Rosenthal, J.P., D. Beck, A. Bhat, J. Biswas, L. Brady, K. Bridbord, S. Collins, G. Cragg, J. Edwards, A. Fairfield, M. Gottlieb, L.A. Gschwind, Y. Hallock, R. Hawks, R. Hegyeli, G. Johnson, G.T. Keusch, E.E. Lyons, R. Miller, J. Rodman, J. Roskoski, and D. Siegel-Causey. 1999. "Combining High Risk Science With Ambitious Social and Economic Goals." In J.P. Rosenthal (ed.), *Drug Discovery, Economic Development and Conservation: The International Cooperative Biodiversity Groups*. Special Issue of *Pharmaceutical Biology*, 37, pp.6–21.

Schwartzman, S. 1992. "Land Distribution and the Social Costs of Frontier Development in Brazil: Social and Historical Context of Extractive Reserves." In D.C. Nepstad and S. Schwartzmann (eds.), *Non-timber Forest Products from Tropical Forests: Evaluation of a Conservation and Development Strategy*. Advances in Economic Botany No.9. New York: New York Botanical Garden.

Simpson, D.R., R.A. Sedjo, and J.W. Reid. 1994. *Valuing Biodiversity for Use in Pharmaceutical Research*. Washington: Resources for the Future.

Stepp, J.R., and D.E. Moerman. 2001. "The Importance of Weeds in Ethnopharmacology." *Journal of Ethnopharmacology*, 75, pp.19–23

Svarstad, H., S. Dhillion, and H. Bugge. 2002. "Novartis' Golden Egg from a Norwegian Goose." In S.A. Laird (ed.), *Biodiversity and Traditional Knowledge: Equitable Partnerships in Practice*. London: Earthscan.

Swiderska, K. 2001. "Stakeholder Participation in Policy on Access to Genetic Resources, Traditional Knowledge, and Benefit-Sharing: Case Studies and Recommendations." *Biodiversity and Livelihoods Issues*, No.4. London: Earthprint Ltd.

Tobin, B. 2002. "Biodiversity Prospecting Contracts: The Search for Equitable Agreements". In S.A. Laird (ed.), *Biodiversity and Traditional Knowledge: Equitable Partnerships in Practice*. London: Earthscan.

World Resources Institute (WRI). 1992. *Global Biodiversity Strategy: Guidelines for Action to Save, Study and Use Earth's Biotic Wealth Sustainably and Equitably*. Washington: WRI.

Chapter 10

Using Fiscal Instruments to Encourage Conservation: Municipal Responses to the 'Ecological' Value-added Tax in Paraná and Minas Gerais, Brazil

Peter H May, Fernando Veiga Neto, Valdir Denardin, and Wilson Loureiro[1]

The 'ecological' value-added tax (Imposto sobre Circulação de Mercadorias e Serviços, ICMS-E), which is now being adopted by most Brazilian states, has been widely lauded as an instrument of fiscal reform that rewards local governments for their commitment to protecting forest and biological resources. The ICMS-E is the first economic instrument to pay for services provided by standing forests in Brazil. This Chapter analyzes the consequences and effectiveness of the ICMS-E as currently applied in the states of Paraná and Minas Gerais. Similar mechanisms are in the process of being implemented and/or discussed in a number of other Brazilian states (Bernardes, 1999).

The ICMS-E is a mechanism that allocates part of the revenues derived from the ICMS to municipalities on the basis of their performance on various environmental criteria. The ICMS-E originated as a means of compensating municipalities that have conservation areas – whether totally protected or restricted sustainable use areas, hereafter referred to as conservation units (CUs) – within their territories for the resulting loss of revenue. As a positive externality, the instrument also seeks to stimulate both improvement of these areas and the creation of new conservation units.[2]

The ICMS-E appears to have had a significant impact. Grieg-Gran (2000) shows that, in Minas Gerais and in Rondônia, the compensatory impacts have been considerable for some municipalities, especially those with large areas under protection. She also shows that the ICMS-E provides incentives for conservation

that are sufficiently attractive to motivate municipalities with low-productivity agriculture to increase the area under conservation.

In Paraná and Minas Gerais, the area under protection increased markedly following implementation of the ICMS-E. In this Chapter, we examine the mechanisms through which this effect occurred. Municipalities receive ICMS-E revenues, but state law neither earmarks nor offers guidance on how they are to be used. Bernardes (1999) has noted that much of the apparent impact of the ICMS-E appears to have been reflected in actions by state governments (creation of state CUs) and by private landholders (designation of private reserves and inclusion in environmental zoning areas). Did the ICMS-E really induce these actions? If so, how? How were the municipal incentives transmitted to states and to private individuals?

This Chapter seeks to better understand how and under what conditions the ICMS-E works. It relies on a combination of quantitative and qualitative analysis. We selected relevant municipalities or regional groupings, according to predefined criteria such as the total values allocated and the observed increment in the number of conservation units, in particular those that involve private properties. Fieldwork in case study areas was undertaken from November 2000 to April 2001, with at least two researchers of the team always present. We carried out interviews with a broad range of local stakeholders – including mayors, environmental and administrative officials, CU managers, and representatives of local civil organizations and producer groups – to identify the instrument's importance at the local level, difficulties in its implementation, and the potential for greater effectiveness. In this Chapter, we focus on a sample of the municipal case studies, describing some of the more significant responses.

History of the ICMS-E and criteria for implementation

The ICMS is a state levy on the circulation of goods, services, energy, and communications, specified by Article 155 of the Federal Constitution (Section I, Item B). It is the largest source of state revenues in Brazil. Under the Federal Constitution (Article 158), 25 per cent of ICMS revenues are allocated to the municipalities. Of the latter share, 75 per cent are distributed according to an index of municipal economic output, while the remaining 25 per cent are distributed according to criteria defined by each state. It is through these complementary state laws that the ICMS-E is introduced into state tributary legislation.

Paraná

Paraná was the first state to adopt the ICMS-E. The impetus toward creation of the ICMS-E arose in municipalities where significant land use restrictions for conservation purposes limited revenues from value-added taxation (Loureiro,

1998). Piraquara is a classic example of this situation: 90 per cent of municipal territory protects a major watershed for the Curitiba metropolitan region, and CUs occupy the remaining 10 per cent. A number of municipalities organized themselves to obtain technical and political support from the state legislature and government agencies. The latter were convinced that the municipalities' concerns were fair, and that traditional police power was insufficient to guarantee environmental conservation. The ICMS-E was developed as a means to compensate municipalities with large conservation areas for the restrictions they faced, while improving incentives for conservation. In 1989 the State Constitution was amended to enable adoption of the ICMS-E (State Law No 59/1991). Complementary state laws and regulations refined the criterion, establishing the specific conditions for its operation and for the resulting revenue-sharing reallocations.

After introduction of the environmental criterion, ICMS pass-throughs to municipalities were amended so that the proportion allocated according to value-added was reduced from 80 per cent to 75 per cent, with 5 per cent now allocated based on environmental criteria (other criteria, such as area and population, remained unchanged). Of the 5 per cent now dedicated to the ICMS-E, half is allocated based on the proportion of municipal area under CUs and half on the proportion in watershed areas. We focus here on the portion based on biodiversity conservation.

Allocation criteria

The ICMS-E program is administered by the Paraná Environmental Institute (Instituto Ambiental do Paraná, IAP). Pass-throughs to municipalities whose territories harbor CUs or special protected areas are based on an environmental index, the Biodiversity Conservation Coefficient (Coeficiênte de Conservação da Biodiversidade, CCB). The CCB is defined as the relation between the surface area of the CU (or other protected area), characterized as satisfactory in physical quality (or in process of being recuperated), and the surface area of the municipality, corrected by a conservation factor associated with different management categories (Loureiro, 1998). This framework has been echoed by ICMS-E criteria adopted in other states. A key feature of the criteria is that besides the quantitative dimension of the area in CUs, they also include a quality index.[3] This allows the CCB to reflect improvements over time in qualitative features of CUs and their relationship with the surrounding community.

