MEASURING VALUES FOR WETLANDS PROTECTION IN A DEVELOPING COUNTRY FROM DOMESTIC AND INTERNATIONAL CITIZEN GROUPS

by

JAMES CHRISTOPHER ALLEN

(under the direction of John C. Bergstrom)

ABSTRACT

The first purpose of this thesis was to measure economic value and consumer surplus of natural resource commodities for citizen groups in both Georgia and Trinidad. A regression was run for the dichotomous choice model; the results showed that Trinidad respondents were very interested in supporting natural resource protection projects in Nariva Swamp, much more than Georgia respondents. Next, a separate regression was conducted for the open-ended model; the results for Georgia and Trinidad respondents were very similar. A similar WTP value was found and response trends were much alike.

The second purpose was to test post-materialist theory. For one of the multi-part questions in the survey, trend graph analysis, response analysis, and a regression analysis of responses were conducted. The goal was to determine differences, if any, between Georgia and Trinidad respondents. A second multi-part question was similarly analyzed for the same purpose; in this case trend graph analysis, regression analysis, and mean value analysis of responses were conducted. Results suggest that Georgia and Trinidad respondents have very similar ideas about environmental values. In fact, contrary to theory, Trinidad respondents showed a stronger interest in environmental values than did Georgia respondents in most cases.
INDEX WORDS: Trinidad, Contingent valuation, Non-market valuation, Nariva Swamp, Post-materialism, Georgia, Environment, Wetlands protection
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B.A., Rhodes College, 1988
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A Thesis Submitted to the Graduate Faculty of the University of Georgia in Partial Fulfillment of the Requirements for the Degree

MASTER OF SCIENCE

ATHENS, GEORGIA

2004
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May 2004
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CHAPTER 1
INTRODUCTION

Because of pressures to convert natural areas to commercial economic development uses, protecting natural areas in developing countries is a major challenge. A developing country may desire to protect natural areas, but relatively high out-of-pocket and opportunity costs of protection could pose considerable hurdles. To help protect natural areas in a developing country, the international community often gets involved; for example, providing funds to purchase and preserve natural areas such as rain forests, river corridors and wetlands. Thus, to determine the economic feasibility of protecting a particular natural area in their country, decision-makers in a developing country may be interested in measuring the economic value (e.g., willingness-to-pay) of protection on the part of both residents and nonresidents of the country.

The overall purpose of this study was to test a common methodology for measuring both domestic and international citizen groups’ values (willingness-to-pay) for protecting a natural area in a developing country. The natural area studied was a wetland area called the Nariva Swamp located in the developing country of Trinidad. A common contingent valuation survey was conducted both in Trinidad and the state of Georgia, USA. The survey instrument worked well in both countries demonstrating the feasibility of administering a common valuation methodology to very different citizen groups living in developing and developed countries.

The Nariva Swamp in Trinidad is one of the largest freshwater wetlands in the Caribbean, supporting a diverse population of flora and fauna, including waterfowl, anacondas, and manatees. The swamp also supports recreation in the form of hunting,
fishing, and ecotourism. Furthermore, subsistence rice and vegetable farming and subsistence fishing of cascadura fish and conchs occur in the swamp. However, some commercial rice production by local residents, who do not have legal ownership of land, is causing serious environmental damage to the swamp.

Overuse of water due to commercial rice production with itinerant irrigation canals has increased the influx of sea water into the swamp, thereby increasing salinity of water in the swamp. If this continues, it could be devastating for flora and fauna in the swamp, local subsistence farming and fishing, and future ecotourism benefits. In order to avoid a worst-case scenario, human activities in the swamp should be balanced to provide economic benefits while protecting the ecosystem functions and services that support these benefits. Attaining such a balance requires knowledge of Nariva Swamp values and benefit-cost analyses of swamp use and management.

The contingent valuation method can be applied to measure use and nonuse values of protecting natural areas. The contingent valuation survey instrument for measuring values of protecting the Nariva Swamp to Trinidad and Georgia, USA citizens was developed jointly by researchers at the University of the West Indies and the University of Georgia. The survey instrument collected data on qualitative attitudes and preferences for Nariva Swamp protection, and quantitative data to estimate willingness-to-pay (WTP) for protecting the swamp. The survey instrument was administered to a sample of general public citizens in both countries. From these data, a common valuation model was estimated and used to calculate mean WTP for Nariva Swamp protection on the part of Trinidad and Georgia citizens.

To obtain more insight on the causes of differences in preferences and values between developing and developed country citizens for protecting a natural area in a
developing country, survey responses to a series of environmental values and attitudes
questions were also analyzed. Responses to environmental value questions indicate
the relative weight Trinidad and Georgia citizens place on use and nonuse values of
Nariva Swamp protection. We were interested to learn if nonuse values of Nariva
Swamp protection are important to Trinidad citizens, and if use values are important
to Georgia citizens since part of the purpose of the overall study was to gauge the
potential of the Nariva Swamp as an international ecotourism destination.

Specific Objectives and Organization

In Chapter 2, the theoretical background for the research conducted is
specified. The contingent valuation model is explained and two methods for
measuring consumer surplus are defined. The first is the case of the dichotomous
choice variable with a set bid amount. This is a binary case, where the respondent is
asked to respond yes or no to making a hypothetical donation to support a natural
resource protection project in Nariva Swamp. The second is an open-ended choice
variable with a set bid amount. In this case, after responding to the dichotomous
choice variable, the respondent is further asked to make a donation amount offer.
Finally in Chapter 2, a summary of post-materialist theory regarding environmental
values is developed, which is later tested with the bi-country data available from this
set of survey responses.

In Chapter 3 research methodology and results are defined and explicated.
First, a series of environmental/ecological preference indices are developed from
preferences questions that comprised part of the survey design. These indices where
then used as variables in the two willingness-to-pay valuation models used to analyze
survey responses. Next, a regression was run for the dichotomous choice model; the
results are provided and explained. Next, a separate regression was conducted for the open-ended model; the results are provided and interpreted.

In the second part of Chapter 3, testing of post-materialist tenets was conducted. For one of the multi-part questions in the survey, trend graph analysis, response analysis, and a regression analysis of responses was conducted. The goal was to determine differences, if any, between Georgia and Trinidad respondents, the ultimate goal being to test the validity of post-materialist theory as it relates to environmental valuation. A second multi-part question was similarly analyzed for the same purpose; in this case trend graph analysis and regression analysis of responses was conducted.

Finally, in Chapter 4 implications for this research are considered. The policy impacts for the consumer surplus findings and reviewed. Further, the results of the testing of post-materialist theory are considered. Finally, a comparison of the responses between Georgia and Trinidad is summarized in order to identify future areas of fruitful research.
CHAPTER 2
THEORETICAL BACKGROUND

Measure of economic value

It is important to consider what type of economic value is being measured when looking at the situation of Nariva Swamp. Total economic value comprises actual use value, existence value, and option value. Figure 1 illustrates the way in which these general value descriptions are further delineated and how they relate to the Nariva Swamp. The economic values that this project tries to assess are divided into three categories, as noted on the figure: non-use, current use, and future use values (Figure 1, Bergstrom, Stoll, Titre, Wright, p. 131).

Use values may be divided into two types, current use and future use. The two are similar except as their names imply, one refers to “economic value of recreational activities produced in the present,” the other refers to those produced at some future time (Bergstrom, Stoll, Titre, Wright, p. 132). Use values can further be divided into consumptive and non-consumptive use values, where consumptive use refers to rival use of natural resources and non-consumptive use refers to non-rival use of natural resources.

Non-use values are those placed on natural resources, which are independent of any present use. They are not associated with actual use of the resource. The suggestion is that just knowing that wildlife and natural habitats for that wildlife exist has value for people. The motivation behind non-use values may be varied. Freeman suggests a sense of stewardship for the natural resource base. Or as John Krutilla eloquently stated, “when the existence of a grand scenic wonder or a unique and fragile ecosystem is involved, its preservation and continued availability are a significant part of the real income of many individuals” (Krutilla, 1969, p. 779).
Option value is a final type of economic value related to Nariva Swamp to be considered. It “is defined as a risk premium associated with retaining the option to use a natural resource sometime in the future” (Bergstrom, Stoll, Titre, Wright, 1990, p. 133). Option value is normally associated with uncertainty of a particular resource in the future (Freeman, 1985). The sum of expected consumers’ surplus and option value is known as option price, the maximum an individual is willing to pay to maintain the option of being able to use the resource at some future time (Bergstrom, Stoll, Titre, Wright, 1990; Freeman, 1985). The amount of the option price depends on the amount of perceived uncertainty regarding the resource being considered.
Consumer Surplus/Willingness-to-Pay and Willingness-to-accept

Generally, consumer surplus can be considered as the amount a consumer is willing to pay over and above what she is required to pay. This is determined by measuring the benefit an individual receives from consumption of some good or resource at a particular price. Graphically, consumer surplus is the area under the consumer demand curve and above the price line and is also known as Marshallian consumer surplus.

Alternatively, Hicksian demand curves, unlike their Marshallian counterparts, take into account substitution effects of price and quantities while holding utility constant. Because utility remains constant, they are preferred over Marshallian surplus measures. They are based on four measures: willingness-to-pay compensation, willingness-to-pay equivalent, willingness-to-accept compensation, and willingness-to-accept equivalent.

One way to value an individual’s utility for a project is to measure their change in consumer surplus for the project. A measure of change in quantity is required and may be conducted by using an indirect utility function:

\[ V(P^0, M-CS, Q^1) = V(P^0, M^0, Q^0) = U^0 \]  

(1)

Where:
- \( P \) = price of resource
- \( M \) = income of individual
- \( CS \) = consumer surplus
- \( Q^0 \) = initial situation
- \( Q^1 \) = subsequent situation

The measure is calculated by the difference in the income that allows the consumer to be at the same indifference curve as the initial situation. This can be measured by
using an exact welfare measure called compensating surplus (CS). The CS can be defined as the amount of money, paid or received, which places an individual at his or her initial utility level after a restricted or rationed change in quantity, where optimizing adjustments are not allowed. The compensating surplus allows economists to determine if the benefits to the gainers outweigh the costs to the losers, which is consistent with potential Pareto improvements. It is also used because the individual should have the right to the initial situation. This can be measured by using an expenditure function because it entails a quantity change in the level of utility of the stakeholders from their initial utility levels.

\[ E = E(P, Q, U) \]  
\[ (2) \]

Where:  
P = price of resource  
Q = non-market commodity level  
U = utility level of stakeholders.

The underlying inverse Hicksian demand function can be defined as:

\[ \frac{dE}{dP} = H = H(P, U) \]  
\[ (3) \]

The Hicksian demand function should be used because it takes utility into account, whereas the Marshallian demand curve only deals with prices and quantities.

