate information to meet some of the demands arising from the Sustainable Development Goals (SDGs), especially SDG 11 (Sustainable Cities and Communities), and from the New Urban Agenda, international commitments assumed by Brazil.



Questions with spatially controlled opening

In the 2022 Census, for the first time, the basic and sample questionnaires will have questions with a spatially controlled opening, that is, they will work in areas previously mapped and defined before the operation. The definition of the households that will answer these specific questions will be based on the assessment of the location of the household in relation to the polygons specifically created to open these questions. This verification is performed by the census taker's mobile collection device at the time of the interview. This new functionality will be applied to specific questions in the questionnaire applied to the indigenous and quilombola population.

In the case of indigenous peoples, lands officially delimited by National Indian Foundation (FUNAI) and indignenous settlements, which are contiguous areas with a concentration of households, mapped by IBGE, were defined as census tracts. Other locations that were not defined in census tracts were called Areas of Operational Interest (AIOs) and include those characterized by the dispersion of occupied households or where it was not possible to confirm the presence of an indigenous population. The AIOs will define the functioning of the coverage question “Do you consider yourself indigenous?” for residents who, in these areas, do not declare themselves indigenous in terms of color/race. This definition occurs through geospatial verification in loco via GPS at the time of the interview.

For quilombola communities (population that will be investigated in detail for the first time), were considered the quilombola territories delimited by National Institute for Colonization and Agrarian Reform (INCRA) and the state land institutes. The quilombola groups identified by the IBGE and other locations not defined in census tracts, which came to constitute quilombola AIOs, were also mapped. Added to the sources, IBGE reached 5,972 quilombola locations in the country. The question that will be displayed on the mobile collection device will be: “Do you consider yourself a quilombola?” If the answer is positive, the informant must also answer the name of his community. With these answers, the number of quilombolas existing in the country and to which communities they belong will be known. And it will be possible to disaggregate the Census results referring to quilombolas, which will allow comparisons to be made with the rest of the population.

The technical project for traditional peoples and communities, which is based on six pillars (questionnaires, territorial base, training, awareness-raising, collection and guarantee of coverage and dissemination of results), in addition to having the participation of representatives of these ethnic groups, had cooperation institutions, such as the National Indian Foundation (FUNAI), the Special Secretariat for Indigenous Health (SESAI), the Palmares Cultural Foundation, the Special Secretariat for Policies for the Promotion of Racial Equality and INCRA.

Geographic Reference Framework for Production, Analysis and Dissemination of Statistics

The Geographic Reference Framework for Production, Analysis and Dissemination of Statistics (QG)[8] aligns IBGE with the Global Statistical Geospatial Framework (GSGF). Inspired by the five principles of the GSGF, QG is the Brazilian framework for the integration of geospatial and statistical information.

In addition to a reference document with information on functional areas (separated into two large groups: administrative, legal or regulatory geographies and statistical geographies), the QG brings together statistical and geospatial systems and, therefore, an appreciation of "where " in the provision of information. Numbers are more relevant when associated with a location, especially for geographies of greater interest for public policies.

The Geographic Framework responds to a public demand for the dissemination of the statistics produced by IBGE through geographies that incorporate local changes and regional policies resulting from the action of society, the economy, and the national, state and local governments, who continually restructure the immense national territory. It is also a tool for public transparency by offering users information on how the geographies are used in the production, analysis, and dissemination of statistics.

The first group, Administrative, Legal or Regulatory Geographies, comprises administrative areas established by the legislation or normative rules for which IBGE is committed to release statistical information. The delimitation is not made by the IBGE and, as a result, these divisions are updated only when the changes are formalized either by their producers or by new legal or administrative instruments. In this group, users will find the Great Regions, State, Federal District, Municipality, District, Subdistrict, Metropolitan Region, Integrated Development Region (RIDE), Urban Agglomeration, Legal Amazon, Superintendency for the Development of the Northeast (SUDENE) Region, Semiarid, Municipalities bordering the sea and Coastal Municipalities, Municipalities of the Borderland Area and Twin Cities and other geographies defined by legal or normative instruments.

