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Global Perspectives
Research Article

The expansion of the Brazilian Federal Universities Network as a vehicle for urban and regional sustainable development

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Keywords

Expansion of universities; Geography of higher education; Sustainable development; Sustainable development goals; Urban and regional development.

Abstract

The present research paper aims to analyze the spatial results of the expansion that Brazilian Federal Universities Network have presented between 2003 and 2018, looking forward the impacts and possibilities towards the achievement of urban and regional sustainable development. In economically obsolete or marginalized areas or in those with strong industrial dynamism or agribusiness production, these new campuses also can be understood as vehicles to promote economic security/growth, social equity and assure environmental integrity. Focusing in two empirical studies, based in qualitative and quantitative methodologies, besides the theoretical approach, in cities and regions of Bahia state which received two new universities, we present the economic contribution of the new campuses, the challenges and strategies to socially develop places with high amount of vulnerable population, and the environmental potentialities to build green campus, understood as a nature-based solution, and to implement the Sustainable Developing Goals.

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1. INTRODUCTION

The concept of sustainable development (United Nations General Assembly, 1987; Redclif, 1993; Sachs, 2015) is based on the indivisible interaction between three spheres: economic, social and environmental. There is a broad understand that these three aspects are indicating directions to promote economic growth/security, environmental integrity and social equity (Basiago, 1998; Fitzgerald, 2010; Gould and Lewis, 2017). Public and private sector have been pursuing some degree or commitment with sustainable development for a couple of decades, with the last five years showing an increase of initiatives to increase and accelerate actions to reach the principles of the Agenda 2030 (United Nations General Assembly, 2015). The seventeen Sustainable Development Goals (SDGs), the measures for mitigate the effects of climate change and several urban and regional planning strategies, like as: nature-based solutions, ecosystem services, green-blue infrastructures (Naumann et al., 2020), have been materialized to create a sustainable and resilient geographical space (Weichselgartner and Kelman, 2015).

Educational networks (public or private) and multiscale educational systems (primary and secondary schools, universities) have an active vehicle to promote sustainable development (Brkić-Vejmelka et al, 2018; Mikhaylova, 2018). To achieve a sustainable future is fundamental to have educated, skilled and creative people which can build a better relationship with nature and create alternatives for the current consumption and production models, based on the depletion of natural resources (Mally, 2020). Agreeing with Wursten (1998), who wrote that the universities make a difference in the places where they are located, we perceive the universities as a successful agent in the promotion of the pillars of a sustainable urban and regional development in a highly effective and permanent way. According to Anacker and Altrock (2008), the aspect of regional development of universities and their role in innovation or technology production/transfer is an accepted topic. Perry and Wiewel (2005) and Wievel and Perry (2008) affirm that universities induce urban and regional development, when expanding actions from their main assignment (education). In this direction, the university can build a social, economic and symbolic infrastructure in cities in a way to produce and induce sustainable practices, like becoming a green campus, offering itself as a space of nature not only for its community, but also for the whole city. The green roofs of the Warsaw University Library are an example and a model for other buildings. The suburban campus can also become a green infrastructure, offering environmental services and being a regional ecosystem amenity.

In the United States, Zecher (2005) asserts that traditional economic development policies in medium-sized cities are based on fiscal and location incentives. This model proved to be flawed and led to economic stagnation in several cities, with a decline in industrial activity, job losses and low competitiveness. The solution to this issue would be the transition from a traditional economy to a knowledge and creative economy (Florida, 2002, 2005; Baumgartner and Rothfuss, 2017, Kumer, 2020), implying innovation and improvement of professional qualification and infrastructure (Cassiolato, 1999). This qualitative leap is only achieved through the positive impact of universities and technological research institutes, which have the strength to be agents and promoters of the knowledge and creative economy, both at the local and regional level.

Through a theoretical and empirical research about the role of new Brazilian Federal Universities created from 2003 until 2018, in a regional and urban development strategy, we examined successful cases and potentialities/challengers to transform this strategy into a sustainable one, thinking how the universities can promote economic

stability, social equity and environmental security. Part of this period (2007-2012) is covered by a public federal policy, denominated Federal Universities Restructuring and Expansion Plan (REUNI), conceived and implemented by the Brazilian Ministry of Education, with an intense expansion of Federal Universities towards the medium and small cities, some located in peripherical or marginalized regions of Brazil. Unfortunate, the changes in the political orientation and in the educational projects of the Ministry of Education had a strong impact on the expansion process, pausing it and increasing the uncertainties, due to recurrent budget cuts carried on by the actual government. However, the Federal Universities Network is resisting, and it is still a strong stakeholder in the promotion of high education and sustainable development in economically stagnant areas and in those with strong industrial or agribusiness dynamism. Nowadays these universities can also act as vehicles to promote several goals and actions related with the SDGs, especially in poor and vulnerable regions of Bahia state, the focus of the research conducted from 2007 until 2019.

