Revista Brasileira de Ciências Ambientais
Brazilian Journal of Environmental Sciences

Sustainable University: challenges for integrating sustainability into the planning of Federal Institutes of Education in the Brazilian Amazon in relation to GreenMetric

Universidade Sustentável: desafios para a integração da sustentabilidade no planejamento dos Institutos Federais de Educação na Amazônia brasileira em relação ao GreenMetric

Valdiney Ferrreira Almeida[1], *Maria Olívia de Albuquerque Ribeiro Simão*[2], *Marcelo Limont*[3]

ABSTRACT

A Sustainable University (SU) should utilize Environmental Management (EM) tools in its institutional routines, such as the UI GreenMetric World University Ranking (GM) as one of the sustainability assessment tools. It presents a global assessment methodology and is widely accepted; however, it does not consider the regional profiles of universities. The objective of this article was to propose guidelines for the Integration of Sustainability in Planning (ISP) of Federal Institutes (FIs) in the Brazilian Amazon in relation to EM. Seven FIs located in the Amazon Biome were compared, as well as their sectoral structures, institutional planning and sustainability documents, adherence to EM tools, and possible integration arrangements. In the field research, EM practices were evaluated. The results show that the seven FIs strive to align with the SU concept, but without systematization and network integration in the sense of union. It is concluded that Higher Education Institutions and FIs that possess a specific EM sector and EM tools demonstrate better sustainability performance. Among the analyzed Amazonian FIs, there is no participation in the GM, and their EM actions are not systemic, as they plan and execute specific actions, distancing themselves from the possibility of ISP. The ISP guidelines pointed out for FIs were the need to adapt institutional documents to encourage the development of actions in Integration Networks; adherence to the GM and the Environmental Agenda Program of the Public Administration (A3P); establishment of a physical EM sectoral channel; and benchmarking with FIs adhering to the GM.

Keywords: GreenMetric; environmental management; planning.

RESUMO

Uma Universidade Sustentável (US) deve fazer uso de ferramentas pela Gestão Ambiental (GA) em suas rotinas institucionais, a exemplo do *UI GreenMetric World University Ranking* (GM), enquanto uma das ferramentas de avaliação em sustentabilidade. Ela apresenta metodologia de avaliação global e tem ampla aceitação, contudo não considera os perfis regionais das universidades. O objetivo do artigo foi propor diretrizes de Integração da Sustentabilidade no Planejamento (ISP) dos Institutos Federais (IF) da Amazônia brasileira em relação ao GM. Compararam-se sete IF inseridos no Bioma Amazônia, as estruturas setoriais, documentos institucionais de planejamento e de sustentabilidade, aderência a ferramentas de GA, eventuais arranjos de integração e, na pesquisa de campo, avaliaram-se as práticas de GA. Os resultados revelam que os sete IF buscam alinhar-se ao conceito de US, porém sem sistematização nem integração em rede no sentido de união. Conclui-se que IES e IF que possuem setor específico de GA e ferramentas de GA apresentam melhor desempenho em sustentabilidade. Entre os IF amazônicos analisados não há participação no GM, e suas ações de GA não são sistêmicas, pois planejam e executam ações pontuais, distanciando-se da possibilidade de ISP. As diretrizes de ISP apontadas aos IF foram: necessidade de adequação dos documentos institucionais para fomentar o desenvolvimento de ações em Redes de Integração; adesão ao GM e ao Programa Agenda Ambiental da Administração Pública (A3P); abertura de canal setorial físico de GA; e realização de *benchmarking* com IF e IES aderentes ao GM.

Palavras-chave: GreenMetric; gestão ambiental; planejamento.

[1]Instituto Federal do Amazonas – Humaitá (AM), Brazil.

[2]Universidade Federal do Amazonas – Manaus (AM), Brazil.

[3]Universidade Positivo – Curitiba (PR), Brazil.

Corresponding author: Valdiney Ferrreira Almeida – Instituto Federal do Amazonas – BR 230, km 7, s/n – CEP: 69800-454 – Humaitá (AM), Brazil. E-mail: valdiney.almeida@ifam.edu.br

Conflicts of interest: the authors declare no conflict of interests.

Funding: Fundação de Amparo à Pesquisa do Estado do Amazonas (FAPEAM), Process n. 55175.850.58404.28082021-79799 – Edital n. 012/2021 – POSGFE.

Received on: 05/27/2025. Accepted on: 10/31/2025

https://doi.org/10.5327/Z2176-94782622

Introduction

In the face of the sustainability paradigm, Higher Education Institutions (HEIs) have redefined their role, as the concept of a Sustainable University (SU) transcends the promotion of quality education and critical citizen formation to encompass the integration of sound socio-environmental practices and the incorporation of Environmental Management Systems (EMS) and their tools (Tauchen and Brandli, 2006) in fostering sustainable societies. HEIs possess significant potential to expand access to qualified information, thereby informing environmental debates and promoting societal engagement with sustainability challenges.

SU, or the "greening" of universities, is constituted by the integration of sustainable practices across management, teaching, research, and outreach (Guerra et al., 2015; Malheiros et al., 2019), and across various dimensions, including political, social, environmental, and economic (Lopes and Vieira, 2021). This integration aligns with declarations signed by HEIs, notably the Talloires Declaration (1990) and the Copernicus Charter (1993), committing to the incorporation of sustainability into teaching and management activities (Calder and Clugston, 2003; Lozano et al., 2013), and to the sustainable development goals (SDGs) — Agenda 2030 of the United Nations (UN), to which Brazil is a signatory (ONU, 2015).

As a tool to aid the assessment of sustainability performance specifically for HEIs, the UI GreenMetric World University Ranking (GM) is an international ranking that classifies universities worldwide in terms of sustainability. The tool was developed to stimulate the continuous pursuit of sustainable practices, healthy competition among HEIs, network formation, encouragement of financial investments, and benchmarking (Cardozo et al., 2020; GM, 2024). The GM leverages the SU concept to evaluate the degree of sustainability, ensuring the applicability and permanence of actions when environmental management is in place at the university (Guimarães and Bonilla, 2018).

Consistent with the SU concept, the GM structures its results into a ranking and evaluates six categories: setting and infrastructure, energy and climate change, waste, water, transportation, and education and research. The GM quantitatively scores institutions, which facilitates comparison among HEIs globally and stimulates a constant quest for improvements and higher classification (Guimarães and Bonilla, 2018; Nascimento, 2018; Galleli et al., 2022; GM, 2024), positioning HEIs as benchmarks for their sustainability performance and encouraging other HEIs to emulate these practices (Leal Filho et al., 2025), which translates into benchmarking.

It is crucial to consider that each HEI has its own characteristics, as well as its own policy for implementing campus sustainability (Lemos et al., 2018; Silva and Castilho, 2021; Galleli et al., 2022), as universities operate within diverse environmental, economic, social, and cultural contexts and realities (Contreras, 2002; Galleli et al., 2022).