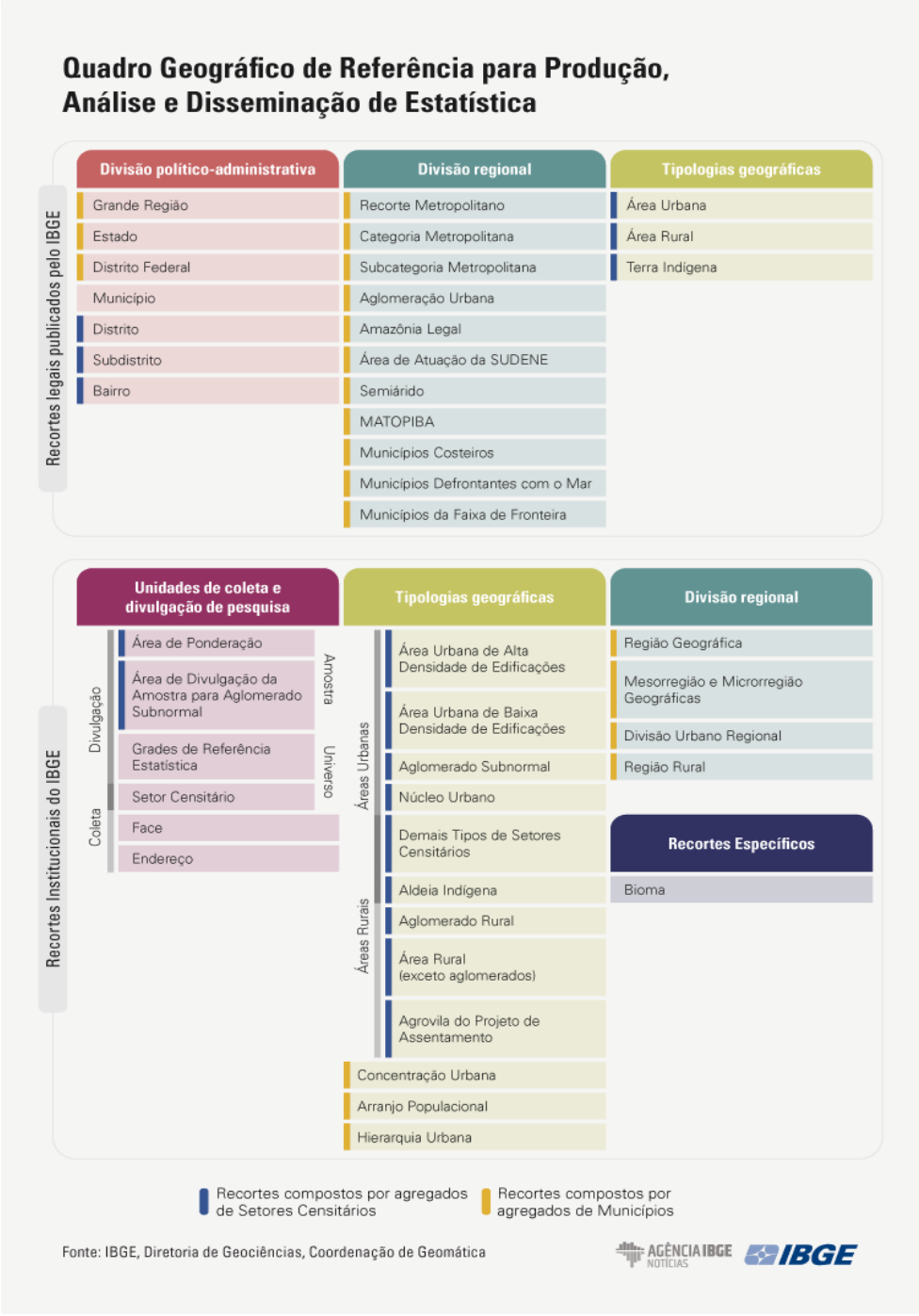
The second group, IBGE´s Institutional Geographies (geographycal, environmental and statistical territorial divisions), comprises geographic reference structures established by the IBGE specifically for the production, analysis, and dissemination of official statistics. These geographies are designed to meet the requirements of data collection and operation of the censuses and surveys, as well as the geographical and environmental studies key to those statistics, to produce several relevant divisions for the public planning and management, as well as inputs to the investments of the private sector. In this group, user will have access to Census Tracts, Block-faces, Addresses, Weighting Areas and Statistical Grid. Territorial divisions derived from geographical and environmental studies

.....