1.2 Methodological notes

Methodologically, the research that supports the discussion brought in this text has quantitative and qualitative aspects. The quantitative basis is related to the collection of official data, produced by the Brazilian Ministry of Education, available online in the Platform E-Mec (emec.mec.gov.br). These data were tabulated and spatialized using a municipal base of the Brazilian territory. At the municipal scale, data from the census produced by the Brazilian Institute of Geography and Statistics (IBGE), were compiled in the aim to produce a characterization of populational, economic and social structure of the cities which received a campus of a new university. Unfortunate, the 2020 Brazilian census was postponed because the Covid-19 pandemic, making just from 2010 and some punctual updates available for this research.

Specifically, about the Federal Universities, historical series of data (number of courses, students and their origin, scholars and staff, budget and environmental programs), made possible the calculation of direct and indirect investments over the years, as well to follow the indicators of the commitment with sustainable development and the SDGs, after 2015. In the qualitative stage of the research, fieldworks were important to collect direct data and to carry geographical analysis about the urban fabric and the campus structure, especially in the direction to see the potentialities and challenges to build a green campus. Interviews with the political and entrepreneurial classes (commercial, services, industrial and agricultural), who settled in the city and/or region due to the presence of the new university, and the university and local communities were also included of the research program.

2. GEOGRAPHY OF FEDERAL UNIVERSITIES IN BRAZIL AND BAHIA STATE

To understand the importance of the expansion of Federal Universities in the Brazilian recent urban and regional development strategy, is essential to present a condensed historical geography of high education institutions in the country. Starting late offering high education, comparing with other Latin American countries, Brazil had also very centralized distribution of graduation courses, basically circumscribed to the state capitals. A periodization, grouping periods of time with different duration but which an internal historical coherence, present some details of the spatialization of universities. A synthesis map (Figure 1) brings the geography of Federal Universities, which is basically the same since 2016, where the latest municipalities were

incorporated in the network. It is important to mention that the municipality is the base level of territorial and administrative organization of the country, with municipalities in the Amazon region (North) being spatially bigger than in other parts of the country. This information is important to understand the covering of the expansion of universities in the 2000's. It is also valid to cite, that some new campuses have just one or two graduation courses.

2.1. Historical periodization of the Federal Universities in Brazil

1808 - 1955: Salvador, the former colony capital, received in 1808 the first public higher education institution in Brazil, a Medical School. At the turn of the 20th century, only four Brazilian cities had higher education courses financed by the central government: Salvador, Recife, São Paulo and Rio de Janeiro. Other cities have some courses of theology and philosophy offered by religious institutions. In the 1930s, a first wave of expansion began, with the creation of Federal Universities in every state capital.

1956 – 1970: The second period is marked by a small expansion of the Federal Universities Network towards the country's inland. This period shows also the interiorization of State public universities financed by the industrial state of São Paulo, with a multiple campus structure, decentralizing the access of high education.

1971 – 1985: The third period shows the movement of the Network from the Midwest to the North, pace-to-pace with the expansion of the agricultural frontier. In other states, several advanced campuses were also created, from existing institutions, destined to the field of agricultural sciences.

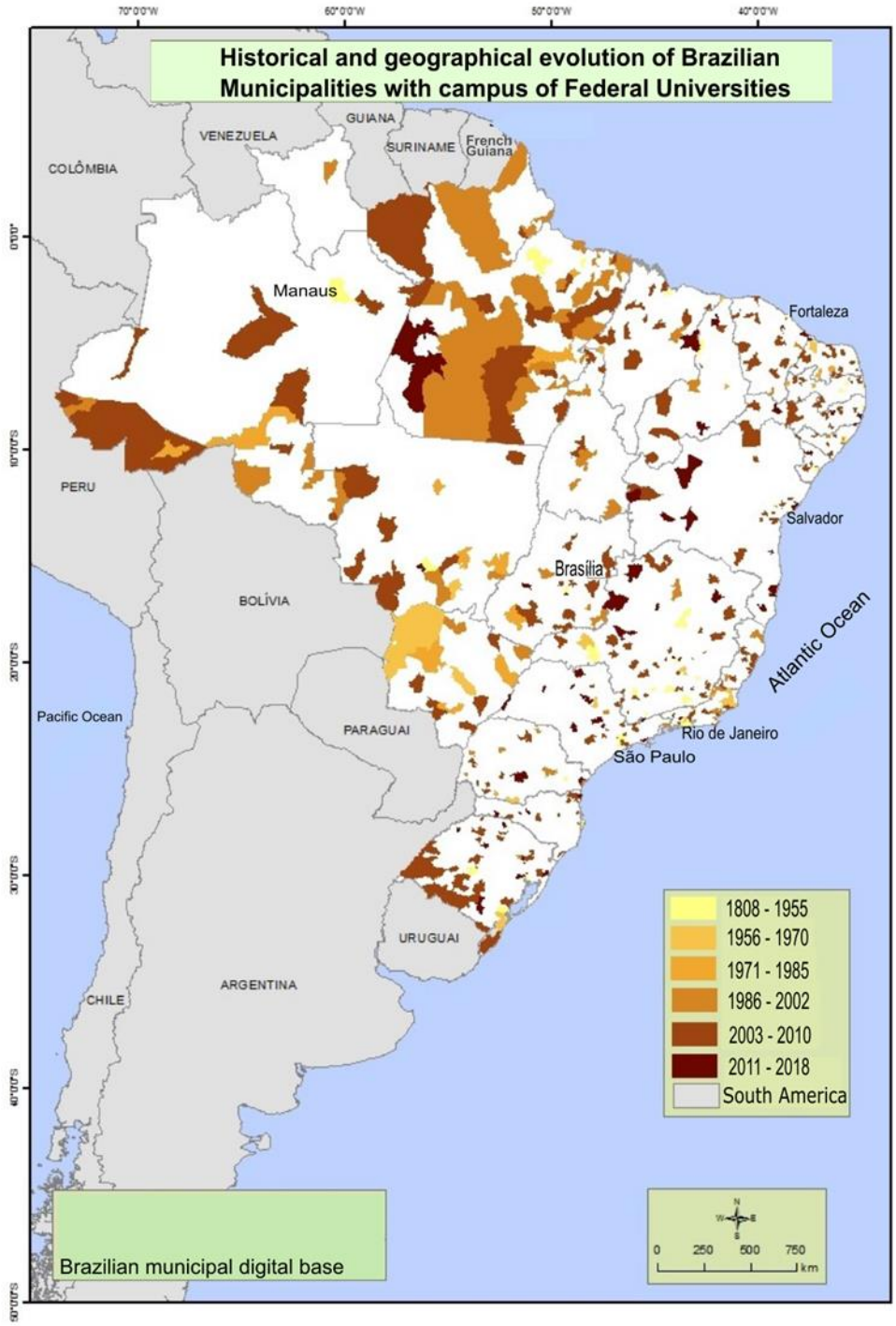
1986 – 2002: The fourth period, which represents the beginning of the country's re-democratization, is clearly marked by the strengthening of the Federal Network in the Amazon region. This period had a strong increment of private owned universities and colleges, connected with a neoliberal state policy, implemented from the 1990s to the early 2000s.