According to the International Union for Conservation of Nature (IUCN, 2019), the Amazon is home to one of the largest carbon stocks and is vital for hydrological cycles in Latin America and the world, bearing a direct relationship with climate change. This fact is predominant, given that its tipping point has been increasingly evidenced due to neo-developmentalist logics of direct forest exploitation that compromise its ecosystemic resilience, leading to significant local and global impacts, such as climate alterations (Gatti et al., 2021). This aspect highlights the important contribution of public HEIs in the region through their sustainable actions for EM and the adoption of tools such as GM.

Global adherence to the GM in 2023 includes 1,183 institutions in 84 countries, with 43 Brazilian HEIs participating. Despite this ranking having a high adherence rate among HEIs worldwide, it receives criticism regarding its questionnaire format, which, in some aspects, may favor HEIs from specific regions (Lauder et al., 2015).

In the Amazonian part of northern Brazil, there are only three HEIs adhering to the GM, representing 7% of the total Brazilian HEIs, and among the seven Federal Institutes (FIs) in the region, none compete in the GM (GM, 2024). Leal Filho et al. (2025) corroborate that the GM is a contributory tool for the sustainability of HEIs within the territory.

Considering that the GM is a global environmental agenda tool designed to enable performance comparison and promote sustainable actions in HEIs across diverse contexts, there is a recognized need for the creation of local mechanisms for adapting and complementing criteria and methodologies to enhance sustainability actions.

Opportunities for promoting sustainability in the FIs of the Brazilian Amazon were identified in their organization and planning to enable adherence and input to the GM tool, based on guidelines within their planning. Given the importance of EM actions for the transition toward an SU, this article aimed to propose guidelines for the Integration of Sustainability in Planning (ISP) in the FIs of the Brazilian Amazon, with reference to the GM.

The state-of-the-art in the context of HEI sustainability revealed a large number of studies addressing the SU; however, it is noteworthy that scientific production is scarce regarding the categories of this research related to FI sustainability and the GM, an international university ranking for worldwide sustainability classification and integration between institutions and sustainability planning. For example, regarding integration in the sustainability category, only five contributory works were found. Given this, this study offers a peculiar and underexplored perspective, underscoring its originality and relevance of contribution.

Materials and Methods

To identify the sustainability planning process in FIs located in the Brazilian Amazon, documentary research was adopted, considering as eligibility criteria the mandatory documents for the operation of HEIs, such as the Institutional Development Plan (IDP), Socio-environmental Policy (SEP), and the Sustainable Logistics Plan (SLP). The search and research within these documents took place from October 2022 to September 2023.

The mission statements regarding sustainability in the IDPs of the FIs in the northern Brazilian region were compared. To understand differences in planning structures and mechanisms among HEIs, the following were analyzed: Group 1 (G1) — HEIs competing in the GM in 2020 — comprising the three highest-ranked universities in Brazil (Universidade de São Paulo — USP, Universidade Federal de Lavras — UFLA, Universidade Estadual de Campinas — UNICAMP); the two universities from the northern region participating in the ranking (Universidade Federal do Oeste do Pará — UFOPA, Universidade do Estado do Amazonas — UEA); and the two FIs (Instituto Federal do Sul de Minas — IFSULDEMINAS and Instituto Federal do Sudeste de Minas Gerais — IF SUDESTE MG); and Group 2 (G2) — FIs located in the northern (Amazon) region not adhering to the GM (Instituto Federal do Acre — IFAC, Instituto Federal do Amazonas — IFAM, Instituto Federal do Amapá — IFAP, Instituto Federal do Pará — IFPA, Instituto Federal de Rondônia — IFRO, Instituto Federal de Roraima — IFRR, and Instituto Federal do Tocantins — IFTO).

Additional documents and information were extracted from the electronic sites of these institutions or obtained via email requests to administrative sectors of the FIs, universities, GM, and Brazilian public bodies.

This process followed these steps:

1 — Sectoral structures, EMS, and adherence to sustainability management and monitoring tools by the researched HEIs were investigated;

2 — An effort was made to identify, within the texts of the Fis' IDPs (IFAC, 2020–2024; IFAM, IFAP, IFPA, and IFRR, 2019–2023; IFRO, 2018–2022; IFTO, 2020–2024), terms and indications of how aligned the IDPs are with the SU concept and SU in relation to the GM categories, using the "search" command. This method was adapted from Guerra and Figueiredo (2014) and Guerra et al. (2015), based on the adjustment of terms and the percentage-based analysis for categorizing the results.

The terms used to identify the SU concept were: environment, natural environment, sustainability, sustainable, sustainable development, socio-environmental, socio-economic, environmental management, environmental education, environmentalization, ecology, ecological, nature, and natural, forest. The terms to verify convergence with SU based on GM were: infrastructure, waste, education, water, research, transport, climate, residue, solids, economy, and energy. From the absolute quantity of each SU and GM-based SU term, a directly proportional percentage was generated relative to the highest identified quantity, calculating the average of the percentages per FI.

To categorize the results, the following parameters (evaluation scale) were considered:

1) "with indications of SU" (≥60%);
2) "with potential indications of SU" (≥31% and ≤59%); and
3) "without indications of SU" (≤30%);

3 — Finally, the synthesis of the sum of percentages for each FI (average of SU indications and GM-based SU indications) was used to generate a ranking from 1 to 7. This was adapted from the method used by Lambrechts et al. (2013), employing the same scale. The structural balance, which did not consider the IDP and had no influence on the classification, served as a didactic visual aid regarding its structural characteristic, considering FIs with a positive balance (n=0) in their structure (B) as "minimum integration" and those with a negative balance as "little or no integration."

The identification and evaluation of EM practices performed at the campuses took place only in the FIs of the northern Brazilian region (G2), where field research was adopted, based on *in loco* visits and photographic records with prior authorization and accompaniment by a staff member at each FI. The visits allowed for understanding specific characteristics and physical structures and for recording phenomena related to the categories used in the composition of the GM ranking.

The visit itinerary considered what could be observed from the GM categories. The campuses visited were: IFAC/Campus Rio Branco (CRB), IFAM/Campus Manaus Zona Leste (CMZL), IFAP/Campus Macapá (CMCP), IFPA/Campus Belém (CBEL), IFRO/Campus Zona Norte (PVZN), IFRR/Campus Boa Vista (CBV), and IFTO/Campus Palmas (CPAL). Visits occurred from May 2023 to November 2023. This article is part of a doctoral thesis in Environmental Management that received approval from the Research Ethics Council (*Conselho de Ética em Pesquisa* — CEP) under number CEP UP, CAAE: 61084422.0.0000.0093, Opinion Number: 5.659.818.

Results and Discussion

Sustainability planning process in Brazilian Amazonian Federal Institutes

A well-defined mission statement in the IDP can delineate the confluence of institutional action and future prospecting for stakeholders and society (Wandercil et al., 2022). Leal Filho et al. (2025) cite that IFSULDEMINAS mentions its contribution to SDGs in its mission, guiding its strategies toward sustainable practices.