[8] https://www.ibge.gov.br/geociencias/organizacao-do-territorio/estrutura-territorial/24233-quadro-geografico-de-referencia-para-producao-analise-e-disseminacao-de-estatisticas.html?=&t=sobre and https://www.ibge.gov.br/apps/quadrogeografico.

and surveys are also presented as Functional Urban Areas (Urban Concentrations and Population Arrangements), Urban Hierarchy, Brazilian Regional Division (Geographic Region, Mesoregion and Microregion), Urban-Regional Division and Rural Region.

The report, released in 2019 and updated in 2022, includes information on the update cycle, reference year, number of units covered, relationship with other geographies, law or reference instrument for all geographies. It was the the first step of an ambitious institutional project aiming at integrating the existing systems and standardizing incorporation of new territorial divisions currently present in Brazil, strengthening, thus, the integration between statistics and geospatial information, aiming at making available comparable and spatially integrated data.



Annually all geographies composed of aggregation of municipalities are revisited incorporating their compositon changes made by legal or institucional intruments and those made by the actualization of the Brazilian Territorial Division (DTB) such as changes in toponymy and in territorial boundaries of the municipalities.

Now, IBGE is structuring the routines of the Geographical Framework to integrate IBGE's systems such as the integration of the traditional statistical system – IBGE System of Automatic Recovery (SIDRA) – with the geospatial information through geoservices compliant with the OGC standards.

Other points to highlight are the creation of an area at the Institute responsible for the Geographical Framework, the formation of a working group from the various areas involved in the production of geographies and the definition of procedures for inclusion and exclusion of geographies from the Framework.

Integrated Geoinformation Production Program

The Integrated Geoinformation Production Program aims to implement a new data production model aiming at an integrated and theme-separated production approach, using unique production collection, monitoring and validation systems. The main objective is to build an integrated set of geospatial data to meet the demands of society and optimize production using IBGE’s regional (27) and local (566) agencies. The program focuses primarily on collecting information through administrative records and Earth Observation, and then using the network of agencies to collect field samples and validate or complement gaps in the geoinformation produced in the office. Currently, the Program is in the planning and pilot testing phase, awaiting the availability of IBGE’s agencies network after the 2022 Census completion.

The specific objectives are to expand the use of administrative records to update the IBGE's geospatial database; improve the technology for producing geospatial information from Earth Observation data; establish a thematic rather than a product approach to production; create baselines for each theme; avoid duplication and optimize the production of geospatial information at IBGE; increase the update frequency and amount of geospatial information produced; consolidate a single tool for the production of geospatial information by the IBGE’s local and regional agencies; consolidate a single tool for tracking and managing the collection of geospatial information; consolidate a single tool for field collection of geospatial data; improve the predictability of the annual workload in the regional and local agencies in order to facilitate management; expand the use of IBGE’s local agencies (around 570 local agencies); make the search for geospatial information by our users (internal and external) easier.

The advantages of switching to the thematic approach are allowing technicians to specialize in themes, creating specific solutions; better association of thematic attributes with geospatial themes; increase in the number of disclosures (specific disclosures for each theme); establishment of update periodicities by theme; improve IBGE's internal thematic

management; establishment of external institutions managing themes; adoption of the management agency's (external, setorial and/or regulatory agencies) coding to facilitate the integration of geospatial information with the thematic atributes; increase in the formalization of cooperation agreements with theme managers, ensuring a permanent flow of information; greater possibility of securing funding from partners or agencies with an interest in specific themes; greater integration and division of internal work, resulting in thematic products.

