

Environmental Public Expenses in the Brazilian States: A Study of the Period within 2002 and 2011

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Abstract This work aimed the analysis of the volume of disbursement done in the environment function by the Brazilian federation members, within 2002 and 2011. To do so, vertical and horizontal analysis of the expenses with Environmental Management and its subfunctions have been done. It was noticed that there was an increase of expenses in the environmental area in the period, but there was decrease of representativeness, since the expansion did not occur according to the growth rate of the total expense. On average, the expenditure concerning environmental issues in relation to the average total expense of the states decreased in the period. The Environmental Management of the states that had the biggest representativeness in the period were the ones that least kept regularity in disbursement in relation to the average. The country presented increase of Environmental Management expenses in the period and tendency to keep on growing, though its representativeness is insignificant if compared to the total expense. It is concluded that, in spite of the fact that Environmental preservation and conservation are subjects very talked about today, it is verified that, financially, little is done to favor the effectuation of the environmental protection in Brazil, since the participation of the environmental management was small, fact evinced in the analysis results.

Keywords: *Brazilian states, vertical and horizontal analysis, Environmental Management, environmental public expenses, sustainability*

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1. Introduction

The environmental issues have rarely had priority in the debates of the governmental agendas. The natural resources were regarded as everlasting and possible to be used to generate goods and services to the society without any rationalization criteria. This perception of the unlimited resources changed in 1992 with the execution of the United Nations Conference on Environment & Development (UNCED), in Rio de Janeiro, where it sought to find balance between the economic development and the planet's sustainable development.

From this historical moment to the mankind on, all countries considered developed or developing started a search to mitigate the effects of the industrialization in the environment without, by this mean, prejudicing the economic growth.

This conference was a landmark to the humanity, because the State, that was, until that moment, a big fomenter of the economic development, without concerning very much about the environment, found itself compelled to change its conduct and policies. It has taken the roles of inspector and protector of the natural resources, creating juridical instruments that might restrain or even prohibit the unsustainable exploration of

the environment in order to assure its preservation to the future generations.

Brazil is a country with wide legislation in both federal and state ambits; legislation whose premise is the natural resources protection, aiming to protect the environment through normative instruments.

Thus, the State, as a representative of the public interests and before its important role in the environmental regulation process, has contributed to the establishment of an institutional structure of environment, through various normative instruments, of which can be highlighted the Federal Law No. 4320, 1964; the Federal Constitution and the ordinance No. 42, 1999, of Ministry of Budget and Management.

The Federal Law No. 4.320, 1964, is the legal instrument that regulates the general norms of Financial Law to the elaboration and control of budgets and the balance sheet of the Union, States, Municipalities and the Federal District. However, it does not determine nor orient the federation members when it comes to financial applications in environmental matters [3].

The Federal Constitution of 1988, in its 23th article, claims that it is left to the Union, States and Federal District the duty to protect and combat the pollution in the environment in any of its forms. The 24th article says that the States and Federal District, as well as the Union, have got competence to legislate with regard to environmental

matters, but it does not demand any investment in protection and recovery. Such investment is taken care by the leader of each sphere and expressed in the Multi-Annual Plan – Plano Plurianual (PPA) [1].

The ordinance No. 42, 1999, of Ministry of Budget and Management also makes this responsibility evident, by setting the environmental management as the government attribution, besides listing subfunctions to its accomplishment [4].

Before this scenario, the objective of this study was analysing the amount of public resources invested in environment by the Brazilian states from 2002 to 2011.

2. Methodology

This study has been developed as an exploratory research, as few studies about environmental public expenses have been identified in Brazilian States. The exploratory research intends to reach an area in which there is little information accumulated, permitting an increase of information about the phenomenon aim of investigation and clarification of its main concepts [8].

This study is also a descriptive research, since it analyzed the evolution of the public expenses of the Brazilian states with environment. The descriptive research “observes, analyses and correlates (variable) facts or phenomena without manipulating them. It seeks to find out, with the biggest precision possible, the frequency with which a phenomenon occurs, its relation and connection with others, its nature and characteristics” [5].

The research can also be classified as bibliographic, since material existing in the literature has been used, providing a better view of the subject studied. The “bibliographic research is developed based on material already elaborated, constituted especially by books and scientific articles” [6].