The data collected in this survey was analyzed using willingness-to-pay compensating measure, WTP\(^c\), for a quantity increase by the gainers, i.e., the people who would benefit by seeing Nariva Swamp stay at its present environmental quality. This is determined in the following equation:

\[ WTP^c = CS = |E(P^0, Q^1, U^0) - E(P^0, Q^0, U^0)| = |M^1 - M^0| \]  
\[ (4) \]

Where:  
Q\(^1\) > Q\(^0\), and M\(^0\) > M\(^1\)
Thus in this case of an imposed quantity increase, the compensating surplus is the individual’s willingness-to-pay for the higher level of Q, or WTP\textsuperscript{c}, which is the Hicksian compensating welfare measure. This also implies that the individual has implicit or presumed rights to the initial situation. Compensating surplus is considered a deduction because the individual states that they are willing to decrease their income by some amount in order to remain at the initial level of recreational facilities.

**Contingent Valuation Method with Dichotomous Choice Variable and Given Bid Amount**

A detailed description of the Contingent Valuation Method (CVM) can be found in Mitchell’s and Carson’s book, *Using Surveys to Value Public Goods: The Contingent Valuation Method*. It is used here because of the need to measure non-use values. Since a measure of total economic value of Nariva swamp is wanted, CVM is the best available option. A common application of CVM is to develop a survey that asks respondents to answer dichotomous choice questions. These data are then analyzed and used to calculate expected consumer surplus, E(CS), using a random utility approach. The steps to this approach are to first, calculate the indirect utility function:

\[ U_i = V_i (w, y_i, s_i) + e_w \]  
\[ (5) \]  

Where:  
- \( w \) = state of environmental quality,  
- \( w=0 \)-status quo, \( w=1 \)-improved  
- \( y \) = income of respondent  
- \( s_i \) = vector of respondent characteristics  
- \( e_w \) = random disturbance

A respondent’s choice is:  

\( w=0, y_i=y_i, \) environmental quality, income constant
\[ w=1, \ y_i=y_i-BID, \ \text{environmental quality increases, income decreases by bid.} \]

In terms of probability, the probability of a YES response is:

\[
\text{Prob} [\text{"YES"}] = \text{Prob}[\Delta (V_i) >= \Delta (e_i)] = F[\Delta (V_i)]
\]

where \( F \) is the cumulative density function, CDF, a logistic distribution of \( \Delta (e_i) \):

\[
\text{Logistic } F = \frac{1}{1+\exp[\Delta (V_i)]}.
\]

Now, using the logistic and the \( \text{Prob}[\text{YES}] \):

\[
\text{Mean WTP}_i = E(CS)_i = \int_{0-\infty} \frac{1}{1+\exp[\Delta (V_i)]} \text{d}BID.
\]

This integral calculates consumer surplus for the change in the non-market commodity.

According to demand theory, factors that drive demand are income, own price, prices of substitutes, and tastes and preferences. In line with these expectations, the regressors that were chosen for this model theoretically should demonstrate these variables by displaying a significant level of decision-making power for the respondent to accept or reject the bid price. The regressors that were chosen are: \text{INCOME}, \text{GENDER}, \text{bid price (BID)}, \text{AGE}, \text{EDUCATION}, and four indices derived from preference questions asked in the survey: \text{NATURAL}, \text{MANAGED}, \text{NONUSE}, and \text{AGUSE}. The method by which these indices were specified is detailed in Chapter 3.

In terms of effects on the regression equations, from demand theory and post-materialist theory, discussed in more depth later in this chapter, we expect the variables to have to following effects in the dependent variable. From demand theory, we expect that increased \text{INCOME} should have a positive affect on WTP. Greater income suggests increased disposable income, which could be funneled to support a natural resource project. Similarly, we expect that increased \text{AGE} and \text{EDUCATION}
have a positive relationship with support of a project insofar as increased age and education lead to increased financial stability. BID should have a negative affect on the response variable. From demand theory, we expect that increased prices leads to decreased demand for a commodity, in this case Nariva Swamp. Demand theory and post-materialist theory, do not provide a clear indication for the influence of GENDER on the response variable. One might contend that in both the US and Trinidad being female has a strong correlation with decreased income compared to being male. With this exception, we should expect that GENDER would have no significant affect on the response variable; the coefficient value should tend to zero. We should expect that the NATURAL, MANAGED, and NONUSE variables would have positive affects on the response variables. Increased interest on the part of respondents in any of these variables should be reflected in increased WTP for Nariva swamp protection. Finally, AGUSE should have a negative effect of the response variable. Increased interest in letting farmers access land sequestered for the Nariva Swamp should result in decreased interest to support swamp protection.

Because the regressors could be highly correlated, they were checked for correlation when the model was run. When we insert the regressors into equation (7), we are given the specific form as follows:

$$WTP = \frac{1}{1+\exp\left[-f(a + b_1INCOME + b_2BID + b_3GENDER + b_4AGE + b_5EDUCATION + b_6NATURAL + b_7MANAGED + b_8NONUSE + b_9AGUSE) \right]}$$  (9)

Contingent valuation method with Open-Ended Variable and Given Bid Amount

Maximum WTP measures derived from CV studies are consistent with market demand-based values (Cummings, Brookshire, and Shulze). For standard neoclassical demand theory, demand equations can be derived which express the quantity of a particular commodity consumed as a function of the price of the commodity, prices of
related commodities, household income and other socio-economic variables which are related to a systematic change in preferences (Ziemer, Musser, and Hill).

An individual’s willingness-to-pay for a quantity of a commodity can be expressed by the bid function:

\[
WTP = f(BID, INCOME, EDUCATION, AGE, GENDER, PRESENT, MANAGED, NONUSE, AGUSE). \tag{10}
\]

In a contingent market using an open-ended question, maximum WTP is stated directly by individuals. The amount of WTP is estimated for a given individual utility change. The individual’s utility changed depends upon the estimation of benefits from the potential wetlands protection program. The benefits may vary across individuals because of differences in income, initial offer price, socio-economic variables, and preferences. The equation may be specified in a linear or logarithmic form to estimate WTP for wetlands protection and estimated using ordinary least squares. This is analogous to option price estimation under supply and demand uncertainty using the logistic model.

**Environmental Values and Post-Materialist Theory**

One of the strongest views concerning environmental quality and conservation is that only those in the industrialized West are capable and interested in preserving environmental resources. Critics have charged that environmental awareness reflects the interests of well-educated, white males in the middle to upper-income classes. Studies conducted of visitors to environmental reserves reflect that users tend to fall within these categories, with women also reporting usage to a more limited extent. The implication is if environmental awareness and environmental resource usage is important to only a limited audience, then there might indeed be little need for support of environmental conservation activities in divergent cultures.
Because the contemporary environmental resource concept originated in North America, the perception of wilderness and the values attributed to it have been described as cultural or social constructions. It is argued that environmental resources are the creation of a given set of people at a particular point in time in a specific cultural, social, and political context. The argument traces the origins of the modern ideas of environmental resources to the latter half of the nineteenth century, to the transcendentalist theories of philosophers R.W. Emerson, H.D. Thoreau, and John Muir. It suggests that it was the freedom granted by their intellectual-class status that allowed them to perceive nature in metaphysical terms. Nature was transformed from a source of resources, wealth, and hard work for the physical body to an ointment for the soul. However, as exemplified by Thoreau in his work *Walden*, man might go to nature for refreshment, but he did not stay there. He returned to regular society with a renewed vigor for work and prosperity.

Until only the last decade, it was presumed that only the socially elite in developed countries cared about environmental status. In fact, this view has had so much cache, that Brechin and Hempton suggest that “this stereotype – that only rich people and nations are environmentally concerned – has such political utility that it would probably survive without theoretical support” (Brechin and Hempton, 246). This post-materialist approach, discussed by Maslow extensively, focuses on the premise that citizens rank physical needs first. Once those needs are met, they can then turn to needs that are more abstract, such as desire for beauty and appreciation of their environment.

Inglehart’s (1990) post-materialist thesis provides a socio-economic theory about perceptions of environmental resources. He suggests that the emergence of scarcity-free, post-materialist societies in the late twentieth century has enabled
individuals in these societies to adopt more egalitarian attitudes and interests regarding other members of society. As material needs are increasingly being met in these countries, a growing number of individuals in these societies can express compassion on issues that extend beyond the basic physical needs, such as gender and racial equity and environmental protection.

Support has come from other fronts as well. For example, Low and Heinen, contend that there are underlying biological forces, not unlike those propounded by Maslow, which explain the ways in which humans make decisions about their use of resources. Further, Inglehart points to political considerations for two sources of interest in environmental protection. First, support for environmental protection is “greatest in countries with relatively severe objective problems (e.g. air pollution, water pollution).” Second, citizens with post-materialist values are more likely to express greater interest in environmental protection; “post-materialist publics rank relatively high in their readiness to make financial sacrifices for the sake of environmental protection.” (Inglehart, 1995)

Inglehart’s post-materialist thesis, however, does not consider class variation within emerging industrial societies. Even if post-materialist status is the most influential factor determining environmental concern, there are still important class differences both within any given cultural group and also between different groups. For example, recent immigrants from Mexico are more likely to be members of the blue-collar working class, while immigrants from China and Korea of more likely to be members of the white-collar working class, who have greater educational, technical, and entrepreneurial attainment (Alba & Nee, 1997). To generalize within a particular country context, even with a similar cultural background, i.e. all Latin or all Asian groups are considered, differences in educational and social attainment, should
significantly affect the capacity of individuals, in the same society, to look beyond basic physical needs and consider time and financial expenditure on meta-needs, such as racial/social equity and environmental protection.

Generally, Inglehart’s environmental approach has been accepted with theoretical support from the post-materialist argument but little actual data. However, there is mounting evidence that, though grounded in theory, it is unfounded in experience. New comparative data have been generated that test conventional wisdom.

Brechin and Kempton cite the rise of grass roots environmentalism in developing countries as one example that runs counter to conventional wisdom. Local level movements in areas as diverse as India and Kenya suggest highly developed support values for environmental protection. In independent studies in the United States, Hunter and Pfeffer & Stycos found that immigrant attitudes and concerns were not significantly different from those of native born Americans. In fact, interest levels tended to be higher. However, Pfeffer and Stycos note a lower likelihood to participate in environmentally oriented political behaviors. Finally, in a very different type of analysis, Bechtel, Verdugo, and Pinheiro, found that students in the US, Mexico, and Brazil had different approaches to the environment and ecology, but not less interest. They highlighted the fact that the different groups reflected varying belief systems. They found that US students tended to fall into a clear dichotomy, indicating that they see a very clear distinction between nature and culture. Mexican students were found to have a similar, though less pronounced, tendency to a distinction between nature and culture. The Brazilian students were found to have no clear distinction at all between nature and culture. This indicates that they have a
much more integrated view of nature and culture than the other two groups of respondents.

