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Sustainable financing for ocean and coastal management in Jamaica: The potential for revenues from tourist user fees

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Abstract/Resumen

This study explores the feasibility of implementing a sustainable funding mechanism for ocean and coastal management in Jamaica. Results show that tourists are more willing to pay for an 'environmental tax'' than a general'' tourism development tax''. The study found that an environmental surcharge of US$2 per person could generate $3.4M per year for management with 0.2% rate of decline in tourist visitation. Negative impacts from the imposition of additional taxes on annual tourist visitation rates could be minimized by providing information on how there venues from the tax will be allocated for management activities.

Keywords: Jamaica reefs, resource management, coastal tourism, tourist user fees.

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Introduction

Coral reef ecosystems hug tropical coastlines and offer protection from the pounding of waves and scouring currents on a daily basis but more importantly, protect against the worst ravages of storms and hurricanes. They are able to grow in high-energy environments and reef growth gradually builds up huge limestone structures, which buffer and defend the coastline. In addition reefs also provide the major source of sand, which builds land and replenishes beaches [1]. Coral reef ecosystems are important because they provide people with a source of livelihood, food, recreation, and medicinal compounds and protect the land on which they live. For a small island developing state (SIDS) like Jamaica, the coastal tourism industry is an important economic activity. The Jamaican tourism industry accounts for 32% of total employment and 36% of the country's GDP [2] and is largely based on the sun, sea and sand, the last two of these attributes being dependent on healthy coral reef ecosystems.

This study draws heavily on the contingent valuation method however its primary goal is not to provide an "accurate" value for the recreational services of coral reefs and beaches. Instead I model contingent behaviour for tourists that receive two slightly different scenarios and formulate hypotheses about how consumer demand may differ across individuals. Based on the results I discuss the feasibility of generating revenues for the sustainable financing of ocean and coastal management in Jamaica.

Jamaica faces many economic challenges and these difficulties have meant necessary budgetary cuts by the central government. This has therefore resulted in a reduction of the amount of money for natural resource management in Jamaica. The results of the study can guide the possible development of revenue generating instruments for the sustainable management of the natural resources of found within the multi-use coastal areas across the island.

This study aims to inform the relevant stakeholders of the feasibility of implementing environmental fees as well as the likely impact of such revenue generating instruments on the current tourist visitation rates to the island.

Methodology

Contingent valuation methods (CVM) can be used to derive estimates that can explain how changes in resource quality can impact respondent behaviour in addition to estimating the economic value of the resource. This study utilizes a modification of the CVM method commonly termed contingent behaviour (CB). The contingent behaviour methodology involves constructing a hypothetical market for the purpose of eliciting people's preferences for public goods. The goal of this approach is to estimate a demand function for the good but in this instance conventional data on prices and quantities consumed (revealed preference) is supplemented by responses to a survey question in a discrete-response format. The survey

question focuses on demand behaviour rather than willingness to pay *per se* [3] however the estimation of a demand function allows for the calculation of consumer surplus.

This study will examine the effect of offering two distinct institutional mechanisms on respondents' WTP for preserving the Jamaican tourism product in the context of a convergent validity test. These institutional mechanisms are defined by the type of payment scenario (type of tax) presented to the respondent. The payment vehicle is an additional tax that results in an increase to their current travel expenses. Data was gathered primarily from recreational users (tourists) in order to provide policy relevant information. In particular, the information was collected from stopover tourist visitors to the island. A random intercept method used to collect data in the departure terminals of the Montego Bay International Airport.

Demand estimation

A non-parametric estimation of WTP was conducted using the Kaplan-Meier-Turnbull estimator [4]. This produces a conservative (lower bound) estimate of consumer surplus. This lower bound of mean willingness to pay is calculated from the raw frequency response data and thus no assumptions are made about the distribution of willingness to pay as the bid price increases. This method of estimation also allows for the calculation of confidence intervals on the means as well as tests for convergent validity [5].