To determine the additional funds allocated to each municipality, the sum of conservation coefficients for each municipality is divided by the sum for the entire state, producing a municipal conservation coefficient. These weights are then applied to the share of the ICMS-E allocated toward biodiversity conservation (50 per cent), apportioned as a share of each year's ICMS tax revenues. Municipal entitlements under ICMS-E are aggregated with their regular revenue shares from value-added taxation, and are transferred to municipal governments on a weekly basis.

Minas Gerais

As in Paraná, the ICMS-E in the state of Minas Gerais originated in municipalities that considered themselves at a comparative disadvantage due to the proportionally large protected areas within their territories. In 1992–1993, municipalities affected by the Rio Doce State Park (the largest contiguous area of Atlantic forest in the state, situated in the eastern Vale do Aço region) initiated a movement to claim fiscal compensation. Initially, they sought to share in the parks' revenues by collecting entry fees (Veiga Neto, 2000), but they became interested in the ICMS-E approach on learning of Paraná's experience, divulged locally by the State Forest Institute (Instituto Estadual de Florestas, IEF). With the help of IEF, municipal leaders created a coalition of municipalities hosting CUs – the Mata Viva ('Living Forest') Association – and formulated a proposal to the state legislature to create the ICMS-E. Two successive bills to this effect were passed by the legislature but then vetoed by the governor, on the grounds that a revenue-allocation law favoring some municipalities over others in the state could be unconstitutional. Finally, in December 1995, the ICMS-E was incorporated into Law 12.040/95, known as the 'Robin Hood Law', which was created with the specific objective of overcoming inter-regional and inter-municipal disparities in revenue allocation. The law introduced additional criteria for ICMS allocations, addressing physical area, population density, health, education, agriculture, cultural patrimony, and environment (Veiga Neto, 2000). Under this law, the proportion of ICMS pass-throughs to municipalities allocated based on value-added was reduced in stages, from 94.1 per cent in 1995 to 79.6 per cent in 1998. The proportion based on environmental criteria was gradually increased from 0 in 1995 to 1 per cent in 1998. Other criteria were also added to the formula, such as cultivated area, cultural heritage, education, and health expenses. The phasing-in of the new criteria allowed municipalities to gradually adapt to the law.

Allocation criteria

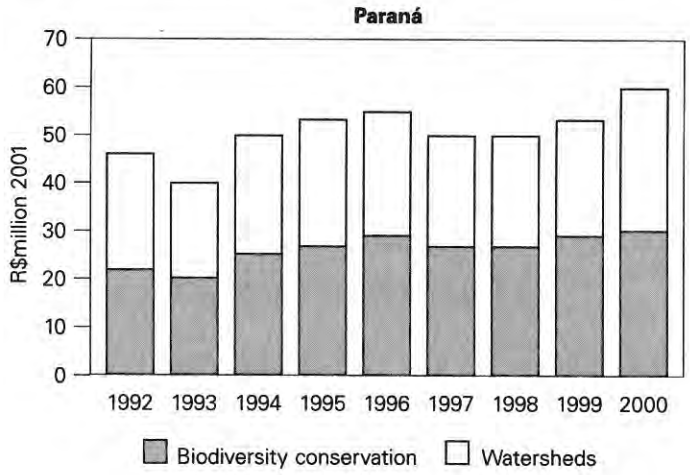
In Minas Gerais, the two environmental criteria adopted in the ICMS-E were the presence of CUs, as in the Paraná case, and sanitation – more specifically, the final treatment of solid waste and sewage. Each criterion received half of the 1 per cent of ICMS revenues allotted according to environmental criteria. We focus here on the proportion allocated based on the presence of CUs, which is administered by the IEF. The law requires the legal existence (including territorial demarcation and land use restrictions) of federal, state, municipal, or private CUs duly registered with the state Environment and Sustainable Development Secretariat (Secretaria Estadual de Meio Ambiente e Desenvolvimento Sustentável, SEMAD). As in Paraná, the distribution of ICMS-E revenues is based on the proportion of area in CUs in the surface area of the municipality, weighted by a conservation factor related to the degree of protection of the area and to the management category of the CU, and by a quality factor (ranging from 0.1 to 1) related to the physical quality of the area, management plan, infrastructure, protective buffer zone, and access control, among other factors affecting management and protection (Veiga Neto, 2000). However, to date the quality factor remains unregulated in Minas Gerais, and is factored in all cases as 1. Lack of implementation of this measure may substantially weaken the instrument's effectiveness for biodiversity conservation, as shown in the case studies below.

Quantitative results

Figure 10.1 presents the revenues allocated according to ICMS-E criteria in Paraná and Minas Gerais. The total values allocated by each state through the ICMS-E are appreciable, averaging over 50 million Brazilian Real (R$) annually in Paraná and about R$15 million annually in Minas Gerais. ICMS-E amounts are higher in Paraná, even though overall ICMS levies are higher in Minas Gerais, due to the substantially higher proportion of overall ICMS revenue allocated according to environmental criterion in Paraná. In Minas Gerais, since its inception, there has been a 100 per cent increase in the number of municipalities that benefit from ICMS-E revenues, while in Paraná the increase has been over 45 per cent. Over half of all municipalities in Paraná and about 30 per cent in Minas Gerais now participate in the program. This growth in interest is both a bane and boon, since additional municipalities dilute the amounts received by municipalities already participating in the program, given the fixed share of ICMS revenues allocated on environmental criteria.

The area dedicated to conservation has also grown significantly in both states since implementation of the ICMS-E, as shown in Table 10.1. In Paraná, the area in CUs grew by over 1 million hectares, a 165 per cent increase, in the nine years since inception of the program in 1992. In Minas Gerais, the area in CUs grew by slightly over 1 million hectares over five years, a 62 per cent increase. The ICMS-E is certainly not the only reason for this growth, however. In Minas Gerais, for example, part of the initial growth observed in the number of CUs was due to efforts by local governments to recognize existing units that had not been regulated by the state (Veiga Neto, 2000).

Intra-state allocations favor municipalities with large proportional areas dedicated to state or federal indirect use CUs (highly weighted by the allocation criteria). But a substantial volume of resources has been allocated to those municipalities that house environmental protection areas (área de proteção ambiental, APAs), which may cover large areas within a municipality with restricted zoning, despite far less rigorous enforcement than other CUs. In both states, the increase in areas dedicated to state and municipal APAs accounts for the vast majority of the incremental area in conservation units. This trend is due to the ease with which APAs can be created and the relatively low level of control exerted over conservation within them. Private natural patrimony reserves (reserva particular do patrimônio natural, RPPNs)[4] have also increased in number



Note: June 2001 R$1 = US$0.42
Sources: Data from Secretaria de Fazenda, Paraná state and Secretaria de Planejamento, state of Minas Gerais

Figure 10.1 *Amounts passed through to municipalities in Paraná and Minas Gerais by the ICMS-E, 1992–2000*

and area, particularly in Paraná. Both states have now established state legislation allowing the creation of RPPNs, and are actively promoting them as part of an integrated public–private partnership in buffer zones surrounding public protected areas (Bernardes, 1999).

