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Valuation of Environmental Education Applied to Payment for Urban Environmental Services in State of Amazonas Legislation

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Abstract**—** *Interest in the economic valuation of environmental resources for remuneration for their preservation demonstrates that Payment for Environmental Services (PSA) is considered the ideal model of sustainability because it understands that ecosystem goods and services are dependent on the economy. In the context of the urban ecosystem, the study of the valuation of environmental education and PES arises as an opportunity to determine the economic value of an environmental resource and to estimate its valuation in relation to other available goods and services, describing to whom they are offered and to whom. are the beneficiaries. The study addressed Law No. 4,286 of December 1, 2015, which establishes the Amazonas State Policy and the Environmental Services Management System, whose focus was the analysis of the PSA of the State Legislation, outlining the criteria and instruments of valuation of urban environmental services emphasizing the valuation of environmental education. In the construction of the environmental education valuation taxonomy, the tabulation model of the economic instruments of the Urban Environmental Services Payment (PSAU) was used to compose the Urban Environmental Services (SAU) matrix applied in the environmental valuation, based on the evaluation model. denominated as Economic Value of the Environmental Resource (VERA). PSA serves as a framework for discussions of participants' conflicts of interest using the taxonomy model of valuing environmental education. Entities involved in public policy and economic decision-makers are recommended to understand the value of environmental goods and services.*

Keywords**— Environmental Resources, Sustainability, VERA, Taxonomy.**

I. INTRODUCTION

With the emergence of large cities and the incorrect disposal of waste, a major environmental problem was triggered, generating mostly negative impacts on the environment due to human consumption. Thus, in order to optimize effective actions to remedy these impacts, the National Solid Waste Policy (PNRS) was created. After years of processing in the Federal Legislature, on August 2, 2010, Law No. 12,305 was approved and entered into force instituting the PNRS [1].

The PNRS establishes principles, objectives, instruments - including applicable economic instruments - and guidelines for integrated management and solid waste management, indicating the responsibilities of generators, public authorities and consumers [1]. Moreover, it has as one of its principles "the recognition of reusable and recyclable solid waste as an economic and social value asset, generator of work and income and citizenship promoter" [1].

Thus enabling the reuse of materials, reducing the extraction of raw materials and reducing the amount of garbage made to the final disposal, with opportunities for income generation and social inclusion, establishing the valuation of a payment for environmental services, which by definition are the activities, products and processes that nature provides to us and that enable life as we know it can occur without higher costs for humanity [2].

Payment for Environmental Services (PSA) is based on the recognition that nature provides a range of services that benefits society and recognizes that technological and scientific advances, despite having taken immense expansion, can complement, but always replace environmental goods and services. It also points out that these services are generally not preserved, given the lack of economic incentives for their provision [3], also mentions that the damage has already been accounted for by some countries by the scarcity of supply of certain environmental services.

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The ecological economy approach tried to shape economic institutions to the physical characteristics of ecosystem environmental services, prioritizing ecological sustainability and fair distribution and requiring a multidisciplinary approach [4].

The term Urban Environmental Services (SAU), is already used in the literature focused on urban services that have an interface with the environmental issue. SAU can be associated with public services as well as other urban activities, such as the correct disposal of solid waste and the recycling of municipal waste [5].

The PSAU is associated with activities carried out in the urban environment that generate positive environmental externalities, or minimize negative environmental externalities, from the point of view of the management of natural resources, risk reduction or the enhancement of ecosystem services [5].

The relationship of environmental services is always subject to change, due to the possibility of new environmental problems, and, consequently, new demands for environmental services related to such problems [6].

In the last decade, the PSA market has gained relevance worldwide, being pointed out as a promising instrument for environmental management at different scales and complementary to traditional command and control mechanisms, reversing direct benefits for persons or private and governmental institutions that provide these services [7].

Combined with the PSA, the environmental valuation presents itself with a set of methods that allow quantifying the benefits and harms resulting from the use and modification in the amount of available natural resources, allowing a cost-benefit analysis in the evaluation of public policies [8].

Based on this assumption, the study of the Valoration of Environmental Education and Payments for Urban Environmental Services emerges as an opportunity to determine the economic value of an environmental resource and estimate its valuation in relation to other goods and services available in the economy and describe to whom they are offered and for whom they are benefited.