In the comparative analysis of the mission statements in the IDPs of the seven FIs in the northern region, five define "sustainable" as their primary focus, which is education. This parameter distinguished IFAC and IFTO as asymmetric from the other members of Group 2 (G2) of FIs in the objectification of sustainability in this guiding institutional document.

According to Pieranti and Silva (2007), the Amazonian region lacks investment in infrastructure and logistics, as well as integration among public institutions for regional protection. Without disregarding the responsibility that public HEIs in the northern region hold for the sustainable development of the Amazonian region, the strategic planning instruments and the institutional organizational structure dedicated to sustainability were analyzed.

The analysis highlights the EM sectoral structure, adherence to programs or use of tools aimed at monitoring or promoting sustainability, and the institutional documents of the HEIs and FIs in G1 and G2 (Table 1).

Table 1 – Environmental Management Structure present in Higher Education Institutions and Federal Institutes participating in the Green Metric — 2020 Edition and in Federal Institutions of the northern region.

Institution		SEP	SLP	Sustainability Tools	EM Sector
Group 1: HEIs and FIs present in GM	USP	yes	n.a.	THE; **GM**; QS; ISCN	SUPERGA
	UFLA	yes	yes	A3P; **GM**	DMA
	UNICAMP	yes	n.a.	THE; **GM**; ISCN	GGUS
	UFOPA	yes	yes	**GM**	DMACGA
	UEA	Yes	n.a.	THE; **GM**	Não possui
	IFSULDEMINAS	n.f.	Yes	A3P; **GM**	CSus
	IF SUDESTE MG	Yes	Yes	**GM**	DDI
Group 2: FIs in the Northern region	IFAC	n.f.	n.f.	Does not adhere	Does not have
	IFAM	Yes	Yes	Does not adhere	Does not have
	IFAP	n.f.	Yes	Does not adhere	LogS
	IFPA	Yes	Yes	Does not adhere	Does not have
	IFRO	Yes	Yes	Does not adhere	Does not have
	IFRR	n.f.	Yes	Does not adhere	Does not have
	IFTO	n.f.	Yes	Does not adhere	Does not have

SEP: Socio-environmental Policy; SLP: Sustainable Logistics Plan; EM: Environmental Management; HEIs: High Education Institutes; USP: Universidade de São Paulo; THE: Times Higher Education Impact Rankings; GM: UI GreenMetric World University Ranking; QS: QS World University Rankings: Sustainability; ISCN: International Sustainable Campus Network; SUPERGA: Superintendency of EM; UFLA: Universidade Federal de Lavras; A3P: Environmental Agenda of Public Administration; DMA: Environmental Directorate; UNICAMP: Universidade Estadual de Campinas; n.a.: not applicable; GGUS: Sustainable University Management Group; UFOPA: Universidade Federal do Oeste do Pará; DMACGA: Environmental Directorate and EM Coordination; UEA: Universidade do Estado do Amazonas; IFSULDEMINAS: Instituto Federal do Sul de Minas; n.f.: not found; CSus: Sustainability Coordination; IF SUDESTE MG: Instituto Federal do Sudeste de Minas Gerais; DDI: Institutional Development Directorate; FI: Federal Institutes; IFAC: Instituto Federal do Acre; IFAM: Instituto Federal do Amazonas; IFAP: Instituto Federal do Amapá; LogS: Sustainable Logistics; IFPA: Instituto Federal do Pará; IFRO: Instituto Federal de Rondônia; IFRR: Instituto Federal de Roraima; IFTO: Instituto Federal do Tocantins.

The organizational structures and strategic planning of G1 HEIs and FIs present structural similarities and alignment on sustainability, with the exception of UEA, which has not established a dedicated EM sector. The FIs of the northern Brazilian region (G2) exhibit structural and planning misalignment, as fewer than half presented their SEP. However, this group predominantly features an SLP, one of the mandatory documents for the operation of an HEI in Brazil. Nevertheless, among them, the only FI with a dedicated EM sector was IFAP.

Regarding adherence to evaluation tools in various domains, Wandercil et al. (2022) indicate that adherence to rankings is relevant to the strategic planning process of universities. Contrary to this observation, it was identified that the G2 FIs do not adhere to rankings as EM tools; however, it was verified that some of these FIs have already adhered to the Environmental Agenda of Public Administration — (Agenda Ambiental na Administração Pública — A3P) (Data collected via e-mail from the Ministry of Environment — MMA, on 06/15/2022), at different periods as follows: IFTO from 12/06/2011 to 12/06/2016 and IFAC and IFAM from 07/22/2015 to 07/22/2020. A3P is a governmental program established by the MMA in 1999, aiming to promote efficiency and a culture of socio-environmental responsibility in the Federal Public Administration (MMA, 2017).

One of the most significant outcomes of adherence to A3P at IFAM was the institutionalization of its SEP and SLP (Resolution No. 41 of 08/22/2017 and Resolution No. 29-CONSUP/IFAM of 06/06/2018, respectively), as well as the creation of the EM Coordination at the time, which, by 2024, had been deactivated.

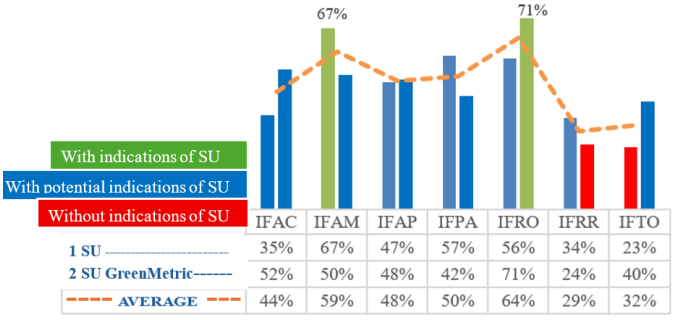
Although IFRO had not adhered to A3P, it developed EM support documents (Resolution No. 71/CONSUP/IFRO/2018) addressing SEP and standardizing the elaboration of SLPs mirrored in the primary points of the Agenda. This practice was also adopted at IFPA, which, despite not adhering to A3P, created its SEP approved by Resolution No. 173/2017/CONSUP/IFPA and instituted the SLP (2019-2023) through Ordinance No. 2.446/2018/GAB/IFPA.

In the IDPs of G2, the occurrence of terms such as "environment," when analyzed in the context of environmental themes, showed an abrupt decline, for example, IFAC (n=40), except for IFAM's IDP (n=102). Overall, the terms appear in approximate but minimal quantities, suggesting only subtle references to environmental themes. Two FIs stood out in the total occurrences compared to the others, IFAM (255) and IFPA (229), whereas IFAC (118) and IFRR (129) exhibited different patterns (Figure 1).

From the perspective of the SU concept, the percentage survey indicates that only IFAM was categorized as "with indications of SU"

(67%), being methodologically considered in this research as the institution with the highest SU indications. Conversely, IFTO was found to have no indications of its positioning as an SU (23%). IFAP, with a percentage of 47%, demonstrated "potential indications of SU," and IFPA (57%) and IFRO (56%) were at the threshold of this status, with positive classification for "potential" indications of SU. IFAC (35%) and IFRR (34%), conversely, tended toward the status of "without indications of SU," though still presenting "potential."