Table 10.1 *Growth in conservation units in Paraná and Minas Gerais*

	Paraná					**Minas Gerais**				
	Number		*Area (ha)*			*Number*		*Area (ha)*		
Management Level	*To 1991*	*2000*	*To 1991*	*2000*	*% Change*	*To 1995*	*2000*	*To 1995*	*2000*	*% Change*
Federal										
Parks and reserves	3	5	218,502	267,603	22.0	6	6	208,453	208,453	0.0
Indigenous lands	12	13	67,255	69,000	3.0	4	4	59,359	59,359	0.0
Forests	2	2	3,825	3,825	0.0	1	1	335	335	0.0
State										
Parks and reserves	34	47	39,859	53,663	35.0	34	49	295,151	491,587	66.5
Municipal										
Parks and reserves	20	90	1,429	4,169	192.0	25	46	3,851	12,927	236.0
Private/mixed										
APAs (federal, state, municipality)	5	17	306,693	1,212,324	295.0	12	61	1,023,566	1,809,460	77.0
RPPNs (federal, state)	0	157	0	26,124		17	54	20,261	34,069	68.0
Other forests[a]			0	38,153						
Faxinais			0	15,454						
Total	**76**	**351**	**637,563**	**1,690,315**	**165.0**	**99**	**221**	**1,610,976**	**2,616,190**	**62.4**

Note: a Streambank reforestation, legal reserves, and other forests are not treated as CUs.
Sources: Paraná: DUC/DIBAP/IAP; Minas Gerais: IEF/MG

Municipal responses – Paraná

This section and the next describe the responses to pass-throughs received under the conservation criterion of the ICMS-E in a selection of municipalities in both states. The characteristics of the case study municipalities and the ICMS-E pass-throughs they received from the inception of the program to the year 2000 are shown in Table 10.2.

Soybean zone

The soybean zone is part of the principal agricultural region of Paraná. Although it has been occupied for less than 40 years, only 2 per cent of its original forest cover remains. This region was selected so as to study two municipalities with outstanding records in the creation of RPPNs: Campo Mourão and Luiziana. We sought here to understand the means used by municipal governments or the IAP to convince producers to create such reserves in such a highly agricultural region.

Regional characteristics

Campo Mourão and Luiziana are part of a micro-region known as COMCAM (Consortium of Municipalities in the Campo Mourão Region). This micro-region is located in the northwestern area of the state, along the Ivaí tributary of the Paraná River. Due to its fertile soils, agricultural development was intense in this region in the 1960s and the 1970s. The expansion of soybean cultivation in this period practically destroyed its two great forest biomes: the semi-deciduous seasonal forest and the mixed forest (IAP, 2001). According to Alberto Contar, an environmental lawyer from Maringa (personal communication), today there is more forest cover in urban than in rural areas.

Conservation activities

The COMCAM micro-region has the highest number of RPPNs in the state of Paraná: 25 units covering a total area of 2307ha. The creation of the Lago Azul State Park[5] in 1997 is the main reason for the existence of so many RPPNs in the region, as IAP's highest priority had been to stimulate creation of RPPNs in the buffer zone surrounding it to form a protected corridor.[6] Eight of these RPPNs have been created in Luiziana, accounting for the high levels of ICMS-E transfers it has received (see Table 10.2). The average amount received for RPPNs in the region has reached about R$57/ha. According to José Alberto Salvadori, the administrative secretary of Luiziana, the municipality still has many areas with potential to be transformed into RPPNs, that would effectively triple the existing area (personal communication).

Table 10.2 *Characteristics of the case study municipalities and ICMS-E revenues received*

Municipality	Population[a] ('000)	Area[a] ('000 ha)	Area in CUs (% total) 1995	Area in CUs (% total) 2000	ICMS-E transfers ('000 R$) 1995	1996	1997	1998	1999	2000	Total	ICMS-E as % of total ICMS transfers (2000)	ICMS-E per capita (2000)	ICMS-E as % of municipal budget (1998)
Paraná														
Campo Mourão	79.5	75.6	0.0	1.4	10	20	73	95	113	117	**429**	2	2	0.2
Luiziana	8.0	91.2	0.0	1.8			65	97	116	122	**400**	6	16	1.0
Altônia	18.4	96.9	7.0	17.0	697	465	619	810	638	694	**3,923**	28	36	5.3
São Jorge do Patrocínio	6.8	41.3	8.0	38.0	1,554	1,424	1,304	1,478	1,363	1,552	**8,675**	71	136	17.6
Vila Alta	3.6	104.6	7.0	28.0	791	767	654	864	972	1,101	**5,149**	59	291	11.9
Rebouças	13.6	54.4	0.0	3.0	2	0	65	152	142	168	**529**	13	12	1.6
Minas Gerais														
Itamonte	12.0	43.1	75.0	90.0		327	330	217	266	239	**1,379**	13	20	3.3
Alto Caparaó	4.7	10.5	41.0	42.0			575	377	282	253	**1,488**	35	54	12.0
Caparaó	5.0	13.1	2.0	42.0			31	20	15	68	**134**	11	14	0.7

Notes: ICMS-E flows are given in constant June 2001 R$, deflated using IGP-DI (Fundação Getúlio Vargas).
a Preliminary results of the 2000 Census. Population redistributed according to municipal boundaries in existence on August 1 2000.

Source: Paraná municipalities: IAP, 2001; Minas Gerais municipalities: Based on data from João Pinheiro Foundation and from the state treasury secretariat

Use of ICMS-E resources

Although ICMS-E revenues represent only 1.6 per cent of total ICMS revenues received by Campo Mourão, their impact has been enhanced by strategic investments. According to Ademir Moro Ribas, environmental secretary of this municipality, the ICMS-E resources are used in a number of activities, but particularly in partnership with IAP for the maintenance of Lago Azul Park, including tool purchase and payments to municipal employees who clean the park area (personal communication). The municipality also uses the revenues to pay for the maintenance of the municipal forestry nursery and the municipal park. In Luiziana, where the share of ICMS-E in overall ICMS revenues is somewhat higher, approximately 15 per cent of pass-throughs are used to help in park maintenance; 20 per cent are spent on the municipal forestry nursery (whose seedlings are donated to reforest riversides and RPPN areas and sold to the community at cost); and 55 per cent are spent on services performed with the municipality's machines for current and potential RPPN proprietors (mainly construction and maintenance of roads, drainpipes, and bridges). Neither municipality has formal procedures for deciding on the use of ICMS-E revenues.

Incentives for municipalities

The main incentive to create new CUs, according to local mayors, has been the potential for increased financial flows. According to Campo Mourão's mayor, Tauillo Tezelli, 'in times of crisis, all resources are welcome' (personal communication). Due to the small share of ICMS-E revenues in total revenues, Mayor Tezelli initially did not try to influence the creation of new CUs, nor did he have direct contact with IAP representatives. However, once he was informed of the potential revenues from the creation of new units, he became interested and personally assumed responsibility for contacting owners of the potential areas for creation of new RPPNs.

Incentives for private landowners

For private landowners, the incentives to create RRPNs appear to take several forms, as outlined below.

- **Support from the municipality.** Municipal representatives indicate that the relationship between the municipalities and RPPN owners operates through the services performed on their behalf, especially those involving municipal equipment, such as building drainpipes on the roads and improvements in access to the properties and to the RPPN areas themselves.[7] These services also protect the area against any harm caused by hunting, fishing, and fires. However, the priority given to RPPN owners for machine time has led to a standing complaint from the community that public monies are used to benefit only a few people. This question has been systematically raised by those who oppose the idea of favoring RPPN owners, who perceive this as an additional instance of the state benefiting larger landowners (Wilson Loureiro, personal communication).
- **Environmental awareness.** As farmers' environmental awareness has increased, especially regarding water resource protection, some farmers have been motivated to protect water sources (Souza, personal communication).
- **Legal forest reserve.** In the Atlantic forest ecosystem, at least 20 per cent of private land must, by law, remain in forest. The possibility of using legal forest reserve areas on private lands to create RPPNs has stimulated their creation in the region. This is particularly notable in Luiziana, where RPPN owners are primarily large farmers (among them, some of the first pioneers in the region or their descendents). The possibility of creating RPPNs also provides options for otherwise idle areas. For example, one Luiziana landowner, Carlos Salonski, created two RPPNs (total area of 411ha), on lands that had been abandoned because they could not feasibly be cultivated mechanically. In his case, besides the desire to protect some of the forest, the motivation to set aside these reserves was to exchange them for other areas that could be cultivated, through the state's system of tradable development rights, SISLEG.[8]
- **Other income from RPPNs.** Another incentive for the creation of RPPNs is the possibility of developing other income-generating activities, notably ecotourism (Artur Cezar Vigillato, personal communication). Although RPPNs earn their proprietors an exemption on the rural land tax due on the area so conserved, landowners do not consider that this provides much of an incentive. The prospects for a link with municipal services and with the landowner's prospects for ecotourism revenue is greater.