Parametric analysis was conducted on the binary choice (Yes/No) data from the dichotomous choice (DC) question on the respondents' decision to make a trip to Jamaica based on the imposition of a user fee. The varying dollar amounts randomly allocated across the sample of respondents allows for the econometric estimation of a demand like relationship between the probability of a "yes" response to a given bid value [6]. The econometric analysis of the dichotomous choice questions involved using a maximum likelihood method applied to a log-normal distribution [5]. This produces estimates that can be used to predict the distribution of the percentage of "yes" responses as the bid amount increases. The probit model that was used in the analysis is outlined below;

$$\text{Prob}(\textit{response is "yes"}) = \Phi\,[\alpha_0 + \gamma z - \beta \ln(t)]$$

where α_0 is an estimated intercept β is an estimated parameter on the monetizing variable (natural log of the tax) and γz is a vector of all other relevant and observed determinants of the respondent (age, income, gender etc). The estimated parameters can then be used to inform the effects of various characteristics on the probability of providing a yes (affirmative) response to the DC question [5].

Findings and results

Table 1. Descriptive statistics

	Tourism Survey	Environmental Survey	Combined Sample
Nights in Jamaica	8	8	8
Age	43	41	42
Female	45.6%	49.1%	47.6%
Male	54.4%	51.9%	52.4%
Household income ($US)	$125,832	$121,586	$123,734
Travel Cost	$2,981	$2,885	$2,926
Average Group Size (persons paid)	2	2	2
US and Canadians	84.3%	86.9%	85.6%
Sample Size	171	181	352

From the results above we can infer that on average persons spent approximately 8 nights in Jamaica and on average where approximately 42 years old. Persons also spent on average approximately US$3,000 on travel expenses (airfare, accommodation and other) which typically covered 2 persons ($1,463 per person). Mean household incomes were reported at just above US$120,000. Just under half of both sample populations were female and US and Canadian visitors comprised the majority of respondents sampled. The results when compared to the annual tourism statistics [7] suggest that the sample is representative of the population of tourists who visit the island.

Non Parametric Analysis

Figure 2 below compares the frequency of the actual "Yes" dichotomous choice question responses for both survey versions and confirms that in general, the percent of yes responses decreases as the level of the bid increases. Using the Kaplan-Meier-Turnbull method to analyse the frequency data, mean lower bound estimates for WTP for the tourism tax were US$130.07 (95% C.I. $0.78 - $259.37) and $165.15 (95% C.I. $83.66 – $246.65) for the environmental tax. A standard t-test of the comparison of the means was conducted and confirmed that one could reject the null hypothesis that $WTP_{TOURISM\ TAX}$ is equal to $WTP_{ENVIROMENTAL\ TAX}$.

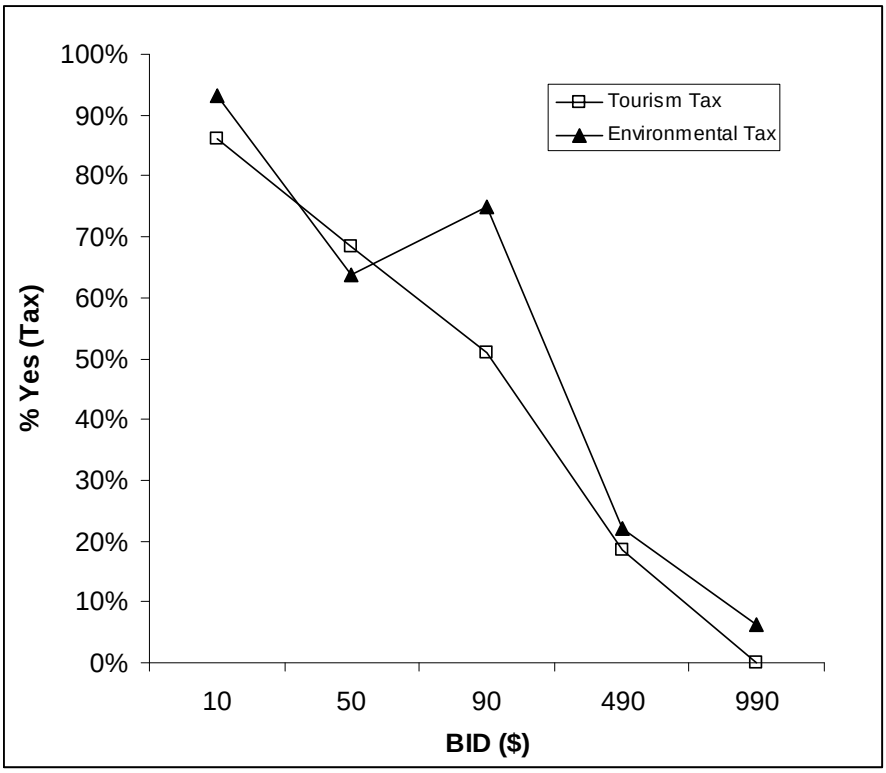

Figure 1 Comparison of response frequencies between survey types.

