

A brief account of the 2030 agenda and its implications for Brazil and the Amazon Region in achieving Sustainable Development Goal 6: Clean Water and Sanitation

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Abstract— The 2030 Agenda prepared by the United Nations (UN) in 2015 contains 17 Sustainable Development Goals (SDGs) broken down into 169 goals and 231 indicators to be implemented by 2030, among them, we highlight the goal Sustainable Development Goal 6: which deals with Water and sanitation for all and aims to achieve universal access to water services and collection and treatment of sewage by 2030 and the objective of this article was to highlight the challenges for the fulfillment of this goal, highlighting the indicatives 6. 1 and 6.2 with a focus on Brazil and Amazonas. The information related to the situation of SDG 6 in the Amazon region is presented and compared with the national realities or other regions of Brazil. To achieve the results, the information National Water and Basic Sanitation Agency (ANA), National Sanitation Information System (SNIS), Brazilian Institute of Geography and Statistics (IBGE), Institute of Applied Economic Research (Ipea) and National Household Sample Survey (PNAD) were analyzed in the period from 2016 to 2020, with scientific research methods with qualitative and quantitative data that examine the performance of Sustainable Development Goal 6. It was possible to identify that it is necessary to invest in water infrastructure in projects to alleviate the lack of sewage treatment that bothers Amazonian citizens. And the conclusion was that the participation and knowledge of different areas in integrated water management increases the likelihood of achieving the goals of Sustainable Development Goal 6 (SDG) by 2030, because the sustainable development of the country is linked to its population

I. INTRODUCTION

The contents of each section may be provided to understand easily about the paper. In 1953, the Legal Amazon was defined for land planning purposes, covering

approximately 60% of the Brazilian territory. The region that has 21 million inhabitants, about 12% of the country's population, 70% of whom live in cities and towns, became the target of many development policies in the 20th century and has structural and economic characteristics

different from the rest of Brazil, mainly because it has the largest rainforest in the world^[1]

The Amazon biome is one of the essential locations in this process, locating and providing data for research and policy development, including coverage for a sustainable society. According to the National Institute for Space Research^[2] (INPE, 2013), in 2012, the total area of deforestation in the Legal Amazon was about 755,000 square kilometers, equivalent to approximately 15% of its geographic area. Therefore, most deforestation is around 570,000. The square kilometers occurred between 1977 and 2004.

In this case, the environment is seen as an infinite source of resources that can be used to meet human needs and misused over time. However, over the years, its use has required a new form of planning to meet future demands^[3]

The continuity of human existence today depends on healthy ecosystems and the flow of goods and services they provide. However, the current level of human intervention in natural ecosystems has altered sources of income, making it necessary to take steps to minimize environmental impact and develop sustainable systems.^[4] Thus, Miola & Sciltz^[5] report that the adoption of the 2030 Agenda aims to achieve a better and sustainable future for all. Therefore, to address the major challenges we face, recognize that poverty eradication requires strategies that can play a role in economic growth, ensure environmental protection, and manage a range of social needs, including health, education, and gender equality. Basic requirements for planning and monitoring public policies aimed at sustainable development. Therefore, this article aims to make a brief report on the objective of SDG number 6 and its main impacts on Brazil and the Amazon region.

II. METHODOLOGY

A narrative and critical review of the literature was conducted. Articles in English, Spanish, French, and Portuguese, published in the last ten years, were searched in the PubMed/MEDLINE, Scielo, Sco-pus, Web of Science, google academic, Capes periodic, and Cochrane Library databases.