**Conclusion**

The purpose of this chapter has been to define the points of measure of economic value and post-materialist theory, which will be used to evaluate data in chapter three. Use and non-use values have been defined and a method for measuring consumer surplus, have been described. Further, a specific approach for measuring willingness-to-pay--contingent valuation--for a natural resource project, such as protection of Nariva Swamp, has been outlined. Finally, post-materialist theory, as it relates to environmental value has been summarized. Post-materialists contend that only when a society achieves a certain level of economic satisfaction can they begin to focus their attention on environmental goods. These approaches will be used in the chapter three as a means to compare the responses of Georgia and Trinidad respondents to survey questionnaires.
CHAPTER 3

METHODOLOGY AND ANALYSIS

**Assessment tool**

Because this thesis deals with non-pecuniary effects rather than directly measurable monetary effects, a survey using contingent valuation method techniques was designed by the University of Georgia and the University of the West Indies. Originally designed in 1999, this survey has been implemented three times. In the summer 1999 it was conducted in Georgia as a mail-out survey and in Trinidad by personal interview. In 2001 the mail-out survey in Georgia was implemented again, in order to increase the number of usable responses available from Georgia so that analysis would be more comparable to that in Trinidad. The Georgia samples were random samples of 500 residents for each implementation purchased from Survey Sampling Inc. Surveys were sent out, then approximately 1 week later a reminder postcard was sent out. Then after 3 weeks, a second round of surveys were sent out to non-respondents, followed by a follow-up post card 1 week later. The overall response rate for the Georgia implementation in 1999 was 18.1%. For the 2001 implementation the response rate was 12.6%. For the Trinidad implementation, personal interviews were conducted with a random sample of citizens. 464 usable responses from Trinidad and 103 usable responses from Georgia were used in this analysis. For more information about the implementation of the survey in Trinidad, Dr. Carlisle Pemberton at the University of the West Indies may be contacted.

The questionnaire is divided into four sections. Section one is used to determine knowledge about Nariva Swamp and the level of importance of several option, use, and non-use values. Section two focuses on Nariva swamp protection.
Section three relates to Nariva swamp visitation and environmental attitudes. Section four focuses on demographic information. The survey appears as Appendix 1.

Environmental/Ecological Preference Indices

In order to derive information about respondents’ environmental and ecological preferences, attitudes, and opinions, two questions, which had several sub-sections, were asked of respondents. Question 3 was phrased: “There may be several reasons for protecting Nariva swamp. For each of the reasons listed below, rate how important you think the following statements are by circling the appropriate number.” A Likert scale with a range from 1-7 was used. Question 16 was phrased: “People have different attitudes and opinions with respect to natural resources and the environment. To help us learn more about these attitudes and opinions, please rate how much you agree with each statement.” A Likert scale with a range from 1-4 was provided.

From these responses, component factor analyses were conducted to see if the multi-itemed value scale could be reduced to a fewer number of dimensions or factors based on similarity of responses. Analysis was conducted in SAS using the PROC FACTOR option with VARI-MAX rotation to generate uncorrelated factors. Missing cases were deleted. Factors with Eigenvalues of 1 or greater were retained. These results are shown in Graphs 3.1 and 3.2. (See Appendix) Two factors for each question were retained. For Question 3 “Non-Use Value” (NONUSE) and “Agriculture Use Value” (AGUSE) were defined. For Question 16 “Natural State Value” (NATURAL) and “Managed Use Value” (MANAGED) were defined.

Once the factors were determined, then factor loadings were analyzed to determine which values would be included in the indices. Items with factor loadings greater than .50 were retained for the corresponding factor indices. NONUSE
comprises responses values from “Existence Values,” “Bequest Values,” “Inter-generational Altruism,” and 3 ecosystem services questions. AGUSE comprises responses values from “Self-Sufficiency in Agriculture” and “Protection of Agriculture Users.” PRESENT comprises “Eco-centrism,” “Bio-centrism,” “Cultural Tourism,” and “Eco-tourism.” MANAGED comprises “Utilitarianism” and “Conservation.”

Factor scores were multiplied with individual responses then linearly summed into an index, creating the newly defined variables: NONUSE, AGUSE, NATURAL, and MANAGED. These were then used in the regression analyses as previously defined.

Model Results

First, variables were checked for auto-correlation. Recall that perfect correlation is reflected in a co-efficient equal to +1 for positive correlation and –1 for negative correlation. The closer the co-efficient is to 0, the less the correlation between the variables. In almost all cases, the correlation co-efficients were very close to 0. There are a few exceptions, which are shown below:

Table 3.1 Correlation Coefficients

<table>
<thead>
<tr>
<th>Combined Correlations</th>
<th>Georgia Correlations</th>
<th>Trinidad Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUCATION/INCOME</td>
<td>.41656</td>
<td>-30432</td>
</tr>
<tr>
<td>COUNTRY/EDUCATION</td>
<td>-37256</td>
<td>.32001</td>
</tr>
<tr>
<td>COUNTRY/INCOME</td>
<td>.30529</td>
<td></td>
</tr>
<tr>
<td>MANAGED/AGUSE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDUCATION/AGE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDUCATION/PRESENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MANAGED/AGUSE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the combined correlations, it was expected that there would be some correlations between country/income and country/education. Similarly, it is not surprising that there is some correlation between education/income. Since Georgia enjoys greater economic development status that Trinidad, these correlations are somewhat
predictable. From the Trinidad responses, it was not surprising that there is a correlation between age and education, since the educational attainment might be considered a luxury in a lesser-developed economy. Additionally, correlation between education/income is not surprising: greater skills sets lead to more highly valued workers. Finally, some correlation was shown in a few of the index variables. In all cases, the correlations were taken into account in the model analysis, but due to theoretical importance it was decided not to remove them from the models.

Next, the means and frequencies of variables were considered. They are shown below:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Min</th>
<th>Max</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>BID (value of given bid)</td>
<td>53.25</td>
<td>1</td>
<td>800</td>
<td></td>
</tr>
<tr>
<td>Q4 (yes or no to bid amount)</td>
<td></td>
<td></td>
<td></td>
<td>no=270, yes=297</td>
</tr>
<tr>
<td>Q5 (bid offered by respondent)</td>
<td>22.53</td>
<td>0</td>
<td>800</td>
<td>0=275, &gt;0=292</td>
</tr>
<tr>
<td>GENDER</td>
<td></td>
<td></td>
<td></td>
<td>female=251, male=316</td>
</tr>
<tr>
<td>AGE</td>
<td>43.85</td>
<td>0</td>
<td>91</td>
<td></td>
</tr>
<tr>
<td>EDUCATION</td>
<td>11.32</td>
<td>0</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>INCOME</td>
<td>26728.40</td>
<td>0</td>
<td>250000</td>
<td></td>
</tr>
<tr>
<td>COUNTRY</td>
<td></td>
<td></td>
<td></td>
<td>GA=103, TRIN=464</td>
</tr>
</tbody>
</table>

Dichotomous Choice Model

For the dichotomous choice questions in the contingent valuation survey bids were randomly assigned with the following values” $1, $2, $5, $8, $16, $33, $49, $82, and $131. The empirical specification of the logit model estimated was:

\[
Pr(YES) = \frac{1}{1+\exp[-f(a + b_1\text{INCOME} + b_2\text{BID} + b_3\text{GENDER} + b_4\text{AGE} + b_5\text{EDUCATION} + b_6\text{NATURAL} + b_7\text{MANAGED} + b_8\text{NONUSE} + b_9\text{AGUSE}]}}
\]

(11)
This model was estimated using SAS and the PROC LOGISTIC procedure. The procedure was conducted for COMBINED data, for GEORGIA individually, and for TRINIDAD individually. Full estimation results, variable means, and calculated WTP values are shown in Table 3.3.

The model describes the curve that bounds consumer surplus. In order to find the value of the consumer surplus, the Cameron form of the model can be used:

$$WTP = -\left( a + b_1 \text{INCOME}_M + b_3 \text{GENDER}_M + b_4 \text{AGE}_M + b_5 \text{EDUCATION}_M + b_6 \text{PRESENT}_M + b_7 \text{MANAGED}_M + b_8 \text{NONUSE}_M + b_9 \text{AGUSE}_M + b_{10} \text{COUNTRY}_M \right) / b_2.$$  \hspace{1cm} (12)

(Sun, Bergstrom, & Dorfman, 65).
## Table 3.3 WTP Estimations from Dichotomous Choice Variable with Given Bid Amount

<table>
<thead>
<tr>
<th>COMBINED DATA</th>
<th>Variable means</th>
<th>Coefficient Estimates (standard error)</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERCEPT</td>
<td>-3.3554</td>
<td>-0.0205*** (.9795)</td>
</tr>
<tr>
<td>BID</td>
<td>53.25397</td>
<td>0.2793** (.0276)</td>
</tr>
<tr>
<td>GENDER</td>
<td>0.55732</td>
<td>-0.014 (.2070)</td>
</tr>
<tr>
<td>AGE</td>
<td>43.84656</td>
<td>-0.014 (.00686)</td>
</tr>
<tr>
<td>EDUCATION</td>
<td>11.32275</td>
<td>0.000276 (.0256)</td>
</tr>
<tr>
<td>INCOME</td>
<td>26728 (-.003802)</td>
<td>0.000276 (.0256)</td>
</tr>
<tr>
<td>COUNTRY</td>
<td>0.81834</td>
<td>2.7663*** (.42)</td>
</tr>
<tr>
<td>NATURAL</td>
<td>8.21504</td>
<td>0.1519** (.0689)</td>
</tr>
<tr>
<td>MANAGED</td>
<td>3.51144</td>
<td>-0.1745** (.0737)</td>
</tr>
<tr>
<td>NONUSE</td>
<td>17.45579</td>
<td>0.0396 (.0358)</td>
</tr>
<tr>
<td>AGUSE</td>
<td>4.10853</td>
<td>(-0.1150) 0.115**</td>
</tr>
<tr>
<td>NUMBER OF RESPONSES</td>
<td>567 (NO=270, YES=297)</td>
<td></td>
</tr>
<tr>
<td>LOG LIKELIHOOD</td>
<td>590.516</td>
<td></td>
</tr>
<tr>
<td>WTP</td>
<td>393.3730992</td>
<td></td>
</tr>
</tbody>
</table>

* .90 Confidence Level
** .95 Confidence Level
*** .99 Confidence Level
(Table 3.3 cont.)