2003 – 2010: This is the strongest and most balanced period in the expansion of the Federal Network. All states, in all regions, have received campuses from existing or new universities, created and implemented in the interior of the country, mainly in medium and small cities, many of them located in poorer and less economic developed areas. The multiple campus model is the milestone of this period, producing a regional approach to the universities' performance. Two universities with an international vocation, designed to promote an integration with Latin American and Portuguese speaking countries in Africa were established.

2011 – 2018: The period is the last moment of geographic expansion, showing deceleration and less intensity. The last four Federal Universities were created from the emancipation of campuses from other universities, not changing the geographical coverage in Brazilian municipalities.

From 2018 until recent, there is a change in the policies of expansion the Federal Network, according to the new guidelines of the Ministry of Education, pausing the program.

Figure 1: Expansion of Brazilian Federal Universities Map



Source: Author elaboration

3. RESULTS, IMPACTS, CHALLENGES AND POTENTIALITIES OF TWO NEW UNIVERSITIES IN BAHIA STATE TOWARDS SUSTAINABLE DEVELOPMENT

From 1808 to 1977, just the city of Salvador had a Federal University. In 1977, the Federal University of Bahia, implemented a campus for agricultural science in a small countryside city. In 2005, the system expanded again, and the state, with an area of 567.295 km², received the installation of five new Federal Universities. Nowadays, 20 medium and small cities, besides the capital, have campuses of a federal institution.