In the local case, the study will address Law No. 4,286 of December 1, 2015, which establishes the Amazon State Policy and the Environmental Services Management System, in which the focus will be the PSA analysis of State Legislation, schematizing the criteria and instruments valuing urban environmental services with an emphasis on valuing environmental education.

II. MATERIALS AND METHODS

The methodology used to perform the respective study comprised the bibliographic review through books, theses, dissertations, specialized journals and analysis of legislation in force in Brazil, published between 1988 and 2018. In addition, a study analysis of the application of the PSAU based on the reference research report on payments for environmental services for the management of solid waste was carried out [5].

In order to carry out the survey of concepts on environmental services and the study of the economic instrument of the PSA, the following authors were used: [3], [9], [10], [11], [12], [13] and [14].

The study cited comprises the analysis of Payment for Urban Environmental Services of the IPEA as a proposal for modeling of a taxonomic matrix of environmental education valuation applied to the PSAU under the State Environmental Services Payment stemming legislation from Amazonas.

In the process of elaboration of the taxonomy of valuing environmental education, the tabulation model of PSAU financial instruments was used, using the Microsoft Excel application to compose the SAU matrix by applying the environmental valuation to the environmental valuation of the assessment denominated by Economic Value of the Environmental Resource (VERA) de [15].

VERA = (VUD + VUI + VO) + VE (eq 1)

Where:

VERA: Economic Value of the Environmental Resource

VUD: Direct Use Value

VUI: Indirect Use Value

VO: Option Value

VE: Value of Existence

In the Legislation of Payments for Environmental Services of the State of Amazonas, the definitions and principles of environmental services will be analyzed, which will be confronted with the mechanisms of the economic instruments of PSA proposed by the authors mentioned, aiming at the public interest in achieving a proposal for a model for valuing environmental education applicable to PSAU, demonstrating a VERA taxonomy for evaluation.

III. RESULTS AND DISCUSSION

Currently, the world tends to exploit natural resources, exceeding the capacity to renew the system and provide environmental services, requiring high investments, so that damage is reversed. Damage can be resolved by advancing

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society's awareness of environmental knowledge and establishing proposed regulations of public interest organizations [9].

The mechanisms of Payments for Environmental Services (PSA) have stood out as a complementary economic instrument for the containment of degradation, for the promotion of conservation activities, in addition to the recovery and sustainable use of ecosystems [9].

Based on the synthesis of the Millennium Ecosystem Assessment Report, prepared by the United Nations research programmer on environmental change and its trends for the coming decades, the Millennium Ecosystem Assessment began discussions, which five years later they were readapted by [5], where the main types of environmental services that could be associated with PSA proposals were listed in Table 1.

Table 1 - Main Types of Environmental Services

CATEGORIES OF ENVIRONMENTAL SERVICES			
SUPPORT	**REGULATION**	**PROVISIONING**	**CULTURAL**
These are the natural processes necessary for other services to exist.	Benefits derived from natural processes that regulate environmental conditions that sustain human life	Related to the ability of ecosystems to provide goods.	Intangible benefits obtained from ecosystems.
Example: Soil formation, pollination and seed dispersal.	Example: purification and regulation of water cycles, flood and erosion control, waste treatment.	Example: fruits, roots, fish, game, honey, firewood, coal, oils, woods, genetic and biochemical resources, ornamental plants and water.	Example: Recreational, Educational, Aesthetic, Spiritual, Cultural Heritage Benefits

Source: Adapted from [22].

According to the complementary description on the theme, [5] mentions that most PSA experiences are related to biodiversity conservation, carbon capture, watershed protection and landscape beauty. However, the report indicates that environmental services extend to other perspectives, but plastered by the lack of public policy.

As the approach of the present study is related to urban ecosystems it is necessary to understand environmental services on this perspective. Using [5] it points out the possible types of environmental services associated with activities in the urban environment that generate positive externalities or minimize negative externalities, and can be summarized as follows in Table 2.

Table 2 - Types of Urban Environmental Services

URBAN ENVIRONMENTAL SERVICES	
TYPES OF SERVICES	**SERVICES PROVIDED**
Correct disposal of solid waste	Improvement in water quality, reduction of greenhouse gas emissions, reduction of infectious diseases
Urban Waste Recycling	Reduction of water and energy consumption, reduction of water pollution, smaller urban landfill area, greater climate stability
Maintenance of green areas	Increased soil permeability, decreased risk of flooding and landslides
Public transport	Reduction of greenhouse gas emissions
Sewage treatment	Improved water quality

Source: Adapted from [5].