Large farmers were prioritized by IAP and the municipal government in the creation of RPPNs because of the ease in operationalizing the resulting CUs, due to their size and the volume of resources that could be generated thereby. Small farmers are sometimes also interested in RPPN creation. However, their lands are not usually eligible due to their small areas of significant remnant forest or other priority biota from a conservation standpoint, which are defining conditions for RPPNs. According to Salvadori, the municipal government is interested in creating more RPPNs, and he believes that a great number of small farmers will ultimately be involved in this process should a means be found to reduce the transactions costs associated with their creation, through reserve condominiums for example.

In this region, which is marked by commercial agriculture, we can observe intense activity by local IAP representatives, supported by the quality evaluation scheme, which favors the creation of RPPNs by generously rewarding these areas with revenue allocations. In Luiziana, we also observed the efficient participation of the municipality in convincing farmers through agreements to perform services with municipal machinery, motivating them to set land aside in RPPNs. Good institutional relationships were found to exist between environmental agencies and the municipal governments, especially in Luiziana, where the two institutions work together in prospecting and convincing the rural proprietors to create new

CUs. Even with these incentives, the area in reserves will in all probability be limited to 20 per cent of the area in the legal forest reserve, due to the potential revenues from agricultural activity on these lands.

Paraná floodplain ('Varjão')

This region was chosen to represent areas where the ICMS-E constitutes a high percentage of municipal revenues. As a consequence, the ICMS-E became an important reference for local people, changing their habits and behavior toward the environment. Action by the public defender (ministério público), reinforced by the possibility of ICMS-E revenues, sparked the creation of municipal APAs. Conservation became a part of the municipal agenda, culminating with the creation of the Ilha Grande National Park by the federal government.[9] To examine this dynamic we visited three municipalities: São Jorge do Patrocínio, Vila Alta, and Altônia.

Regional characteristics

The region is located in the northwestern part of the state, within the Paraná, Paranapanema, and Piquiri watersheds. It is marked by a group of islands that make up the archipelago of Ilha Grande and by lowlands lying along the Paraná river. Although it was the last area in Paraná to be colonized, its forests have been nearly completely exhausted over the past four decades. As the soil is inadequate for annual crops, coffee cultivation dominated initially, and was replaced later by cattle raising and a few mechanized crops due to climate and economic problems. Of the three municipalities, São Jorge do Patrocínio has the best land distribution, with properties averaging around 13ha producing coffee, silk, grapes, oranges, and milk. Cattle ranching is also important in the other municipalities. Land prices in the region are about R$2500/ha for uplands and R$1200/ha for floodplain areas.

Conservation activities

As the only part of the Paraná river that is not dammed for energy supply (Campos, 1999), the Varjão region saw the creation in 1995 of Brazil's first municipal consortium for biodiversity protection (Consórcio Intermunicipal para Conservação do Remanescente do rio Paraná e Áreas de Influência, CORIPA). CORIPA's basic objectives are to represent the municipalities, to plan and execute programs to protect and conserve the ecosystem that borders the Paraná river, and to promote and foster regional social, economic, and environmental development through ecological–economic zoning and APA management. The potential for additional resources from ICMS-E transfer was an important motivation for APA creation in the region. The mechanism also promised to help ameliorate the serious social problems on the island, especially the costs associated with the periodic evacuation of families during floods.

The public defender's role

The public defender's office played an important role in CU creation in this region. Its first measures were aimed at stopping the commercialization of *pfaffia* (Brazilian ginseng), whose extraction resulted in indiscriminate burning in stream-bank areas (Azevedo, 1999). Local cattle ranchers had also exploited the island and floodplain indiscriminately, causing social and environmental harm. The public ministry proposed that cattle be removed from Ilha Grande and from the area alongside the river, in a decision based on the Forest Code, which requires the maintenance of riparian forests. The availability of ICMS-E resources provided the public defender with a carrot to supplement its law enforcement stick. The public defender contacted the mayors of the four municipalities involved and explained the possibility that the ICMS-E could generate revenues linked with environmental protection. The possibility of ecotourism development was also mentioned.

ICMS-E's importance to the municipalities

The impact of ICMS-E resources in the region has been very significant, especially to the municipality of São Jorge, in which 52 per cent of the total area are CUs (see Table 10.2). Differences in ICMS-E pass-throughs between municipalities are mainly due to differences in the proportions of park area compared with the total area of the municipality. The high ICMS-E transfers have become a solution to the financial problems of these municipalities. The local populations also perceive this, and the result has been a change in the behavior of the community toward the environment. The Ilha Grande National Park offers the prospect of greater revenue generation, both from ICMS-E revenues and from ecotourism. This will only be possible when the management plan is implemented, affecting the annual quality evaluation of the park by IAP, and the amounts consequently received by the municipalities.

Use of ICMS-E resources

ICMS-E resources are used for numerous activities in the communities, such as well-drilling (to provide drinking water), acquisition of tractors, maintenance of seedling nurseries, cleaning and landscaping of urban areas, construction of industrial facilities, garbage collection, landfills, environmental education, and enforcement of land use controls in parks and APAs. All these benefits, provided by ICMS-E revenues, are disclosed to the community to make the public aware of the link between environmental protection and day-to-day problems. All the resources required to maintain the Ilha Grande National Park also come from ICMS-E revenues.

Central southern region

This region was selected to explore the incentive created by Paraná's ICMS-E to preserve *faxinais* (common property forest resources). This land use system,

characteristic of central southern Paraná, a region primarily colonized by Ukrainian migrants in the 19th century, involves the collective use of land for animal production.[10] It is based on the integration of unfenced, range-fed animal production, using collective breeding sites; agriculture production, based on subsistence polyculture for consumption and commercialization; and low impact forest extraction of erva-mate, araucária (Paraná pine), and other native species. This type of production is important both from the perspective of environmental conservation and from that of maintaining the region's cultural heritage. Recognizing the vulnerability of small farming enterprise in the region, especially the planting of annual crops or exotic forest species, the state government created special regulated-use areas ('*faxinais*') through State Decree 3.446/97, allowing *faxinais* to be included in the state registry of CUs. In this case study, our objective was to understand whether the people living in the *faxinais* – low income producers – and the system itself benefited from the ICMS-E pass-throughs. For the current study, we selected the municipality of Rebouças. This region of Paraná accounts for 48 per cent of the state's tobacco production, 42 per cent of erva-mate tea, 37 per cent of onions, and 33 per cent of black beans (Cerri, 1999). About 25 per cent of the municipality's population lives in areas where *faxinais* are prevalent.

Environmental importance of faxinais

Although generally considered primitive from an agricultural production standpoint, the *faxinal* system allowed protection of large forest areas that otherwise would have been cut down for agricultural purposes. There are important remnants of Paraná pine (*Araucária angustifolia*), which is threatened or nearly extinct, in *faxinais*.