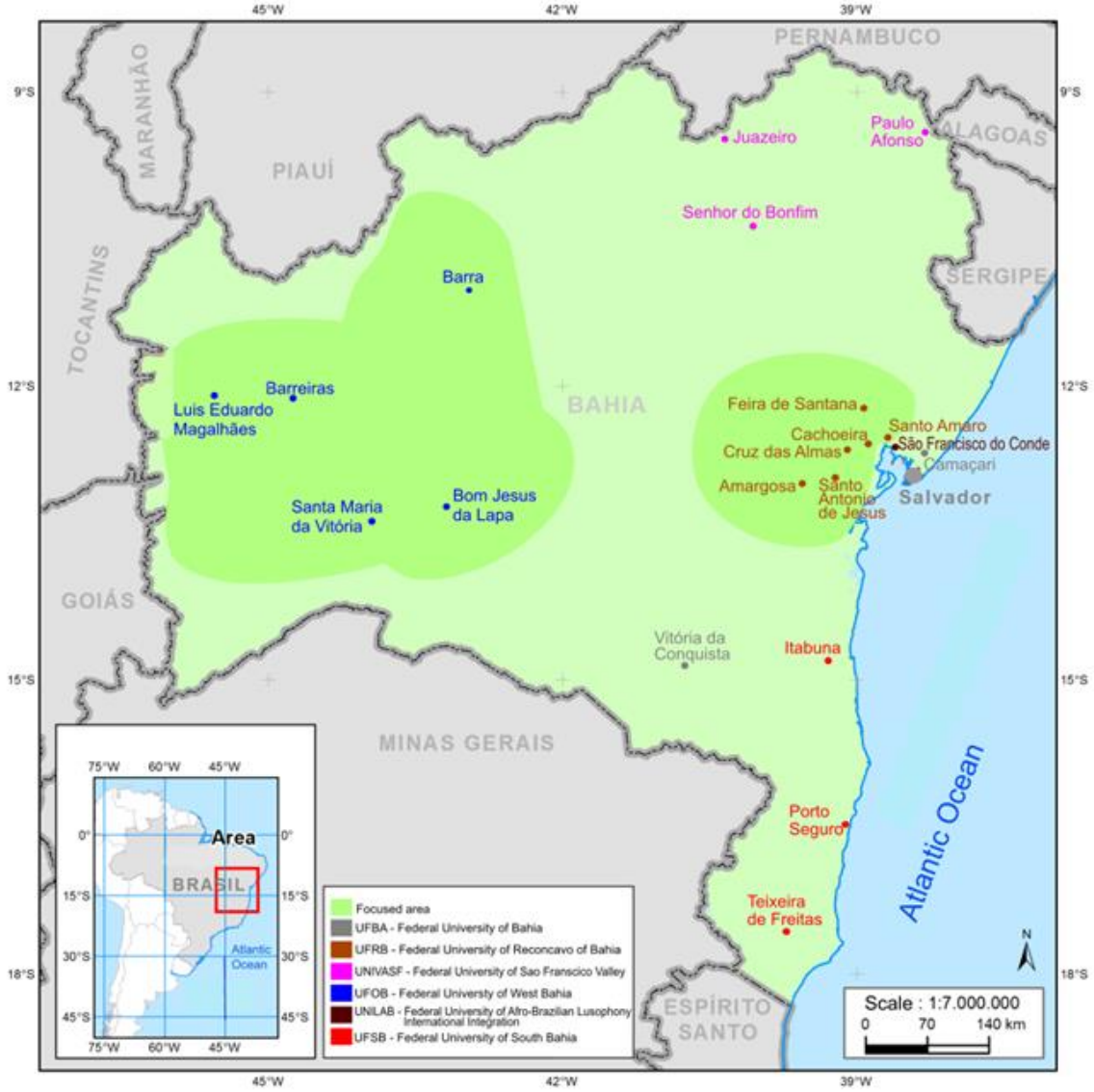
Other cities have campuses of State and Private Universities. This expansion (Figure 2) occurred in three different administrative ways:

a) Creation of a campus related to the expansion project of the Federal University of Bahia (3 municipalities).

b) Creation of a new university: UFRB - Federal University of Bahia Reconcavo (6); UFOB - University of West Bahia (5); UFSB - University of South Bahia (3).

c) Creation of campus from a multiple-state university: UNILAB – Federal University of Afro-Brazilian Lusophony International Integration (1); UNIVASF - Federal University of São Francisco Valley (3).

Figure 2: Map of cities with Federal University campus in Bahia



Source: Author elaboration

The most detailed empirical studies on the role of these news universities in association with strategies of sustainable development were carried out for cities in Bahia with campuses of the UFRB (Amargosa, Cachoeira, Cruz das Almas, Santo

Antonio de Jesus, Feira de Santana, Santo Amaro) and the UFOB (Barra, Barreiras, Bom Jesus da Lapa, Luís Eduardo Magalhães, Santa Maria da Vitória).

3.1 Impacts and results in economic growth/security

One of the pillars of sustainable development, the economic growth/security in a sustainable future is highly dependent of production innovation and technological development (Mikhaylova 2018). Economic development is a goal to be achieved from local to global scales, since the Eco 92 (United Nations, 1992), the idea of development has been associated with the idea of sustainability, according with Mally (2020).

One direction to increase innovation in the production realm is the share of people with higher education degree, geographically distributed along the territory and inside regions. The expanse of the human capital with high levels of education can be also stimulating GDP growth (Mikhaylova, 2018). In economic stagnant and obsolete cities or regions, through knowledge and innovation, technological development and dissemination, the universities can promote their modernization (Baumgartner, 2014; Baumgartner and Rothfuss, 2017; Demazière and Baumgartner, 2017). This path is visible in the creation and implementation plans of the new Brazilian Federal Universities. Changing, regenerating and redefining the economic structure/environment and, consequently, changing the social structure with more qualified population in terms of formal education, is one of the first objectives of the installation of the UFRB (2005) and UFOB (2013).

Rosalind Greenstein (2005) analyzing the structural changes of the economic base in cities, writes that many industrial plants had left cities, local/regional bank chain or stores have been replaced by national/international brands. However, universities rarely leave cities. This idea gives to the university a character of stability and permanence, especially the public ones, which is an important factor to bring security in an economic long-term sustainable growth perspective. Universities have a direct and immediate impact in the local and regional economies, due to investments in infrastructure, paying salaries and having sometimes annual budgets bigger than several municipalities. It is particularly important to mention that the creation and implementation of these new universities have happened in a short time, from 1 or 2 years since the first discussions.