These urban environmental services listed in the previous table clearly indicate actions that mitigate the harmful effects of urbanization on urban ecosystems. Initiatives such as these, as advocated by [5], should be valued and remunerated in the same way that other PSA initiatives are in other non-urban ecosystems.

To set up a schematized PSA mechanism it is necessary to identify and define what types of environmental services provided, so that there is clarity of what will also be paid for by the report from [5].

The focus of Urban Environmental Services and the mechanisms of Payments for Urban Environmental Services (PSAU) are linked recycling activity, waste activities and screening of municipal solid waste made by waste pickers of recyclable materials [5].

Once the focus of the PSAU mechanisms to be proposed is outlined, the assumptions that will guide the instruments are analyzed. The most important assumptions are: (i) payment should go to waste pickers' cooperatives, not waste pickers individually; (ii) payment must be in return for the environmental service provided; and (iii) the mechanisms should reward efficiency in the provision of the environmental service [5].

In order to adapt and ensure the financial viability of PSA mechanisms it is important to seek opportunities to group a large number of environmental service providers,

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located in nearby areas, in order to ensure greater scope of actions [9].

The authors above mention that it is necessary to invest in the dissemination of knowledge about methods of economic valuation and its application in a practical way, seeking to sensitize the population and decision makers. In order to adapt this situation, the authors suggest performing information systematizations, knowledge exchanges and training courses in the theme.

The PSA mechanism is the financial payment to private agents as a means to achieve environmental conservation [10]. In view of the problems caused by the exhaustion of natural resources, PSA is an economic instrument that allows to internalize the costs and benefits of preservation between providers and beneficiaries of the contracted services [11].

On this controversy, [10] understands that the basis for the fulfillment of legal duties starts from a more pragmatic argument, such as the lack of effectiveness of the instruments of "command-and-control", but goes through arguments principle such as the notion of the recipient protector, which emphasizes the benefits of conservation for the collectivity, even if due to legally determined practices.

Like all environmental policy, the PSA must have clear and specific objectives so that it can achieve favorable results for both the collective and beneficiaries and providers of environmental services [10]. The principle is to motivate individuals, through cash retribution or not, to execute obligation beyond what the legislation requires, thus representing a plus of what the provider should carry out.

Therefore, the challenge is currently to create strategies for the valuation of environmental services. The environmental valuation consists of giving monetary value to unrecognized environmental goods and services in the markets. [8] defines environmental valuation as determining the economic value of an environmental resource, estimating its monetary value in relation to other goods and services available in the economy.

According to what conventional economic theory, the use of natural resources, almost always generating negative external economies in the economic system. These externalities are not fully captured in the pricing system, as the security of property rights or use of these resources resulting in high transaction costs due to the technical or cultural difficulty of fixing exclusive and rival rights [8].

At the moment a good or service contributes to the economic agent achieving its goal and increasing its satisfaction, it presents valuation, being attributed to ecosystems two types: intrinsic value and total economic value [9].

Intrinsic values are difficult to measure, as they are associated with the contribution of ecosystems in maintaining the health and integrity of species, regardless of human satisfaction. The total economic value is composed of usage and non-use values. Usage values can be differentiated between direct usage, indirect usage and option values; and the non-use values are composed of the value of existence [9].

Each method of valuing environmental goods or services presents their limitations in capturing the different types of values of environmental resources. The choice should consider the purpose of the valuation, the efficiency of the method for the specific good or service and the information available for each study [8] in Table 3.

Table 3 – Taxonomy of the VERA

ECONOMIC VALUE OF THE ENVIRONMENTAL RESOURCE				
	USAGE VALUE		**NON-USE VALUE**	
	Direct use value	**Indirect Use Value**	**Option Value**	**Existence value**
Value	Appropriate environmental goods and services directly from resource exploitation and consumed today	Environmental goods and services that are generated from appropriate ecosystem functions and indirectly consumed today	Direct and indirect environmental goods and services to be appropriated and consumed in the future.	Value not associated with current or future use and reflecting moral, cultural, ethical or altruistic issues
Related Services	Provisioning and Regulation Services	Regulatory, support and cultural service	Provision, regulation, support and cultural services not yet discovered	Cultural services

Source: Adapted from [8].