III. THE DEVELOPMENT PROCESS

Of the multiple dimensions that encompass the development process of a society, it is possible to mention: economic development, social development, human development, endogenous development, underdevelopment, sustainable development,

organizational development, urban development, rural development, eco-development, regional development, and territorial development^[6] The^[7] idea of formulating a concept for regional development is utopian. That is, development is a multidisciplinary concept and is not only linked to the policy of incentives or income increase but, above all, to the ultimate objective of the well-being of specific populations. For example, the coordination of projects with a view to a virtuous cycle for the promotion of education, health, employment, social protection, and respect for diversity. This means that despite all the efforts, technologies, innovations, and methods to describe, measure, and evaluate a region in its development process, its true meaning is when people are able to cooperate among themselves. In order for this to happen, knowing the region is one of the main factors for the formulation of policies and programs focused on regional development in a way that is adequate to the characteristics and identity of each place^[8]. Given this,

IPEA^[9], presented the proposal to adapt the global goals of the 2030 Agenda for Sustainable Development to the Brazilian reality, in compliance with the assignment received from the National Commission for the Sustainable Development Goals (CNODS) and in line with its mission to provide technical and institutional support to governmental actions for the formulation and reformulation of public policies and national development programs. Kronemberger^[10] studying the challenges of building global SDG indicators, reports that building national platforms for the dissemination of indicators and/or other information on SDGs is very important because it creates a collaborative environment between different actors—such as different data producers—, allows for the gathering and presentation of SDG indicators, and becomes a database (statistical and geospatial)) that facilitates data sharing, visualization, and dissemination. Among the 17 indicators for development, in this article, we want to highlight SDG 6, which deals with drinking water and sanitation. Its establishment portrays the increased attention to the problems related to water and sanitation in the global political agenda. Carvalho; Barcelos^[11] describe that the indicators aim to protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss, with SDG 6 being one of those that most deserves attention around the globe, especially in socioeconomic development processes. According to FAO^[11], in Brazil, for instance, approximately 40 indicators have no data available in the country, covering topics such as economic losses attributed to disasters, sustainable agriculture, use of family planning methods, consumption

of materials, and several others. Therefore, the links between the dimensions of development are flawed or non-existent when it comes to the production of the indicators, as in "health and environment" or "health and living conditions."

IV. DEVELOPMENT GOALS AND BRAZIL

The Millennium Development Goals (MDGs) diverge from the Sustainable Development Goals (SDGs) on the basis that the MDG processes boil down to social issues with some financial underpinnings, whereas the SDGs are both more global and environmentally inclined. [12] It is worth mentioning that the SDGs can be considered as an extension of the MDGs. [13]

The 17 agreed Sustainable Development Goals include targets on a wide range of themes, such as poverty eradication, agriculture and food security, education, health, inequality reduction, electricity, water and sanitation, sustainable production and consumption, climate change, conservation and sustainable use of terrestrial and marine ecosystems, inclusive economic growth, infrastructure and industrialization, sustainable cities, governance, and implementation strategies. [14],[15],[16] They provide an integrated, holistic, and coherent framework to address the world's most pressing sustainability challenges and to create a better future for all, and among such SDs is access to "Water and Sanitation" (SDG 6). Water resources and related services underpin efforts to eradicate poverty, economic growth, and environmental sustainability. The main challenges related to water resources are the conservation and sustainable use of oceans and seas, freshwater resources, and combating water scarcity and pollution [14] According to the PNRH [17] the management of national water resources should be based on the goal of rationalizing management and integrating it with environmental management. The water sector is central and strategic to sustainable development, and the application of the Environmental Integration Principle (EIP) is one of the prerequisites for achieving this goal. The access to treated water as well as all the benefits generated by this process is the role of the State. However, in Brazil, some shortcomings are particular to each region analyzed.

TABLES 1, 2, and 3 show the analysis of households with access to the public water network, using data from the 2019 National Household Sample Survey (PNADC), and demonstrate the situation by region, especially the Northern area of the country.

Focusing on the main interest, which is the evaluation of inequalities in household access between services throughout the national territory, it is noted that Brazil had

a result of 85.5% of permanent private households served by the public water supply network. The Southeast region stands out, with 92.3%, while the North region presented a percentage of 58.8% in 2019, with the difference between these two being 33.5 percentage points. The result for the North region is lower than that of Brazil and the other geographic regions analyzed, showing regional disparities. It also shows that the percentages in the Northeast, Midwest, and South regions are much lower than in the Southeast.

