

The "Ecological" Value Added Tax (*ICMS-Ecológico*) in Brazil and its effectiveness in State biodiversity conservation: a comparative analysis

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Abstract

Fiscal transfer schemes are being widely used to redistribute public revenues from national and subnational to local governments. Since the 1990s, environmental fiscal transfer (EFT) schemes were implemented as part of an integrated set of incentives to reward local government efforts toward sustainable development. Responding to emerging concerns over resource conservation, agricultural expansion and biodiversity, Brazil pioneered the introduction of EFTs through the adoption of the *ICMS Ecológico* (ICMS-E) in a number of states to compensate municipalities for land-use restrictions and opportunity costs imposed by protected areas. The ICMS-E arose from the constitutional prerogative that states may legislatively allocate up to 25% of the revenues they devolve to municipalities from value added taxation, according to their own criteria (rather than on the basis of revenues generated locally alone). Although the ICMS-E was originally introduced to compensate for land-use restrictions, it soon developed into an incentive to create new protected areas. However, two important shortfalls impede its effectiveness in this regard: 1) ICMS-E revenues are not earmarked to support local government environmental expenditures unless local governments pass complementary legislation, and 2) the amounts devolved for this purpose are diluted by the instrument's very success; as it represents a fixed proportion of overall value added revenues, additional protected area creation reduces the proportionate amount of overall value added taxes devolved per unit area. Discussion is still underway concerning the real impacts of ICMS-E in Brazil, but a similar instrument has been created in Portugal and is under discussion in other countries. This paper aims to provide a policy analysis of the ICMS-E in Brazil with respect to its environmental effectiveness, distributive impacts and the institutional requisites for its improvement. Pointing to the results of prior research, we describe the experience of several states that enacted ICMS-E legislation over a similar period, pairing them with other states that have not yet implemented the instrument. Progress in protected area creation in the selected states will be compared from a BACI (before-after-control-intervention) perspective, taking into account the typology of conservation units and the apparent role of municipal governments in their creation. The following questions will be discussed: (a) to what extent has the introduction of the instrument and relative volume of ICMS-E allocations appeared to stimulate state and local responses to promote greater conservation?; (b)

is there a threshold beyond which the instrument is no longer effective (related to the fixed proportion of ICMS-E revenues or to geographic limitations to protection)?; (c) What are the social impacts and the fairness in inter-municipal allocation of ICMS-E? (d) What legal and institutional arrangements including requirements for local participatory budgeting and conservation quality assessment as a complement to EFT allocation weighting could allow an improvement in the effectiveness and equity effects of the ICMS-E implementation?

Introduction

Intergovernmental fiscal transfers have been identified as an innovative instrument for compensating local jurisdictions for the ecological goods and services they provide across local boundaries (Tacconi et al., 2011). Since the 90s, these types of schemes are being implemented as part of a strategy to create an integrated set of incentives to support sustainable development (policymix). From a public finance perspective, fiscal transfers are a suitable instrument for internalising spatial externalities and fortifying intergovernmental financial capacity. However, most federal states use this instrument predominantly to reward public sector social and economic performance rather than for ecological attributes or protective efforts (Ring, 2008).

Brazil was the first country to introduce ecological fiscal transfers, through the adoption of the “ICMS Ecológico” (ICMS-E) in a number of states to compensate municipalities for land-use restrictions imposed by protected areas. The ICMS-E emerged from the possibility of setting environmental standards and criteria for a portion of the ICMS (value added tax on goods and services) revenues that are devolved to the municipalities. Although the ICMS-E was originally introduced as a compensation for land-use restrictions, it has been seen to evolve over time into an incentive to create new protected areas. Part of the revenue from this value-added tax is redistributed to the local level on the basis of ecological indicators. In this way, states use fiscal transfers to compensate municipalities for the dedication of lands to protected areas and for other ecological services provided within their territories that have repercussions beyond the municipalities themselves. Based on the Brazilian experience, analysts have contended that such fiscal transfers can represent both a compensation for land-use restrictions and an incentive to value and engage in more conservation activities at the local level. However, research is still needed on the effectiveness of the ICMS-E in Brazil as a basis for recommendations to extend the instrument to other states as well as to other nations where such approaches are being tested.

This paper aims to provide an exploratory policy analysis of the ICMS-E in Brazil with respect to its environmental effectiveness and institutional context. The research examines the hypothesis: To what extent have ICMS-E allocations appeared to stimulate local responses to promote greater conservation? After examining the response in other Brazilian states, the case of the state of Mato Grosso will be analyzed in greater depth. In order to answer this question we will use a single dataset – the national cadaster of protected areas – in two different time periods: before and after the ICMS-E was introduced in each state. The paper is structured as follows: section (1) will provide the historical context in which Brazil introduced environmental fiscal transfers. Section (2) looks at

how the ICMS-E works in Brazil looking at the institutional arrangements of the instrument. The methods are described in section (3). Finally, section (4) will show the results and section (5) draw some conclusions.

1. Environmental Fiscal Transfers in Brazil

Economic instruments (EIs) are being increasingly used in different countries for environmental conservation. This paper will seek to compare the practical results of the use of environmental fiscal transfers in Brazil under the ICMS-E, taking into account the objectives that guide creation of such instruments, which involve encouraging conservation behavior and maximization of social welfare.

State intervention in economic activity for environmental protection purposes may occur through mechanisms of direction, by imposing prohibitive or permissive standards, as well as by mechanisms of induction, leading to desirable behaviors (Modé, 2009). The ICMS-E fits into the latter category, in which municipal governments are rewarded for proactive expansion in the protected area system. It is hoped that such a rewards approach can improve upon command and control mechanisms whose environmental effectiveness and revenue generating potential through charges and fines on reprehensible behavior is not always adequate, particularly in states which lack surveillance capacity.

In search of solutions, such reward-based EIs may represent economically efficient and environmentally effective approaches to complement strict command and control actions. By providing incentives to promote resource protection, such EIs allow the social cost of environmental control to be reduced while generating revenues to the coffers of local government needed to support maintenance of protected areas and buffer zones (Serôa da Motta, 2002).