In 2020, because of the protective quarantine and lockdowns, the universities moved all activities to online platforms, with an impact in the numbers of the academic community transiting in the cities, reducing the direct impact of students and scholars' expenditures. However, in a research from 2007 till 2019, it was possible to calculate, approximately, the economic impact of the UFOB and UFRB academic community. Considering just an average student spending (rent, alimentation, books and others) and the staff salaries, the amount of money is, sometimes, bigger than the municipal budget. In our study area, eight municipalities need to deal with lower budgets to provide basic education, health and infrastructure, than the UFRB and universities (Table 1). In 2018, UFRB and UFOB had annual budgets of R$ 258 and R$ 95,5 million, respectively. Numbers with a slight increase in 2019, passing to R$ 275,9 and R$102,1 million, even though declining already in 2020 to R$ 265,9 and R$ 96,6 million, according with official data from the Transparency online Platform (http://www.portaltransparencia.gov.br). The smaller UFOB have bigger budget than three municipalities. Students also contribute to increase the money circulation in the economy, shopping groceries and clothes, paying rents and consuming services and products directly connect with their studies.

For example, in Cachoeira (UFRB's Center of Arts, Humanities and Literature), the students cost to live in the city was approximately R$ 500, signifying for a universe of a little more than 1,000 students, a direct minimum expenditure of R$ 5 million per academic year. Another R$ 5.3 million enters the city's economy monthly through salaries paid by the university or R$ 63,9 million in 12 months. In one year, Cachoeira, potentially, receives R$ 68,9 million, with is almost the 2018's municipal annual budget (Table 2). Investments and money directly circulating in the economy helps to bring economic stability and security to those cities and regions, once most of them have large amount of economically and socially vulnerable population, living with without plenty of formal jobs and low incomes (Table 1).

Table 1: Profile of the municipalities with UFOB and UFRB campuses

Municipality	**Population 2020 (estimated)**	**Budget 2018* (millions of R$**)**	**Population living with less than ½ minimum wage*** 2010* (%)**	**Population with formal jobs 2018* (%)**
Barra	53.910	114	58,2	5,6
Barreiras	156.975	517,35	38,2	20,8
Bom Jesus da Lapa	69.662	94,24	49,3	12,7
Luís Eduardo Magalhães	90.162	320	32,1	28,0
Santa Maria da Vitória	39.775	106,13	49,6	11,9
Amargosa	37.441	63,41	46,7	11,0
Cachoeira	33.567	70,23	48,6	11,5
Cruz das Almas	63.591	109,10	41,4	20,9
Santo Antonio de Jesus	102.380	182,22	38,9	24,1
Feira de Santana	619.609	1.167,08	38,7	21,9
Santo Amaro	60.131	114.53	48,8	9,6

Sources: Brazilian Institute of Geography and Statistics (IBGE) – Profile of Brazilian municipalities and IBGE online Platform Cid@des (www.cidades.ibge.gov.br)
* Last available data
**The Brazilian currency (Real – R$) suffered a large devaluation (296,12% in 11 years) in comparison with US$ Dollars. Jan./2010: 1US$ = R$ 1,779; Jan./2018: 1US$ = R$ 3,162; Jan./2021: 1US$ = R$ 5,268
*** The minimum wage in 2010 was R$ 510,00. In 2021 is R$ 1.100,00. Between Jan./2010 and Jan./2021, the official inflation rate was 84,27% (IBGE).

In several cities, entrepreneurship, startups also become recurring words in the job market and in the economic life, linked to the creative and knowledge economy. Teachers and alumni create companies, businesses and services; students implement junior companies; universities join the industrial sector in the strategy of incubating and developing new products. UFOB, for example, is intrinsically connecting with Startups in technological research focused on the agriculture. Those are some of the results and

potential economic sustainable aspects developed by the new universities. In general, the role of the universities in a long term and sustained economic growth, can help developing 3 SDGs: 1 (No poverty), 8 (Decent work and economic growth) and 9 (Industry, innovation and infrastructure).

3.2 Potentials for social equity

The campuses of these new universities are in some poor and vulnerable municipalities (Tables 1 and 2). Even if the last available data are from the beginning of the last decade, and it is still not possible to detect an expressive Human Developed Index (HDI) improvement, especially in education, those numbers help to characterize the social environment where the new campuses are installed, with low (1 municipality), medium (6) or high (3) HDI. However, considering the Education Index alone, the indicators are very low (2), low (5), medium (3) and 1 municipality in the inferior limit of high. Even if the indexes had increased from the previously available data (2000), the presence of the universities is expected to accelerate the growth of those low numbers. In 2019, Brazil had a general HDI of 0.765 (High), but just 0.694 (Medium), in the Education index (United Nations Development Programme, 2020).

The UFOB has the most advanced program to increase the number of regional students in its courses. To achieve this goal, the university has been giving an extra bonus in the access exam, for candidates living in its geographical regional (considering a ratio of 150km from any of its campuses). Students from public schools have also share of the available places in the courses, like afro-Brazilians or indigenous, in a common policy of all Federal Universities. The UFRB has a program to facilitate high education access for people with disabilities, reserving vacancies in every graduation course. This university also has a program to increase the participation of women in areas as engineering and technological sciences, with an increase from 31% to 42% of women in graduation course of those areas (UFRB, 2020).

