



PAYING PARKS TO CONSERVE WATER: A PROPOSAL FOR TRÊS PICOS

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Nature gives us a variety of services, such as keeping our climate stable, cycling nutrients, providing places for recreation and protecting drinking water. In most cases beneficiaries don't directly pay for these services, so there is little monetary incentive to protect the ecosystems that provide them. Payments for environmental services (PES) represent a widely proposed mechanism to solve this problem and increase the quality and quantity of such services. Our proposal, for water resource payments in the State of Rio de Janeiro, is guided by Articles 47 and 48 of the Brazilian law governing protected areas, known by its Portuguese acronym, SNUC. The fundamental principle at work is that those protecting resources should receive a financial reward for their stewardship.

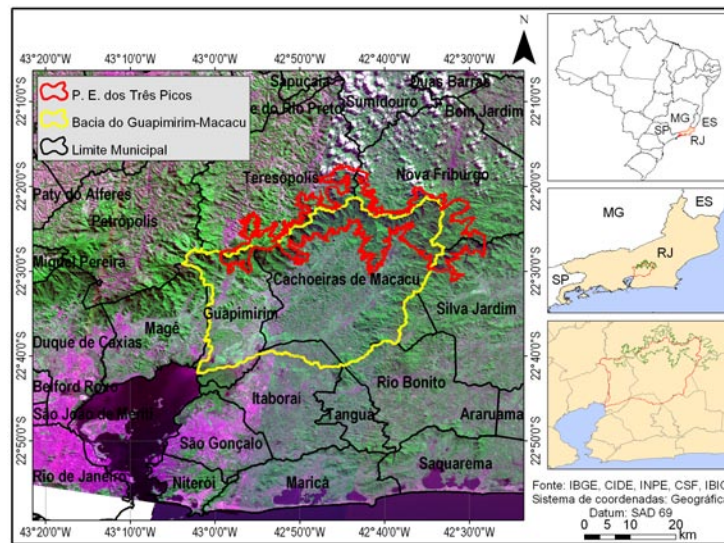
We developed a concept for pricing water in the Guapi-Macacu watershed which lies partly within the 46,000-hectare (114,000-acre) Três Picos State Park near Rio de Janeiro. The study has five parts: 1) estimating the cost of guaranteeing the hydrological protection afforded by the park; 2) estimating the park's contribution to water used by the main consumers; 3) definition of economic criteria relevant to the allocation of protection costs among consumers; 4) proposal of three alternative pricing scenarios; and 5) description of an institutional arrangement to govern the payment system.

The estimate of protection costs was limited to those needed to safeguard water resources, things like sorting out land tenure for disputed parts of the park, paying guard salaries, specific training, equipment, fuel, administrative costs and certain physical infrastructure. Unrelated costs, such as visitor facilities, were excluded. The total cost was estimat-

ed at around R\$635,680 (around \$318,000 at 2007 exchange rates).

To calculate the park's water contribution to each user, we used a geographic information system with data on topography, rivers, land use, park boundaries, water intake points and rainfall. The system estimates both surface and aquifer supplies originating in the park.

When calculating how much each user should pay, we started from the rather obvious idea that the sum of all payments should equal the cost of protecting the park. However, we also considered the basic economic principle that the quantity demanded of a good goes down if the price goes up. So, the price was set at a level to cover park protection costs, presuming slightly diminished consumption. Our proposal also adjusts the price based on the proportion of each consumer's total water use that is supplied by the park. That means that users will only pay extra for water that is actually provided by the park.



Study area map

From this starting point, we generated three possible water rate scenarios:

NEUTRAL SCENARIO: In this scenario, the water price simply varies based on the proportion of each user's water that comes from Três Picos.

DISTRIBUTIVE SCENARIO: This scenario provides a 50% "cross" subsidy to residential consumers, in addition to adjusting the price based the share of park-provided water. This is an arbitrary subsidy, calculated simply to illus-

trate a price structure based on a value judgment that one used group deserves to pay less.

ELASTICITY-BASED SCENARIO: This scenario assigns a higher price to those users who react less to the price rise – whose elasticity of demand is lower – but offers no subsidy. The elasticity figures used are based on existing data for each category of user group. The idea is to charge the extra fee to consumers whose behavior suggests that they don't mind paying it or have little flexibility to lower their use.

A base rate was estimated for each scenario, from which the rate for each user was subsequently calculated. The base, low and high prices are presented in Table 1. These figures represent the addition to current water bills to cover the park's protection costs.

Table 1 – Water rates by pricing scenario

Scenario	Rate (US\$/m3)		
	Base	Low	High
Neutral	0,01434	0,00146	0,01434
Distributive	0,02594	0,00132	0,02594
Elasticity-based	0,01059	0,00145	0,01292

The cost of park protection adds only 1.18%, on average, to the rates currently paid by water user in the study area. However, this figure varies widely among users, since the proportion of their consumption derived from the park also ranges significantly. The criteria used in the Distributive and Elasticity-based scenarios also contribute to this variation. Further, a large part of the variation is explained by the fact the Imunana Canal, a municipal supply point, is the largest user of the park's water (88%) in absolute terms, but derives only 10% of its total intake from the park, which means that it pays a relatively low unit price. The price increase for other users varied from 4.24% to 10.96% in the Neutral scenario, 7.67% to 19.82% in the Distributive scenario and 4.96% to 11.05% in the Elasticity-based scenario.

To govern the payment system, we propose a committee composed of the park director, one representative of each consumer group, and one representative from each municipality sharing the park's territory. The committee would ensure revenues are put to their intended use and decide on any adjustment in

the rate structure over time.

The method we propose is well-suited to parks protecting the headwaters of rivers. In the case of mid-basin protected areas that function as natural water “filters,” water quality data would have to be included in any pricing arrangement. One fact worth underscoring in the case of the Três Picos State Park is that the revenues needed to guarantee hydrological services are well within the means of water consumers. Assuming conservatively that the Imunana facility supplies half of the region's 1.68 million residents, the average cost per person of paying for headwaters protection is R\$ 0.76 (around 35 US cents) per person per year. In other words, at an almost negligible individual costs, water consumers can make their supplies more secure, while also protecting the variety of other environmental services provided by Três Picos.

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REFERENCES AND NOTES

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 5. Photos by Marcos Amend