Parametric analysis

The data from the two samples were combined and a multivariate probit regression was conducted in order to evaluate the effect of the different "treatments" (tourism versus environmental tax). The bid coefficient (LogBid) has a negative sign and is highly significant and thus confirms *a priori* expectations of a downward sloping demand relationship between increasing bid levels and the probability of a "yes" response (table 2). The dummy variable for the environmental tax version (EnviroTax) is positive and significant at the 90% level and this suggests there is a significantly different and higher willingness to pay for an environmental tax than a tourism tax.

Regression II and Regression III also compare the differences between high and low income earners and males and females respectively. The results show that persons earning less than or equal to the median income have a lower probability of saying "yes" to the tax when compared to those who earn more than the median income ($90,000), while women have a lower probability of saying "yes" than men. The results also show that North American respondents are more likely to say yes to an environmental tax than to the tourism tax even though in general they have a lower probability of saying yes to any type of tax when compared to other countries. All other variables were not statistically significant and hence cannot be used to predict the contingent behaviour of the wider tourist population.

Table 2. Mutilvariate probit regression output

	Regression I		Regression II		Regression III	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	SE
Intercept	2.9569**	0.5727	3.1422**	0.5898	2.9108**	0.6431
LogBid	-0.6460**	0.0685	–	–	–	–
EnviroTax (1= Env, 0 = Tourism)	0.2937*	0.1707	–	–	–	
Nights in Jamaica	-0.0096	0.0131	-0.0095	0.0132	-0.0099	0.0132
Age	-0.0012	0.0062	-0.0012	0.0063	-0.0009	0.0062
Education	0.0841	0.1228	0.0688	0.1231	0.0710	0.1236
Gender (1 = Female, 0 = male)	0.0386	0.1712	0.2074	0.2366	0.5817	0.6549
Household Income (US$10,000/year)	-0.0045	0.0096	-0.0066	0.0121	-0.0042	0.0097
USA_Canada	-0.1195	0.2688	-0.2858	0.2878	-0.2750	0.2865
						–
EnvTax*Females			-0.3311	0.3231	-0.2982	0.3244
EnvTax*USA_Canada			0.4158*	0.2327	0.3914*	0.2311
LogBid_Low Income (≤ $90,000)			-0.6549**	0.0737	–	–
LogBid_ High Income(> $90,000)			-0.6381**	0.0715	–	–
LogBid_ Female					-0.6905**	0.0987
LogBid_ Male					-0.6052**	0.0944
Chi-squared	123.6		122.4		124.2	
No. Observations	304		303		304	

*significant at the 90% level, **significant at the 99% level

Policy implications and recommendations

One of the objectives of this study is to provide policy relevant information that can guide the development of a user fee system for that can provide funding for environmental management and protection. Results from this study can be used to generate optimal pricing values for the environmental tax. Based on the fact that tourists have a significant consumer surplus associated with the beaches and coral reefs of Jamaica then it would be reasonable to think that they might be willing to contribute to the sustainable financing of coastal ecosystem protection.

To determine the feasibility of implementing an environmental user fees would require the relevant policy makers to take the following actions. The first step would be to identify the costs of ocean and coastal zone management programs. Then based on these costs policy makers can determine the necessary ranges for the per-person tax that would cover the annual costs of resource management. The second step would be to incorporate the use of the statistical models of contingent behaviour to estimate the impact that these price ranges would have on tourist visitor rates. This would enable policy makers to make informed decisions between the trade off between possible reductions in visitation rates versus the protection and management of the critical coastal ecosystems, such as coral reefs and beaches. Lastly, after considering all of the above and consulting with the relevant stakeholders (hotels, environmental agencies, NGO's, municipalities etc.) a decision can be made to select the price that would meet the goals of environmental protection and sustainable development of the coastal tourism industry.