The topics with the highest indicators in the analyzed documents, considering the GM categories, were education and research, with a prominent presence of consecutively identified terms in IFAM (985 and 300) and IFAP (632 and 300). Conversely, the least frequent terms were climate change and waste.



	IFAC	IFAM	IFAP	IFPA	IFRO	IFRR	IFTO
1 SU	35%	67%	47%	57%	56%	34%	23%
2 SU GreenMetric	52%	50%	48%	42%	71%	24%	40%
AVERAGE	44%	59%	48%	50%	64%	29%	32%

Figure 1 – Percentage of characterization of indications of the Sustainable University concept and Sustainable University — GreenMetric-based on the Institutional Development Plans of Federal Institutes located in the northern region of Brazil.

IFRO also presented over 70% of convergence-term indications in planning within the assessed categories, whereas IFRR (24%) had its classification negatively affected by the absence of SU indications. Figure 2 presents the synthesis of elements for ISP of the northern region FIs analyzed in the research regarding the SU concept and GM-based SU.

Regarding the synthesis of elements in ISP, the classification in ascending order placed IFRO (64%), IFAM (59%), and IFPA (50%), which show a differential in adopting SEP and SLP, despite not having a dedicated EM sector nor adhering to EM tools. These factors offer the potential to enhance their SU indications. In fourth place, IFAP (48%) stands out, as it is the only one with a dedicated EM sector, suggesting possible growing potential in its SU indications. IFRO, IFAM, IFPA, and IFAP were considered to have "minimum integration." Integration is an important element for the introduction or strategic guidance for HEIs (Cardozo et al., 2020).

IFAC, ranked fifth (44%), had the worst condition in structuring for sustainability issues (balance [B]=−4); however, it secured "potential indications of SU." IFTO (32%) with potential for SU and IFRR (29%) without indications of SU, consecutively, also showed a negative balance (B=−2) in one of their SU indications. These FIs were considered to have "little or no integration" of sustainability.

In a similar analysis of institutional documents, Leal Filho et al. (2025) evaluated the actions and sustainability planning of 10 Brazilian universities adhering to the GM ranking from the perspective of GM categories. This corroborates the importance of these documents as a fundamental structure for organization, planning, integration, and internal policy.

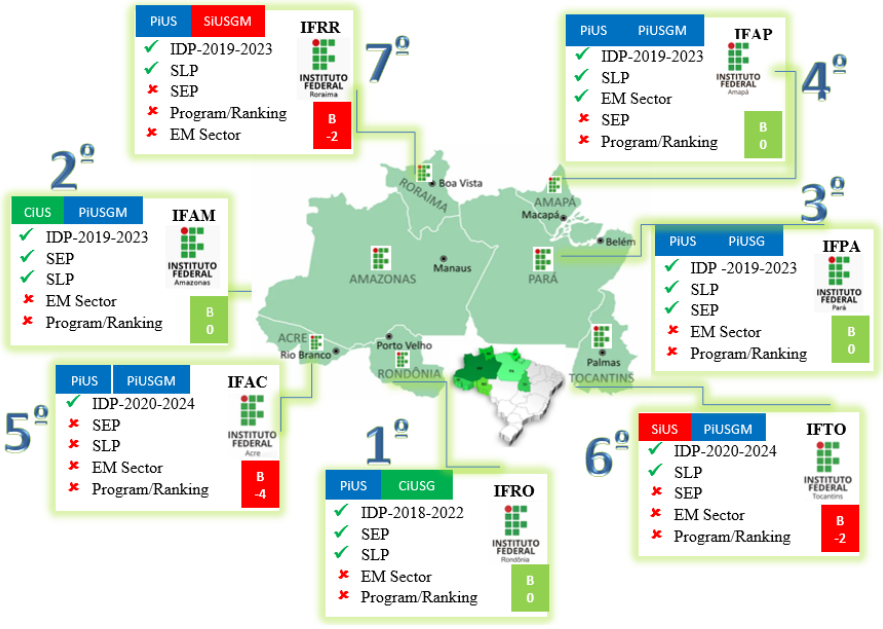


Figure 2 – Synthesis of elements for the Integration of Sustainability in Planning in Federal Institutes located in the northern region of Brazil.
IDP: Institutional Development Plan: SEP: Socio-environmental Policy; SLP: Sustainable Logistics Plan; EM: Environmental Management; CiUS: With indications of SU; PiUS: With potential indications of SU; PiUSGM: With potential indications of SU of based GM; SiUS: Without indications of SU; SiUSGM: Without indications of SU of based GM; B: Balance.

Assessment of Environmental Management Performance in Amazonian Federal Institutes

Photographic records from the *in loco* research revealed, regarding the environment and infrastructure category of the campuses of the FIs located in the northern region (G2), that gardens, trees, vegetable gardens, green socialization spaces, and constructed and/or adapted physical structures are conducive to the well-being of staff and students (Table 2).

CMZL, part of IFAM, stands out for having an extensive green area with plants and trees and a vast camping area. CPAL (IFTO) also distinguishes itself with a large green area with trees, including some (*Pau-terra-folha-miúda*, *Cinamomo*, and *Faveira/Favela*) with identification for use in environmental education activities of the Agronomic Engineering course, as well as a large number of *Pequi* fruit trees, also known as *Pequi do Cerrado* or *Pequi do Goiás*.

Table 2 – Photographic records of the field research in the Federal Institutes of the northern region regarding the indicators of the GM category: environment and infrastructure.

FI/Campus	GM Category: Environment and Infrastructure
IFAC/CRB	
IFAM/CMZL	
IFAP/CMCP	
IFPA/CBEL	
IFRO/CPVZN	
IFRR/CBV	
IFTO/CPAL	

CBV (IFRR) and CMZL feature more flowering gardens than the other campuses. The physical structures of CMZL and CBEL (IFPA) possess older constructions (1972 and 1909, respectively), being the first to be established in the northern region.

Improved accessibility to meet the National Education Policy (*Política Nacional de Educação* — PNE) was an action observed across all researched campuses, with the installation of elevators, ramps, tactile warning floors, handrails, walkways, and Braille signage, in accordance with the established norms (MEC, 1999; ABNT, 2015; Brasil, 2015). Even so, FIs need adaptation and/or implementation of maternity care resources in areas such as bathrooms, lactation rooms, transportation, and daycare — actions identified only at CRB (IFAC).

The only campuses where plant nurseries were identified were CMZL and CPAL. At CPAL, a hydroponic garden and beds of medicinal plants (*boldinho*/*boldo miúdo*) were recorded, as well as a remnant corn plantation (already dry after harvest). PVZN (IFRO) has a smaller green and building area and is considered a modern structure unit, as its building originally belonged to the Center for Technological Education and Business of Rondônia (*Centro de Educação Tecnológica e Negócios de Rondônia* — Cetene), being donated to IFRO in 2009 (IFRO, 2016; Research data, 2024). CRB and CMCP have the potential to increase their green areas due to the size of the existing "unoccupied" territorial area.