As an alternative to environmental taxes or eco-taxation, such an approach would invert the polluter pays principle by intervening in the economic domain through a promotional approach. For Yoshida (2005), such an approach represents a real change from a passive approach, which is concerned more with repressing harmful actions, to an active one, which is concerned more with promoting beneficial than harmful actions.

In the early 1990s, such promotional environmental policies began to be implemented in Europe: Sweden decreased income taxes while increasing taxation on energy consumption. Denmark, Norway and Finland carried out the so-called Green Reform, to shift the focus to tax polluting activities while stimulating environmental amenities; Germany increased energy taxation and incentives to encourage water treatment (Oliveira, 2010). The movement toward promotion of environmental services through payments and transfers, as found in the European Agricultural Directive, and environmentally differentiated consumer prices through eco-labeling are other manifestations of a more widely adopted promotional approach to environmental policy.

Due to concerns about conservation, deforestation and biodiversity, Brazil was the first country to introduce ecological fiscal transfers (EFTs) through the adoption of the ICMS-E in a number of states to compensate municipalities for land-use restrictions imposed by protected areas. In Brazil, it is difficult for municipalities to generate income from conservation and related ecosystem services.

Environmental protection is often established at higher levels of government and although protection is identified as beneficial to the well-being of people beyond municipal boundaries, the associated costs (in terms of land-use restrictions) are often borne by local actors. The designation of protected areas for biodiversity or water conservation, for example, often faces opposition at local levels due to land use restrictions for economic purposes (Ring, 2008).

2. The Brazilian environmental policymix

In Brazil, the National System of Protected Areas (SNUC) had its origins in the 1970s, when the former Brazilian Institute for Forestry Development (IBDF), with the support of a national NGO (Brazilian Foundation for the Conservation of Nature), detailed a Plan for a System of Conservation Units in 1979 (Souza et al, 2011). The plan, approved in 1982, defined a typology of protected areas as well as resource management criteria. Legal provisions were developed over the ensuing decades to give form to the SNUC, which finally was passed as Law No. 9985 of July 18, 2000, and regulated by Decree No. 4340/2002.

The SNUC has as its primary objectives: to contribute to the maintenance of biological diversity and genetic resources within the national territory and territorial waters; to protect endangered species; to preserve and restore natural ecosystems; and to promote natural resource based sustainable development. The SNUC is the only national policy instrument specifically created to define the purpose and implement protected areas, but it does little more than designate such areas and to attempt to protect them (often unsuccessfully) against conflicting uses.

In August 1981, Federal Law No. 6938 established the National Environment Policy, creating the National Environment System (SISNAMA), led by the National Environment Council (CONAMA), composed of federal ministries, as well as state environmental agency, industrial and civil society representatives. Its role is to set standards and to define mechanisms and instruments to protect environmental quality, including incentives, education, control, licensing, zoning, etc. One of its principal initial acts was to establish the requirement for Environmental Impact Assessment and Reporting (EIA/RIMA), as well as to regiment environmental licensing procedures at the federal level and the recognition of ecological zoning as an instrument of planning. During the 1990s, Ecological Economic Zoning was adopted in different regions in the Amazon as an instrument for territorial and environmental management with the intention to integrate natural and social aspects into land use and management.

National environmental policy achieved constitutional status in the Brazilian Constitution of 1988, which guarantees an ecologically balanced environment as a common right of the citizenry, making it a duty of government and society “to defend and preserve it for present and future generations”. State and municipal governments are obligated to create departments and councils

able to respond to the population's environmental concerns. Addressing the overall lack in municipal environmental technical and financial capacity became a central institutional concern.

In response to the governance requirements established by the 1988 Constitution, in the early 90s the landmark state of Paraná created the ICMS-E as a measure to compensate municipalities which faced opportunity costs from revenue loss due to watershed protection for water supply to the larger Curitiba metropolitan area. Rather than make such compensation restricted to this area, legislators determined to extend it to the entire state, and to include an equal share for other protected areas. Such areas include public and private areas protected under the SNUC as well as locally relevant common property forest areas known as *faxinais* (Ring et al, 2011).

3. Expansion in adoption of the ICMS-E in Brazilian states

Since their adoption in Brazil, in 1991 by Paraná, ecological fiscal transfers (EFTs) have been increasingly legislated at the state level. Such transfers are financed without creating a new tax, but through the reallocation of existing revenues, in particular, the value added tax on goods and services (*imposto sobre a circulação de mercadorias e serviços* - ICMS). Section II of Article 155 of the Brazilian Federal Constitution empowers the states to impose a tax "on circulation of goods and services of interstate and intermunicipal transportation and communication (...) (ICMS)". Value added taxes are permitted to vary, but internally they are mostly set at 17%, while interstate commerce is taxed in most cases at 12%. The ICMS constitutes by far the principal source of state and local fiscal revenues, constituting 84.5% of all states' revenues in 2010, and an even greater share of municipal revenues (IPEADData, 2012).

Article 158, IV of the Constitution, in turn, which addresses the distribution of tax revenues, "provides that twenty-five percent of the total revenues from the collection of the state tax on transactions related to the circulation of goods and services of interstate and intermunicipal transportation and communication accrue to the municipalities." The same Article states that "the portions of income accruing to municipalities, will be credited according to two criteria: (i) at least three quarters, on the proportion of added value in transactions involving the circulation of goods and the provision of services carried out in their territories, and (ii) up to one quarter, according to the state's legal provisions. " Figure 1 describes the breakdown of ICMS taxation, and the share that may be apportioned toward ICMS-E.