Table 3 shows how the information from the statistical model could be used to guide the development of surcharges or user fees for funding ocean and coastal resource management. The visitation rate and revenue calculations shown in table 4 are based on the statistical model for the environmental tax sample and the total number of stopover visitors in 2007 (1,700,785). The costs of management and potential revenue that could be earned from various tax amounts and the potential impact on visitation rate are also described in table 4. The approximate costs of environmental and coastal zone management for Jamaica were obtained from personal communication with marine park managers and officials in the coastal zone management branch of the National Environment and Planning Agency (NEPA). The actual 2008 budgetary allocation from central government for environmental management (US$185,133) is also presented. It should be noted that the costs outlined in the table are overestimates of actual management costs and represent what would be the "best case" scenario for resource managers.

Table 3. Management costs, potential revenues and the impact on visitation rate.

Annual Costs			**Potential Revenues and Impact on Visitation Rate**		
	Jamaican	**$1 US = J$71.30**	**Per Person Tax (US)**	**% Visitor Decline**	**Revenue**
Central Government	$13,200,000	$185,133	$1	0.1%	$ 1,699,867
NEPA	$50,000,000	$701,262	$2	0.2%	$ 3,393,326
5 NGO's (J$15M each)	$75,000,000	$1,051,893	$10	3.9%	$ 16,351,866
TOTAL	$138,200,000	$1,938,289	$50	21.6%	$ 64,938,704
			$165.15*	52.4%	$ 133,599,666

* Turnbull consumer welfare estimate

Table 3 shows that if an environmental tax of $1 per person were introduced it would not cause a significant decline in visitation rate (0.1%) and would generate revenues of $1.7M. This would be somewhat lower than the cost estimate of $1.9M for natural resource protection. Similarly a $2 per person tax would cause a decline in visitors of 0.2% while generating revenues of $3.4M. Higher amounts are also shown with their corresponding rates of decline.

Conclusions

A random airport intercept contingent behaviour survey with an 85% response rate was used to compare estimates of two groups of tourist's willingness to pay additional tourist fees. The results show that tourists have a high consumer surplus associated with a vacation in Jamaica, and have a significantly lower willingness to pay for a tourism tax when compared to an environmental tax. The findings of the study show that the "label" of the tax and as well as the respondent's awareness of the institutional mechanisms for environmental protection and tourism are important to their decision framework.

A simple benefit cost analysis shows that coastal zone management activities could be completely financed from the introduction of a $2 per person environmental tax in addition to the existing tourism tax. The potential negative impact on the annual visitation rate to Jamaica from the introduction of this additional tax appears to be negligible (– 0.2%). However any decline in visitation rate could be mitigated by providing visitors with information on how tax revenues are allocated. It is important that the provision of this information is complimented by ensuring that the funds are indeed used for the purposes specified.

The importance of coastal tourism's continued contribution to Jamaica's economy rests the ability of key stakeholders to protect the coastal ecosystem that the industry is so vitally dependent on. In the absence of adequate government funding for natural resource management, targeted taxes on major resource users of the coral reefs and beaches such as tourists can generate income to support comprehensive management of the ocean and coastal resources of Jamaica. This study demonstrates an approach that could be used as part of the policy framework for resource protection and sustainable management of important coastal ecosystems and natural resources in other countries dependent on coral reef based tourism.

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Appendix

Contingent Market Scenarios

Tourism Tax

Suppose that prior to your most recent trip to Jamaica, the Jamaican government decided to increase this "tourism tax". This new tax would result in an increase in your overall travel costs. The extra revenue from this tax would go to the Government of Jamaica to be used to support necessary government programs.

Q. If, because of the increased tax, you now had to pay a per person surcharge of US$100 (in other words an additional $90 on top of the existing $10) as part of your overall travel expenses, would you still have decided to visit Jamaica?

Environmental Tax

Suppose that prior to your most recent trip to Jamaica, the Jamaican government decided to add an "environmental tax" to the existing US$10 surcharge, as part of its efforts to provide funding for the management of the coastal environment. These funds would go directly to the relevant environmental management agencies for activities such as; marine patrols, public education and joint environmental programs and therefore preserve the existing conditions and prevent a decline in environmental quality.

Q. If, because of this mandatory environmental tax, you now had to pay a per person surcharge of US$100 (in other words an additional $90 on top of the existing $10) as part of your overall travel expenses, would you still have decided to visit Jamaica?

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