ICMS-E pass-throughs

The low profitability of the *faxinal* system, the impossibility of obtaining authorization for forest clearing from the late 1980s onward, and the needs for improvement of living conditions of the *faxinal* inhabitants were the main reasons that led local mayors to link the *faxinal* and the ICMS-E. After *faxinais* became eligible for ICMS-E transfers, Rebouças started receiving significant amounts, as shown in Table 10.2. The four *faxinais* that account for these transfers total 1349ha, ranging from 61 to 637ha each. They generate municipal revenues of approximately R$100/ha of *faxinal*. According to IAP data, ICMS-E pass-throughs represent approximately 12 per cent of the total amount transferred to the municipalities. The municipality has used these resources for education and health expenditures, road improvements, and the repair of outer fences, whose poor condition is a frequent cause of conflict between ranchers and farmers.

One factor that differentiates *faxinais* from other CUs is that actions taken with the support of ICMS-E resources take into consideration the needs of the *faxinal*'s inhabitants directly. Specific actions are negotiated between the municipal governments and the *faxinal* associations with IAP participation, and are part of the annual targets evaluated by IAP. These include forest maintenance

and conservation, improvement in the quality of life of the community, and the organization and participation of the community in decision-making (Márcia Zarpellon, personal communication).

This participatory approach has resulted in a substantial popular perception of the benefits from ICMS-E. Fence installation and reduced in-fighting were clear evidence of improvements resulting from the ICMS-E that could be perceived by the *faxinal* population. The municipality also implemented a project to fumigate the animals raised there, thus overcoming resistance from state agricultural extension technicians who had always opposed this method of animal management.

This example illustrates how the ICMS-E transfer can allow for redistributive effects in favor of low-income and traditional groups that use land in sustainable ways. This support may fortify their capacity to react against the loss of land to commercial agriculture. Another way in which ICMS-E transfers could have redistributive effects is discussed in Box 10.1.

Box 10.1 *ICMS-E POTENTIAL IN LAND-REFORM SETTLEMENTS*

ICMS-E transfers could be used to support poor communities by creating RPPNs in legal reserve areas located in land-reform settlements in Paraná. According to members of the Brazilian Movement of Landless Workers (Movimento dos Sem Terra, MST), 17 settlements are already engaged in the process of creating RPPNs. RPPNs created in land-reform settlements could generate ICMS-E pass-throughs of approximately R$200,000 per month to the municipalities in which they are located. The MST is proposing that this amount be shared equally between settlements and municipalities. The major problem in implementing this proposal is ensuring that any such revenue-sharing commitment continues in subsequent municipal administrations. The MST hopes that the creation of RPPNs and consequent receipt of ICMS-E transfers will generate revenues for settlement maintenance and help improve the movement's environmental image, which has been criticized due to the deforestation that has occurred in some settlements.

Municipal responses – Minas Gerais

The ICMS-E in Minas Gerais, although it has similar origins, began to be implemented somewhat later than that in Paraná, due to questions of equity and constitutionality. Its criteria were immersed in a much broader bill aimed to redress regional disparities in revenue allocations, and the ecological intent of the program was hence somewhat diluted. Nevertheless, as in Paraná, the ICMS-E has leveraged a movement toward the creation of private reserves, linking conservation more directly to the communities surrounding major parks and protected areas.

Itamonte

Itamonte has always been among the top municipalities in Minas Gerais in ICMS-E transfers. In recent years a new state APA, the Papagaio Mountain State Park, was created there. Itamonte was selected specifically so that municipal involvement in the creation of this new state CU could be studied.

Regional characteristics

Itamonte (which means 'rocky mountain') is located in southern Minas Gerais, and shares a border with São Paulo and Rio de Janeiro states. With steep slopes and abrupt scarps, the area divides the Rio Grande and Paraíba do Sul river basins (Itamonte, 1999). It is a former dairy region in the process of becoming an important ecotourism area.

Conservation activities

Itamonte includes parts of three CUs. The most important in terms of ICMS-E generation is the 30,000ha Itatiaia National Park, of which about 9800ha lie within the municipal borders.[11] The municipality also includes about 22,300ha of the Serra de Mantiqueira APA, an environmental protection area of 23 municipalities in the tri-state region. A third CU, Papagaio Mountain State Park, was created in August 1998, with about 6500ha within municipal lands.[12]

ICMS-E pass-throughs

Itamonte received one of the highest ICMS-E allocations in the first year of the program's implementation in Minas Gerais – as much as 64 per cent of total transfers in 1995, according to Veiga Neto (2000) (see Table 10.2). However, pass-throughs fell substantially in the second year as new CUs were added in other municipalities. With the creation of Papagaio Mountain State Park, ICMS-E revenues began to increase again in 1999. The possibilities for expanding ICMS-E revenues are slim, given that the greater part of the municipality is already protected. A few projects that would allow transfer increases, such as creating a municipal park and a waste recycling plant, were mentioned by interviewees, but none of these has progressed.

Municipal perceptions of the ICMS-E

Even though Itamonte is one of the top recipients of ICMS-E resources, municipal government officials expressed some measure of ignorance about the functioning of the instrument. This ignorance is probably due to the town obtaining most of its tax revenues from a Parmalat milk processing plant. The ICMS-E represents only about 10 per cent of total ICMS transfers to the municipality. The mayor believed, incorrectly, that the municipality was receiving ICMS-E only due to its share of Itatiaia National Park. In fact, ICMS-E pass-throughs also result from the presence of Mantiqueira APA and, since 1998, Papagaio Park. The mayor

diminishing over time (they have actually stabilized in real terms). Local people are also generally uninformed about public administration, and in particular have no knowledge about the ICMS-E and its potential benefits (Isabel de Andrade Pinto, personal communication).

Use of ICMS-E resources

The mayor considers the ICMS-E resources insufficient to allow the municipality to undertake substantial investments. Instead, the municipality has employed the additional resources to maintain its almost 800km of rural roads. Besides improving the local quality of life, this allows tourism expansion, especially rural tourism and ecotourism, activities that have awoken municipal interest as an alternative to traditional cattle ranching.

Our hypothesis that the municipality – one of the greatest ICMS-E beneficiaries in Minas Gerais – played an important role in the creation of Papagaio State Park is far from being corroborated. The initiative for the park's creation was taken by IEF, and predates the creation of the ICMS-E. There was no municipal support, whether official or popular, for its creation. On the contrary, the municipal government appears to be generally ignorant of the instrument, its potential, and even of its present value. The ICMS-E, therefore, appears not to have changed the behavior of either the local government or local producers. This situation would perhaps change if the amounts passed through and the activities undertaken with the additional resources were better publicized.

In contrast, in the neighboring municipality of Alagoas the ICMS-E has stimulated a proactive environmental attitude. According to its administration secretary, the municipality spends more on the environment than it receives from the ICMS-E (approximately R$58,000 per year). He considers the ICMS-E one of the most important laws created in Brazil, responding to the trend toward ecotourism, an activity that is progressively occupying the place of the local dairy industry. But its development also requires attention from public agencies to avoid the predatory exploitation that has been observed in other regions of the Mantiqueira Mountains (personal communication). This response in a neighboring municipality suggests that it is not necessarily the highest revenue recipients that best respond to the instrument's potential, but rather those who have a clearer idea of its potential to complement other resources for environmental protection.

Alto Caparaó

The coffee growing municipalities of Caparaó and Alto Caparaó are situated at the frontier of Minas Gerais and Espírito Santo, in the headwaters of the Itabapoana river basin.