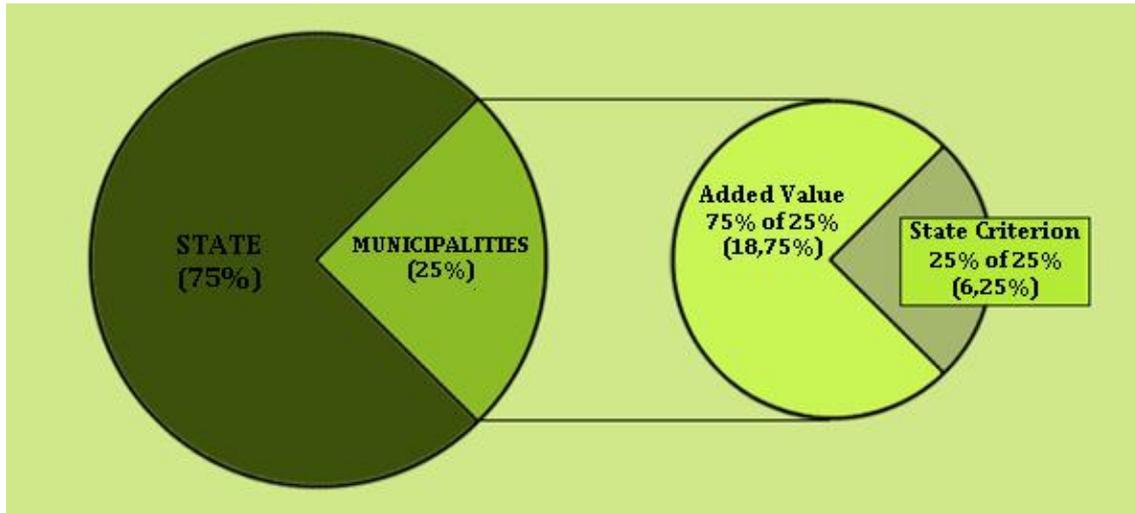


Figure 1. Source of fiscal revenues for ICMS-Ecológico.

The ICMS-E acts thereby as a revenue neutral tool to promote conservation of biodiversity while compensating a municipality for the protected areas existent in its territory.¹ The instrument may also encourage the creation of new protected areas: municipalities may act proactively to create new PAs, thus increasing their share of the overall ICMS-E allocation. In general, environmental criteria reflected in the ICMS-E include, in addition to protected areas, other factors such as primary sanitation investment and water resource protection. Variables such as poverty indices, rural population, share of local income coming from agriculture, and other factors, are used by some states in allocating such revenues. The proportional share of the 25% devolved to municipalities derived solely from protected areas in each state adopting the instrument is described in Ring et al. (2011).

The ICMS-E has been adopted to date by law in 14 Brazilian states: Paraná (1990), São Paulo (1993), Minas Gerais (1995), Rondônia (1996), Amapá (1996), Rio Grande do Sul (1997), Mato Grosso (2000), Mato Grosso do Sul (2000), Pernambuco (2000), Tocantins (2002), Acre (2004), Rio de Janeiro (2007), Ceará (2007) and Piauí (2008) (Figure 2). All 14 states included a conservation factor in the allocation formula, ranging from 2 to 20% of the share (25%) of ICMS revenues constitutionally devolved to municipalities. Although the instrument began to be adopted in the south and southeast of Brazil, it is by no means restricted to the more economically well off regions; several states in the Amazon, beginning with Rondônia, have adopted the instrument. In many cases, the value of the transfer of the ecological ICMS represents a significant amount of the municipal budget, ranging from 28% to 82% of total funds received (Campos, 2000).

¹ The ICMS-E is revenue neutral, because the overall revenue base from which it is derived is not altered by the allocation formula. At a municipal level, however, governments receive differential amounts of resources derived through the mechanism, affected by the proportion of each municipal area dedicated to protected areas in distinct conservation classes. There is thus a promotional effect incorporated in the mechanism, that rewards those municipalities which have dedicated a greater than average share of their territories for this purpose.

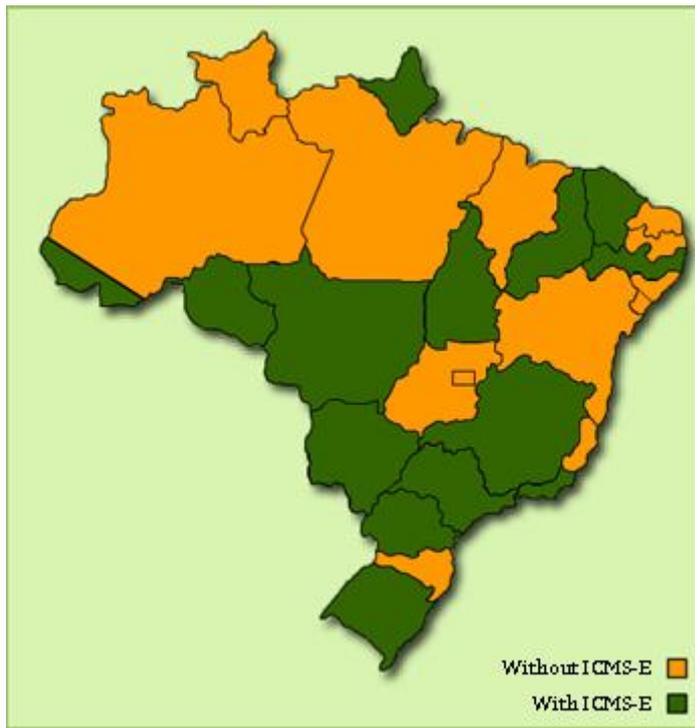


Figure 2. States with/without ICMS-E (Ring, 2011)

Loureiro (1997) asserts that the ICMS-E contributed positively to increase the extent of protected areas in these states as municipalities sought to increase their revenues by this means. But above all, one of the main contributions was to make more relevant the inclusion of protected areas as part of the agenda of public administrators, including provision for budgets, structure and capacity building. The gross value of resources reallocated to municipalities benefiting from the program, by state is shown in the below table, having attained a value of R\$ 446 million in 2009 in 11 states for which data was available, most of which (R\$ 406 million) was due to the PA criteria.

Table 1. Value of ICMS-E redistributed on basis of Protected Areas, 11 states, 2010.

STATE	TOTAL PERCENTAGE OF THE ECOLOGICAL VAT	COEFFICIENT ADOPTED FOR THE CU CRITERIA	VALUE OF THE ECOLOGICAL VAT IN 2009 (R\$ MILLION)	VALUE OF THE ECOLOGICAL VAT GENERATED BY THE CU CRITERIA (R\$ MILLION)
Acre	5%	5%	-	1.5
Amapá	1.4%	1.4%	1.0	1.0
Mato Grosso	5%	5%	-	68.4
Mato Grosso do Sul	5%	5%	39.4	39.5
Minas Gerais	1%	0.5%	45.4	22.7
Paraná	5%	2.5%	124.1	62.1
Pernambuco	15%	1%	-	13.5
Rio de Janeiro	2.5%	1.1%	37.9	17.1
Rondônia	5%	5%	90.7	90.7
São Paulo	0.5%	0.5%	78.2	78.2
Tocantins	13%	3.5%	29.7	8.0
Total			446.4	402.7

SOURCE: DATA OBTAINED FROM THE WEBSITE WWW.ICMS-ECO-LOGICO.ORG.BR AND STATES' DEPARTMENTS OF FINANCE.