The data from Table 2 also show the percentage of population with access to adequate sanitary conditions, with the data considering as adequate, a network continuously collecting and transporting the effluents in a hygienic way to an appropriate final disposal location, which does not mean, treatment. Just four municipalities provide for more the 50% of its inhabitants this kind of basic infrastructure in urban or rural areas. Even the second largest city of Bahia in population and GDP, Feira de Santana, covered, in 2010, less than 60% of inhabitants with basic sewage collecting system. There is no recent data for all municipalities, but, according with the NGO Instituto Trata Brasil (2020), in 2020 Feira de Santana had 60,96% of its population covered by adequate sanitary infrastructure, since the increase of the service is not catching up with the increase of its population.

Just these numbers indicate how vulnerable is the population to diseases provoked by lack of sanitary condition, as well the marginalization in the labor market because of low educational levels. It is clear that the university will not provide access to sewage system in a city or end social inequality in short time. However, the universities are strong vehicles to empower, through education and outreach/community services, marginalized and neglected communities. Writing about marginalization and informal urban areas, Safarabadi et al (2015) describe forms of empowerment of poor and marginalized population, providing social services and stability into the urban space. The universities can deliver this, educating and promoting formal education and the sense of social and political activism, increasing the social collective conscience. A social active community is aware of its rights and knows the ways to fight politically to

have them materialized in its space, meaning better basic infrastructure or education and qualification.

Table 2: HDI and Sanitary infrastructure

Municipality	HDI* 2000		HDI* 2010		Population with access to adequate sanitary infrastructure (2010)
	General	*Education*	*General*	*Education*	
Barra	0.378	0.194	0.557	0.457	16.4 %
Barreiras	0.572	0.414	0.721	0.668	34.9 %
Bom Jesus da Lapa	0.486	0.321	0.633	0.533	37.3
Luís Eduardo Magalhães	0.547	0.325	0.716	0.590	18.1 %
Santa Maria da Vitória	0.449	0.251	0.614	0.516	12.7 %
Amargosa	0.487	0.314	0.625	0.492	22.7 %
Cachoeira	0.516	0.372	0.647	0.577	51.4 %
Cruz das Almas	0.574	0.452	0.699	0.650	17.4 %
Santo Antonio de Jesus	0.560	0.401	0.622	0.700	66.6 %
Feira de Santana	0.585	0.440	0.712	0.619	59.7 %
Santo Amaro	0.516	0.386	0.646	0.559	59.1 %

Source: Atlas of Human Development in Brazil. Retrieved from: http://www.atlasbrasil.org.br/ranking, Accessed in 29/01/2021.
* DHI Scale: 0.800 – 1.000 (Very high); 0.700 – 0.799 (High); 0.600 – 0.699 (Medium); 0.500 – 0.599 (Low); 0.000 – 0.499 (Very low). United Nations Development Programme (2020).

Improving qualifications and diversity of people can also bring human capital to promote social justice (Kumer, 2020). Woiwode et al. (2021) commented about the need to expand the understanding ways that sustainable development can be achieved, including inner aspects of human behavior, from cultural to artistic ones, drawing attention to aspects culturally built, like values, perceptions or ethics. All those new universities have teacher's training programs to graduate professionals for primary and secondary schools, with a high impact in the qualification of those teachers and a direct impact in the quality of education in the local and regional levels. This is a way to increase the Educational index in the HDI. It is also interesting to note, that this new profile of residents, contrasts with the classic type of the inhabitant of the countryside. According to Santos (2005), small towns in the interior were cities of the notable, populated by outstanding personalities such as the priest, the big farmer, the mayor, among others. However, through the qualification and educational increased standards, personalism can be replaced by professionalism. With these actions, the two new universities in Bahia have been directly and indirectly promoted the following SDGs: 4 (Quality education), 5 (Gender equality), 6 (Clear water and sanitation), 10 (Reduce inequalities) and 16 (Peace, justice and strong institutions).

3.3 Challengers and potentialities for environmental integrity

Starting from producing knowledge about sustainable development, including its education (concepts, necessities, urgency), to the promotion of a sustainable everyday life, the universities have several potentialities, some not yet fully developed, to achieve environmental integrity. This can be reached in several ways, but our focus here are in two directions: the achievement of the SDGs goals (Agenda 2030), since just two municipalities are ratifying it (Table 3), and the idea of a green campus, comprehended as nature-based solution. The two universities are located in very distinct biomes, with the UFRB predominantly in the Atlantic Rain Forest, which stretches along the Brazilian Coast, with high biodiversity, but just 7% of its original area remaining, being considered the most threatened ecosystem in the country, because urbanization and industrialization, and some transitional areas with Caatinga (a biome in the semi-arid region, with flora and fauna adapted to long dry periods). The UFOB has its campuses in the Cerrado (the Brazilian savanna, and is the second most threated biome, due to soy production and cattle grazing, and just 3% of it is protected) and the Caatinga. Since the campuses are in small and medium-sized cities in the countryside, the street arborization is relatively high, with two municipalities presenting more than 90% of any kind of greening along its urban streets. On the other side, two condensed historical urban fabrics have less than 50%, in the same range as Feira de Santana.