In Brazil, IBGE is fully or partially responsible for 13 of the Global Fundamental Geospatial Data Themes, excluding only the Land Parcels theme. In addition, it is the manager of the Brazilian Directory of Geospatial Data (DBDG) of the National Spatial Data Infrastructure (INDE). Therefore, IBGE can create synergy for the integrated production of the fundamental themes of geospatial production. The Program focuses on the collection of the information

Accessible and usable geospatially enabled statistics

IBGE has been working to increase the integration between statistics and geography, the essence of the Institute, using global principles and best practices. In this regard, some initiatives stand out such as the geocoding of the geographies used in the census operation, the Geographic Reference Framework (QG), the collection of geographic coordinates and addresses in a broad and systematic way, the creation of geospatial panels for monitoring of the collection and making information available to users, among other initiatives.

In the spirit of making statistics accessible, usable and geospatially enabled, IBGE has made available to the public since 2013 a series of geospatial tools for analyzing and

interacting with statistical information. The first is the Interactive Geographic Platform (PGI)[9], which makes it possible to view and analyze the themes of publications and studies in documents in portable document file (PDF) format and in the form of geoservices. In PGI the user can also download data in tabular, shapefile, KMZ and PDF formats. It is also possible to interact with the map by selecting other themes, zooming in and zooming out, increasing layer transparency, among other tools. All information is held in custody at the INDE and its metadata can be found in the IBGE catalogue.

For the coming years, the IBGE intends to develop improvements in the PGI, including creating a unified portal for access to the various products available on the platform, as well as moving towards the consolidation of a Geoportal, that is, a broader and more complete platform for the provision of geospatial information and spatially enabled statistics.

Another platform, aimed more at mapping and statistics of environmental information, is the Environmental Information Database (BDiA)[10]. BDiA brings together the collection of thematic bases of natural resources in the national territory, adjusted to a scale of 1:250,000, produced by IBGE within the scope of the Natural Resources Mapping project. These data were produced in four thematic areas: Geology, Geomorphology, Pedology and Vegetation.

The databases contained in the BDiA were developed within the scope of the SIVAM Project and the Mapping of Natural Resources from 1998 onwards. The methodologies and procedures carried out for the elaboration of these bases are inheritance and evolution of methods developed during the RADAM/ RADAMBRASIL, which carried out a survey of Brazilian natural resources, non-marine, published on a scale of 1:1,000,000, in the 1970s and 1980s.

Thus, on the BDiA platform, web consultation of such data and information is available, to interactively share the IBGE's collection of geospatial information. It can be done in a multi-scale and inter-thematic way, so that the user can get to know the different environmental characteristics of the Brazilian territory. This information can also be consulted, visualized and exported by the platform, through its different existing functionalities, in formats appropriate to the origin of the data.

Thematic mappings have different levels of navigation, organized into layers of information displayed on web maps, supported by graphs and tables. According to the visualization scale, the user can perceive the level of detail of each theme that is more compatible with the approximation/departure of the gespatial information on screen.

Technically, the first two levels of mapping visualization were “rasterized” to optimize the navigation performance in the data, while the third level maintains the original vector format and the data can be accessed by selecting the mapping units. In the web map display, additional layers of thematic information, cartographic boundaries and other

.....

[9] https://www.ibge.gov.br/apps/atlas_nacional/.

[10] https://bdiaweb.ibge.gov.br/#/sobre/bdia.

environmental studies can be activated or deactivated, and external layers (wms format) can be inserted.

The mappings, in digital vector format, were produced from the interpretation of images from orbital sensors, field expeditions and bibliographic survey. The mapping methodologies are described in the Technical Manuals in Geosciences published by IBGE: Technical Manual on Geology; Technical Manual on Geomorphology; Technical Manual on Pedology; and Technical Manual on Vegetation. More details on the mapping history, process steps and inputs can be found in the metadata of each layer on the portal or in the IBGE Metadata Catalog[11].