Source: Medeiros et al., 2011.

Once legislatively approved, state governments must adopt regulations in which they set forth the adjusted municipal allocation formulae, and calculation procedures. Simulations have been performed in many states as a means to negotiate the specific formulae. Although some municipalities will invariably lose a portion of the revenues they would have received without these measures, such municipalities are typically urbanized, lacking in green space and difficult to identify new protected areas, so they may not easily be brought into the benefits of the program as time goes on. Municipalities that lose tax revenues due to ICMS-E allocations are usually those with higher overall revenue, so the loss in per capita terms may not be significant.

Besides the difficulties in negotiating an equitable revenue sharing formula, two frequently cited problems with the ICMS-E as an environmental fiscal transfer (May et al., 2002; Ring, et al., 2011) are its fixed coefficients over time. Amounts allocated for the area conserved in a given municipality may actually decline if the total protected area in the state increases at a greater rate than that of the municipality in question, and total ICMS collected in the state does not increase commensurately. It is plausible that local governments may then become less motivated to protect additional biodiversity if their revenues from this source fall over time.

Secondly, since states are constitutionally disallowed from earmarking taxes they reallocate to municipalities, the specific use of additional revenues derived from the ICMS-E is discretionary to the local government. Environmental expenditure conditionality is not exercised. Indeed their expenditure on infrastructure or business attraction incentives that facilitate land use change may thus paradoxically threaten the very protected areas that triggered the availability of these additional fiscal resources.

The ICMS-E in Brazil has been widely cited as an instrument not only for compensation of the opportunity costs associated with dedicating land to conservation or watershed protection, but also as a incentive mechanism to motivate municipal governments to press for creation of new protected areas (Loureiro, 1997). To our knowledge, however, the effectiveness of the instrument in stimulating creation of new protected areas has never been analyzed empirically.

4. Materials and methods

This paper reviews national protected area creation statistics over time to identify the possible role of the ICMS-E in motivating enhanced biodiversity conservation in Brazilian states and municipalities. Two analyses were carried out in this paper to investigate the environmental effectiveness of the ICMS-E, to identify whether the instrument serves as a stimulus to promote greater conservation.

In the first analysis, we observed the rate of creation of additional protected areas in the states that have enacted the instrument, before and after its implementation. Here we focused on the evolution of total area under PAs in these states, on an annualized basis.

The second analysis consisted in a pairwise comparison between states which have and which have not enacted the ICMS-E. This was an attempt to simulate a Before-After-Control-Intervention (BACI) type of analysis. Due to considerable differences between the states, we sought to reduce regional effects by selecting states in pairs within the same biome, of similar territorial size and development level. In this analysis we did not attempt to control for the timing of intervention, but simply compared those states which have the instrument in place with those that do not, over the same period.

For both analyses the data used was derived from information on individual PAs reported by their managers and maintained within the National Cadastre of Protected Areas (CNUC). A database was created including all PAs for which information was provided in the CNUC, with information such as name, level of restriction of use, management categories, year of creation, level of government, area, biome and state. We were particularly careful to discriminate between PAs created at a federal, state and municipal level and whether the PAs were in the category of integral protection (parks, reserves) or sustainable use (extractive reserves, APAs), as these features affect their weight in the state ICMS-E allocation formulae.

It is important to remark that although the CNUC is an official federal data source, it has imperfections which prejudice the analysis. These imperfections are related both to missing PAs in the register and to erroneous information, such as PA area. Some such errors were discovered while the analysis was in progress and were revised insofar as possible. For example, some PAs are listed in more than one state, but the relative area in each state is not readily evident in the database; these were adjusted approximately by examining location maps.

We must particularly highlight the absence of an unknown number of municipal PAs in the register. For example, Mato Grosso according to the CNUC had no municipal PAs, but on consultation with state authorities, it was found that a number of such units had been created immediately prior to and after the enactment of the ICMS-E in the state. This factor has disturbed the analysis, in which we were particularly interested in the response of municipal governments to the instrument. To compensate, we carried out an in-depth analysis of the Mato Grosso case.

5. Results

5.1 Creation of protected areas before and after ICMS-E

As an initial attempt to establish the effectiveness of the ICMS-E in stimulating creation of new protected areas in Brazil, Table 2 and Figure 3 below show the annual average rate of creation of

protected areas before and after enactment of the instrument in each state. Due to the fact that there is a gap between enactment and the impacts of its creation, the year of creation was included in the period “before” the ICMS-E (although it is also apparent that the proximity of the implementation of the mechanism may have led to anticipatory creation of PAs).

In the first column of the table are the states where the mechanism is in operation. The second column shows the years of creation of the mechanism in each state (according to Ring et al., 2011). The third and fourth columns show the average annual increment in PA area registered in the CNUC, before and after the implementation of the ICMS-E (beginning in 1980).

Table 2. Annual average PA creation (ha)

State	Year Enacted	Before ICMS-E	After ICMS-E
<u>North</u>			
AP	1996	127,582	509,222
RO	1996	198,466	64,364
TO	2002	153,684	23
<u>Northeast</u>			
CE	2007	38,028	10,165
PE	2001	22,050	8,026
PI	2008	92,750	0
<u>Ctr-West</u>			
MS	2001	45,297	42,949
MT	2001	98,471	178,623
<u>Southeast</u>			
MG	1995	82,538	103,551
RJ	2007	35,324	18,520
SP	1993	201,802	128,050
<u>South</u>			
PR	1991	29,383	80,624
RS	1998	30,778	504
Total	-	96,782	86,361

In the majority of the states (ten out of 13) average new PA area had declined in absolute terms in the period after creation of the ICMS-E. The case of Tocantins (TO) is notable, where the ex post average became almost null. The four states that increased their average PA creation experienced substantial relative increases, especially Amapá (AP), which multiplied its area by four (mostly due to one national park of over 1 million ha). The total is the average of all the states.