FIs adhere to the economy as a management principle, including the use of energy-efficient equipment and solar energy (Table 3). However, the need for implementing activities on their campuses to ensure this efficiency was verified, namely: regular maintenance of photovoltaic plants already in operation; activation of already installed plants; increasing the generating capacity of photovoltaic plants to meet the total demand of the unit and, beyond that, generate surpluses.

It is recommended to increase the number of alternative renewable energy sources and implement programs for reducing greenhouse gas (GHG) emissions and the CO_2 carbon footprint. The FIs lack policies or programs addressing risks, impacts, mitigation, adaptation, impact reduction, and early warning for disasters intensified by climate change.

On the researched campuses, the use of LED and fluorescent lamps was observed, as well as inverter-type air conditioners classified as Class A Procel/INMetro (economic). However, a significant quantity of equipment requires maintenance or replacement.

Regarding energy issues, Ahmed et al. (2025) discuss the concepts of sustainable retrofitting in university buildings, proposing an integrated framework for modernizing existing structures. This may contribute to educational policies and significantly improve the educational environment and reduce energy consumption. Leal Filho et al. (2025) also reference IFSULDEMINAS, which excels in solar energy generation and the installation of rainwater harvesting cisterns.

Concerning waste, FI campuses provide selective collection bins/dumpsters. CPAL was the only unit where large containers/skips for depositing each type of waste were recorded. Thus, considering the potential for enhancing waste management activities adopted on their campuses, it is suggested that public managers raise awareness among stakeholders for conscious consumption and correct waste disposal; implement an integrated work policy from collection to correct waste disposal (selective collectors, containers for each type of waste, and a committee for donating recyclable material); adopt a recycling program, organic waste treatment, inorganic waste treatment, toxic waste recycling, and sewage disposal; introduce policies to reduce paper and plastic use on campus; and apply more efficient measures in disposing of unserviceable durable goods.

As for water, the FIs are supplied by artesian wells and/or water from official concessionaires. Given this context, and considering recommendations for efficient water resource management, the following management actions are recommended: reducing groundwater use; increasing programs for conservation and protection of habitats; implementing water meters for monitoring and controlling water consumption; raising stakeholder awareness to avoid waste; utilizing rainwater for irrigation, toilet flushing, car washing, and building cleaning; employing equipment that increases efficiency and reduces waste, such as smart faucets, eco-efficient showers, and drinking fountains; and regularly modernizing and maintaining the system. These indicators are supported by Leal Filho et al. (2025), who state that the quantity of water consumed can be assessed to plan and direct economic initiatives.

The transport category is where the fewest or no actions are instituted in the researched FIs. During the *in loco* visits, the following situations were recorded: large vehicle parking spaces, bicycle racks, trees around the parking area, and exclusive spaces for people with disabilities (PWDs) and aged individuals. However, to enhance efficiency, the following activities are suggested for FI management: awareness campaigns and implementation of a program to reduce parking spaces; implementation of policies and projects that promote pedestrian pathways on campus designed for safety and convenience, such as "carpooling," increased use of bicycles, the use of sustainable vehicles (e.g., administrative cars, buses, and boats for student transport), that is, increasing the number of zero-emission vehicles (electric cars, boats, and buses); and the installation of charging stations for electric vehicles used by stakeholders. In this category, Leal Filho et al. (2025) corroborate in their study that this is the least evidenced area, presenting a challenging gap for universities.

Regarding education and research from the GM perspective, FIs address environmental and sustainability issues in a punctual manner, through research and outreach projects, and also within course curricula. The environmental and administrative management of FIs, along with teaching, research, and outreach departments, needs to systematize the model of applications, foster and stimulate the multiplication and implementation of routine actions/programs/projects related to sustainability, and their description in reports. These reports could subsequently be integrated into annual management reports with a specific section explicitly detailing institutional indicators and efforts in sustainability actions, as well as be made visible on their websites with dedicated links.

Table 3 – Records from field research on the campuses of Federal Institutes in the northern region regarding indicators of the Green Metric categories: energy and climate change, and waste and water.

FI/Campus	GM Category: energy and climate change, and waste and water
IFAC/CRB	
IFAM/CMZL	
IFAP/CMCP	
IFPA/CBEL	
IFRO/CPVZN	
IFRR/CBV	
IFTO/CPAL	

Web pages and dedicated links allow for the systematization of information and evidence that would enable FIs in the northern region to monitor and improve their actions toward becoming an SU and, like IFSULDEMINAS and IF SUDESTE MG, participate in HEI sustainability rankings such as the GM. In university social responsibility, sustainability is the least communicated aspect, according to Tetrevova et al. (2021). Improving the communication and interactive display of information using electronic sites represents a viable strategy that could enhance the institution's reputation (Carrillon-Durán et al., 2024).

Integration of sustainability in planning guidelines for Amazonian Federal Institutes

The evaluation of the performance of FIs in the northern region, systematically organized according to the categories and criteria of GM, reveals the incipient nature of sustainability actions on campuses and the need for integration among institutions and inclusion in the GM. Thus, the structural proposal for ISP in Amazonian FIs comprises the indication of guidelines and recommendations structured around the concept of SU.

The strategic planning guidelines refer generally and specifically to the units analyzed in this research, though the inherent ambiguity suggests that, even when organized in groups, each FI should consider its strengths and opportunities — that is, its internal needs that reflect its unique characteristics or "digital footprint." The steps in adopting the guidelines are framed within the strategic spheres of institutional and administrative EM policies proposed herein (Table 4).

In conformity with the proposed guidelines (Table 4), a course of action is suggested, translating into recommendations that can assist in forming arrangements for the implementation of ISP in the Amazonian FIs, as follows:

A1 — Council of the Amazonian FIs Sustainability Network: Composed of the Rector of each FI and members/staff active in management, teaching, research, and outreach. The presidency of the council must be exercised by a top manager democratically elected among peers. The Council must be formally instituted, be part of the institutional organizational chart, and possess a regulation. Its objective is to represent and strengthen the sustainability network of the FIs and to organize and plan guidelines to be executed by the FIs. Thus, it aims to embody the true sense of "Network" — the process of shared socio-environmental management among Amazonian FIs for institutional ISP.

A2 — Administrative Sustainability Commission of each FI: Must be composed of the Rector of each FI as president, the highest managers of the campuses, and a convenient number of members, integrating the academic community. The Commission must be officially instituted, be part of the institutional organizational chart, and possess a regulation. Its objective is to represent the Amazonian FIs Sustainability Network within the FI, to foster, organize, and plan actions to be executed by the FI, sharing these administrative functions with the EM sector linked to the Rectory.

A3 — Campus Management Commission: Will aim to represent the Amazonian FIs Sustainability Network at the campus level, organize, plan, and execute sustainability actions on campus, and produce and submit reports to the EM sector linked to the Rectory. The Commission will be composed of a suitable number of members and chaired by the unit's top manager. It must be officially instituted and possess a regulation.