<table>
<thead>
<tr>
<th>GEORGIA DATA</th>
<th>Variable means</th>
<th>Coefficient Estimates (standard error)</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERCEPT</td>
<td>-12.5514</td>
<td>(4.702)</td>
</tr>
<tr>
<td>BID</td>
<td>14.083495</td>
<td>-0.0204</td>
</tr>
<tr>
<td>GENDER</td>
<td>0.46602</td>
<td>-0.3259</td>
</tr>
<tr>
<td>AGE</td>
<td>46.32039</td>
<td>0.0637*</td>
</tr>
<tr>
<td>EDUCATION</td>
<td>15.01942</td>
<td>0.3573*</td>
</tr>
<tr>
<td>INCOME</td>
<td>63447</td>
<td>-0.00002</td>
</tr>
<tr>
<td>COUNTRY</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NATURAL</td>
<td>7.39245</td>
<td>0.6541*</td>
</tr>
<tr>
<td>MANAGED</td>
<td>3.2121</td>
<td>-0.6863*</td>
</tr>
<tr>
<td>NONUSE</td>
<td>17.17209</td>
<td>0.00503</td>
</tr>
<tr>
<td>AGUSE</td>
<td>4.9008</td>
<td>0.1379</td>
</tr>
</tbody>
</table>

NUMBER OF RESPONSES 103 (NO=92, YES=11)
LOG LIKELIHOOD 47.862
WTP -101.8840716

*.90 Confidence Level
**.95 Confidence Level
***.99 Confidence Level
Recalling from Chapter 2, the theoretical expectancy for the signs of coefficient estimators is: INCOME-positive, AGE-positive, EDUCATION-positive, BID-negative, GENDER-tending to zero, NATURAL-positive, MANAGED-positive, NONUSE-positive, and AGUSE-negative. For COUNTRY, from the post-materialist argument, we should expect that the coefficient estimator would be negative. As the responses move from 0 (Georgia) to 1 (Trinidad), i.e. from a developed economy to a
lesser-developed one, we should expect that the propensity to make a donation to a natural resource protection project would decrease.

For the COMBINED data, the coefficients showed the following results. BID was positive, as expected, with a 99% confidence level. GENDER, which was expected to be neutral, was positive at the 95% confidence level. NATURAL had a positive sign, as expected, at the 95% confidence level. MANAGED had a negative sign, contrary to expectations, at the 95% confidence level. AGUSE had a positive sign, contrary to expectations, at the 95% confidence level. For COUNTRY the sign was positive, 2.7663, at the 99% confidence level, which was contrary to expectations. For the remaining variables, according to the model estimation and hypothesis testing, they did not have a statistically significant effect on WTP.

For the GEORGIA data, BID had a positive coefficient, as expected, at the 99% confidence level. AGE and NATURAL were positive, as expected, at a 90% confidence level. Contrary to expectations, the sign for MANAGED was negative at the 90% confidence level. And, AGUSE was negative, contrary to expectations, at the 90% confidence level. For the remaining variables, according to the model estimation and hypothesis testing, they did not have a statistically significant effect on WTP.

For the TRINIDAD data, AGE, EDUCATION, and NATURAL all had positive coefficient values, as expected, at the 90% confidence level. MANAGED showed a negative coefficient value, contrary to expectations, at the 90% confidence level. For the remaining variables, according to the model estimation and hypothesis testing, they did not have a statistically significant effect on WTP.

For the willingness-to-pay values, the tendency from Trinidad respondents is encouraging. With more intimate knowledge of the wetland area, we expect that respondents would be more willing to contribute. One possible explanation is that
offered by Brechin and Kempton. Using cross-national surveys, they were able to determine that indeed respondents in lesser-developed countries had a strong willingness-to-pay for environmental protection, not unlike developed countries. The primary difference was that respondents from more advanced economies were more willing to pay in terms of cash, while in lesser advanced economies they were more willing to pay in terms of time. (Brechin and Kempton, 260) In inherent weakness in willingness-to-pay valuation is that it is conducted explicitly in terms of cash. In the instance where a respondent might be willing to pay in terms of time, their valuation is lost.

For Georgia respondents, the number of yes responses was very small. So, it is difficult to gauge the implication of the WTP for this data. However, the fact that such a large majority of respondents were unwilling to respond positively to the hypothetical situation has strong policy implications. There is clearly little interest on the part of the Georgia respondents to support natural resource preservation projects in Trinidad.

Open-ended Model

Next we consider the responses to the open-ended choice variable. The simplified version of this WTP equation is:

$$\text{WTP} = a + b_1 \text{INCOME}_M + b_2 \text{BID}_M + b_3 \text{GENDER}_M + b_4 \text{AGE}_M + b_5 \text{EDUCATION}_M + b_6 \text{NATURAL}_M + b_7 \text{MANAGED}_M + b_8 \text{NONUSE}_M + b_9 \text{AGUSE}_M + b_{10} \text{COUNTRY}_M$$

(13)

This model was estimated using SAS and the PROC LIFEREG procedure. The procedure was conducted for COMBINED data, for GEORGIA individually, and for TRINIDAD individually. Further, by taking the estimated coefficients and the
independent variable means, we can calculate a WTP value. Table 3.4 shows the coefficients, the independent variable means, and the calculated WTP.

Table 3.4: WTP Estimations from Open-ended Model with a Given Bid Amount

<table>
<thead>
<tr>
<th>COMBINED DATA</th>
<th>Variable means</th>
<th>Coefficient Estimates (standard error)</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERCEPT</td>
<td></td>
<td>-0.2595 (.7540)</td>
</tr>
<tr>
<td>BID</td>
<td>53.25397</td>
<td>0.0082*** (0.002)</td>
</tr>
<tr>
<td>GENDER</td>
<td>0.55732</td>
<td>-0.3764*** (0.1420)</td>
</tr>
<tr>
<td>AGE</td>
<td>43.84656</td>
<td>0.0024 (.0052)</td>
</tr>
<tr>
<td>EDUCATION</td>
<td>11.32275</td>
<td>0.0172 (.0168)</td>
</tr>
<tr>
<td>INCOME</td>
<td>26728</td>
<td>0</td>
</tr>
<tr>
<td>COUNTRY</td>
<td>0.81834</td>
<td>1.2245*** (0.3434)</td>
</tr>
<tr>
<td>NATURAL</td>
<td>8.21504</td>
<td>-0.0067 (.0491)</td>
</tr>
<tr>
<td>MANAGED</td>
<td>3.51144</td>
<td>-0.0581 (.0509)</td>
</tr>
<tr>
<td>NONUSE</td>
<td>17.45579</td>
<td>0.1115*** (0.0279)</td>
</tr>
<tr>
<td>AGUSE</td>
<td>4.10853</td>
<td>0.1395*** (0.0478)</td>
</tr>
<tr>
<td>WTP</td>
<td>3.529852768</td>
<td></td>
</tr>
<tr>
<td>NUMBER OF RESPONSES</td>
<td></td>
<td>292</td>
</tr>
<tr>
<td>LOG LIKELIHOOD</td>
<td>-478.8393356</td>
<td></td>
</tr>
</tbody>
</table>

*.90 Confidence Level  
**.95 Confidence Level  
***.99 Confidence Level
(Table 3.4 cont.)

<table>
<thead>
<tr>
<th>GEORGIA DATA</th>
<th>Variable means</th>
<th>Coefficient Estimates (standard error)</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERCEPT</td>
<td>1.9977</td>
<td>1.9977</td>
</tr>
<tr>
<td>BID</td>
<td>14.083495</td>
<td>-0.0046**</td>
</tr>
<tr>
<td>GENDER</td>
<td>0.46602</td>
<td>-0.691*</td>
</tr>
<tr>
<td>AGE</td>
<td>46.32039</td>
<td>-0.0023</td>
</tr>
<tr>
<td>EDUCATION</td>
<td>15.01942</td>
<td>-0.0278</td>
</tr>
<tr>
<td>INCOME</td>
<td>63447</td>
<td>0</td>
</tr>
<tr>
<td>COUNTRY</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NATURAL</td>
<td>7.39245</td>
<td>0.0817</td>
</tr>
<tr>
<td>MANAGED</td>
<td>3.2121</td>
<td>-0.204</td>
</tr>
<tr>
<td>NONUSE</td>
<td>17.17209</td>
<td>-0.0665</td>
</tr>
<tr>
<td>AGUSE</td>
<td>4.9008</td>
<td>0.5947***</td>
</tr>
<tr>
<td>WTP</td>
<td>2.80807589</td>
<td></td>
</tr>
<tr>
<td>NUMBER OF RESPONSES</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>LOG LIKELIHOOD</td>
<td>-14.44556604</td>
<td></td>
</tr>
</tbody>
</table>

* .90 Confidence Level
** .95 Confidence Level
*** .99 Confidence Level
<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient Estimates (standard error)</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERCEPT</td>
<td>0.8549 (.0677)</td>
</tr>
<tr>
<td>BID</td>
<td>33.8125 (0.0096*** )</td>
</tr>
<tr>
<td>GENDER</td>
<td>0.57759 (-0.0017 )</td>
</tr>
<tr>
<td>AGE</td>
<td>43.29741 (0.0154)</td>
</tr>
<tr>
<td>EDUCATION</td>
<td>10.50216 (-0.0154)</td>
</tr>
<tr>
<td>INCOME</td>
<td>18578 0</td>
</tr>
<tr>
<td>COUNTRY</td>
<td>0 0</td>
</tr>
<tr>
<td>NATURAL</td>
<td>8.39764 (-0.0068)</td>
</tr>
<tr>
<td>MANAGED</td>
<td>3.57788 (-0.0508)</td>
</tr>
<tr>
<td>NONUSE</td>
<td>17.51877 (0.1197*** )</td>
</tr>
<tr>
<td>AGUSE</td>
<td>3.93266 (0.1294*** )</td>
</tr>
<tr>
<td>WTP</td>
<td>3.560413572</td>
</tr>
<tr>
<td>NUMBER OF RESPONSES</td>
<td>275</td>
</tr>
<tr>
<td>LOG LIKELIHOOD</td>
<td>-454.0825978</td>
</tr>
</tbody>
</table>

* .90 Confidence Level  
** .95 Confidence Level  
*** .99 Confidence Level

Recalling from Chapter 2, the theoretical expectancy for the signs of coefficient estimators is: INCOME-positive, AGE-positive, EDUCATION-positive, BID-negative, GENDER-tending to zero, NATURAL-positive, MANAGED-positive, NONUSE-positive, and AGUSE-negative. For COUNTRY, from the post-materialist argument, we should expect that the coefficient estimator would be negative. As the responses move from 0 (Georgia) to 1 (Trinidad), i.e. from a developed economy to a lesser-developed one, we should expect that the propensity to make a donation to a natural resource protection project would decrease.
For the COMBINED data, many of the coefficients did not show the expected sign. BID, which was expected to be negative, was positive, with a 99% confidence level. GENDER, which was expected to be neutral, was negative at the 99% confidence level. COUNTRY, which was expected to be negative, was very strongly positive with a 99% confidence level. AGUSE, which was expected to be negative, was positive with a 99% confidence level. NONUSE was positive, as expected, with a 99% confidence level. For the remaining variables, according to the model estimation and hypothesis testing, they did not have a statistically significant effect on WTP.