[14] states that interest in the economic valuation of environmental resources, for the purpose of remuneration for its preservation, in reality, reinforces the intersection between law, public policies and economics, because it considers that the attempt to approximation to an ideal model of sustainable development permeates the recognition, that economic productive activity is dependent on goods and services provided by ecosystems.

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Despite the existence of funds and financial incentives for the environmental market, there are still obstacles to the advancement of this sector namely: i) high tax burden; (ii) environmental licensing and supervision; iii) access to specific credit lines to the environmental area; iv) ignorance on the subject, such as concepts and classification in accordance with national codes of economic activities; v) lack of organization of the sector; vi) access to technologies; and vii) cultural and market aspects in general [16].

Considering this situation, it is understandable that there are several existing methodologies, and that these are the function of the peculiarities of each situation. It is important to emphasize that, due to local realities, other steps can be inserted to the executor's need, as is the case with an Amazon IAN PSA model, which highlights the importance of valuing environmental education.

The valuation of environmental education precedes the principle of Sustainable Development provided for in Art. 170, item VI, of the Federal Constitution, in which it provides that protection to the environment and economic development must live harmoniously, that is, while seeking development, the rational use of resources should be taken into account described, with the improvement of the quality of life of man [17].

No Art. 1st Of the Brazilian National Environmental Education Policy, operationalized by Law No. 9,795 of April 27, 1999, defines Environmental Education as the processes through which the individual and the collectivity build social values, knowledge, skills, attitudes and skills focused on the conservation of the environment [18].

In this sense, local, national and international strategies have been created over the years to enable the implementation of the valuation of environmental education in all sectors, requiring accountability and transparency during the execution of practices procedures, preparation and application of resources, generating benefits for this system [19].

In the context of the protection of natural resources, it must be recognized that repressive norms and educational actions (environmental education), have not been sufficient and effective to curb the high levels of degradation resulting from enterprises and anthropic activities [14].

The strategy adopted by Brazilian environmental legislation in recent years is marked almost exclusively by the use of command and control instruments, of a repressive and punitive nature, which have not proved sufficiently effective, practical results obtained. Thus, there is an imperative need to complement these instruments, with the creation of awards and incentives, in order to shape human conduct to be conducted in favors of sustainable development [13].

Payments for Environmental Services break out as a possibility of induction to positively valued behaviors, from the implementation of bonus arrangements to those who, from performing super conforming behavior, corroborate not only with the reversal of environmental damage already occurred, but with the maintenance or increase of ecosystem services understood as direct and indirect benefits provided by nature to man and other species [14].

It is within this context that Payments for Environmental Services emerge as a new tool and innovative alternative through the principle of the provider-recipient, economically efficient and environmentally valid, that can complement instruments of command and control, directing investments and public policies, effectively contributing to achieving the objectives of promoting a quality and sustainable environment for the current and future generations [13].

On December 1, 2015, the law that states the State Policy of Environmental Services of the State of Amazonas was approved (Law No. 4,266/15). After a long process of more than 4 years of preparation and consultation, Amazonas now has a legal device that provides for the collection of resources for the socioeconomic development and the conservation of natural resources. In the same, the law still needs to be regulated for its programs to go into operation with recognition [12].

In the Amazon Ian legislation on PSA in its Art. 1st, item XXIX is mentioned the urban environmental services, in which they must be aligned with Art. 3, items II and XI, which deal with the principles of sustainable development and the receiving provider, respectively [20].

Based on [5], [15] and [12], it was proposed the preparation of the description of the Valoration of Environmental Education and the type of Payment for Urban Environmental Service in the VERA model (Table 4).

Table 4 - Valoration of Environmental Education

Appreciation of environmental education	**Mitigation** Dumpers manufacturers Consumers **Recovery**	**Awareness** Biodiversity Resource **Maintenance**	**Formation** Education Technology **Qualification**	**Tradition** Patrimony Experience **Protection**
Type of	**Reductio**	**Alliance**	**Instructio**	**Associatio**

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urban environmental service	**n** Reuse Recycling **Reverse logistic**	Development Harnessing **Agreements**	**n** Optimization Remediation **Solution**	**n** Preservation Conservation **Diffusion**

Source: Adapted from [5], [8] and [12].

Scored in the studies of [12], [13] and [14], it was proposed to elaborate the identification of possible sources of appeal, the applicable economic instrument and the estimated time of return in relation to the Valoration of Environmental Education in Table 5.