B1 — Creation or adaptation of the Socio-environmental Policy of the Amazonian FIs: Must consider and list the IPS, incorporating participatory and democratic management and the previously proposed items (A1, A2, and A3). It should describe structures, importance, objectives, meeting periodicity, input forecasting, adherence, permanence, and execution of EM tools and/or programs. This arrangement will also be necessary for implementing item B2, which concerns creating and/or adapting the FIs' SEP.

B3 — Review and adaptation of the IDP: Must include the description of sustainability processes, emphasizing the institutional mission, vision, and organizational values, as well as the adaptation of institutional documents promoting sustainability within the institution. The IDP must contain a specific sustainability section in which the organizational work and congruent planning based on decisions from the proposed councils and commissions will be described.

B4 — Review and adaptation of Campus institutional documents: Primarily addressing internal regulations, Institutional Pedagogical Projects, Political-Pedagogical Projects, and Course Pedagogical Projects, emphasizing the promotion of sustainability.

C1 — Institution of a dedicated sustainability sector linked to and established in the Rectory: Depending on each FI structure, this sector should be composed of a Directorate and an EM Coordination, pref-

Table 4 – Steps for adopting integration of sustainability in planning guidelines for Amazonian Federal Institutes.

Institutional Policy Strategies (IPS)	
A — Creation of Councils/ Commissions	1 — Council of the Amazonian FIs Sustainability Network; 2 — Administrative Sustainability Commission in each FI (Rectory), representative in the Amazonian FIs Sustainability Network; 3 — Campus Sustainability Management Commission.
B — Creation or adaptation — Socio-environmental Policy (SEP), Institutional Development Plan (IDP), and institutional documents	1 — Socio-environmental Policy of the Amazonian FIs; 2 — Socio-environmental Policy in each FI; 3 — Review and adaptation of the Institutional Development Plan (IDP) and institutional documents for the adoption of sustainability references and principles in management, teaching, outreach, and research; 4 — Review and adaptation of Campus institutional documents.
Administrative Environmental Management Strategies (AEMS)	
C — EM Sector, EM Program, and Study Groups	1 — Creation of a sustainability sector, linked to the rectories, in each FI; 2 — Adherence/adoption of sustainability rankings/sustainability monitoring tools/sustainability promotion programs in HEIs; 3 — Creation of a socio-environmental study group for Amazonian FIs; 4 — Adaptation of the website with a specific tab for disseminating the institution's sustainability actions.

erably allocated within the Pro-Rectory of Administration. The Sustainability Directorate, together with the EM Coordination, will be responsible for systemic administrative functions, organizing, planning, and monitoring projects, systematized and punctual actions, as well as collecting and processing data and creating reports to be included in the Fis' annual management reports.

C2 — Adherence to EM tools and/or programs: Primarily involving adherence to the GM and A3P, as they converge in categories and/or thematic axes for sustainability, facilitating adherence to these initiatives.

C3 — The Amazonian FIs Socio-environmental Study Group: Would be responsible for conducting research related to sustainability in HEIs, EM, and especially the application and mitigation of socio-environmental problems in the Amazonian context.

C4 — Adaptation of the website with a specific tab for disseminating sustainability actions: To be included on each FI's institutional website. Actions, activities, executed and planned projects, sustainability events, and planning should be gathered to promote transparency and broad dissemination to the academic community and society.

Regarding website adaptation, this is a highly relevant item, as it constitutes a digital communication strategy that enhances institutional reputation and image, generating direct communicative impact on sustainability (Carrillo-Duran et al., 2024).

Notwithstanding the guidelines proposed for integration among these HEIs, it is also necessary to use benchmarking, a strategic instrument of paramount relevance that supports and is applicable to all actions and steps of public administration planning, including those of EM (Tauchen and Brandli, 2006; Cardozo et al., 2020; Marques et al., 2021).

It is understood that the proposed planning strategies need to be analyzed, organized, adapted, and executed by managers who experience the daily life of the FIs, as the strategic planning of an HEI must propose resolutions and mitigations for socio-environmental problems which, as Silva and Pinheiro (2018) emphasize, must be recorded in official documents, forming what is called systemic planning. Thus, new approaches and practical, daily sustainability actions become part of internal policies and encompass the connection between sustainability and organizational vision (Kantabutra, 2024).

The innovative work by Dickson (2025) highlights the driving factors for sustainability action in HEIs, emphasizing the development of internal policies, which surpasses other sectors, and includes the crucial relevance of administrator and community participation for developing sustainability priorities. Dickson (2025) also underscores the importance of external drivers and network formation, moving institutions away from competition and toward collaborative action.

Another analysis that can enhance management processes derives from studies showing that, based on institutional documents from 38 FIs in Brazil, Barros et al. (2021) suggest the need for greater transparency in reporting sustainable practices. This is corroborated by Lucio et al. (2022), who identified the lack of standardization in management processes, environmental control, and management reports in FIs.

Emphasizing planning, Silva and Castilho (2021) indicate that planning aligned with institutional values contributes to understanding institutional social practice and clarifies its function to society. Regarding institutional integration, Manso and Santos (2023) convey the essence of a network by reporting the experience of IFSULDEMINAS (adherent to GM and A3P) with the IFSOLAR project, which benefited HEIs and FIs in adhering to and leading a major procurement initiative, becoming a national reference in procurement, generation, and research of solar photovoltaic energy in the public sector in Brazil.

To conclude the item on adherence to EM tools, Wilhelm et al. (2025) discuss the difficult decision-making process for managers when deciding whether to adhere to rankings, as unsatisfactory performance can damage institutional reputation. Bautista-Puig et al. (2022) corroborate that non-integration into a ranking can be a deliberate strategy to avoid reputational damage when unfavorable results are anticipated. Although this line of reasoning is understandable, efforts by HEIs should be made with the understanding that well-structured and adapted institutional planning can facilitate the integration of sustainability.

Conclusions

Among the benchmark institutions participating in the GM and possessing an EM sector, USP, UFLA, UNICAMP, UFOPA, and IFSULDEMINAS highlight the importance of EM in planning and in the adoption and attention that these HEIs adhering to sustainability tools demonstrate. These HEIs develop sustainability agendas with better performance than other HEIs that do not adhere to such tools. The institutions in question have played an important role in promoting sustainability, demonstrating organizational leadership and EM planning, serving as salutary references for networks, and distinguishing themselves among HEIs and FIs.

The FIs (IFAM, IFAC, IFPA, IFRR, IFRO, and IFTO) demonstrate potential in their results, but mostly in a punctual manner. Therefore, there is no structure in place to seek arrangements for the promotion of ISP. Such a perspective is distant from the proposed model, as its incipience, demonstrated in both documentary and field research, highlights the need for structural, systemic, and holistic alignment to be considered efficient in sustainability in the most faithful sense of SU.