For the GEORGIA data, GENDER, which was expected to tend towards zero, was negative, at –0.691 with a 90% confidence level. AGEUSE, which was expected to be negative, had a positive coefficient with a 99% confidence level. BID showed a positive sign, as expected, at a 90% confidence level. For the remaining variables, according to the model estimation and hypothesis testing, they did not have a statistically significant effect on WTP.

For the TRINIDAD data, BID, which was expected to have a negative coefficient, had a positive one, but it was very close to zero at 0.0096 and a 99% confidence level. GENDER, which was expected to tend towards zero, was positive, at 0.3834 with a 99% confidence level. AGUSE, which was expected to be negative, was positive with a 99% level of confidence. NONUSE showed a positive coefficient value, as expected, with a 99% confidence level. For the remaining variables, according to the model estimation and hypothesis testing, they did not have a statistically significant effect on WTP.

The results are encouraging from the Trinidad respondents. 275 of total 460 respondents from Trinidad gave offer amounts in answer to this question. From Georgia respondents, only 17 of 103 respondents responded with offer amounts for
Testing of Post-materialist Theory

The purpose of this section of analysis is to test the validity of the post-materialist argument with the Georgia-Trinidad data collected in the survey. Two of the questions in the survey were designed to focus on motivations and attitudes regarding environmental protection generally and Nariva Swamp specifically. Question 3 of the survey was designed to probe respondents about their motivations for protecting Nariva Swamp. Question 16 looked at respondents’ philosophies, attitudes, and opinions with respect to protecting Nariva Swamp. The nature of the questions and the ability to collect bi-country data provide a significant test of the post-materialist theoretical approach.

Theory states that we should expect greater interest from Georgia respondents (members of a post-industrial society) compared to Trinidad respondents (members of a developing industrial society), who should exhibit little interest in environmental protection. Testing was conducted as follows:

1) Graphs were created graphing the response trends of respondents from both countries

2) With question 3, analysis was conducted of propensity to respond with either option “Don’t Know” or option “Don’t Care”

3) Ordered logistic regressions were run on each of the questions, setting the response as the dependent variable. Independent variables in the regression were Age, Gender, Education, Income, and Country (of origin).
4) The means of the responses were calculated to compare with the results of the regressions.

Question 3: Possible Reasons for Protecting Nariva Swamp

Question 3 comprises eleven subsections in order to look at several different categories of motivations. This was done in order to discover which motivations were the most important to the respondents. The categories were:

- Part a: protection for agriculture users
- Part b: current use values
- Part c: option values
- Part d: existence values
- Part e: self-sufficiency of agriculture
- Part f: bequest values
- Part g: inter-generational altruism
- Parts h, i, j, k: various types of values for ecosystem services

The questions and the Likert scale used for respondents’ scoring is shown in Table 3.5. The Likert scale ran from 1-7, where 1=Don’t care, 2=Not important, 3=Somewhat important, 4=Important, 5=Very important, 6=Extremely important, and 7=Don’t know.
<table>
<thead>
<tr>
<th>Table 3.5: Question 3 Possible Reasons for Protecting Nariva Swamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don’t Know</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>a. Protecting the livelihood of the rice farmers in Nariva swamp.</td>
</tr>
<tr>
<td>b. Providing me with current recreation uses such as hunting, fishing, or wildlife watching.</td>
</tr>
<tr>
<td>c. Even if I do not plan on visiting Nariva swamp with in the next year I would like to go there in the future, if I choose.</td>
</tr>
<tr>
<td>d. Just knowing that Nariva swamp exists and is protected, even though I don’t plan on going there in the future.</td>
</tr>
<tr>
<td>e. Contributing to self-sufficiency of rice production in Trinidad and Tobago.</td>
</tr>
<tr>
<td>f. Knowing future generations will enjoy Nariva swamp as it exists today, even though I don’t plan on going there in the future.</td>
</tr>
<tr>
<td>g. I enjoy knowing that other people currently able to visit Nariva swamp.</td>
</tr>
<tr>
<td>h. Nariva swamp is an important to protect because there are possible plants and animals that live in the swamp that could have important scientific and medical values in the future (for example: sources for new or improved medicines or ways to improve agricultural crops).</td>
</tr>
<tr>
<td>i. I believe that all of the elements of Nariva swamp (for example: plants, animals, landforms) have value independent of any kind of human benefit including visiting these areas, provision of clean air and water, scientific and human health benefits, and the satisfaction gained from knowing that natural areas and everything found in them exist.</td>
</tr>
<tr>
<td>j. Nariva swamp is important to protect because it contributes to better local, regional, and global air and water quality.</td>
</tr>
<tr>
<td>k. I enjoy watching television shows or looking at pictures that include the Nariva swamp.</td>
</tr>
</tbody>
</table>
Graph Analysis

The trend lines in each graph compare the responses of Trinidad respondents with Georgia respondents for each part of each question. The graphs appear in the appendix as Graphs 3A-3K. The purpose is to determine if there are similar or opposing trends in the responses between respondents from the two countries. If the post-materialist theory holds, one would expect US respondents to show great interest in environmental and natural resource values compared to Trinidad, presuming that the US respondents reflect a post-materialist public. If this is not the case, then trends should be similar between the two groups of respondents. If that proves to be the case, it would represent a refutation of the post-materialist argument.

The response graphs below may be divided into three categories. First, responses to questions 3 D, F, G, H, I, and J show identical trends between the two countries. There is no significant difference between the responses from Trinidad or those from Georgia. The second category of responses is 3 A, B, and E. Each of these graphs shows some disharmony between the middle areas, but the trends are the same. There are light responses on the tail, and the heaviest percentages of responses fall on the median answers: Not important, Somewhat Important, Important. A strong argument can be made that these trends are qualitatively quite similar. Finally, the Trinidad responses to 3 C and K have a trend that is ever further to the right than Georgia responses. That means that for those two questions, Trinidad respondents show stronger value for the ecological/environmental values represented by those questions.

Response Analysis

Because question 3 had a 7-point Likert scale, where two of the options where “Don’t Know” and “Don’t Care,” a response analysis was conducted. The reasoning
for this analysis is that both of these responses could be considered non-responses.

Choosing either “Don’t Know” or “Don’t Care” could be a slightly more acceptable method of omitting the question. Therefore, the purpose was to determine if there was some particular trend in the responses that might suggest an avoidance of the questions by one country group of respondents as compared to the other. The results are below.

Table 3.6: Question 3 Response Distributions

<table>
<thead>
<tr>
<th></th>
<th>Omitted</th>
<th>Don't know/Don't care</th>
<th>%</th>
<th>Responded</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3</td>
<td>80</td>
<td>13.31%</td>
<td>518</td>
<td>86.19%</td>
</tr>
<tr>
<td>GA</td>
<td>TR</td>
<td>GA</td>
<td>TR</td>
<td>GA</td>
<td>TR</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>23</td>
<td>57</td>
<td>112</td>
<td>406</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16.79%</td>
<td>12.28%</td>
<td>81.75%</td>
</tr>
<tr>
<td>B</td>
<td>2</td>
<td>58</td>
<td>9.65%</td>
<td>541</td>
<td>90.02%</td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>46</td>
<td>7.65%</td>
<td>555</td>
<td>92.35%</td>
</tr>
<tr>
<td>D</td>
<td>2</td>
<td>26</td>
<td>4.33%</td>
<td>575</td>
<td>95.67%</td>
</tr>
<tr>
<td>E</td>
<td>2</td>
<td>93</td>
<td>15.47%</td>
<td>506</td>
<td>84.19%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>115</td>
<td>391</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16.06%</td>
<td>15.30%</td>
<td>83.94%</td>
</tr>
<tr>
<td>F</td>
<td>2</td>
<td>21</td>
<td>3.49%</td>
<td>578</td>
<td>96.17%</td>
</tr>
<tr>
<td>G</td>
<td>1</td>
<td>30</td>
<td>4.99%</td>
<td>570</td>
<td>94.84%</td>
</tr>
<tr>
<td>H</td>
<td>3</td>
<td>22</td>
<td>3.66%</td>
<td>579</td>
<td>96.34%</td>
</tr>
<tr>
<td>I</td>
<td>2</td>
<td>27</td>
<td>4.49%</td>
<td>572</td>
<td>95.17%</td>
</tr>
<tr>
<td>J</td>
<td>3</td>
<td>41</td>
<td>6.82%</td>
<td>560</td>
<td>93.18%</td>
</tr>
<tr>
<td>K</td>
<td>9</td>
<td>87</td>
<td>14.48%</td>
<td>505</td>
<td>84.03%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>115</td>
<td>391</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16.06%</td>
<td>15.30%</td>
<td>83.94%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>115</td>
<td>391</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16.06%</td>
<td>15.30%</td>
<td>83.94%</td>
</tr>
</tbody>
</table>

The initial plan for this analysis was to set all responses values between 2 and 6 as a positive response and all remaining response values as negative responses.

Then, a binary logistic regression was to be run, using available variables, Bid, Age, Sex, Education, Income, and Country, from the data to determine any correlations.

However, after conducting initial analysis, it was determined that there were too few
negative responses to warrant the regression analysis. Eight of the eleven questions had positive response rates over 90%. The other three had response rates at over 84%. This suggests that the negative responses where most likely “real” responses rather than avoidance responses. Table 3.6 shows the distribution of positive/negative responses. The encouraging response rate suggests consideration of the responses that is robust in both Georgia and Trinidad respondents.

**Regression Analysis**

A regression of the each of the preference sub-questions was conducted. The response value on the Likert scale, 1-7, was set as the dependent variable. GENDER, AGE, EDUCATION, INCOME, and COUNTRY were set as the independent variables. This served several purposes with regard to the post-materialist argument that is being tested with this data. If the argument holds we should expect:

1) GENDER and AGE (granted that all respondents were adults) shouldn’t have any particular predictive power with regard to response; sex and age are not important tenets of the post-materialist argument.