ICMS-E pass-throughs

Alto Caparaó separated from Caparaó in 1996. Alto Caparaó retained the greater part of Caparaó National Park, which explains the substantial difference

in ICMS-E pass-throughs received by the two municipalities, as shown in Table 10.2. The new municipality has 4350ha within the park, or 42 per cent of its total area, while the former municipality kept only 292ha within the park, representing 2 per cent of its total area. According to mayor of Alto Caparaó, Delfino Emerich, the main motivation for the separation of the new municipality was the neglect it suffered from the old Caparaó municipal administration, not the potential to receive greater ICMS-E pass-throughs by retaining the greater share of the park in the new municipality. The new administrators had been unaware of the scale of ICMS-E resources they would receive thanks to the park.

In terms of ICMS-E transfers, Alto Caparaó's best year was 1997. Thereafter, the creation of new CUs by a growing number of Minas Gerais municipalities led to a decline in transfers to municipalities with pre-existing CUs. The significant funds received by Alto Caparaó prompted neighboring municipalities to create new reserves to gain access to ICMS-E funds. The principal regional municipality of Manhuaçu, for example, created a municipal park, and Caparaó a municipal APA. Creation of new CUs, whether municipal or private, is impossible in Alto Caparaó, given the absence of available areas. Its relative share of ICMS-E resources thus declined.

Use of ICMS-E resources

Alto Caparaó pays its regular monthly expenses with transfers from the municipal participation fund (a separate mechanism that supports the smallest municipalities; its revenues are smaller than those from the ICMS-E), leaving ICMS-E resources to carry out a number of necessary works. Among the principal works undertaken were rural and urban electrification, construction of flood containment barriers, street paving, the construction and repair of schools, a health center, sewer and drainage networks, and a bridge, and the acquisition of machinery. Few ICMS-E transfers were used for environmental purposes. Alto Caparaó gave priority to general expenses, such as health, education, and waste collection. Indeed, the mayor's office had an unfriendly relationship with the park. Earmarking of ICMS-E resources would without any doubt benefit the environment, but the mayor clearly prefers the funds to be unconstrained: 'for us mayors, suffering with lack of money, it would be better if we could be free to work with the money [as we choose]' (personal communication).

Caparaó fights back

With Alto Caparaó's separation, the original municipality saw a reduction in its prospects for ICMS-E transfers, given the loss of much of its protected area. Since 2000, however, Caparaó has seen a rise in such revenues, thanks to the creation of a municipal APA. Caparaó's mayor, Itair Horst Pinheiro, cites the increasing municipal revenues from the ICMS-E as a primary objective of the APA's creation, along with environmental protection. He considers the ICMS-E's role to be very important, because it is difficult to justify the creation of new CUs on environmental criteria alone (personal communication). During the meetings before the

APA's creation, producers were informed of the benefits it would bring to the municipality, as well as of the possibility of rural land tax exemption for those creating RPPNs. Nevertheless, some municipal producers, who had their areas zoned for wildlife conservation, feel damaged by this, considering the rural land tax exemption to be too small. The environment secretary, Dulio Garcia Sepúlveda, is hoping to use part of the ICMS-E resources to establish and fortify an independent environmental management agency (personal communication). To achieve this, he expects to propose that the city council allocate part of ICMS-E revenues for a recently created municipal environmental fund, following the lead of some Paraná municipalities.

Conclusions

The ecological value-added tax adopted by most Brazilian states provides a valuable fiscal instrument to reward local governments for efforts to protect forests and unique biological resources. It has been associated with a significant increase in the number and size of protected areas in the states where it has been adopted, prompting other states to take it up as a means to encourage natural resource conservation through revenue reallocation, rather than additional expenditure. As the review of the ICMS-E experience in Paraná and Minas Gerais has shown, although the instrument itself is fairly uniform in construction and intent, its operation in practice has differed markedly between municipalities, both within and between states. ICMS-E resources appear to have had a substantial impact on conservation decisions in some areas, while in others their impact has been much more limited. This section reviews some of the main lessons of this experience and provides recommendations for improving this impact in the future.

Compensation alone or a stimulus toward additional conservation?

Much of our work in this study focused on the question of whether the ICMS-E constitutes a simple compensation for past efforts on the part of governments to protect remaining forests and other unique areas, or rather as a mechanism that effectively stimulates stakeholders to take greater conservation initiatives. Although the bulk of resources is still allocated to lands that were either previously committed for conservation, or whose status was quickly registered so as to benefit from the instrument, we conclude that the ICMS-E has indeed been a harbinger of new partnerships between public and private actors for conservation purposes. By recognizing RPPNs, APAs, and *faxinais* as contributors to public conservation efforts, the instrument rewards those municipalities that have promoted their creation or maintenance as part of a mosaic of privately owned reserves and public parks.

Would earmarking reinforce the instrument's benefits?

The challenge ahead will be to reinforce the incentive created by the ICMS-E toward expansion in local and private conservation areas, by providing for transfers between local government and landowners who agree to protect forest remnants, whether through implicit earmarking (as in the case of *faxinais* or the MST proposal for agrarian settlements) or provision of in-kind services to RPPN owners, as in the soybean zone of Paraná. Another important use of such committed resources would be to build capacity for regional management over the loosely regulated land uses within APAs, such as has occurred in the Varjão area of Paraná and, incipiently, in Caparaó, Minas Gerais. Indeed, some municipalities have gone so far as to pass laws requiring that additional revenues derived from the ICMS-E be applied toward specifically ecological purposes, in response to a local environmental agenda.

How important is the quality factor?

The principal aspects that differ between Paraná and Minas Gerais in the implementation of the ICMS-E are the absence of regulation of the quality factor in the latter, and the fact that the instrument has existed longer in the former. State agents have built on their experience in developing and applying the quality evaluation criteria in Paraná, and are now actively prompting mayors to take steps that will enhance the quality of protection in local CUs over time, thus increasing their potential for revenue capture through the instrument. State environmental agents may thereby assume an important role in the definition of municipal public policies toward the environment if they are able to effectively inform local officials of the link between conservation and municipal revenues.

The ICMS-E can thus create a virtuous circle that involves both institutional learning on the part of the state authority and local capacity-building. The availability of additional funds has prompted the establishment of formal agreements between state park managers and municipal governments, providing for a share of these funds to be used to support CU protection and maintenance, adding further points to the quality assessment.

In many cases, on the other hand, the instrument's potential has been reduced due to insufficient information. Municipalities receive ICMS-E transfers along with transfers received under other ICMS criteria. The amount generated by each CU is something of a 'black box', with or without the quality factor. Awareness of the instrument's potential among local officials is mixed, but has been generally greater in Paraná than in Minas Gerais, due both to the instrument's longer time in application there, and considerable effort by the implementing agency to communicate its potential to local governments.

Implementation of the quality factor has been assessed as an important way to promote the instrument's effectiveness. But for the quality factor to be effective it must be treated as a dynamic feature of the instrument, subject to continual reassessment so as to stimulate certain CU categories, reward local actions, fine

environmental agenda. It is currently often perceived as a subjective 'black box'. Greater transparency is needed so that local governments and communities can see clearly why and how they were ranked, and how they might improve their ranking to receive greater resources.

Can the ICMS-E improve relations between protected areas and surrounding communities?

Improvements in relations between parks and surrounding populations are an important potential benefit by the ICMS-E. Once local communities perceive that CUs lying within their municipalities generate additional revenues, traditional resistance toward environmental protection is replaced by a concern to mobilize greater synergy with local economic development, particularly through ecotourism. Transfer of ICMS-E revenues has, by and large, been a significant source of support for traditional economic activities in areas where earnings rely on threatened ecosystems, such as *faxinais* and indigenous lands. In addition, some local governments apply ICMS-E resources to provide employment so as to minimize the loss of income from traditional activities that are now repressed, such as palmito harvesting.

Does the ICMS-E promote the creation of new CUs?