Given the aforementioned alignment demand and for the actions of the FIs to result in positive externalities for the promotion of sustainability, the ISP guidelines for the Brazilian Amazonian FIs, in relation to the GM, guide not only the updating of each FI's governance documents, but also the introduction and adherence by each FI to evaluation tools — GM and A3P — a structured sector dedicated to EM in each FI, integration in the sense of union among institutions (network), and benchmarking.

The proposed guidelines are open arrangements conceived for the promotion of sustainability in the Amazonian scenario, to encourage and commit managers to a robust EM performance. Ultimately, they aim to elevate the positive reflections of sustainability promotion by FIs to the academic community, and to the Amazon biome and to contribute directly and indirectly to global agendas such as the SDGs and the fight against climate change.

For future studies, it is suggested to expand and update the data and HEIs, especially including international scenarios, to serve as benchmarks and benchmarking for HEIs, managers, and researchers. Another suggestion for future research is to analyze the actions of FIs and HEIs in sustainability based on GM and to evaluate a possible restructuring of the ranking — criteria, categories, and scoring — through consultation with managers and specialists.

Authors' Contributions

Almeida, V.F.: conceptualization, data curation, formal analysis, investigation, writing – original draft, writing — review and editing. **Simão**, M.O.A.R.: methodology, validation, writing — review and editing. **Limont**, M.: formal analysis, methodology, supervision, validation, writing — review and editing.

References

Ahmed, E.K.A.; Dewidar, K.M.; Abd El-Hakeem, Y.; Guirguis, M.N., 2025. An integrated framework for sustainable retrofitting of existing university buildings. Discover Sustainability, v. 6, 38. https://doi.org/10.1007/s43621-024-00703-7.

Associação Brasileira de Normas e Técnicas (ABNT), 2015. ABNT NBR 9050:2015: acessibilidade a edificações, mobiliário, espaços e equipamentos urbanos. 3rd ed. ABNT, Rio de Janeiro.

Barros, A.C.S.; Souza, N.A.; Carvalho, J.L.; Ferreira, D.D.M.; Bellen, H.M.V., 2021. Práticas de Sustentabilidade em Instituições de Ensino Superior (IES): Uma Análise Preliminar dos Planos de Gestão de Logística Sustentável (PLS) dos Institutos Federais (IFs). 21st USP International Conference in Accounting. São Paulo, July 28 to 30, 2021.

Bautista-Puig, N.; Orduña-Malea, E.; Perez-Esparrells, C., 2022. Enhancing sustainable developmentgoals or promotinguniversities? An analysis of the times higher education impact rankings. International Journal of Sustainability in Higher Education, v. 23 (8), 211-231. https://doi.org/10.1108/IJSHE-07-2021-0309.

Brasil, 2015. Lei nº 13.146, de 6 de julho de 2015. Diário Oficial da União, Brasília.

Calder, W.; Clugston, R.M., 2003. International efforts to promote higher education for sustainable development. Planning for Higher Education, v. 30, 31-44.

Cardozo, N.H.; Barros, S.R.S.; Quelhas, O.L.G.; Martins Filho, E.R.; Salles, W., 2020. Benchmarks Analysis of the Higher Education Institutions Participants of the GreenMetric World University Ranking. Leal Filho, W.; Tortato, U.; Frankenberger, F. (Eds.), Universities and Sustainable Communities: Meeting the Goals of the Agenda 2030, World Sustainability Series. Springer Nature Switzerland AG. https://doi.org/10.1007/978-3-030-30306-8_40.

Carrillo-Durán, M.V.; Sánchez, T.B.; García, M., 2024. University social responsibility and sustainability. How they work on the SDGS and how they communicate them on their websites. Higher Education Quarterly, v. 78 (3), 586-607. https://doi.org/10.1111/hequ.12470.

Contreras, L., 2002. Sustainable Universities Around the World – A Model for Fostering Sustainable University Program – Effectiveness. Doctoral Thesis, University of Massachusetts Lowell, Lowell, Massachusetts. Retrieved 2021-01-23, from https://www.proquest.com/openview/56ce51f58f3dd0e628f97d55943afb49/1?pq-origsite=gscholar&cbl=18750&diss=y.

Copernicus Charter (1993). COPERNICUS CHARTA 2.0/2011European Commitment to Higher Education for Sustainable Development (Accessed Jul 05, 2020) at:. https://www.copernicus-alliance.org/images/Downloads/COPERNICUSCharta_2.0.pdf.

Galleli, B.; Teles, N.E.B.; Santos, J.A.R.; Freitas-Martins, M.S.; Hourneaux Junior, F., 2022. Sustainability university rankings: a comparative analysis of UI green metric and the times higher education world university rankings. International Journal of Sustainability in Higher Education, v. 23 (2), 404-425. https://doi.org/10.1108/IJSHE-12-2020-0475.

Gatti, L.V.; Basso, L.S.; Miller, J.B.; Gloor, M.; Domingues, L.G.; Cassol, H.L.G.; Tejada, G.; Aragão, L.E.O.C.; Nobre, C.; Peters, W.; Marani, L.; Arai, E.; Sanches, A.H.; Corrêa, S.M.; Anderson, L.; Von Randow, C.; Correia, C.S.C.; Crispim, S.P.; Neves, R.A.L., 2021. Amazonia as a carbon source linked to deforestation and climate change. Nature, v. 595, 388-393. https://doi.org/10.1038/s41586-021-03629-6.

Guerra, A.F.S.; Figueiredo, M.L., 2014. Caminhos e Desafios para a Ambientalização Curricular nas Universidades: panorama, reflexões e caminhos da tessitura do Programa Univali Sustentável. In: Ruscheinsky, A.; Guerra, A.F.S.; Figueiredo, M.L.; Leme, P.C.S.; Ranieri, V.E.L.; Delitti, W.B.C. (orgs.), Ambientalização nas Instituições de Educação Superior no Brasil: caminhos trilhados, desafios e possibilidades. EESC/USP, São Carlos (SP).

Guerra, A.F.S.; Figueiredo, M.L.; Orsi, R.F.M.; Steuck, E.R.; Carletto, D.L.; Silva, M.P.; Luna, J.M.F., 2015. A ambientalização na Educação Superior: trajetória e perspectivas. In: Guerra, A.F.S. (Org.), Ambientalização e Sustentabilidade nas Universidades: subsídios, reflexões e aprendizagens. Editora UNIVALE, Itajaí (SC).

Guimarães, C.S.; Bonilla, S.H., 2018. Gestão ambiental em Universidades sustentáveis e a importância do GreenMetric. In: IX Congresso Brasileiro de Gestão Ambiental ConGeA, São Bernardo do Campo/SP.

Instituto Federal de Rondônia (IFRO), 2016. Histórico do Campus (Accessed February 06, 2024) at:. https://portal.ifro.edu.br/calama/o-campus.

Kantabutra, S., 2024. Toward a sustainability performance management framework. Heliyon, v. 10 (13), e33729. https://doi.org/10.1016/j.heliyon.2024.e33729.

Lambrechts, W.; Mulà, I.; Ceulemans, K.; Molderez, I.; Gaeremynck, V., 2013. The integration of competences for sustainable development in higher education: an analysis of bachelor programs in management. Journal of Cleaner Production, v. 48, 65-73. https://doi.org/10.1016/j.jclepro.2011.12.034.