2) EDUCATION and INCOME should be positively correlated with response. High educational attainment and economic status are basic assumptions of the post-materialist argument.

3) COUNTRY should be negatively correlated with higher response rates. The data were coded as 0=GEORGIA and 1=TRINIDAD. Therefore, we should expect that as we move from 0 to 1 in the response to COUNTRY, there should be a proportionate percentage propensity to move negatively along the Likert scale in the response variable. A positive value for this co-efficient would represent an inability to confirm the post-materialist argument.
<table>
<thead>
<tr>
<th>Question</th>
<th>GENDER</th>
<th>AGE</th>
<th>EDUCATION</th>
<th>INCOME</th>
<th>COUNTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection of Ag. Users</td>
<td>.0399</td>
<td>.03313</td>
<td>-.0199</td>
<td>-.016</td>
<td>-0.9033***</td>
</tr>
<tr>
<td></td>
<td>(.1536)</td>
<td>(.00519)</td>
<td>(.0196)</td>
<td>(.0419)</td>
<td>(.2415)</td>
</tr>
<tr>
<td>Current Use Values</td>
<td>.1229</td>
<td>.0023</td>
<td>-.0102</td>
<td>-.00416</td>
<td>.6741***</td>
</tr>
<tr>
<td></td>
<td>(.1549)</td>
<td>(.00523)</td>
<td>(.0197)</td>
<td>(.0429)</td>
<td>(.2429)</td>
</tr>
<tr>
<td>Option Values</td>
<td>.308</td>
<td>.0149</td>
<td>.0296</td>
<td>.0616</td>
<td>1.8585***</td>
</tr>
<tr>
<td></td>
<td>(.1580)</td>
<td>(.00532)</td>
<td>(.0201)</td>
<td>(.0429)</td>
<td>(.2541)</td>
</tr>
<tr>
<td>Existence Values</td>
<td>-.1029*</td>
<td>-.000917</td>
<td>.0496**</td>
<td>.1082**</td>
<td>1.0798***</td>
</tr>
<tr>
<td></td>
<td>(.1582)</td>
<td>(.00535)</td>
<td>(.0202)</td>
<td>(.0432)</td>
<td>(.2494)</td>
</tr>
<tr>
<td>Self-Sufficiency in Ag.</td>
<td>.1629</td>
<td>.0041</td>
<td>-.0228</td>
<td>.0154</td>
<td>-1.0784***</td>
</tr>
<tr>
<td></td>
<td>(.1535)</td>
<td>(.00518)</td>
<td>(.0196)</td>
<td>(.0419)</td>
<td>(.2417)</td>
</tr>
<tr>
<td>Bequest Values</td>
<td>-.1619</td>
<td>-.00482</td>
<td>.0519**</td>
<td>-.0448</td>
<td>.0586**</td>
</tr>
<tr>
<td></td>
<td>(.1588)</td>
<td>(.00537)</td>
<td>(.0204)</td>
<td>(.0433)</td>
<td>(.2481)</td>
</tr>
<tr>
<td>Inter-generational Altruism</td>
<td>-.1276</td>
<td>-.00645</td>
<td>.0155</td>
<td>.071*</td>
<td>1.1383***</td>
</tr>
<tr>
<td></td>
<td>(.1618)</td>
<td>(.00549)</td>
<td>(.0203)</td>
<td>(.044)</td>
<td>(.258)</td>
</tr>
<tr>
<td>Ecosystem Services I</td>
<td>.1958</td>
<td>-.0113**</td>
<td>.0539***</td>
<td>-.033</td>
<td>.0602</td>
</tr>
<tr>
<td></td>
<td>(.158)</td>
<td>(.00534)</td>
<td>(.0202)</td>
<td>(.0435)</td>
<td>(.2472)</td>
</tr>
<tr>
<td>Ecosystem Services II</td>
<td>.1713</td>
<td>-.0145***</td>
<td>.0207</td>
<td>.0635</td>
<td>.3121</td>
</tr>
<tr>
<td></td>
<td>(.1566)</td>
<td>(.00533)</td>
<td>(.0199)</td>
<td>(.0428)</td>
<td>(.244)</td>
</tr>
<tr>
<td>Ecosystem Services III</td>
<td>.049</td>
<td>-.00692</td>
<td>.00606</td>
<td>-.0747*</td>
<td>05311**</td>
</tr>
<tr>
<td></td>
<td>(.1566)</td>
<td>(.00529)</td>
<td>(.0199)</td>
<td>(.043)</td>
<td>(.2462)</td>
</tr>
<tr>
<td>Ecosystem Services IV</td>
<td>-.0816</td>
<td>.00647</td>
<td>.0177</td>
<td>-.0141</td>
<td>1.5108***</td>
</tr>
<tr>
<td></td>
<td>(.1566)</td>
<td>(.0053)</td>
<td>(.02)</td>
<td>(.0427)</td>
<td>(.2509)</td>
</tr>
</tbody>
</table>

Table 3.7 shows the co-efficients given by the regression analyses. First, we consider the GENDER variable. For the “Existence Values” question, sex of the respondents had a negative effect, -0.31029. This is inconsistent with what we expect, given the post-materialist argument. Gender should not matter; however, in this case being female increases the odds ratio of the response.

Next we look at the AGE co-efficients. In one case, there was significance to a .99 confidence level, -.0145, and in another case, there was significance to the .95 confidence level, -.0113; however, the values were very close to zero. We can say that...
age doesn’t play a strong role in the odds ratio of response. This is consistent with the post-materialist assumptions. Next we look at EDUCATION. In three cases, there was high significance of the co-efficients; however, again, the values were very small: 0.0496, 0.0519, and 0.0539. The values are very close to zero, so they play no strong influence on the response variable. This is counter to what we expect given the post-materialist assumptions. Similarly for INCOME, three responses show strong levels of confidence, but their values are very small: 0.10182, 0.071, and -0.0747. As with EDUCATION, this is counter to post-materialist argument. Finally, we consider the COUNTRY variable. In eight of the regressions, COUNTRY was strongly positively related to the response variable. This is counter to what we should expect from post-materialist theory. In two cases, it was strongly, negatively related to the response variable, which is consistent to the post-materialist theory.

To further test the post-materialist tenets, we can compare the mean value of responses from the Georgia and Trinidad samples:

<table>
<thead>
<tr>
<th>Sub-question</th>
<th>Trinidad Mean Response</th>
<th>Georgia Mean Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>3a</td>
<td>3.1632184</td>
<td>3.7851240</td>
</tr>
<tr>
<td>3b</td>
<td>3.6528736</td>
<td>3.2892562</td>
</tr>
<tr>
<td>3c</td>
<td>4.0643678</td>
<td>3.2644628</td>
</tr>
<tr>
<td>3d</td>
<td>4.3724138</td>
<td>4.1404959</td>
</tr>
<tr>
<td>3e</td>
<td>3.1011494</td>
<td>3.9090909</td>
</tr>
<tr>
<td>3f</td>
<td>4.5494253</td>
<td>4.4628099</td>
</tr>
<tr>
<td>3g</td>
<td>4.4275862</td>
<td>4.0991736</td>
</tr>
<tr>
<td>3h</td>
<td>4.9195402</td>
<td>4.8429752</td>
</tr>
<tr>
<td>3i</td>
<td>4.6735632</td>
<td>4.6198347</td>
</tr>
<tr>
<td>3j</td>
<td>4.7333333</td>
<td>4.4958678</td>
</tr>
<tr>
<td>3k</td>
<td>4.2206897</td>
<td>3.2561983</td>
</tr>
</tbody>
</table>

If we compare the mean responses with the COUNTRY coefficients, we can see that they pair up exactly. In all eight cases where the COUNTRY coefficient was positive and significant, the mean responses for Trinidad are quite a bit higher than the
Georgia mean responses. Similarly, for the two cases where the coefficient was negative, the Georgia mean responses were quite a bit higher than the Trinidad responses. In the two cases where COUNTRY was not significant, the mean values were very close in value. With the regression results and the mean value results we can say with confidence that in this case Trinidad responses in this group of environmental preferences are much stronger than Georgia responses.

**Question 16: Attitudes/Opinions with Respect to Natural Resources and Environment**

The questions in question 16 are more abstract and focus less on Nariva swamp and more on attitudes towards environmental/natural resource management generally. Question 16 comprises 9 subsections in order to look at several different categories of philosophies, attitudes, and opinions. This was done in order to determine which items might be most important to respondents. The categories were:

- Part a: eco-centrism, protection of the whole ecosystem, both living and non-living components
- Part b: utilitarianism and materialism
- Part c: conservation and rational planning
- Part d: stewardship
- Part e: biocentrism
- Part f: deep ecology
- Part g: human subsistence
- Part h: ecotourism
- Part i: cultural tourism
The questions and the Likert scale used for respondents’ scoring is shown in Table 3.8. The Likert scale ran from 1-4, where 1=Disagree, 2=Somewhat disagree, 3=Somewhat agree, and 4=Agree.

### Table 3.9: Question 16: Attitudes/Opinions with Respect to Natural Resources and Environment

<table>
<thead>
<tr>
<th>Statement</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. I believe that protecting the ecological structure and integrity of Nariva swamp should receive the highest priority when managing the area.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. I believe that Nariva swamp should be used in a way that would support a maximum quantity of commercial products such as agricultural goods that are grown for human consumption.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. I believe that providing a wide variety of goods and services (including commercial, recreational, and aesthetic goods and services) are the most important uses of Nariva swamp and therefore, the swamp should be managed to balance the economic benefits and costs of providing these goods and services over time.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. I believe that people are not the “owners” of the Nariva swamp and therefore should only act as responsible “caretakers” of the swamp which means allowing human use of the swamp as long as the natural environment is not abused, and prohibiting or restricting human use when it leads to abuse or overuse of the environment.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. I believe that protecting the biological components of Nariva swamp should receive the highest priority when managing the swamp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. I believe that people and animals have equal rights to live, therefore Nariva swamp should be managed in a way that will protect the fish and wildlife in the area even if it means prohibiting people from visiting or using the swamp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. I believe that Nariva swamp’s resources should be used by a minimal amount of people and this use should be restricted to activities such as subsistence rice farming.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h. I believe the Nariva swamp should be used by people but only for a responsible level of eco-tourism activities such as bird watching and sightseeing tours of the swamp.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. I believe that Nariva swamp should be used by people but only for a responsible level of cultural tourism. (For example: visiting and staying in recreated native villages while learning about the early native’s relationship to the swamp as well as their way of life).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Graph Analysis

The trend lines in each graph compare the responses of Trinidad respondents with Georgia respondents for each part of each question. The graphs appear in the appendix as Graphs 16A-16I. The purpose is to determine if there are similar or opposing trends in the responses between respondents from the two countries. If the post-materialist theory holds, one would expect US respondents to show great interest in environmental and natural resource values compared to Trinidad, presuming that the US respondents reflect a post-materialist public. If this is not the case, then trends
should be similar between the two groups of respondents. If that proves to be the case, it would represent a refutation of the post-materialist argument.