Data on population market, education and access to TV, internet and mobile phones, investigated by the Continuous National Household Sample Survey (PNAD-C), can now be accessed in an interactive dashboard[12]. The tool was launched in partnership with the International Labour Organization (ILO), spatializes and facilitates the visualization of information from the largest household survey in the country, through interactive maps and graphics.

The dashboard provides, for the first time, experimental indicators for 146 geographic strata and 24 indicators selected from the entire historical series of the Continuous PNAD, which began in 2012. Among them, data on occupation, unemployment and the population contingent, published by the quarterly edition of the survey.

The information, previously restricted to publications and SIDRA (the IBGE's statistical table database), can now be consumed through different geographical areas, showing the evolution of indicators over time and their distribution in territorial space, through interactive graphs and maps, facilitating access and interpretation by users.

.....
[11] http://www.metadados.geo.ibge.gov.br.
[12] https://painel.ibge.gov.br/pnadc/

Regional Hub for Big Data and Data Science in Brazil

The Regional Hub in Brazil aims to contribute to the advancement in the use of Big Data and Data Science to improve the production of official statistics, promoting the sharing of knowledge and the development of innovative initiatives in Latin America and the Caribbean. The Regional Hub will serve as a platform to support projects in the use of Big Data and data science for official statistics and indicators of the Sustainable Development Goals (SDGs) agenda, and will promote multiple activities, such as sharing knowledge about methods, algorithms and training tools and actions for the statistical community in the Central and South America region.

The Hub is hosted at the National School of Statistical Sciences (ENCE), the academic arm of the IBGE, which coordinates the efforts and contributions of the different areas of the Institute to support the activities of the Regional Hub.

In the initiatives related to the production of geospatial data and integration with statistics promoted by the Regional Hub, it is worth highlighting the 'Conference Using Big Data and Machine Learning for Land Cover and Use Mapping - Challenges for Mapping Precision' and the webinar 'Initiatives of Collaborative Geoinformation in Latin America'.

The Conference, held in July 2022, brought together experts and researchers from Latin America and the Caribbean with the aim of sharing knowledge and promoting the formation of a community of experts and researchers among the countries of the region. In addition, it aimed to facilitate the exchange of information and contribute to the discussion on the use of new data sources and technologies. The discussions were guided around the following topics: Big Earth Observation Data for Land Cover and Use Mapping: requirements, methodology and products; Land Cover and Use Mapping Initiatives: advances, results and challenges in the production of official data and Earth Observation applied to agricultural statistics. The event was organized by IBGE, National Institute for Space Research (INPE) and by the Information and Coordination Center of Ponto BR (NIC.BR). There was simultaneous translation into Spanish, English and Portuguese, the three official languages of the region.

On the other hand, the webinar brought together experts and researchers from Latin America and the Caribbean, working on the topic of Collaborative Geoinformation, Participatory Cartography or Volunteered Geographic Information (VGI). The objective was to share knowledge and promote the formation of a community of experts and researchers among the countries of the region in the use of digital tools to collect, analyze and share geographic information provided by users. It also aimed to facilitate the exchange of information and contribute to the discussion on Big Data techniques and methods, leading to unprecedented progress for VGI.

IBGE has sought to strengthen ties with INPE in initiatives such as the Brazil Data Cube (BDC), a research, development and technological innovation project coordinated by INPE that is producing data from large volumes of medium resolution remote sensing images for the entire national territory and developing a computational platform to process and analyze this data using artificial intelligence, machine learning and image time series analysis. The data produced in the BDC project includes collections of data ready for analysis (Analysis-Ready Data – ARD), multidimensional data cubes and mosaics from images from the CBERS-4/4A, Sentinel-2 and Landsat-8 satellites. The computing platform is composed of web services, software applications and iterative computing environments. INPE has also been developing a Georeferenced Information Base (BIG) - which combines a repository of orbital images and geospatial data with the possibility of performing cloud processing.

The partnership with INPE will allow alignment in the production of geoinformation and geospatial data, as well as the use of technologies developed by INPE to improve the Mapping of Land Cover and Land Use and Territorial Base. For INPE, it opens the possibility of strengthening ties with methodologies and statistical, geographic and environmental information produced by the IBGE, as well as the possibility of using the IBGE collection network for validation of samples in the field.