Lauder, A.; Sari, R.F.; Suwartha, N.; Tjahjono, G., 2015. Critical review of a global campus sustainability ranking: GreenMetric. Journal of Cleaner Production, v. 108 (Part A), 852-863. https://doi.org/10.1016/j.jclepro.2015.02.080.

Leal Filho, W.; Lopes, G.; Trevisan, L.; Bella, R.L.; Rampasso, I.; Brunozi Júnior, A.C.; Bichueti, R.; Quelhas, O.; Anholon, R.; Galleli, B., 2025. Green metrics: how are Brazilian universities doing?. Discover Sustainability, v. 6, article number 90. https://doi.org/10.1007/s43621-025-00864-z.

Lemos, P.F.I.; Brando, F.R.; Almeida, P.; Mülfarth, R.C.K.; Aprilanti, T.M.G.; Marques, L.O.A.; Jorge, N.L.; Malheiros, T.F., 2018. The University of São Paulo on the 2017's GreenMetric Ranking. E3S Web of Conferences, v. 48, 02003, IWGM. https://doi.org/10.1051/e3sconf/20184802003.

Lopes, J.B.S.; Vieira, T.A., 2021. Sustainable University: From the Worldwide Conception to the Brazilian Amazonia. Revista Sustainability, v. 13 (19), 10875. https://doi.org/10.3390/su131910875.

Lozano, R.; Lukman, R.; Lozano, F.J.; Huisingh, D.; Lambrechts, W., 2013. Declarations for sustainability in higher education: becoming better leaders, through addressing the university system. Journal of Cleaner Production, v. 48, 10-19. https://doi.org/10.1016/j.jclepro.2011.10.006.

Lucio, M.A.; Ramos, M.C.; Tontini, G.; Parisotto, I.R., 2022. Aderência dos Institutos Federais de Educação à Agenda Ambiental na Administração Pública. ABCustos, São Leopoldo: Associação Brasileira de Custos, v. 17 (3), 240-265. https://doi.org/10.47179/abcustos.v17i3.668.

Malheiros, T.F.; Espinosa, D.C.R.; Fernandez, F.R.B.; Lemos, P.F.I.; Almeida, P.S.; Gomes, T.M.; Ambrizzi, T., 2019. Universidades rumo à sustentabilidade. SGA/USP, São Paulo.

Manso, L.S.; Santos, P.H.M., 2023. IFSOLAR: the Innovative IFSULDEMINAS Program for the Acquisition of Solar Photovoltaic Plants. Journal of Sustainability Perspectives, v. 0, 353-360. https://doi.org/10.14710/jsp.2023.20841.

Marques, L.O.A.; Carvalho, R.S.; Sa, M.O.M.; Malheiros, T., 2021. Benchmarking as a management tool to reduce non-revenue water. Ambiente & Sociedade, v. 24, e0025. https://doi.org/10.1590/1809-4422asoc20200025vu2021L4DE.

Ministério da Educação (MEC), 1999. Política de diretrizes e normas para o uso, o ensino, a produção e a difusão do Sistema Braille (Accessed February 05, 2024) at:. http://portal.mec.gov.br/seesp/arquivos/pdf/port319.pdf.

Ministério do Meio Ambiente (MMA), 2017. Agenda Ambiental da Administração Pública – A3P. Gestão Socioambiental nas Universidades Públicas (Accessed April 18, 2024) at:. https://sga.furg.br/images/Documentos_para_linkar/A3P_universidades.pdf.

Nascimento, J.M., 2018. Gestão Ambiental em Instituições Educação Superior no Brasil: do discurso a realidade. Dissertation, Centro de Ciências do Ambiental, Universidade Federal do Amazonas, Manaus. Retrieved 2020-02-20, from https://tede.ufam.edu.br/handle/tede/7114.

Organização das Nações Unidas (ONU), 2015. Objetivos do Desenvolvimento sustentável (Accessed July 28, 2021) at:. https://www.un.org/sustainabledevelopment/es/.

Pieranti, O.P.; Silva, L.H.R., 2007. A questão Amazônica e a política de defesa nacional. Cadernos EBAPE.BR, v. 5 (1) (Accessed November 25, 2022) at:. https://www.scielo.br/j/cebape/a/YXr8rjtP5sHnDkSs49LCCGC/?format=pdf&lang=pt.

Silva, C.N.N.; Castilho, M.L., 2021. O planejamento dos Institutos Federais (IF): valores institucionais e documentos norteadores. Revista Brasileira da Educação Profissional e Tecnológica, v. 1 (20), e10002. https://doi.org/10.15628/rbept.2021.10002.

Silva, J.I.A.O.; Pinheiro, A.L.S., 2018. Avaliação da Sustentabilidade do Instituto Federal de Educação, Ciência e Tecnologia do Rio Grande do Norte. Desenvolvimento em Questão, v. 16 (45), 249-272. https://doi.org/10.21527/2237-6453.2018.45.249-272.

Talloires Declaration (1990). Association of University Leaders for a Sustainable Future (ULSF) (Accessed April 10, 2020) at:. https://ulsf.org/talloires-declaration/

Tauchen, J.; Brandli, L.L., 2006. A gestão ambiental em instituições de ensino superior: modelo para implantação em campus universitário. Revista Gestão e Produção, v. 13 (3), 503-515. https://doi.org/10.1590/S0104-530X2006000300012.

Tetrevova, L.; Vavra, J.; Munzarova, S., 2021. Comunicação de atividades socialmente responsáveis por instituições de ensino superior. Sustentabilidade, v. 3 (2), 483. https://doi.org/10.3390/su13020483.

UI GreenMetric World University Ranking (GM), 2024. Classificação mundial de universidades da UI GreenMetric: Histórico do Ranking (Accessed December 24, 2024) em:. https://greenmetric.ui.ac.id/about/welcome.

União Internacional para Conservação da Natureza (IUCN), 2019. A UICN — União Internacional para a Conservação da Natureza — convoca o governo brasileiro e outros governos e cidadãos a se unirem para acabar com os incêndios na Amazônia (Accessed December 01, 2022) at:. https://iucn.org/pt/news/secretariat/201908/a-uicn-uniao-internacional-para-a-conservacao-da-natureza-convoca-o-governo-brasileiro-e-outros-governos-e-cidadaos-a-se-unirem-para-acabar-com-os-incendios-na-amazonia.

Wandercil, M.; Calderón, A.I.; Ganga-Contreras, F., 2022. Academic Rankings: implications for university governance of Brazilian Catholic universities. Educação & Realidade, v. 47, e117631. https://doi.org/10.1590/2175-6236117631vs02.

Wilhelm, E.M.S.; Santos, C.B.; Pilatti, L.A., 2025. Are the best higher education institutions also more sustainable?. International Journal of Sustainability in Higher Education, v. 26 (3), 518-539. https://doi.org/10.1108/IJSHE-09-2023-0450.