The response graphs, which appear in the appendix as Graphs 16A-16I, may also be divided into three categories. First, responses to questions 3 D, E and F show identical trends between the two countries. There is no significant difference between the responses from Trinidad or those from Georgia. The second category of responses is 3 A, C, H, and I. Although each of these graphs shows some discrepancy between the final two areas – Somewhat agree and Agree-- the trends are the same. There are light responses on the left end and heavier percentages of responses on the right tail. A strong argument can be made that these trends are qualitatively quite similar. Finally, the Trinidad responses to 3 B and G have an inverse trend to that of the Georgia responses. In both bases, the Trinidad responses tend towards the extremes and the Georgia responses tend toward the median values. For both these questions, Trinidad respondents show stronger, more binary responses to the ecological/environmental values represented by those questions.

**Regression Analysis**

Just as in question 3, a regression of the each of the preference sub-questions was conducted with the response on the Likert scale set as the dependent variable and GENDER, AGE, EDUCATION, INCOME, and COUNTRY as the independent variables. This served several purposes with regard to the post-materialist argument that is being tested with this data. If the argument holds we should expect:

1) GENDER and AGE (granted that all respondents were adults) shouldn’t have any particular predictive power with regard to response; sex and age are not important tenets of the post-materialist argument.
2) EDUCATION and INCOME should be positively correlated with response. High educational attainment and economic status are strong assumptions of the post-materialist argument.

3) COUNTRY should be positively correlated with higher response rates. The data were coded as 0=Georgia and 1=Trinidad. Therefore, we should expect that as we move from 0 to 1 in the response to COUNTRY, there should be a proportionate percentage propensity to move negatively along the Likert scale in the response variable.

Table 3.10 shows the co-efficients given by the regression analyses. In the case where there was a confidence level of .90 or higher, the point estimates were also included. First, we consider the GENDER variable. For the “Eco-Centrism” question, sex of the respondents had a significant, positive effect, .4633. Also, for “Eco-tourism” it has a significant, negative effect, -.3631. This is counter to what we should expect, given the post-materialist argument. Sex should not matter; however, in this case being male increases odds ratio of the response for the “Eco-centrism” question, and being female increases the odds ration of the response for the “Eco-tourism” question.
Next we look at the AGE co-efficients. In two cases, there was significance to a .95 confidence level and in another case to the .90 confidence level; however, the values were quite small: .0199, .011, and -.0107. We can confidently say that age doesn’t play a strong role in the odds ratio of response. This is consistent with the post-materialist assumptions. Next we look at EDUCATION. In a single case, there was high significance of the co-efficient; for the “Utilitarianism” question, the coefficient value was .0381. This is very close to zero, which suggests that it has little effect on the odds ratio. This is counter to what we expect given the post-materialist assumptions. For INCOME three responses show strong levels of confidence, but their values are not large: -.0159, .1222, and .1399. As with EDUCATION, this is counter to post-materialist argument. Finally, we consider the COUNTRY variable.
On every question except two, “Utilitarianism” and “Human Subsistence,” COUNTRY was strongly, positively correlated. We might interpret that as meaning that being from Trinidad has a very strong, positive influence on responses to the questions. This is counter to what is postulated by the post-materialist argument. For “Human Subsistence” COUNTRY was strongly, negatively correlated, which is consistent with the post-materialist argument.

To further test the post-materialist tenets, we can compare the mean value of responses from the Georgia and Trinidad samples:

<table>
<thead>
<tr>
<th>Sub-question</th>
<th>Trinidad Mean Response</th>
<th>Georgia Mean Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>16a</td>
<td>3.8091954</td>
<td>3.250000</td>
</tr>
<tr>
<td>16b</td>
<td>2.4413793</td>
<td>2.2916667</td>
</tr>
<tr>
<td>16c</td>
<td>2.8873563</td>
<td>234916667</td>
</tr>
<tr>
<td>16d</td>
<td>3.8160920</td>
<td>3.5250000</td>
</tr>
<tr>
<td>16e</td>
<td>3.8712644</td>
<td>3.2396694</td>
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<tr>
<td>16f</td>
<td>3.4666667</td>
<td>239586777</td>
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<tr>
<td>16g</td>
<td>2.4689655</td>
<td>2.8016529</td>
</tr>
<tr>
<td>16h</td>
<td>3.3379310</td>
<td>2.7933884</td>
</tr>
<tr>
<td>16i</td>
<td>3.0919540</td>
<td>2.7603306</td>
</tr>
</tbody>
</table>

If we compare the mean responses with the COUNTRY coefficients, we can see that they pair up exactly. In all seven cases where the COUNTRY coefficient was positive and significant, the mean responses for Trinidad are quite a bit higher than the Georgia mean responses. Similarly, for the single case where the coefficient was negative, the Georgia mean responses were quite a bit higher than the Trinidad responses. In the single case where COUNTRY was not significant, the mean values were very close in value. With the regression results and the mean value results we can say with confidence that in this case Trinidad responses in this group of environmental preferences are much stronger than Georgia responses.
CHAPTER 4

SUMMARY AND CONCLUSIONS

Summary

The first purpose of this thesis was to measure economic value and consumer surplus of natural resource commodities for citizen groups in both Georgia and Trinidad. A series of environmental/ecological preference indices were developed from preferences questions that comprised part of the survey design. These indices were then used as variables in the two willingness-to-pay valuation models used to analyze survey responses. Next, a regression was run for the dichotomous choice model; the results showed that Trinidad respondents were very interested in supporting natural resource protection projects in Nariva Swamp, much more than Georgia respondents. Next, a separate regression was conducted for the open-ended model; the results for Georgia and Trinidad respondents were very similar. A similar WTP value was found and response trends were much alike.

The second purpose was to test post-materialist theory. For one of the multi-part questions in the survey, trend graph analysis, response analysis, and a regression analysis of responses were conducted. The goal was to determine differences, if any, between Georgia and Trinidad respondents, the ultimate goal being to test the validity of post-materialist theory as it relates to environmental valuation. A second multi-part question was similarly analyzed for the same purpose; in this case trend graph analysis, regression analysis, and mean value analysis of responses were conducted. Results suggest that Georgia and Trinidad respondents have very similar ideas about environmental values; both find them very important. In fact, contrary to theory,
Trinidad respondents showed a stronger interest in environmental values than did Georgia respondents in many cases.

**Policy Implications**

The implications of these findings are important for planners both in the US and in Trinidad. WTP for Georgia respondents reveals limited interest in supporting a potential project in Nariva Swamp. There is limited reason to expect citizens would be interested in US government funding of such a project. So, a further implication is that it could be difficult for the Trinidadian government to seek aid for the US government to support environmental protection in the area.

**Theoretical Implications**

We also compared responses from Trinidad and Georgia citizens to questions designed to assess their general environmental ethics and attitudes towards natural area protection. Research literature suggests that, generally, respondents from more economically developed countries should show a greater interest in environmental issues and natural area protection. This is due to a shift from focus on physical sustenance and safety to a broader understanding and appreciation for quality of life, based on Maslow’s hierarchy of needs. However, more recent research suggests this approach could be inaccurate. The survey results provide evidence of consistent environmental ethics and natural area protection attitudes on the part of Trinidad and Georgia citizens. This is exciting theoretically because of the limited amount of bi-country or multi-country research that has been conducted to test these interests. Post-materialist theory is intuitively convincing and has developed such a stronghold that it is pretty much accepted as fact, without significant evidence to prove or disprove it. The results here do not confirm the theoretical framework.
Limitations

There are two important limitations of this research. First, the surveys conducted in Trinidad were collected by personal interview. Those collected in Georgia were mail-out surveys. This, likely, resulted in the smaller number of responses in the Georgia sample. Second, in this case, Trinidad respondents were much more familiar with Nariva Swamp than Georgia respondents. This more intimate knowledge of the situation could have resulted in more interest in the survey and more positive responses to survey questions. However, by looking at the generalized preference questions, an attempt was made to deal with the issue of environmental preferences independently of this potential bias.

Future Research Needs

The project is important in that it is a first attempt at comparative analysis of responses to a contingent valuation survey with respondents from different country backgrounds. Other research has looked at implementations in lesser-developed countries, but none has compares responses to an identical survey. Despite the financial considerations, further research of a comparative nature, like this one, would be invaluable. The results would have important policy implications for international development agencies, which are considering funding of natural resource development projects, as well as agencies, which have environmental criteria as part of the funding approval guidelines.

A method that would be useful would be to consider a neutral environmental resource, where comparative responses might have less chance of bias. For example, a comparison of environmental preferences and willingness-to-pay for environmental resources in the upper Amazon region could be a neutral area where a more unbiased comparison of responses between Georgians and Trinidadians would be possible.
REFERENCES


APPENDICES
Appendix 1: SURVEY

SECTION I
1. Have you ever heard of or read about Nariva swamp?
   Yes   No – Go to Question 3.

2. Where did you read or hear about the Nariva swamp?
   (Please circle all that apply)
   a. TELEVISION PROGRAMS
   b. NEWSPAPER OR MAGAZINE ARTICLES
   c. BOOKS
   d. PAMPHLETS OR BROCHURES
   e. VISITING NARIVA SWAMP
   f. NEVER ENCOUNTERED INFORMATION ABOUT NARIVA SWAMP.
   g. OTHER (please specify)

3. There may be several reasons for protecting Nariva swamp. For each of the reasons listed below, rate how important you think the following statements are by circling the appropriate number.