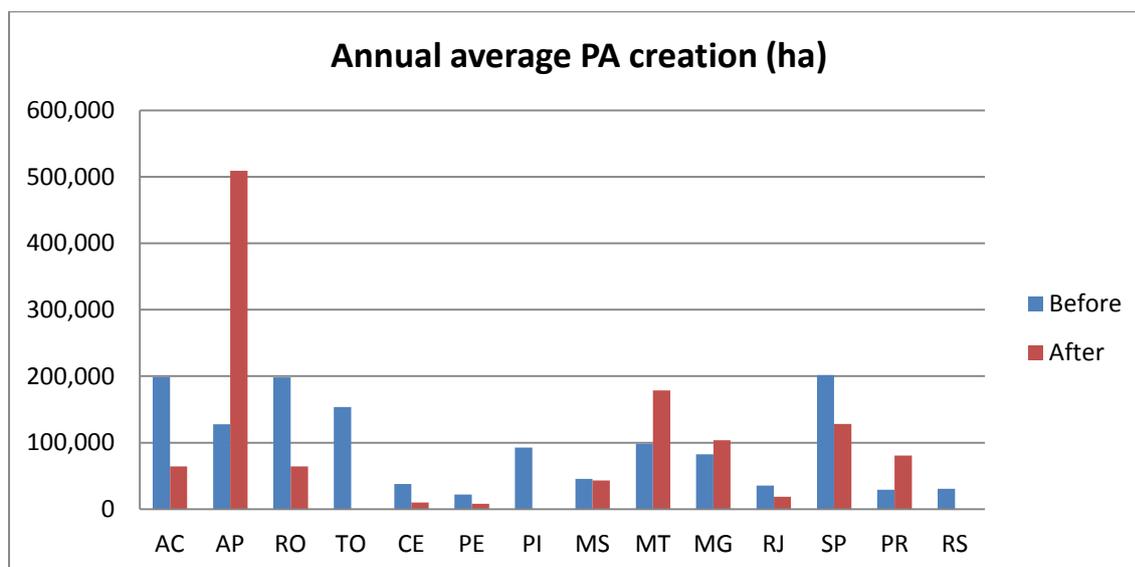


Fig. 3. Annual average PA creation in states before and after enactment of ICMS-E.

Sorting the states by the regions, we can see that in the North Region, characterizing Amazonia, only Amapá (AP) has increased its average. Acre (AC), Rondônia (RO) and Tocantins (TO) had decreased PA creation rates in the period after the mechanism was implemented. In the Northeast region (caatinga biome) all states have decreased their averages. In the Central-West, Mato Grosso (MT) had increased its average whereas Mato Grosso do Sul (MS) had decreased it. In the Southeast, only Minas Gerais (MG) shows an increase. Finally in the South Region, Paraná (PR) has increased its average whereas Rio Grande do Sul (RS) has decreased.

Although the creation of protected areas is irregular with respect to time, we did not find a substantial improvement in explanatory power of these before/after data by using a moving average (3-year basis), although the difference between average overall PA creation in the two periods became nearly equivalent (95,000 ha/yr in the former and 94,500 in the latter).

5.2 Pairwise BACI comparisons

Comparing the group of states that have enacted ICMS-E and the group that has not, revealed some difficulties related to discrepancies that exist between the states. Such differences may be due to the different periods over which the mechanism was implemented as well as to socio-economic, environmental and political variability among states in different regions of Brazil, insofar as these variables affect PA creation.

The great diversity that exists between the states would surely lead to error if we compare two very different states, such as São Paulo (SP), the richest and most populous state, and Amazonas, whose

surface area consists mainly of dense tropical forests. Also, due to the different years of implementation of the ICMS-E in each state, it is not possible to easily define the appropriate periods over which to observe the mechanism's impact.

We thus undertook to compare states in pairs that present greater similarities, such as those that lie in the same region, within the same biome, and having similar territories. To some degree, the regional grouping permits us to assume that some sociopolitical and cultural features are also similar.

The analysis consisted in comparing the annual average of the number and area of PAs created in the periods before and after the mechanism was enacted. The range of years was delimited so as to contain the same total number of years in both periods, with the exception of Rio de Janeiro, whose period after enactment was shorter than most (three years). The list below shows the pairs, the region (or biome) and the total range of years in each of the pairs selected for comparison.

Table 2. Pairwise comparisons between states with and without ICMS-E

State (with ICMS-E)	State (without)	Region (biome)	Period of analysis
Pernambuco (PE)	Paraíba (PB)	Northeast (caatinga)	18 years
Paraná (PR)	Santa Catarina (SC)	South (Atlantic Forest)	18 years
Rio de Janeiro (RJ)	Espírito Santo (ES)	Southeast (Atlantic Forest)	11 years
Mato Grosso do Sul (MS)	Goiás (GO)	Center-West (cerrado)	18 years

In the first two pairs (PE-PB, PR-SC), the states with ICMS-E had an area in PAs higher than that in the state without ICMS-E in the period after the mechanism was enacted. However with regard to evolution, in the first pair the average annual area decreased in Pernambuco after the instrument was enacted, whereas in Paraíba this rate increased. In Paraná-Santa Catarina, both states showed an increase in the average rate of PA area creation.

In the third pair, Rio de Janeiro has decreased its average from 80.000 ha per year to 18.500 ha per year after enactment, and Espírito Santo increased its average from 4.300 ha to 47.800 ha per year, far exceeding the average rate in Rio de Janeiro, despite not having enacted the instrument. In the last pair both states have decreased their averages. Mato Grosso do Sul, that had already a lower average, had created approximately 43.000 ha per year and Goiás about 76.000 ha per year.

This analysis may be affected by the non-linear evolution of PA area, which tends to be lumpy as large areas created in a given year may affect the overall average. For this reason we adjusted the values analyzed over the period used moving averages.