On the other hand, data from the North region on supply by deep well or artesian well (21.3%), shallow well, underground well or water hole (13.4%), fountain or spring (2.8%), and 3.6% other forms of water supply are much higher than in the other geographic regions analyzed.

Table 1-Household by source of water supply Country and macro-regions (%)

Indicator:	Year	Brazil	North	Northeast	South	Southeast	Central-West
Households by source of supply in Brazil and by geographic region (%)	General distribution system	85,5	58,8	80,0	87,9	92,3	87,2
	Artesian or deep well	7,1	21,3	8,7	6,6	3,9	7,4
	Shallow well or cistern	3,2	13,4	3,9	2,2	1,4	3,5
	Fountain or spring	2,1	2,8	1,3	3,2	2,2	1,5
	Another form of supply	2,0	3,6	6,1	0,1	0,2	0,4

Fonte: IBGE.[18]

Table 2- Index Share of the total population living in households with access to treated water in the country and in the macro-regions (%)

Indicator	Year	Brazil	North	Northeast	South	Southeast	Central-West
Share of total population living in households with access to treated water (%)	2020	84,1%	58,9%	74,9%	91,3%	91,0%	90,9%
	2019	83,7%	57,4%	74,0%	91,1%	90,5%	89,7%
	2018	83,6%	57,1%	74,2%	91,0%		89,0%
						90,2%	
	2017	83,4%	57,3%	73,2%	91,3%	89,6%	90,1%
	2016	83,3%	55,4%	73,6%	91,2%	89,4%	89,7%
	2015	83,3%	56,9%	73,4%	91,2%	89,4%	89,5%

Fonte: SNIS[19]

Table 3- Rate of population with regular water supply (%)

Indicator	Year	Acre	Amapá	Amazonas	Pará	Rondônia	Roraima	Tocantins
Share of population with regular water supply (%)	2019	22,0%	46,9%	71,4%	48,3%	42,3%	73,7%	79,6%
	2018	22,4%	42,4%	67,3%	42,1%	37,8%		79,4%
							85,7%	
	2017	44,0%	80,9%	90,5%	88,1%	91,4%	98,0%	93,3%
	2016	40,7%	96,3%	89,5%	85,9%	89,9%	96,4%	98,7%

Fonte: IBGE^[20]

When we take the analysis to the field of sewage treatment and minimum health conditions, which directly impacts the SUS (Brazilian Unified Health System), the data are even more astounding, revealing how far we are from reaching some of the goals proposed within the 17 SDGs.

As shown in TABLES 4, 5, and 6, and concerning the sanitation component, in Brazil, the share of the population living in households with sewage connected to the public collection network¹ rainwater network, or septic tank² connected to the public network increased from 65.9% in 2016 to 68.3% in 2019. It is registered, therefore, a slight improvement in sanitation conditions in Brazil. Differently, the Southeast region presented a percentage of 88.9%, considerably higher than the other demographic regions, and remained stable compared to previous years. The Northern region corresponded to 27.4% in 2019 and presented the lowest percentage in the analyzed period among the macro-regions. According to Lins ^[21] it is evident that there is an excessive difference among the Brazilian regions when it comes to investment and infrastructure that guarantee the health of the population. For this reason, the North is among the regions with the worst indexes regarding quality water and sanitation and, consequently, among those with the worst infant mortality indicators, for not having an adequate structure for the population.