Considering that the research’s main objective was analysing the public expenses with environment, the universe researched was the Brazilian states, viz: Rio Grande do Norte (RN), Roraima (RR), Amapá (AP), Maranhão (MA), Tocantins (TO), Roraima (RO), Espírito Santo (ES), Goiás (GO), Mato Grosso do Sul (MS), Mato Grosso (MT), Alagoas (AL), Acre (AC), Piauí (PI), Paraíba (PB), Pará (PA), Sergipe (SE), Santa Catarina (SC), Amazonas (AM), Pernambuco (PE), Rio Grande do Sul (RS), Distrito Federal (DF), Paraná (PR), Bahia (BA), Ceará (CE), Minas Gerais (MG), Rio de Janeiro (RJ) and São Paulo (SP).

To do this work, data referring to the financial execution of the Brazilian states from 2002 to 2011 have been obtained from the Secretariat of National Treasure. The environmental expenses of each state have been collected, as well as the Environmental Management subfunctions and the amount of expenses of all the states.

It has been done horizontal and vertical analysis in order to verify the performance of the states’ investments in environmental issues, showing the importance of each subfunction in the whole, the paths trailed and the possible tendencies of the expenses with environment in Brazil.

In the vertical analysis it is visualised the importance of each calculation in regard to the financial demonstration it belongs to, in order to infer whether there are items out of the normal proportions. In the horizontal analysis it is

noticed the evolution of each subfunction (Environmental Preservation and Conservation, Environmental Control, Recovery of Degraded Areas, Hydric Resources e Meteorology) of the Environmental Management from 2002 to 2011 [7].

In order to identify whether there is statistic difference in the environmental disbursement between the five Brazilian regions, a model was estimated, whose explanatory variables are the dummies for each region. To do so, the following function was defined:

$$Y_i = \beta_1 + \beta_2 D_1 + \beta_3 D_2 + \beta_4 D_3 + \beta_5 D_4 + e_i$$

In which

Y_i = average value of the disbursement with the states environmental management

$\beta_1, \beta_2, \beta_3, \beta_4 e \beta_5$ = function coefficients

D_1 = 1 to the Southern states and 0 to the others

D_2 = 1 to the Southeastern states and 0 to the others

D_3 = 1 to the Midwestern states and 0 to the others

D_4 = 1 to the Northeastern states and 0 to the others

3. Results and Discussions

3.1. Total Expense and Environmental Management Expense Analysis in Brazil

The analysis of the public expense with Environmental Management was based on the volume of resources executed in the environment function by the members of the federation within 2002 and 2011.

Table 1. Environmental Management Expense versus Total Expense of the states within 2002 and 2011 (in millions of US\$)

States	Total Expense	Environmental Management	
Brazil	1,706,030.14	10,622.97	0.62%
RN	23,709.13	313.17	2.9%
CE	52,521.02	667.76	6.3%
SE	18,473.58	131.55	1.2%
BA	85,333.97	505.93	4.8%
PI	18,367.25	101.64	1.0%
PB	21,490.18	111.73	1.1%
AL	18,780.37	94.79	0.9%
PE	58,756.14	215.27	2.0%
MA	28,591.75	38.64	0.4%
TOTAL	326,023.38	2,180.48	20.5%
MT	33,363.31	232.32	2.2%
DF	44,083.77	256.74	2.4%
MS	27,054.43	86.56	0.8%
GO	47,086.29	83.21	0.8%
TOTAL	151,587.81	658.82	6.2%
AC	11,609.97	98.12	0.9%
RR	7,081.55	5.91	0.1%
AM	32,721.30	160.29	1.5%
RO	15,934.16	63.53	0.6%
TO	15,860.48	49.13	0.5%
PA	37,883.05	114.15	1.1%
AP	9,003.00	19.78	0.2%
TOTAL	130,093.51	510.90	4.8%
RJ	178,007.84	1,484.70	14.0%
SP	483,468.94	3,890.44	36.6%
ES	41,244.27	81.10	0.8%
MG	157,517.63	968.49	9.1%
TOTAL	860,238.67	6,424.73	60.5%
PR	80,099.58	447.33	4.2%
SC	47,807.16	151.78	1.4%
RS	110,180.02	248.91	2.3%
TOTAL	238,086.76	848.03	8.0%

Source: Elaborated based on STN (Ministry of Treasure) data

On Table 1, it was compared the Environmental Management Expense of the states to the Total Expense, in order to know the representativeness of the expense with Environmental Management in the total expenditure from 2002 to 2011.

The share of Environmental Management expense in the total expense of the country during the period was 0.62% only. In the face of the contemporaneous discussions about the environmental issues and the search for sustainability, it was hoped more significant expenses in such area. The seven states to be highlighted for surpassing this percentage were: Rio Grande do Norte, Ceará, Acre, Rio de Janeiro, São Paulo, Sergipe and MatoGrosso; whereas the states of Goiás, Maranhão and Roraima were the ones that least directed resources to the environmental matters, with share under 0,20% in the total expenses in the period.