Collaboration with the United Nations Group of Experts on Geographical Names

Brazil is an active member of the United Nations Group of Experts on Geographical Names (UN-GEGN) especially of the Portuguese-speaking Division. The Portuguese-speaking Division was created in August 2007, during the 24th Session of the United Nations Group of Experts on Geographical Names and has been operating discontinuously over the years.

In 2021, after the 2nd Session of the UN-GEGN, the IBGE requested assistance from the UN-GEGN Secretariat in obtaining contacts from the Portuguese-speaking Division potential Member Countries, to try to reactivate the Division one more time. The first country to respond was São Tomé and Príncipe.

To restart the Division, IBGE invited the Institute of Geographical Names of Mozambique-IP (INGEMO-IP) for a videoconference, to discuss the future of Portuguese-speaking Division, which was inactive and without leaders, since the representative of Mozambique had left the INGEMO-IP and the representative of Brazil had retired. Furthermore, only two of the objectives established at the first meeting were achieved, namely, the translation into Portuguese of the Glossary of Terms for the Standardization of Geographical Names and the creation of the website. However, due to the low interest of the Member States, the website is outdated and with very little content.

After the IBGE exposed the current situation of the Portuguese-speaking Division, INGEMO-IP, under a new and recent administration, stated they had gone through great difficulties and had been very little active for a period and that they were now, with the new Directors, resuming their activities, albeit with a staff deficit. However, despite the problems reported, the institution was receptive to the proposal to reactivate the Portuguese-speaking Division and decided to give their decision, in a new meeting, on continuing as Chair, assisted by the IBGE, which would remain as Vice-Chair.

On August 19, 2021, a second videoconference was held, and INGEMO-IP accepted the proposal to remain as Chair, while the IBGE committed to assume the position of vice-chair. In that meeting, initial tasks for the reactivation of the Portuguese-speaking Division were established were defined as: • initiate contacts with other Portuguese-speaking countries, with INGEMO-IP being responsible for contacting the African countries, namely: Angola, Sao Tome and Príncipe, Cabo Verde, Equatorial Guinea and Guinea-Bissau and IBGE with the task of contacting Timor-Leste and Portugal; • share the names of the representatives of the two countries and send them together with a brief report on the new status of the Portuguese-speaking Division to the UN-GEGN Secretariat; • jointly prepare the report on the current status of the Division for submission to the UN-GEGN Secretariat; • submit the report on the current status of the Division to the UN-GEGN Secretariat, summarizing the decisions taken at the two meetings; • hold Divisional meetings on a

quarterly basis; • indicate focal points of institutions; • reactivate the Division website; • send IBGE the necessary information to update the website.

From November 2021 to the present, the Division has continued to focus on efforts to integrate more Portuguese-speaking countries, encouraging them to implement the previously approved work plan and holding work meetings, which have contributed to the growth and strengthening of the Division. In this sense, it is worth mentioning the maintenance of contacts with Portuguese-speaking countries, which culminated in the integration of Cabo Verde, Timor-Leste. and São Tomé and Príncipe in the Division's work, increasing from 2 to 5 active countries.

The Division has been making significant progress in complying with the previously approved Work Plan, however, there is still a long way to go, towards the integration of more Portuguese-speaking countries in the works, preparation and availability of lists of exonyms, abbreviations, glossary of generic terms, as well as mutual support in the field of training and capacity building in relevant matters on geographic names, with a view to leveraging the work of standardization of geographic names in the Member States.

Confirming Brazil's commitment to being an international training center for UN-GEGN Portuguese-speaking and Latin American divisions, IBGE has sought an active role in training in toponymy and geographical names by offering courses and workshops that involved around 60 participants from different institutions from Brazil and other Portuguese-speaking and Latin American countries. In addition, IBGE participated in the UN-GEGN Webinar Series: Developing Digital Gazetteers Using Free and Open-Source Software in May 2022 with the presentation Gazetteers of Brazilian Base Maps.