¹ When the sewage pipe from a bathroom or toilet is connected directly to the sewage collection system, even if the system has no sewage treatment plant, it results in a general drain in the area

² When toilet sewage is connected to one or more tanks made of concrete, plastic, fiberglass, or other impermeable material, the liquid part is directed into the public sewage system

Table 4 - Index of households with mains or septic tanks connected to the mains in the country and in the macro-regions (%)

Indicator	Year	Brazil	North	Northeast	South	Southeast	Central-West
Domiciles with general network or septic tank connected to the general network in the country and in the macro-regions (%)	2019	68,3	27,4	47,2	68,7	88,9	60,6
	2018	66,3	21,8	44,6	66,8	88,6	55,6
	2017	66,0	20,3	44,9	66,0	88,9	52,7
	2016	65,9	18,9	44,2	64,8	89,0	54,7

Fonte: IBGE^[20]

Table 5- Index Portion of the population without sewage collection in the country and in the macro-regions (%)

Indicator	Year	Brazil	North	Northeast	South	Southeast	Central-West
Share of population without sewage collection	2020	45,0%	86,9%	69,7%	19,5%	52,6%	40,5%
	2019	45,9%	87,7%	71,7%	20,5%	53,7%	42,3%
	2018	46,9%	89,5%	72,0%	20,8%	54,8%	47,1%
	2017	47,6%	89,8%	73,1%	21,4%	56,1%	46,1%
	2016	48,1%	89,5%	73,2%	21,4%	57,5%	48,5%
	2015	49,7%	91,3%	75,3%	22,8%	59,0%	50,4%

Fonte: SNIS^[19]

Table 6- Index Portion of the population without sewage collection (%)

Indicator	Year	Acre	Amapá	Amazonas	Pará	Rondônia	Roraima	Tocantins
Share of population without access to water (%)	2020	88,6%	93,1%	86,2%	92,2%	93,3%	36,7%	73,1%
	2019	90,0%	93,0%	85,1%	94,2%	94,1%	39,7%	70,5%
	2018	89,9%	92,9%	90,0%	94,8%	95,1%	48,3%	73,6%
	2017	89,3%	93,4%	90,6%	93,7%	95,5%	58,2%	74,1%
	2016	87,8%	94,1%	92,7%	91,0%	95,9%	61,6%	78,3%
	2015	87,5%	96,2%	92,3%	95,1%	96,0%	61,9%	78,0%

Fonte: IBGE^[20]

Goals 6.1 and 6.2, which deal with the provision of and access to safe drinking water and sanitation services, bring within them the concept of access to safely managed sources. The security character augments the understanding of mere access (called basic access) and is based on the idea that these services must be accessible on premises, available when needed, and free from contamination. ^[22]

Access to drinking water, sewage collection, and treatment is a right that must be guaranteed to all, as it is exactly this set of criteria that aims to preserve or modify,

if necessary, the environmental conditions of a certain place. Sanitation is intended to prevent disease and promote health, improving the quality of life of the population. In this way, the individual will also be able to develop productively and even reduce public spending on the treatment of illnesses. According to Instituto Trata Brasil, considering the progress in sanitation, it is estimated that, between 2015 and 2035, over BRL 7 billion will be spent in Brazil on hospitalizations or absences from work related to gastrointestinal infections.^[23], it is important to emphasize the role of the State and the conditions for the creation of public policies that aim to improve the quality of services in this sector, as it is imperative that countries that wish to develop increasingly distance themselves from this reality. For this purpose, it is necessary to carry out specific research and studies to identify the issues that concern sanitation, economy, and health.

V. CONCLUSION

To face this disparity, actions, investments in engineering and technology, qualification, sustainable management alternatives, awareness raising, and social mobilization are essential, aiming at a way to compensate for this lack sustainably and employ governance models to study resorts in which community management can work together to alleviate this inequality in Brazilian society.

Investments in water infrastructure, based on a participative model with the entire population, are equally crucial so that they can prepare basic sanitation plans and adopt the public policies necessary to achieve universal basic sanitation by 2030. Therefore, in face of a national and local panorama of severe financial restriction, it becomes urgent to raise more and more public policies, seeking a more comprehensive approach among its various participants, so that higher levels of availability can be achieved and allow the sustainable development of Amazonas. These are very relevant challenges that, in some cases, require a large amount of financial and material resources to be tackled in a convenient way

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