It is noticeable that the discrepancy of environmental public disbursement between the various Brazilian states highlighted in Table 1 may be due to the inexistence of a state policy, like it determines the country Federal Constitution, regarding the expenses with health and education, 15% and 25%, respectively. In these specific cases, the State has to invest these minimum percentages in the budget. Regarding the environmental public disbursement, since there is no legal determination, it is up to the public manager, in federal, state or municipal spheres, to destine the financial resources according to his/her governmental policy.

By analysing the Brazilian regions (Northern, Northeastern, Southern, Southeastern and Midwestern), it is possible to perceive that it was directed to the Southern region a little more than half of the total expenses in Brazil in the period studied (50,4%). It may be so due to the fact that this is the country's principal region, where the economic and political centres and the biggest populational concentration are (Table 2).

However, it is shown by Table 2 that Northern region received only 7,6% of the total expenses of Brazil within 2002 and 2011. A possible explanation for this small allotment may be lied in the fact that this region presents low economic development and low population density.

Table 2. Share of Brazilian regions in the total expenses of Brazil within 2002 and 2011 (in millions of US\$)

Regions	Total Expense	Share
Northern	130.093,51	7,63%
Northeastern	326.023,38	19,11%
Midwestern	151.587,81	8,89%
Southern	238.086,76	13,96%
Southeastern	860.238,67	50,42%
Brazil	1.706.030,14	100%

Source: Research Data

With the same principle used before, it was analysed the representativeness of each region concerning expenses with Environmental Management in the period from 2002 to 2011. Thus, it can be seen that the Southeastern region spent 60,5% of all environmental expense of Brazil. This situation can be explained by the fact that the region is the country's biggest one and, therefore, receives more attention from the public rulers.

However, it is surprising how low the expense of the Northern region with Environmental Management is, representing only 4,81% of what was spent in Brazil

(2002 a 2011). As previously mentioned, in view of all debates about the necessity of environmental preservation to achieve sustainability, it was expected that this region had bigger resources application in environmental sphere (Table 3).

Table 3. Share of the Brazilian regions in the disbursement with environmental management from 2002 to 2011 (in millions of US\$)

Regions	Environmental Management	Share
Northern	510,90	4,81%
Northeastern	2.180,48	20,53%
Midwestern	658,82	6,20%
Southern	848,03	7,98%
Southeastern	6.424,73	60,48%
Brazil	10.622,97	100%

Source: Research Data

Through the analysis of the states' total expenses from 2002 to 2011, having 2002 as reference, it is verified that there was growth, ranging from US\$ 97,7 million in 2002 to US\$ 268,931 million in 2011, what represents a rise of 175% in the period. The expense with Environmental Management presented growth of 91% in the same period, ranging from US\$ 802.475 million in 2002 to US\$ 1,532 million in 2011.

Before the data presented above, it was sought to identify if there is statistic difference of environmental expenses in the Brazilian regions. The Northern region was adopted as reference, since it has a big Amazon Forest area. Based in the regression defined in the methodology, the following regression was estimated (in millions of dollars):

$$Y_i = 6.50 + 18.76D_1 + 137.17D_2 + 8.19D_3 + 15.13D_4 + e_i$$

Std. Err. (47.20) (47.20) (78.30) (78.30) (63.00)

t (0.31)^{ns} (0.49)^{ns} (3.95)^{**} (0.24)^{ns} (0.54)^{ns}

R² = 0,4558

ns = values bigger than 5% (not significative)

** = values inferior to 5% (significative)

In order to identify if there is heteroscedasticity, the White's Test was applied, through which it was obtained the value of 11.84 with p-value of 0.0186. Thus, the null hypothesis (H_0) of heteroscedastic model was rejected. Concerning multicollinearity, the Variance Inflation Factor (VIF) was used to identify its existence. The average VIF of 1.37 was obtained, indicating the rejection of null hypothesis (H_0) of multicollinearity.

Through the regression data, it was possible to notice that the average expense of the Northern region in the Environment function was about US\$ 6.5 million. The average expense of Southern region was superior to the Northern region one in about US\$ 18.76 million. The expense of Southeastern region were bigger than Northern region one in approximately US\$ 137.17 million. Midwestern region spent US\$ 8.19 million more than Northern region. And Northeastern region destined about US\$ 15.13 million more than Northern region. Considering the significance of 5%, it is possible to observe that disbursement in the Environmental function in the Northern, Northeastern, Midwestern and Southern regions are statistically alike, since their p-values were superior to 5%. However, in regards to the Southeastern region, at 5% of significance, the coefficient was significant, what implies to say that the expenses in the

Environmental function differ from the Northern region one.