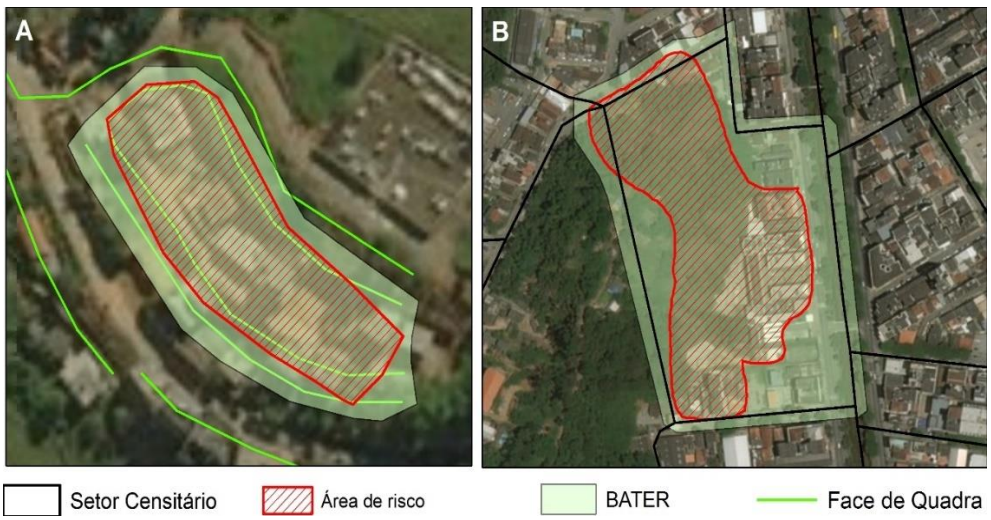
Finally, we highlight the holding of the II Pan American International Symposium on Toponymy – II SIPAT. SIPAT constitued a unique opportunity for the exchange of information, experiences and issues among researchers, and contributed to give a higher profile to this area, which is so important in the context of geography and other fields to which geographical names relate.The event was held by the Federal University of Rio de Janeiro (UFRJ) and by IBGE and had the support of the UN-GEGN, the International Cartographic Association (ICA), the International Geographical Union (UGI), the Pan-American Institute of Geography and History (IPGH), the Brazilian Cartography Society (SBC) and the Historical Cartography Reference Center of the Federal University of Minas Gerais (CRCH-UFMG).

Geospatial information and services for disasters

The population in risk areas in Brazil is a project[13] that is part of the cooperation agreement between the IBGE and the National Center for Monitoring and Early Warning of Natural Disasters (CEMADEN), established in 2013. The partnership aims at joining efforts and actions for the development of applied surveys and the generation of databases and information associated to the characterization of the populations vulnerable to natural disasters in the national territory to give support to monitoring, early warnings, risk management and response to natural disasters.

The interinstitutional agreement made it possible to associate, in an unprecedent way, the IBGE's demographic information (from the 2010 Census) and the risk areas of municipalities monitored by CEMADEN (around 870 local governments) and reveals the first results about the situation of people in risk areas in Brazil. The main goal is to provide socioeconomic data to risk areas, which are fundamental elements for initiatives that aim at reducing the number of deaths and material damage caused by natural disasters all over the country. By making databases with population variables available, Brazil takes an important step towards the implementation of systems for identifying, observing and monitoring urban spaces; particularly those which are susceptible to hydrometeorological, and weather conditions linked to floods, downpours and mass movements, i.e., at risk of natural disasters, with significant impact on society and the environment.

The Statistical Territorial Base of Risk Areas (BATER) was generated from the association of Census 2010 data to areas at risk of floods, inundation and mass movements. The challenge of generating geographic information articulated at different scales of analysis constitutes a first effort to estimate the Brazilian population exposed and vulnerable to the risk of natural disasters.