The difficulties of creating public CUs, owing to the high financial and, eventually, social costs of expropriations, prevent municipal governments from taking such actions. The ICMS-E brought with it an incentive to form private reserves. Agreements such as those signed between municipal governments and producers in the Paraná soybean region serve as examples of how public authorities can divide the benefits of creating the RPPNs between their owners, with obvious gains for both sides, thus reinforcing the creation of these private reserves, which are still viewed with distrust by a large number of rural landowners.

Does the ICMS-E favor the rich?

There is strong evidence that the ICMS-E can serve as a low cost mechanism to affect private landowner behavior. But it is important to stress that distributional effects will vary, and in the case of RPPNs, it is more likely to favor large landowners, given the relatively high transaction costs involved in registering perpetual conservation areas. The experience with *faxinais* belies this apparent distributional bias, as does the proposal by the MST, which, if implemented, could benefit hundreds of formerly landless rural laborers.

Recommendations

Although the ICMS-E has been shown to be an effective compensatory fiscal transfer, and to stimulate additional efforts toward forest conservation under

certain conditions, there are a number of ways to improve it as it is adopted by an increasing number of Brazilian states.

Democratize information and reinforce local environmental agendas

Showing in a clear, consistent, and regular manner to the largest possible number of stakeholders the amounts involved in ICMS-E transfers and how they are used is crucial to the accountability and transparency of this instrument. This inherently governmental role, as well as the regular evaluation of the quality of CUs and their integration with the local community, may be most effectively assumed by non-governmental organizations (NGOs).

Consider earmarking ICMS-E revenues

One aspect of the instrument that remains undefined at the state level, in part because of the need for constitutional amendment, is the adoption of local laws that earmark where and how the ICMS-E is to be spent. Another option to be explored is the direct payment of some of the funds raised to RPPN proprietors, commensurate with their contribution to municipal revenues. This approach has been effective in stimulating the creation of additional private CUs in the soybean zone of Paraná, as well as the preservation of the *faxinais*, and could be formally established at the state level.

Clearly, the desirability of across-the-board earmarking of funds requires broader discussion, since there are many mayors who would resent any meddling in the allocation of local revenues (as indicated in the interviews cited). Furthermore, earmarking could be accused of doubly rewarding conservation, since the areas that benefit will already have been created as a response to environmental concern, and rewarded (at least in Paraná) commensurate with the degree of local conservation effort. But in general in Brazil, fiscal incentives are far more directed toward development purposes than toward conservation, and the vast majority of protected areas are insufficiently enforced and poorly managed. The redirection of revenues from traditional economic activities toward conservation effected by the ICMS-E marks a substantial shift in policy. Reinforcement to improve the sustainability of the areas conserved would be a logical next step.

Increase the ecological share of ICMS allocations

As the number and proportional area of CUs grows, their relative share of ICMS-E revenues shrinks. This fundamental paradox deserves to be reconsidered. Indeed, this is already under consideration in both of the states studied, with proposals to increase the proportionate share of municipal ICMS revenue-sharing allocated on environmental criteria. There is a significant tension generated from such proposals, as those municipalities that were 'losers' in the initial years of the instrument's allocation (primarily major urban centers) lead a fierce backlash that could threaten the instrument's very survival. Yet these measures have great merit and deserve more attention from the national environmental movement, as resources dwindle for traditional parkland acquisitions.

Notes

1 The authors are grateful to the many municipal and state officials, and other people, who generously devoted their time to interviews for this study. They also acknowledge the financial support of the World Bank research project, Fiscal Incentives for Conservation (No 683-42), under the general direction of Kenneth Chomitz, who contributed to the study design. However, all opinions, interpretations, and conclusions in this study are the sole responsibility of the authors, and are not to be attributed to the World Bank or to any Brazilian agency. The project was ably managed by REDES at the Federal Rural University of Rio de Janeiro, Graduate Program in Development, Agriculture and Society. In the interests of full disclosure, it should be noted that one of the authors, Wilson Loureiro, played an important role in establishing and managing Paraná's ICMS-E system on behalf of IAP.

2 In the state of Paraná, the ICMS-E also benefits those municipalities that protect watersheds; in Minas Gerais, it also benefits those that invest in waste treatment facilities. However, the discussion in this Chapter focuses on the ICMS-E's role in forest conservation.

3 The quality index is assessed by regional officers of the state environmental agency, based on the following variables: physical quality; biological quality (fauna and flora); quality of water resources (within the CU and in its surroundings); physical representativeness; quality of planning, implementation, and maintenance; exceeding compliance with extant agreements with municipalities; development of facilities; supplementary analysis of municipal actions regarding housing and urban planning, agriculture, health, and sanitation; support to producers and local communities; and the number and amount of environmental penalties applied within the municipality by public authorities. This evaluation is expressed as a score used as a quality factor in the calculation of revenue distribution. The bands for each score vary in accordance with the type of CU and the objectives of state environmental policy, giving greater weight to the state's environmental management capacity over that of municipal or federal agencies.

4 RPPNs are properties under private domain in which either the total area or a part are identified as primitive, semi-primitive, recuperated natural conditions, or as possessing characteristics that justify recuperation, for scenic value or for the preservation of the biologic cycle of native Brazilian species of fauna and flora. Properties registered as RPPNs must be conserved in perpetuity, being restricted in use to ecotourism, education, and scientific research

5 The park is 1749ha in size, and comprises the remnants of the two forest biomes mentioned above. The park also has a reservoir (operated by the state power authority, COPEL) with a water surface area of approximately 11km^2 (IAP, 2001).

6 The park manager, Rubens Lei Pereira de Souza, is the chief person in charge of prospecting areas eligible to be transformed into RPPNs. Souza tries at first to demonstrate the environmental importance of the forest to the municipality as a way of persuading landowners to participate (personal communication).

7 For example, rural landowner and hotelier Artur Cezar Vigillato, the owner of an RPPN in Campo Mourão (109ha) and another in Luiziana (71ha), stated that no agreement with municipal governments existed prior to the RPPNs' creation. However, this possibility was in his mind, as he was aware of the financial benefits that would accrue to the municipality. For this reason, he is now able to demand services from the municipal governments. Vigillato says that he received support in the form of machine time to build and maintain roads, allowing the control of predatory hunting and fishing in his reserve.

8 The legal forest reserve of 20 per cent, required by the Forest Code of 1964 in Atlantic forest areas, in practice emulates the conservation benefits of RPPNs. However, the perpetual easement conferred on RPPNs, and their restrictive use, imposes a greater degree of permanent protection on these areas than that conferred by the Forest Code, which allows for extractive resource management in legal reserves.

9 The 78,875ha Ilha Grande National Park was created in 1997, and contains parts of the municipalities of Guairá, Altônia, São Jorge do Patrocínio, Vila Alta, and Icaraíma in Paraná; and parts of the municipalities of Mundo Novo, Eldorado, Naviraí, and Itaquiraí in Mato Grosso do Sul. The park is considered a transitional zone between the seasonal forest of Paraná (*cerrado*) and the *pantanal* of Mato Grosso do Sul, with very significant biodiversity. Besides the typical objectives of a federal park, its objectives also include the implementation of economic and ecological zoning in APAs. For the municipalities, the park also offers the prospect of greater resource generation whether from ICMS-E revenues or from ecotourism. This will only be possible when the management plan is implemented, affecting the annual quality evaluation of the park by IAP, and consequently the amount of ICMS-E resources received by the municipalities.

10 *Faxinais* were created by families settling in forest areas, normally on flat lands close to the water. As they lived close to each other and raised their animals freely, they created collective grazing areas. These areas, some of them extensive, were fenced on the outer limits, beyond which subsistence crops were cultivated (Márcia Zarpellon, personal communication). Normally each family had two pieces of land, one inside the *faxinal* and the other for cultivation outside the *faxinal*. Over the course of the 20th century, this system came under strong pressure from professional farmers, who coveted the flat forest areas. Many *faxinais* were sold or transformed into cultivated areas during the 1980s, when forest clearing was still legally permitted.