Table 3: Annual average of creation of PAs area

State	Before	After	Variation (%)
PE (with)	42.071	8.026	-80,9%
PB (without)	1.683	4.442	163,9%
PR (with)	37.662	149.718	297,5%
SC (without)	2.877	18.683	549,4%
RJ (with)	79.691	18.520	-76,8%
ES (without)	4.304	47.783	1010,2%
MS (with)	110.726	42.949	-61,2%
GO (without)	129.777	76.416	-41,1%

Clearly, these results do not indicate a significant relative increase of creation on the area or number of protected areas created in the states which enacted the instrument in comparison with those which did not. There are several possible reasons for this. One is that in many states, creation of new protected areas may have reached a threshold of feasibility at some point. There may simply not be sufficient biodiversity rich areas left in a given state to be put aside for this purpose. Land costs may be prohibitively high for expropriation. Another possible explanation is that of adequate instrument sequencing. If ICMS-E reaches a threshold of effectiveness due to limitations on viable additional areas worthy of protection, other PA-related instruments which are more directed toward conserving remnants on private properties, such as RPPNs or APAs, may become more effective in drawing in additional areas. However, the areas conserved may then diminish in size or effectiveness due to the generally less restrictive nature of direct use PAs, influencing revenues derived from the ICMS-E, and the stimulus toward new protected area creation.

On the other hand, due to the previously described data limitations in the CNUC, it was not possible to examine the relative impact of the ICMS-E at the municipal level. For this reason, we determined to focus on the experience in one state, Mato Grosso, in which a greater knowledge of factors affecting PA creation was possible due to complementary research underway in the Policymix project, and where we were able to obtain data on recent creation of PAs at the municipal level.

5.3 In depth analysis: municipal response to ICMS-E in Mato Grosso

The ecological ICMS was created in the state of Mato Grosso (MT) in 2000, when the State Complementary Law no. 73 defined the allocation of 5% of the state ICMS revenue to municipalities, based on the existence of PAs and Indigenous Territories (ITs). In 2003, the same law was amended to provide an increase in the allocation of an additional 2% to compensate for environmental sanitation projects involving water catchment, treatment and waste disposal systems in the municipalities. This amendment was later rescinded due to governmental pressures. The division of

ICMS-E resources in Mato Grosso is determined by the State Complementary Law n. 157-04, as shown in the table below:

Table 4: Distribution criteria for ICMS revenues in Mato Grosso

Value Added	75%
Municipal Territorial Area	1%
Protected Area and/or Indigenous Territory	5%
Tax revenues	4%
Population	4%
Social coefficient (equal in all municipalities)	11%
Total	100%

According to a study conducted by Instituto Socioambiental (ISA, 2007), the ICMS-E in MT is still limited "quantitatively and qualitatively" in effectiveness as an instrument for environmental management, considering its potential. The cited study traces these results to the timidity of municipal conservation goals, the use of ICMS-E resources to cover other expenses not related to the environmental area, the lack of knowledge about the impact that an increase in such transfers can have on the municipal budget, the rates of tax collection efficiency in the state, among others.

Nevertheless, the same study states that ICMS-E transfers to municipalities are significant compared, for example, with transfers from the Rural Territorial Tax (ITR) or collection of Reforestation funds from timber extraction fees. Compared to other states in the Amazon, the potential of ICMS-E in MT is more significant than other sources of revenue for environmental management (Campos, 2000).

The application of the index of ICMS-E, applied to both PAs and TIs in MT began in 2002, and helped direct additional resources to 78 of the 139 municipalities in the state, in its first year of implementation. Posterior to its year of implementation, additional municipalities created or pressured for the creation of new PAs and were included among beneficiaries: by 2007, 86 municipalities had benefited directly from the instrument (SEMA-MT, 2008).

During these six years, 36 new protected areas were included in the database used for calculation of the ICMS-E, so on average six new areas were included per year in the database. Of these 36 areas, six were Indigenous territories, nine were municipal PAs, 10 were state PAs and 11 were Federal PAs (SEMA-MT, 2008).

Between 2002-2008 the ICMS-E was responsible for distributing more than R\$ 216 million among the 86 municipalities that have territory in PAs and/or TIs. In 2006, for example, the municipality of Querência in the Amazon region of the state, much of which lies in the Xingu National Park received 0.148% of the total ICMS collected throughout the state, but 2.96% of the share associated with the

ICMS-E. The transfer amounted to R\$ 741,621.16 or 17.92% of the state's total ICMS transfers to the municipality, 40.67% of total resources received from the Federal Fund for Municipal Revenue-Sharing (FPM) and more than 500% of the value received from rural land taxes (ITR) (ISA, 2007).

However, during the same period MT reported high levels of deforestation in the Cerrado, related to strong expansion of soybean and cotton production. This trend suggests that the ICMS-E could not compete with agribusiness commodities as a source of local revenues. The incoming Blairo Maggi state government in 2003 had little political will for the creation of new PAs, especially when these began to restrict opening up of new areas for soybean production.²

The criterion for the distribution of resources in MT is currently based only on quantitative surveys, which take into account the relationships of size in hectares and the conservation factor of protected areas contained in the municipality with the overall area of the municipality. A qualitative index which would stimulate efforts to improve local biodiversity protection and management, although included in the legislation, has yet to be regulated.

The PA creation rate in MT in the period prior to the implementation of ICMS-E is due primarily to creation of federal PAs, while in the ex post period, state and municipal PAs achieve precedence, (see Figure 4). On the other hand, in most cases, the area dedicated to municipal PAs is far smaller. As a case in point, the majority of the PAs in Mato Grosso are municipal (33 of 65), while 24 are state PAs and only eight are federal. Despite this, 52% of the total area is in Federal PAs, whereas only 10 percent is in municipal PAs.

From 1980 until the early 1990's all PAs created in Mato Grosso were federal. The first state PA was created in 1994 followed in 1995 by the first municipal PA. The table below shows the shares of cumulative number and area of PAs created from 1980 to 2000 and additional areas created in each category up to 2010. It is clear from this table and the accompanying figure, showing the temporal evolution of PA creation at different levels of government in Mato Grosso, that the municipal areas, though small, have nearly quadrupled since the enactment of the instrument.