Even though, just Luis Eduardo Magalhães and Feira de Santana have local legislation clearly promoting the Agenda 2030 and the SDGS, all the other municipalities have at least one action or program related with sustainable development. The most visible aspect is related with the construction of sustainable development territorial plans, based basically in economic growth with a strong emphasis in agribusiness and mining. But there are some guidelines in the municipal legislation supporting environmental education and circular economy. These actions, programs or guidelines have a strong connection with academic research and outreach university activities. For example, UFOB has an Institute of Environmental Sciences and Sustainable Development, fostering several courses about sustainable development. The UFRB is producing and transferring knowledge in two main topics: Rural sustainable development and sustainable Tourism.

The achievement of the Sustainable Development Goals (SDGs), present in the Agenda 2030, will have an important impact in the production of a sustainable future (Mally, 2020). Specifically, about it, there is a whole uncharted territory to be fulfilled by the universities, since there is just one action directly connected with this theme: a UFOB Youtube channel, produced by a professor of the Department of Geography, presenting and explaining the SDGs.

Besides supporting the achievement of the SDGs, the most ambitious plan, in our point of view, for a Brazilian university, most of them occupying large portions of public urban or suburban land, is their conversion into a green campus, understood as a nature-based solution (Table 4).

Even though, just Luis Eduardo Magalhães and Feira de Santana have local legislation clearly promoting the Agenda 2030 and the SDGS, all the other municipalities have at least one action or program related with sustainable development. The most visible aspect is related with the construction of sustainable development territorial plans, based basically in economic growth with a strong emphasis in agribusiness and mining. But there are some guidelines in the municipal legislation supporting environmental education and circular economy. These actions, programs or guidelines have a strong connection with academic research and outreach university activities. For example, UFOB has an Institute of Environmental Sciences and Sustainable

Development, fostering several courses about sustainable development. The UFRB is producing and transferring knowledge in two main topics: Rural sustainable development and sustainable Tourism.

Table 3: Environmental characteristics

Municipality	**Biome**	**Costal ecosystem**	**Urban street arborization 2010***	**Agenda 2030**
Barra	Caatinga	No	94 %	No
Barreiras	Caatinga, Cerrado	No	53,2 %	No
Bom Jesus da Lapa	Caatinga, Cerrado	No	79,1 %	No
Luís Eduardo Magalhães	Cerrado	No	67,5 %	Yes Dec/2019
Santa Maria da Vitória	Cerrado	No	93.4 %	No
Amargosa	Atlantic Rain Forest, Caatinga	No	67.5 %	No
Cachoeira	Atlantic Rain Forest	Yes	45.1 %	No
Cruz das Almas	Atlantic Rain Forest	No	65.9 %	No
Santo Antonio de Jesus	Atlantic Rain Forest, Caatinga	No	55.9 %	No
Feira de Santana	Atlantic Rain Forest, Caatinga	No	48.3 %	Yes Jun/2017
Santo Amaro	Atlantic Rain Forest, Caatinga	Yes	34.9 %	No

Source: IBGE online Platform Cid@des (www.cidades.ibge.gov.br)

Even though, just Luis Eduardo Magalhães and Feira de Santana have local legislation clearly promoting the Agenda 2030 and the SDGS, all the other municipalities have at least one action or program related with sustainable development. The most visible aspect is related with the construction of sustainable development territorial plans, based basically in economic growth with a strong emphasis in agribusiness and mining. But there are some guidelines in the municipal legislation supporting environmental education and circular economy. These actions, programs or guidelines have a strong connection with academic research and outreach university activities. For example, UFOB has an Institute of Environmental Sciences and Sustainable Development, fostering several courses about sustainable development. The UFRB is producing and transferring knowledge in two main topics: Rural sustainable development and sustainable Tourism.