   Possible reasons for protecting Nariva Swamp:

<table>
<thead>
<tr>
<th>Reason</th>
<th>Don't Know</th>
<th>Not Important</th>
<th>Somewhat Important</th>
<th>Important</th>
<th>Very Important</th>
<th>Extremely Important</th>
<th>Don't Care</th>
</tr>
</thead>
</table>
   a. Protecting the livelihood of the rice farmers in Nariva swamp.     | 1          | 2             | 3                  | 4        | 5             | 6                  | 7         |
   b. Providing me with current recreation uses such as hunting, fishing, or wildlife watching. | 1          | 2             | 3                  | 4        | 5             | 6                  | 7         |
   c. Even if I do not plan on Nariva swamp with in the next year I would like to go there in the future, if I choose. | 1          | 2             | 3                  | 4        | 5             | 6                  | 7         |
   d. Just knowing that Nariva swamp exists and is protected, even though I don't plan on going there in the future. | 1          | 2             | 3                  | 4        | 5             | 6                  | 7         |
   e. Contributing to self-sufficiency rice production in Trinidad and Tobago | 1          | 2             | 3                  | 4        | 5             | 6                  | 7         |
   f. Knowing future generations will enjoy Nariva swamp as it exists today, even though I don’t plan on going there in the future. | 1          | 2             | 3                  | 4        | 5             | 6                  | 7         |
   g. I enjoy knowing that other people are currently able to visit Nariva swamp. | 1          | 2             | 3                  | 4        | 5             | 6                  | 7         |
   h. Nariva swamp is an important area to protect because there are possible plants and animals that live in the swamp that could have important scientific and medical values in the future (for example: sources for new or improved medicines or ways to improve agricultural crops). | 1          | 2             | 3                  | 4        | 5             | 6                  | 7         |
   i. I believe that all of the natural elements of Nariva swamp (for example: plants, animals, landforms) have value independent of any kind of human benefit including visiting these areas, provision of clean air and water, scientific and human health| 1          | 2             | 3                  | 4        | 5             | 6                  | 7         |
benefits, and the satisfaction gained from knowing that natural areas and everything found in them exist.

j. Nariva swamp is important to protect because it contributes to better local, regional, and global air and water quality.

k. I enjoy watching television shows or looking at pictures that include the Nariva swamp.
SECTION II
NARIVA SWAMP PROTECTION

Protection of wildlife, vegetation, and habitat will require Trinidad and Tobago to alter water and land use regulations, so as to allow more water to remain in the swamp. Suppose a protection program was developed by the Trinidad and Tobago government to implement and enforce the new water and land use regulations necessary for keeping Nariva swamp in a natural state. This protection would involve elimination of farming in the swamp. Without the protection program, water diversions for farming would continue, causing Nariva swamp to dry up. The major costs of the protection program would be in the form of costs of enforcing the new water and land use regulations, the costs of educating the residents of Nariva, and costs of managing natural resources in the swamp. Funding to pay for these enforcement and management costs will come from a special Nariva Swamp Conservation Fund administered by the Trinidad and Tobago government.

4. Would you make a one-time contribution of $___________ to the Nariva Swamp Conservation Fund to help ensure protection of the swamp in a natural state through the protection program described above? (Circle your answer)

   1. YES   2. NO

5. What is the largest one-time contribution that you would make to the Nariva Swamp Conservation Fund to ensure protection of the swamp in a natural state through the protection program described above? (Write the amount in the blank below)

   $___________

   If your answer to this question is zero, please go to question # 7.
   If your answer to this question is not zero, please answer the question below.

6. There are many reasons for preserving Nariva swamp. Please indicate what percent of your dollar amount started in question 5 above is for each of the following reasons. Read all four parts first, then answer each part. Together your four answers should total 100 percent (%).

   a. Value for you to actually visit Nariva swamp this year.
      Percent (%)

   b. Value to maintain the opportunity for you to visit Nariva swamp next year or sometime in the future.
      Percent (%)

   c. The value to you from knowing that Nariva swamp will be preserved for other people in current or future generations to enjoy, even if you do not visit the swamp this year, next year, or anytime in the future.
      Percent (%)

   d. Other reasons that the dollar amount is intended to support.
      Percent (%)
d. The value to you from just knowing that Nariva swamp exists as a natural place even if people, including yourself, would not be allowed to visit the swamp this year, next year, or anytime in the future.

TOTAL 100
Percent (%)

IF YOUR ANSWER TO QUESTION 5 FROM THE PREVIOUS PAGE WAS ZERO, PLEASE ANSWER THE FOLLOWING QUESTION BELOW. OTHERWISE, PLEASE GO TO QUESTION 8.

7. Why was your amount zero? (Please check one answer and then go to the next section.)

_____ a. Your household receives the same level of benefits from Nariva swamp regardless of whether or not it is protected in a natural state.
_____ b. I cannot afford to contribute towards protection of the Nariva swamp at this time.
_____ c. Preservation of Nariva swamp is my right, and it is unfair to expect me to pay for it.
_____ d. Only Trinidad and Tobago residents should pay, not any other.
   e. Other: Please list reasons.

SECTION III
INFORMATION ON NARIVA SWAMP VISITATION

8. Have you ever visited Nariva swamp?  YES (If YES, go to Question 9)  NO (If NO, go to question 16)  
   (Circle your answer)

9. What was the YEAR of your most recent visit to Nariva swamp?  
   (Write the year in the blank)

   YEAR

10. What was the approximate cost of the trip incurred by your household?  
   (Please include food, transportation, and lodging)  
   (Write the amount in the blank)

   $

11. How much of this cost was solely due to your stop at Nariva swamp?  
   (Write the amount in the blank)

   $

12. What were the main reasons you visited Nariva swamp?  
   (Circle all that apply)

   a. Observe the waterfowl, anaconda, or manatee.
b. Sightsee at Nariva swamp.
c. Have a picnic.
d. Photograph waterfowl, anaconda, manatee, or scenery.
e. Curiosity about Nariva swamp.
f. Hiking or nature walk.
g. Fishing
h. Canoeing or other boating.
i. Other: Please describe

13. If the protection program described previously is implemented, how likely is it that you (or a member of your household) will visit Nariva swamp over the next 5 years?

(Write the percentage in the blank) ___________ Percent(%)  

14. If the protection program described previously is NOT implemented, how likely is it that you (or a member of your household) will visit Nariva swamp over the next 5 years?

(Write the percentage in the blank) ___________ Percent(%)  

15. Assume for now that you are planning a visit to Nariva swamp this year or next year. In total, what would be the most you would pay for your trip there? (Including food, transportation, and lodging)

(Write the amount in the blank) $
16. People have different attitudes and opinions with respect to natural resources and the environment. To help us learn more about these attitudes and opinions, please rate how much you agree with each statement. (Circle the number for each statement).

Disagree  Somewhat disagree  Somewhat Agree  Agree

a. I believe that protecting the structure and integrity of Nariva swamp should receive the highest priority when managing the area.
   1  2  3  4

b. I believe that Nariva swamp should be used in a way that would support a maximum quantity of commercial products such as agricultural goods that are grown for human consumption.
   1  2  3  4

c. I believe that providing a wide variety of goods and services (including commercial, recreational, and aesthetic goods and services) are the most important uses of Nariva swamp and therefore, the swamp should be managed to balance the economic benefits and costs of providing these goods and services over time.
   1  2  3  4

d. I believe that people are not the “owners” of the Nariva swamp and therefore should only act as responsible “caretakers” of the swamp which means allowing human use of the swamp as long as the natural environment is not abused, and prohibiting or restricting human use when it leads to abuse or overuse of the environment.
   1  2  3  4

e. I believe that protecting the biological components of Nariva swamp should receive the highest priority when managing the swamp.
   1  2  3  4

f. I believe that people and animals have equal rights to live, therefore Nariva swamp should be managed in a way that will protect the fish and wildlife in the area even if it means prohibiting people from visiting or using the swamp.
   1  2  3  4

g. I believe that Nariva swamp’s resources should be used by a minimal amount of people and this use should be restricted to activities such as subsistence rice farming.
   1  2  3  4

h. I believe the Nariva swamp should be used by people but only for a responsible level of eco-tourism activities such as bird watching and sightseeing tours of the swamp.
   1  2  3  4

i. I believe that Nariva swamp should be used by people but only for a responsible level of cultural tourism. (For example: visiting and staying in recreated native villages while learning about the early native=s relationship to the swamp as well as their way of life).
   1  2  3  4

SECTION IV
INFORMATION ABOUT YOURSELF

The following questions will allow us to determine how well our sample represents the sample population. Your answers will be strictly confidential.
17. Are you:  
   Male______  (Check one)  
   Female

18. What is your age?  _______ years  (Write the amount in the blank)

19. Are you a member of a business organization? (For example: trade association, chamber of commerce, etc.)
   Yes (Please give complete name of organization)
   No

20. Are you a member of a hunting or fishing organization? (For example: hunting or fishing association or club.)
   Yes (Please give complete name of organization)
   No

21. Are you a member of an environmental organization? (For example: environmental protection organization, endangered species preservation organization.)
   Yes (Please give complete name of organization)
   No

22. Have you donated money or time over the past year to promote business development?
   Yes
   If yes, how much time and money did you donate
   (Write amounts in each blank)
   Dollars

   No

23. Have you donated money or time over the past year to promote the sports of hunting or fishing?
   Yes
   If yes, how much time and money did you donate
   (Write amounts in each blank)
   Dollars

   No
24. Have you donated money or time over the past year to promote environmental protection, endangered species, or other environmental causes (other than hunting or fishing)?

Yes
If yes, how much time and money did you donate
(Write amounts in each blank)

Dollars

Hours

No

25. Do you subscribe to any business publications?

Yes (Please give complete name of publication)
No

26. Do you subscribe to any hunting or fishing publications?

Yes (Please give complete name of publication)
No

27. Do you subscribe to any environmental publications (other than hunting or fishing)?

Yes (Please give complete name of publication)
No

28. What is the highest year of formal schooling you have completed? (Circle one number)

Elementary  Jr. High  High School  College or Professional
Graduate or Vocational School

1 2 3 4 5 6

7 8

9

10 11 12

13 14 15

16

17 18 19

20
29. To the best of your knowledge, what was your household income (before taxes) last year?
   (Circle one)
   a. Less than $10,000
   b. $10,000-19,999
   c. $20,000-29,999
   d. $30,000-39,999
   e. $40,000-49,999
   d. $50,000-69,999
   f. $70,000-99,999
   g. $100,000-149,000
   h. $150,000-249,000
   i. $250,000 or more (please specify, $____________________.)

Thank you very much!
Your effort in this cause has been greatly appreciated. If you would like a copy of the survey results, please write your name and address on a separate piece of paper and send it back with the completed survey in the return envelope. Such information will be immediately separated to ensure confidentiality. Also, if there is any more information that you feel is pertinent to our task, please feel free to use the back of this questionnaire.
Graph 3a: Protection of Agricultural Users

- Georgia
- Trinidad
Graph 3E: Self-sufficiency in Agriculture

Georgia
Trinidad
Graph 3I: Ecosystem Services II

- Georgia
- Trinidad
Graph 16D: Stewardship

- Georgia
- Trinidad
Graph 16H: Eco-tourism

[Graph showing data for Georgia and Trinidad]
Graph 16I: Cultural Tourism

- Georgia
- Trinidad

Legend:
- Georgia
- Trinidad