² The Maggi group has become one of the largest soybean growers and traders in the world, based largely on its expansion in the cerrado of Mato Grosso.

Table 4. Shares of government levels in PAs – Mato Grosso: 2000 and 2010

Level	Variable	2000	2010
Federal	N	30,4%	12,3%
	Area	65,4%	51,9%
State	N	39,1%	36,9%
	Area	31,9%	38,3%
Municipal	N	30,4%	50,8%
	Area	2,7%	9,8%
Total	N	100%	100%
	Area	100%	100%

The graph below illustrates this sequence of adoption.

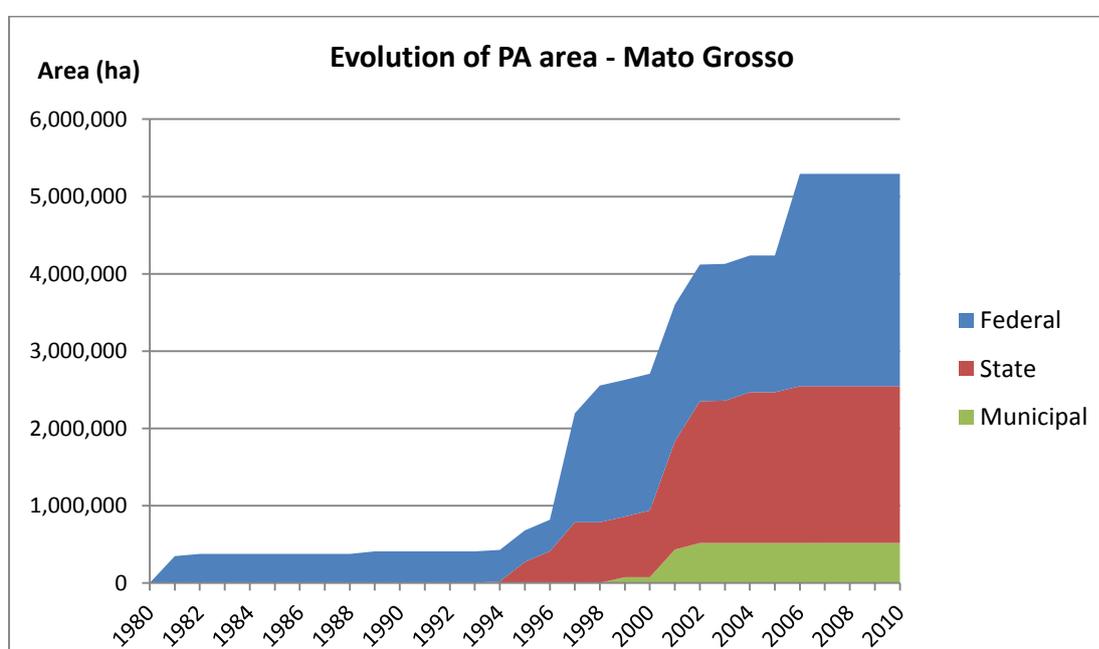


Figure 4. Cumulative area under protection in Mato Grosso by jurisdiction, not including Indigenous Territories. Source: SEMA-MT.

The ICMS-E in Mato Grosso is differentiated from that in operation in other states, due to its inclusion of Indigenous Territories in the calculus of protected areas for purposes of resource allocation. However, only a few new Indigenous Territories have been created since the passage of the instrument, and rarely are such areas created as the fruit of proactive efforts on the part of municipal governments (on the contrary!).

Further analysis of the actual impact of the ICMS-E on conservation in MT would require knowing the specific purpose to which additional resources are put in each municipality. Although municipalities are legally obliged to report on the receipt and detail the expenditures of these funds

(Ordinance 2759-01), there is little transparency in the implementation of municipal budgets. There is a striking disparity between the quality of public financial and tax reporting available from the State Finance Secretary, from the Mato Grosso Association of Municipalities (AMM) and the State Court of Auditors (ECA), while information available from the State Environmental Secretariat is limited to the data on protected areas in existence as a basis for calculation of revenue allocation.

The transparency in the application of these resources is crucial to identify its benefits for environmental management. This lack of transparency also results in difficulty in assessing distributional issues associated with the mechanism, such as social impacts and distributive justice. A social impact assessment would permit the analysis, monitoring and management of the social consequences, both intended and unintended of the ICMS-E, be they positive or negative (IAIA, 2003).

A research project conducted by the International Institute for Environment and Development (IIED) and the Darwin Initiative in 2006 concluded that the development of a system to monitor the environmental impacts of the ICMS-E in MT is important to understand the extent of benefits and negative impacts of the instrument. This study developed a range of indicators to assess the impacts of the instrument in biodiversity conservation, but because of a lack of political will and resources of the State Foundation of the Environment (FEMA), responsible for implementing the ICMS-E, a detailed monitoring of direct impacts on biodiversity was not accomplished.

Clearly, an analysis of distributional impacts of the instrument in the state of MT depends on further research with the local governments of each municipality and primary data collection with actors impacted by ICMS-E.

6. Conclusions

There was a danger that the ecological fiscal transfer (ICMS-E) system could become an uncritical instrument: a justification for different tax revenue sharing with no incremental improvement to environmental conditions. In the case of Paraná, the initial implementation of the scheme led to further change (Loureiro, 2002). It led to the adoption of the quality index which is sensitive to the efforts of municipalities towards protected area establishment and maintenance. According to Loureiro (2002) the instrument, therefore, has acted as an incentive rather than just compensation and allows each municipality to influence outcomes according to their own conservation decisions and actions. Some experiments using the ICMS-E, when accompanied by specific institutional arrangements, have enabled the distribution of benefits to individuals and groups who adopt conservation practices.

An important limitation of ICMS-E to environmental management, is that the transfer to municipalities is not subject to strict application of resources in the environmental area, since the

National Taxation Code provides that taxes not be bound to specific expenditures. It seems logical to assert that, in the absence of social control over the application of these resources, the chance of their being used to cover other expenses at the municipal level tends to be high. On top of that the ICMS-E resources are rival: as new municipalities are registered to receive these resources, there is a decrease in the contribution of resources to others.