Table 4: Potentialities for a nature-based solution campus

Campus location *plus code – Google Maps*	**Situation and potentialities for the Campus**
Barra *WV74+3V Barra, BA*	Urban area. Few trees and not paved. Potential for greening projects, water retention ponds, green public transport stops.
Barreiras *VX2H+G9 Nova Barreiras, Barreiras - BA*	Suburban green area. Few trees and very impermeabilized. Parking lots without trees. Potential for greening projects, permeable paving, green public transport stops.
Bom Jesus da Lapa *PHRP+85 Bom Jesus da Lapa, BA*	Urban area, but in a small land parcel. Green roofs, facades and wall could be implemented, as well green public transport stops. Surrounded by empty land that could become a green park.
Luís E. Magalhães *V5VW+XH Bairro Santa Cruz, Luís Eduardo Magalhães - BA*	Small land lot, completely built, in an urban area. High potential for green public transport stops, green roofs, facades and walls.
Santa M. da Vitória *JR85+3J Santa Maria da Vitória, BA*	Small land lot in as urban expansion area. Potential green roof, facades and walls, green public transport stops. The neighbor public cemetery could be greener.
Amargosa *X9GP+MQ Amargosa, Bahia*	Suburban green area, great potential space for greening projects, green public transport stops. Paved parking lots could be transformed into permeable paving.
Cachoeira *92XM+C7 Cachoeira, Bahia*	Historical protected Building in the city center. Due legislation facades and colonial architecture cannot be changed. Potential for green public transport stops.
Cruz das Almas *8WR5+86 Cruz das Almas, Bahia*	Suburban campus with few constructions. Great potential for urban sustainable agriculture projects, greening projects, green roofs, facades and walls, green public transport stops, construction of wetlands, rain playgrounds, greening streets and green corridors.
Santo A. de Jesus *2PCX+QC Santo Antônio de Jesus, Bahia*	Suburban area, with few trees and unpaved areas covered with grass. High potential for greening projects, urban agriculture, green roofs, facades and walls, green public transport stops, construction of wetlands, rain playgrounds, greening streets and green corridor.
Feira de Santana *P3WF+9H Sim, Feira de Santana - BA*	It occupies a good size land in an urban expansion area. High potential for expanding greening area, urban agriculture, green roofs, facades and walls, permeable paving, green public transport stops, rain playgrounds, greening streets and green corridors.
Santo Amaro *F73R+V3 Sacramento, Santo Amaro - BA*	It is not a proper campus, but a shared space with a state-owned public school. The environmental conditions are poor. High potential for a blue infrastructure and renaturing project for the polluted river along the space, green public transport stops, riverbank restoration.

Source: Author elaboration

The achievement of the Sustainable Development Goals (SDGs), present in the Agenda 2030, will have an important impact in the production of a sustainable future (Mally, 2020). Specifically, about it, there is a whole uncharted territory to be fulfilled by the universities, since there is just one action directly connected with this theme: a UFOB Youtube channel, produced by a professor of the Department of Geography, presenting and explaining the SDGs.

Besides supporting the achievement of the SDGs, the most ambitious plan, in our point of view, for a Brazilian university, most of them occupying large portions of public urban or suburban land, is their conversion into a green campus, understood as a nature-based solution (Table 4).

The nature-based solutions (NBS) are, according with EU (2015) and Naumann et al (2020), infrastructures copying natural ecosystems or restored natural areas to be used as tools addressing environmental problems. In the recent years, the NBS have been catalogued and promoted, together with ecosystem services and green-blue infrastructures, to sustainable solutions for flooding, overheating effects, shortage of urban greenery, air pollution. Iwaszuk et al (2019), describe the most common NBS: green roofs, walls and facades, green public transport stops, permeable paving, infiltration pools and water retention ponds, restoration and construction of wetlands, rain playgrounds, greening streets and green corridor, riverbank restoration, etc.

In general, after field trips and satellite images interpretation, all campuses have some potential to become a nature-based solution campus and offer ecosystem services (Table 4). They can also develop into an environmental amenity for the city and the region.

Transforming their campus into a NBS and helping the implementation of the Agenda 2030, make the universities an active agent helping the achievement of the following SDGs: 11 (Sustainable cities and communities), 13 (Climate action), 15 (Life on land) and 17 (Partnerships for the goals).

4. CONCLUSIONS

The geographical character of the expansion of the Brazilian Federal Universities disseminated a potential sustainable transformation across the country, including marginalized and forgotten regions and cities, living places of considerable number of vulnerable persons. Due to the volume of human capital and financial resources handled regularly, the implantation of a university can become a strategy to promote a long-term urban and regional sustainable development. The direct economic impact, generation of qualified jobs, the improvement of educational standards, qualification of the workforce, technological development, decrease of social inequalities and the contribution to the environment, are potential contributions from the universities to achieve the SDGs.

The universities can be a model and a committed agent in a territorial strategy for post-COVID-19 economic, social and emotional recovery. These days and the after the pandemic scenario have been defined as special momentum for technological and behavior evolution into the production of a sustainable future. The skills and qualification of scholars and students can be a key instrument to develop green and sustainable innovative process, production and services, that will determine the speed and the effectiveness of recovery policies. Developing new learning strategies, increasing the scale of outreach activities in terms of education, qualification and skills developing for a broad population, behind their own students, is an immediate and urgent demand for the universities around the world.

Since the university itself consume fewer natural resources, and have been developing new technologies, there is an inner potential to produce the means to transform the campuses into a nature-based solution. A green campus, opened to the general population, where people can be in touch with nature, will become a source of psychological and physical assistance, in a sense of wellbeing promotion. Besides, it will contribute to build resilient cities and regions in terms of climate adaptation.

A last challenge is the contribution to build an equal society. The cooperation between the university community and the local population in social and environmental activism can have also positive impact in the construction of a collective body, demanding a better future for all, through: participation in groups and movements campaigning for a sustainable future; production and dissemination of knowledge about NBS, the importance of green and blue infrastructures, unpaved surfaces and sustainable local agricultural production; development and use of sustainable energy sources, sustainable construction materials; demanding the conversion of the universities campuses into a NBS, producing and adopting clean energy sources, planting more trees, building green roofs, walls and facades, transforming part of the campus into an urban garden with agricultural production opened to the community as a source of healthy alimentation or just leisure, expanding the greenery to the neighborhoods, among others possibilities.

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