Table 5 - Economic Instrument in the Valoration of Environmental Education

VALUATION OF ENVIRONMENTAL EDUCATION APPLICABLE TO THE ECONOMIC INSTRUMENT				
Appreciation of environmental education	**Mitigation** Manufacturers Consumers **Recovery**	**Awareness** Biodiversity Resources **Maintenance**	**Formation** Education Technology **Qualification**	**Tradition** Patrimony Experience **Protection**
Resource Source	Private initiative Social initiative	International fund Union fund	Encouraging science Technology incentive	State fund Municipal fund
Economic instrument	Compensation Behavioral	Pactuation Collaboration	Awards Innovation	Intellectual property recognition
Estimated time	Months	Decades	Years	Years

Source: Adapted from [12], [13] and [14].

From the analysis presented, it was observed that payment for environmental services is a recent management instrument, being incorporated into public policy discussions with innovative potential to restore, conserve and preserve environmental resources, warning those involved in public policies and economic decisions not to ignore or neglect the value of environmental goods and services [21].

Based on this assumption, the study of the Valoration of Environmental Education and Payments for Urban Environmental Services emerges as an opportunity to determine the economic value of an environmental resource and estimate its valuation in relation to other goods and services available in the economy and describe "who are they offered?" and "who are they benefited from?". Thus, serving as a basis for discussion in public hearings as a way to guide conflicts of participation interests, being able to use the Taxonomy model of the Valoration of Environmental Education in Table 6.

Table 6 - Taxonomy of the Valoration of Environmental Education

VERA TAXONOMY WITH A PSAU ENVIRONMENTAL EDUCATION VALUATION				
	USAGE VALUE		**NON-USE VALUE**	
	Direct use value	**Indirect Use Value**	**Direct use value**	**Indirect Use Value**
Value	Appropriate environmental goods and services directly from resource exploitation and consumed today	Environmental goods and services that are generated from appropriate ecosystem functions and indirectly consumed today	Direct and indirect environmental goods and services to be appropriated and consumed in the future.	Value not associated with current or future use and reflecting moral, cultural, ethical or altruistic issues
Related Services	Provisioning and Regulation Services	Regulatory, support and cultural services	Provision, regulation, support	Cultural services
Appreciation of environmental education	Mitigation Dumpers manufacturers Consumers Recovery	Awareness Biodiversity Resource Maintenance	Formation Education Technology Qualification	Tradition Patrimony Experience Protection
Type of urban environmental service	Reduction Reuse Recycling Reverse logistic	Alliance Development Harnessing Agreements	Instruction Optimization Remediation Solution	Association Preservation Diffusion

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Who are they offered for?	?	?	?	?
Who are they benefitin g for?	?	?	?	?
Resource Source	Private initiative Social initiative	Internatio nal fund Union fund	Encourag ing science Technolo gy incentive	State fund Municip al fund
Economi c instrume nt	Compens ation Behavior al	Pactuatio n Collabora tion	Awards Innovatio n	Intellect ual prop. Recogni t.
Estimate d time	Months	Decades	Years	Years

Source: adapted from [5], [15], [12], [13] and [14]

IV. FINAL CONSIDERATIONS

Payments for Environmental Services are of economic value, since their lack of availability changes the levels of comfort and production of society. Stressing that the implementation of this environmental management instrument should be carried out considering ecological principles and understanding of the detailed functioning of each component.

It is also noteworthy that it is necessary to expand investments in ecological infrastructure made by government organizations in the federal, municipal and state levels, in order to encourage sustainable Environmental Education practices, through economic incentives, operating with social control in partnership with the instruments of command and control with civil society.

The Valorization of Environmental Education is an important awareness-raising tool, which, if combined with the principle of the provider-recipient, can stimulate and enhance environmental conservation actions, encouraging more providers of environmental services in the optimal maintenance of sustainability.

Considering sustainability regarding the way environmental services are calculated, there is still a non-explicit condition to actually assess its value from resource collection to the end of the production chain by adding Environmental Education as awareness-raising instrument, which is still difficult to value by presenting itself as something that is not feasible the reality of a PSAU.

Thus, this brief study added relevant information, understanding the need for exhaustive discussions so that in fact the valuation of environmental services occurs in order to promote sustainability, in addition to the inclusion of the PSAU fairly, so that they can public and private policies are implemented conducive to better management of services related to the urban environment.