11 Itatiaia National Park, created in June 1937, was the first national park in the country. Its initial area of 11,943ha was later enlarged to 30,000ha in 1982. The park includes the highest peak in southeast South America, and has a variety of ecosystems from tropical forest to alpine meadows. Despite its longevity and importance, the land tenure situation in the park has still not been completely regularized, even in its oldest part (Mendes Jr, 1991).

12 Papagaio Mountain State Park was created on August 5 1998 after a ten-year process. The landowner initially intended to donate the area to the state, but after perceiving the state's interest he offered to sell it instead. Although the park is registered for purposes of ICMS-E transfer, no IEF management has yet been designated because the park is still in the planning stage. Cattle raising is still underway in the area as the park has not not in fact been implemented except by decree, and nothing has as yet been paid to the owner.

References

Azevedo, R.F. 1999. "A Presença do Ministério Público na Área do Remanescente do Rio Paraná." In J.B. Campos (ed.), *Parque Nacional de Ilha Grande: Re-conquista e Desafios*. Maringá: Instituto Ambiental do Paraná.

Bernardes, A.T. 1999. "Some Mechanisms for Protection of Biodiversity in Brazil with Emphasis on Their Application in the State of Minas Gerais." Brazil Global Overlay Project. Washington: World Bank (processed).

Campos, J B (ed). 1999. "Parque Nacional de Ilha Grande: Re-conquista e Desafios." Maringá: IAP.

Cerri, C. 1999. "De Volta ao Brasil." *Globo Rural*, **14**:159, January, pp. 26–33.

Freitas, A. 1999. "ICMS Ecológico: um Instrumento Econômico para a Conservação." Brasília: WWF Brasil.

Grieg-Gran, M. 2000. "Fiscal Incentives for Biodiversity Conservation: the ICMS Ecológico in Brazil." Discussion Paper No.00–01. London: IIED.

Instituto Ambiental do Paraná (IAP). 2001. "Plano de Manejo Parque Estadual Lago Azul." Maringá: IAP.

Instituto Brasileiro de Meio Ambiente e Recursos Naturais Renováveis (IBAMA). 2001. "Floresta Nacional de Irati." Paraná: IBAMA (processed).

Itamonte. 1999. "Terras Altas da Mantiqueira, Itamonte, MG." Itamonte: Galeria Serrana.

Loureiro, W. 1998. "Incentivos Econômicos para Conservação da Biodiversidade no Brasil: ICMS Ecológico." Curitiba: IAP.

Mendes Jr., L.O., 1991. "Relatório Mantiqueira." São Paulo: Frente em Defesa da Mantiqueira.

Veiga Neto, F.C. 2000. "Análise de Incentivos Econômicos nas Políticas Públicas para o Meio Ambiente – O caso do 'ICMS Ecológico' em Minas Gerais." M.A. Dissertation, CPDA. Rio de Janeiro: Universidade Federal Rural do Rio de Janeiro.

People interviewed

Aguiar, R.M. – Mayor's advisor, Alto Caparaó City Hall, Minas Gerais
Alvarenga, R. – Matutu community, Airuoca, Minas Gerais
Andrade, J.A. – Municipal Secretary of Agriculture and Environment, Rebouças, Paraná
Azevedo, R.F. – District Attorney, Altônia, Paraná
Bagão, P. – Municipal Environmental Secretary, Altônia, Paraná
Barbosa, P.L. – Mayor, Ibitirama, Espírito Santo
Battilani, E. – City Councilman, Campo Mourão, Paraná
Bezerra, C.A. – Tourism entrepreneur, Alto Caparaó, Minas Gerais
Contar, A. – President of Brazilian Association for Environmental Defense, Maringá, Paraná
Emerich, D. – Mayor, Alto Caparaó, Minas Gerais
Faria, de Marcos, P. – Mayor, Vila Alta, Paraná
Fumião, R.A. – EMATER technician, Caparaó, Minas Gerais

Guedes Neto, R. – Ex-Secretary of Environment, Caxambu, Minas Gerais
Kepka, Z.A. – Municipal Agriculture Secretary, Fernandes Pinheiro, Paraná
Koch, R. – EMATER technician, Fernandes Pinheiro, Paraná
Loss, E.F. – Mayor, Fernandes Pinheiro, Paraná
Marchezini, E.F. – Manager, Caparaó National Park, Alto Caparaó, Minas Gerais
Maria Jr., J.J. – Manager, Passa Quatro National Forest, Passa Quatro, Minas Gerais
Melo, L.A.N. – IBAMA State Representative, Paraná
Mendes, R.R. – Municipal Secretary of Administration, Alagoa, Minas Gerais
Milhiolo, R.J.I. – Municipal Environmental Secretary, Espera Feliz, Minas Gerais
Motta, M.N.J. – Manager, Ilha Grande National Park, Vila Alta, Paraná
Nilcinei. – Agronomist, Landless Peoples' Movement (MST), Curitiba, Paraná
Oliveira, G.M. – IAP regional office, Umuarama, Paraná
Palozzi, C. – Ex-Mayor, São Jorge do Patrocínio, Paraná
Panceri, S.L. – Vice-President, Mourão Agricultural Cooperative, Campo Mourão, Paraná
Pinheiro, I.H. – Mayor, Caparaó, Minas Gerais
Pinto, I.A. – Colina Community, Itamonte, Minas Gerais
Pitombeiras, M. – Manager, Mantiqueira Federal APA, Passa-Quatro, Minas Gerais
Rezende Neto, J. – Municipal Secretary of Environment, Vila Alta, Paraná
Ribas, A.M. – Municipal Secretary of Infrastruture and Environment, Campo Mourão, Paraná
Ribon Jr, M. – Biodiversity Protection Director, IEF, Belo Horizonte, Minas Gerais
Rodrigues, J.D. – IEF Technician, Carangola, Alto Caparaó, Minas Gerais
Romanelli, N. – Mayor-elect, Itamonte, Minas Gerais
Saloniski, C.A. – Farmer, Campo Mourão, Paraná
Salvadori, J.A. – Administration Secretary, Luiziana, Paraná
Samek, J.L. – Coordinator, ICMS-E for Watersheds, SUDERHSA, Curitiba, Paraná
Santos, V.M.M. – President of the Environmental Guardians Institute, Prudentópolis, Paraná
Sepúlveda, D.G. – Municipal Environmental Secretary, Caparaó, MG
Silva, J.M. – IEF Technician, Itamonte, Minas Gerais
Silva, L.P. – Mayor, Itamonte, Minas Gerais
Simiano, V.R. – IAP, Curitiba, Paraná
Souza, A. – Mayor's office, São Jorge do Patrocínio, Paraná
Souza, R.L.P. – IAP Regional Technician, Campo Mourão, Paraná
Tanahaki, P. – Regional office chief, IAP, Campo Mourão, Paraná
Tezelli, T. – Mayor, Campo Mourão, Paraná
Uchoa, L.A.C. – Manager, Iratí National Forest, Iratí, Paraná

Vigillato, A.C. – Farmer and hotelier, Campo Mourão, Paraná
Witzel, R.M. – Municipal Environmental Secretary, São Jorge do Patrocínio, Paraná
Zak, L.E. – Mayor, Rebouças, Paraná
Zarpellon, M.A.O. – IAP Regional Technician, Irati, Paraná

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Market-based Mechanisms for Conservation and Development

Edited by

Stefano Pagiola,
Joshua Bishop,
and
Natasha Landell-Mills

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