[13] https://www.ibge.gov.br/en/geosciences/territorial-organization/territorial-typologies/22187-population-in-risk-areas-in-brazil.html?=&t=o-que-e and https://www.ibge.gov.br/apps/populacaoareasderisco/#/home

A total of 4,273 census tracts and 193,486 block-faces were used in urban areas. Of the 8,309 BATER polygons, 77.5% (6,438 polygons) had data associated with the 2010 Census, while 22.5% (1,871 polygons) had no data association. Of the BATER polygons with data associated with the 2010 Census, 87% (5,625 polygons) were mapped using block-faces, while 13% (813 polygons) used census tracts with data associated with the 2010 Census.

In 2010, the population in risk areas in the 872 municipalities monitored reached 8,270,127 inhabitants, who lived in 2,471,349 households. About 17.8% of the people who lived in the risk areas of these municipalities were the elderly or children, the most vulnerable age groups.

The methodology was developed to be replicated to the 2022 Census results, ensuring low execution costs and optimization of public resources. In addition, it will be possible to follow the temporal evolution of the characteristics of the population exposed to the risk of disasters. It is expected that the refinement of the 2022 Census address and coordinates information will improve the delimitation of BATER. Furthermore, because of the cooperation agreement, CEMADEN will send weather alerts to census takers' mobile devices.

Another front of generation of geospatial information and services for disasters is the articulation with the National Secretariat of Civil Defense and Protection (SEDEC) to produce the SDG indicators[14]. Using administrative records from the Integrated Disaster Information System (S2ID)[15] it was possible to generate the indicator of number of deaths, missing persons and directly affected persons attributed to disasters per 100.00 population (1.5.1, 13.1.1 e 11.5.1). The information from the Survey of Basic Municipal Information (MUNIC) also allowed the generation of a national indicator (proxy indicator) to represent the proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies.

.....
[14] https://odsbrasil.gov.br/
[15] https://s2id.mi.gov.br/

IBGE representatives for Geo-related matters

Committee of Experts on Global Geospatial Information Management (UN-GGIM)

Claudio Stenner
IBGE Director of Geosciences
claudio.stenner@ibge.gov.br

United Nations Regional Committee on Global Geospatial Information Management for the Americas (UN-GGIM: Americas)

Miriam Mattos da Silva Barbuda
IBGE Assistant Director of Geosciences
miriam.barbuda@ibge.gov.br

United Nations Expert Group on the Integration of Statistical and Geospatial Information (EG-ISGI)

Cayo de Oliveira Franco
IBGE Geography Manager
cayo.franco@ibge.gov.br

United Nations Group of Experts on Geographical Names (UN-GEGN)

Ana Cristina da Rocha Berenger Resende
Head of IBGE Geographical Names Department
Vice-chair of UNGEGN Portuguese-speaking Division
ana.resende@ibge.gov.br

UN-GGIM Subcommittee on Geodesy

Sonia Maria Alves Costa
IBGE Geodesy Manager
Subcommittee on Geodesy Guest Member (SIRGAS)
Co-Chair of th Geodetic Reference Frame for the Americas (GRFA) Working Group of the UN-GGIM: Americas
sonia.alves@ibge.gov.br

Geodetic Reference System for the Americas (SIRGAS)

Sonia Maria Alves Costa
IBGE Geodesy Manager
President of the Geodetic Reference System for the Americas (SIRGAS)
sonia.alves@ibge.gov.br

Salomão Soares
Representative of Brazil on SIRGAS board of directors
salomao.soares @ ibge.gov.br

Alberto Luis da Silva
Coordinator of SIRGAS Network and responsible for the IBGE SIRGAS Analysis Center
alberto.luis@ibge.gov.br

Expert Group on Environment Statistics (EGES)

Ivone Lopes Batista
ivone.batista@ibge.gov.br

System of Environmental Economic Accounting Ecosystem Accounting (SEEA EA)

Maria Luisa da Fonseca Pimenta

IBGE Environment Manager

SEEA Focal Point

maria.f.pimenta@ibge.gov.br

Inter-Agency and Expert Group on Disaster-related Statistics (IAEG-DRS)

Therence Paoliello de Sarti

IBGE Geography and Environment

Coordinator

therence.sarti@ibge.gov.br