REFERENCES

[1] BRASIL. Lei nº 12.305, de 2 de agosto de 2010. Institui a Política Nacional de Resíduos Sólidos. 2010.
[2] PALÁCIOS, M.P. Publicação sobre pagamento por serviços ambientais com foco em populações tradicionais. Rumo Sustentável, 2009.
[3] ALTMANN, A. Pagamento por serviços ambientais: imperativos jurídicos e ecológicos para a preservação e restauração das matas ciliares. Caxias do Sul, RS: Educs, p.81-82, 2009.
[4] FARLEY, J; COSTANZA, R. Payments for ecosystem services: From local to global. Ecological Economics. 69, 2060–2068. 2010.
[5] (IPEA) INSTITUTO DE PESQUISA ECONÔMICA APLICADA. Pesquisa sobre pagamento por serviços ambientais urbanos para gestão de resíduos sólidos. Relatório de Pesquisa, Brasília, 2010.
[6] PEIXOTO, M. Pagamento por serviços ambientais: aspectos teóricos e proposições legislativas. Brasília: Núcleo de Estudos e Pesquisa do Senado, nov. 2011.
[7] SANTOS, R. F.; VIVAN, J. L. Pagamento por Serviços Ecossistêmicos em perspectiva comparada: recomendações para tomada de decisão. Brasília: Projeto Apoio aos Diálogos Setoriais UE - Brasil, 2012.
[8] DAMOTTA, R. S. Manual para valoração econômica de recursos ambientais. Rio de Janeiro: IPEA/MMA/PNUD/CNPq, 1997.
[9] GUEDES, F. B; SEEHUSEN, S. E. Pagamentos por Serviços Ambientais na Mata Atlântica: lições aprendidas e desafios. – Brasília: MMA, 280p.
[10] NUSDEO, A. M. O. Pagamento por serviços ambientais: sustentabilidade e disciplina jurídica. São Paulo: Atlas, 2012.
[11] MONTEIRO, R. Pagamentos por Serviços Ambientais: análise do Produtor de Água no Pipiripau. Brasília: Monografia, CIÊNCIAS AMBIENTAIS – UNB, 2013.
[12] (IDESAM) INSTITUTO DE CONSERVAÇÃO E DESENVOLVIMENTO SUSTENTÁVEL DA AMAZÔNIA. Desafios e Oportunidades para a Implementação da Lei de Serviços Ambientais do Amazonas. Análise do Progresso após 180 dias da Lei Estadual. 2015.
[13] RÉGIS, A. A. O. Pagamento por serviços ambientais: uma promissora ferramenta de política ambiental. Rio de Janeiro: Lumen Juris, 2018.

https://dx.doi.org/10.22161/ijaers.611.11 *ISSN: 2349-6495(P) | 2456-1908(O)*

[14] SIQUEIRA, R. P. S. Pagamento por serviços ambientais: conceitos, regime jurídico e o princípio do protetor-beneficiário. Curitiba: Juruá, 2018.
[15] DAMOTTA, R. S. Valoração e precificação dos recursos ambientais para uma economia verde. In GRAMKOW, C. L.; PRADO, P. G. (coord.) Economia Verde: desafios e oportunidades. Belo Horizonte: Conservação Internacional, 2011.
[16] HASNER, C; ROMERO, T. C. Mercado de bens e serviços ambientais: desafios e oportunidades para a América Latina. 2010.
[17] BRASIL. Constituição da República Federativa do Brasil de 1988.
[18] BRASIL. Lei nº 9.795, de 27 de abril de 1999. Institui a Política Nacional de Educação Ambiental e dá outras providências. 1999.
[19] (ONU) ORGANIZAÇÃO DAS NAÇÕES UNIDAS. "El futuro que queremos". Rio de Janeiro: PNUMA, 2012.
[20] AMAZONAS. Lei nº 4.286, de 1 de dezembro de 2015. Institui a Política do Estado do Amazonas e o Sistema de Gestão dos Serviços Ambientais. 2015.
[21] CAETANO, P. P; MELO, M. G. S; BRAGA, C. F. C. Pagamento por Serviços Ambientais (PSA) – análise de conceitos e marco regulatório. Revista Principia. Divulgação Científica e Tecnológica do IFPB nº 31. João Pessoa. 2016.
[22] (MEA) MILLENNIUM ECOSYSTEM ASSESSMENT. Ecosystem and human well-being: synthesis. Washington D.C: Island Press, 2005.