The Northern region is made up by states that have direct connection with the Amazon Forest and compose the Legal Amazon (Acre, Amapá, Amazonas, Roraima, Rondônia, Pará, MatoGrosso, Tocantins e Maranhão), with the inclusion of a Midwestern state (MatoGrosso) and of a Northeastern one (Maranhão). Thus, it was expected that these states, once having in their respective territories a percentage of native forest, destined public resources to environmental preservation. In spite of that, the amount set is too little in regards to the necessity of preservation in an area of about 5.217.423 km². This small allotment of resources can be explained also by the little share of the states in the Gross National Product, comparing to the Southeastern region, which is the economic and political center of the country, and whose share in the Gross National Product is very relevant.

Figure 1 presents the evolution of the Environmental Management expense of the Brazilian States in the period analysed. By means of the horizontal analysis, it is verified increase in the Environmental Management total expense of the Brazilian States in all years studied, comparing to the initial level, ranging from 2% to 96% (Figure 1).

The expansion happened in the period, in relation to the subfunctions analysis initial level (2004), was due especially to the subfunctions: Environmental Preservation and Conservation; Hydric Resources; and the Other Subfunctions group that presented, respectively, increase of 71%, 97% e 239%. Besides, the subfunctions mentioned had the biggest levels of representativeness in the Environmental Management function, representing 21%, 16% e 37% of the total, respectively.

The growth of the expense with Environmental Management in the states in the period reached 91%, with representativeness of 0,57% of the total expenses in 2011.

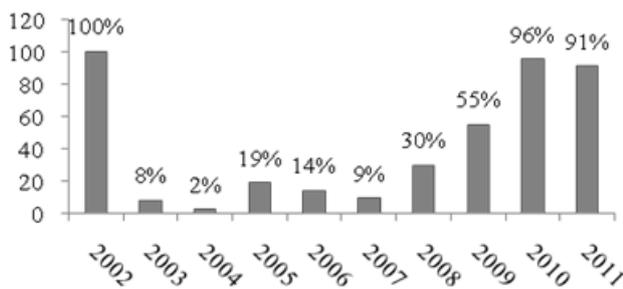


Figure 1. Horizontal Analysis of the expense with Environmental Management of the States (Source: Research Data)

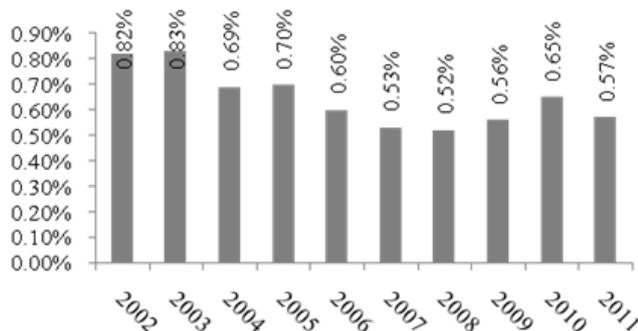


Figure 2. Horizontal Analysis of the Environmental Management Expense of the States (Source: Research Data)

It is noticed growth of the expense in the environmental area in the period. However, the increase did not happen at the same rate of the total expense, since there was decrease of representativeness. Through Figure 2, it is perceived that in 2002 the share of Environmental Management expense in the Total Expense summed 0,82% and in the last year (2011) reached only 0,57%, making evident the fall of resources allotment to expenses with environmental activities.

In financial terms, the evolution of the States expenses with Environmental Management summed less than US\$ 99 million in the period analysed, except in the States of São Paulo, Rio de Janeiro and Minas Gerais.

The States that had the biggest outlays in the period were São Paulo, Rio de Janeiro and Minas Gerais, reaching more than the half of the amount spent with Environmental Management from 2002 to 2011, with 60% of the expense against 40% referring to the sum total of all other States, in the last year analysed.

The state of Ceará, in the beginning of the period, also had significant representativeness in the Environmental Management Total Expense of the States (12,84%), but its expenditures with environment decreased during the term studied, remaining close to the average of the other States expenses. The Environmental Management Expense of the other 23 states was, on average, inferior to 2% during all the period (Figure 3).