In the case of Mato Grosso, once the ICMS-E was created it seems to have served as an incentive for the creation of protected areas at a state and municipal level (mainly in 2001 and 2002), but after the first transfers of funds (in 2002) this process experienced a sharp drop. One could argue that the amount allocated to municipalities was not enough to continue to serve as an incentive to the creation of protected areas in the state. Also, municipalities of Mato Grosso prioritized creation of municipal sustainable use protected areas, which receive a lower weight in the revenue allocation formula. The resultant lower transfer of funds from the ICMS-E became therefore a disincentive for proactive initiatives in the ensuing years.

The lack of transparency regarding the allocation of ICMS-E as well as of its effective implementation by municipalities is an obstacle to evaluating the actual impacts of the instrument. There is also a lack of information for environmental managers and society as a whole, about the potential that the ICMS-E can be a source of support to offer greater dynamism to regions with conserved areas. In general, there is not a real commitment by state authorities to conservation goals, and therefore this is not a priority in Mato Grosso, whose development objectives are linked to the fortunes of the agribusiness sector.

A more detailed study within the realm of a “fine grain” assessment in Mato Grosso at municipal level is being undertaken to better recognize the real potentials of ICMS-E and similar fiscal transfer mechanisms as a tool for municipal environmental management and fiscal capacity. We must also encourage the involvement of landowners and civil society organizations to establish partnerships with municipal governments in the management of shared resources and ICMS-E, ensuring their direct application in the environmental area. Such partnerships should consider extension of revenue allocation promotion to other aspects of environmental management, such as observance of Forest Code strictures by private landowners.

We conclude from our results on the paired state level analysis that it is not possible to state that the enactment of the ICMS-E has been more effective in promoting creation of PAs than its absence among the states compared. Among the four states selected that have enacted the ICMS-E, the only one whose average rate of PA creation increased substantially was Paraná, a well known early case of success with adoption of this mechanism. Most of the new areas created in Paraná were at the municipal level, such as Environmental Protection Areas (APAs) and private nature reserves enabled at the state level (RPPNs), showing that the instrument may have different effects at different levels of government. Since the instrument is primarily directed at municipal finances, this result is

coherent with a causal relationship, despite the limitations of the instrument (non-conditional with regard to environmental expenditure, fixed rates over time as a share of overall tax revenues).

The increase in areas of conservation, as an indicator should be used with caution, since there is still no comprehensive qualitative assessment. After creation, the effective deployment and maintenance of protected areas face difficulties in general, owing to incomplete land tenure perspective. Finally, it is necessary to define criteria and indicators to monitor and evaluate the real impact of the instrument in biodiversity conservation, increasing the transparency of actions and reducing potential negative impacts of the instrument.

References

Campos, L. (2000) Experiências nos Estados do Paraná, São Paulo, Minas Gerais e Alternativas na Amazônia. Programa Piloto para a Proteção de Florestas Tropicais. Sub-programa de políticas de recursos naturais – SPRN.

IAIA (International Association for Impact Assessment) (2003) Social Impact Assessment, International Principles.

ISA - Instituto Socio-Ambiental (2007) Instrumentos Econômicos e Financeiros para a Conservação Ambiental no Brasil. Uma análise do estado da arte no Brasil e no Mato Grosso. Desafios e Perspectivas. Brasília.

IPEADData. (2012). Value of ICMS as a share of overall tax revenues, Brazilian states.

Loureiro, W. (1997) Contribuição do ICMS Ecológico à conservação da biodiversidade no Estado do Paraná. Curitiba.

Loureiro, W., (2002). Contribuição do ICMS Ecológico à Conservação da Biodiversidade no Estado do Paraná. Tese Doutorado. Universidade Federal do Paraná, Curitiba.

Matheus, A.C. (2007) A aplicação concreta do ICMS ecológico como opção das políticas públicas ambientais. In: Paula, J. L. M. Direito Ambiental e Cidadania. São Paulo: Mizuno, p. 25.

May, P.H., Veiga Neto, F., Denardin, V., Loureiro, W., (2002). Using fiscal instruments to encourage conservation: municipal responses to the 'ecological' value-added tax in Paraná' and Minas Gerais,

Brazil. In: Pagiola, S., Bishop, J., Landell-Mills, N. (Eds.), *Selling Forest Environmental Services: Market-based Mechanisms for Conservation and Development*. Earthscan, London, pp. 173–199.

Modé, F.M. (2009) *Tributação Ambiental. A função do tributo na proteção do meio ambiente*. Curitiba: Juruá, p.70.

Oliveira, J.M.D. (2010) *Proteção ambiental e Sistema Tributário. Brasil e Japão: problemas em comum?* In MARINS, James. *Tributação do Meio Ambiente*. Curitiba: Juruá, p. 117.

Ring, I., Schröter-Schlaack, C., Barton, D., Santos, R., May, P. 2011 *Recommendations for assessing instruments in policy mixes for biodiversity and ecosystem governance*. Technical Brief n. 5.

Available at:

http://policymix.nina.no/DesktopModules/Bring2mind/DMX/Download.aspx?Command=Core_Download&EntryId=869&PortalId=51&TabId=3736

SEMA-MT (Secretaria Municipal de Meio Ambiente) (2008). *Relatório sobre a aplicação do ICMS Ecológico no Estado De Mato Grosso - Período de 2002 a 2007*. Governo do Estado de Mato Grosso, Secretaria de Estado de Meio Ambiente, Superintendência de Biodiversidade, Coordenadoria de Unidades de Conservação.

Serôa da Motta, R. (2002) *Instrumentos Econômicos e Política Ambiental*. IPEA, Rio de Janeiro.

Souza, N., Santos, F.R.P, Salgado, A.S; Araújo, F.F.S. (2011). *Dez anos de História: avanços e desafios do SNUC. Dez anos do Sistema Nacional de Unidades de Conservação: lições do passado, realizações presentes e perspectivas para o futuro*. Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis. Visited in March 2012.

Tacconi, L., et al. (2011)

Yoshida, C. (2005) *Efetividade e Eficiência Ambiental dos instrumentos econômico-financeiros e tributários. Ênfase na prevenção. A utilização dos bens ambientais e suas implicações*. In Torres, H.T. *Direito Tributário Ambiental*. São Paulo. Malheiros, p. 538.