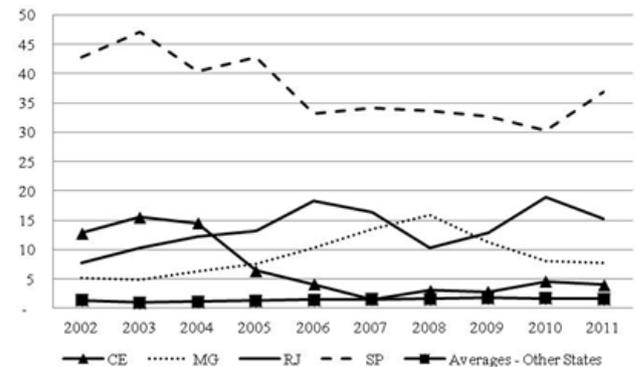


Figure 3. Representativeness of the states in Environmental Management Expense (Source: Research Data)

3.2. Environmental Management Expense Analysis by Subfunction

The expense by subfunctions will be analysed in the period from 2004 to 2011, since the members of the federation did not present their expenses with such division in the years prior to 2004.

The Table 4 presents the development of the Environmental Management Expense analysed by government subfunctions. It is noticed that the States started to invest less in Hydric Resources and Meteorology. During the first two years, there was decrease of the Hydric Resources subfunction, and in 2007, it started to increase again, but remained below the level of initial investment till the year of 2010, when it presented growth of 12%, ending the term (2011) this way, stable; whereas the outlay with Meteorology was reduced, so much so that it came to nullity in 2008.

It is emphasized that, in spite of the Degraded Area Recovery subfunction presented the highest level of growth in the period, reaching 595%, its representativeness in the

Environmental Management expense did not exceed 3% in all period.

Table 4. Progress of the States Expenses with Environmental Management by subfunction (percentage)

Subfunctions	2004	2005	2006	2007
Environmental Preservation and Conservation	0	26	61	49
Environmental Control	0	36	25	51
Degraded Area Recovery	0	-65	-46	-58
Hydric Resources	0	8	-46	-57
Meteorology	0	38	-77	-72
Other Subfunctions – Environmental Management	0	9	66	58
Subfunctions	2008	2009	2010	2011
Environmental Preservation and Conservation	45	55	108	71
Environmental Control	70	106	120	97
Degraded Area Recovery	75	206	595	319
Hydric Resources	-41	-20	12	12
Meteorology	0	0	0	0
Other Subfunctions – Environmental Management	110	147	194	239

Source: Research Data

Before such data referring to the environmental public expenses in Brazil and in its various states, it is possible to perceive that the environmental issues in the country are still incipient, since there is not a state policy able to determine a minimum percentage of the budget destined to preservation and recovering of forests, rivers, lakes and other natural resources. As such, it is the managers' choice to destine resources, as much as they find sufficient, to the environmental protection. In order to solve these bottlenecks, especially referring to environmental issues, it is necessary the sanction of a law that determines a minimum percentage of the public budget to be allotted by each state in the environmental sub functions.

4. Final Considerations

Since the objective of this work was to analyse the amount of financial resources spent with Environmental Management in the Brazilian States, it was perceived that the states of Rio Grande do Norte and Ceará were the ones that most directed resources to cost environmental issues, the only ones with representativeness above 1% of the total expense of the period; whereas Goiás, Maranhão and Roraima had the smallest shares of participation in the Environmental Management Expense, inferior to 0,20%. And the country had share of only 0,62% in the period, what can be improved, in view of so much discussion about environmental issues and search for sustainable development increasingly more frequent in both national and international contexts.

Considering the Brazilian regions, the Southeastern one represents a little more than half of the total amount spent in Brazil in the period of analysis (50,4%) and in the Environmental Management it had share of 60,5% of all outlay in Brazil, situation associated to the fact that this region is the country's most economically and politically

developed one, besides having the biggest populational concentration.

Concerning the environmental impacts caused by economic activity, it is necessary, especially in the Southeastern region, that the federation members adopt an environmentally sustainable model of management, in order to minimize the degradation provoked by the economic growth. To do so, Stiglitz (2003) highlights that, in order to reduce the inefficacy of the externality, it is necessary governmental interventions, through regulation, fines and incentive actions, to orient social behavior.

The Environmental Management of the country increased in the period and presents tendency to keep on increasing. However, the representativeness of the expense with environment is insignificant when compared to the total expenses of the States.

In spite of the fact that questions about environmental preservation and conservation are very talked about in the country, it is seen that, in practical terms, little is done to contribute to the effectuation of the environmental protection in Brazil, illustrated by the little participation of the Environmental Management, evinced by analysis results.

It can be perceived that the divulgation of public expenses in Brazil, including the disbursement with environment, is a recent governmental action yet, imposed by the Fiscal Responsibility Law [2], promulgated in 2000; and that the environmental issues in the country are still ruled by ideological discourses without effective actions that assure sustainability.

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