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An Evaluation of Factors Affecting the Choice of Coastal Recreational Activities

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A visitor's decision to use a particular recreational site is influenced by the individual's taste as well as the characteristics of the site. For this reason, improved knowledge of the visitors' interests and factors influencing their choices are vital for both planning and policy formulations in coastal development. This study examines visitor characteristics and desired site-specific characteristics in order to determine the factors affecting use of the Louisiana coast for specific recreational purposes. We use a multinomial logit model and internet survey data to evaluate the factors affecting individuals' decisions to visit coastal Louisiana for a specific use. Results suggest that the major variables affecting the choice of coastal recreational activities include environmental quality of the site, income, and travel time.

Key Words: coastal recreation, destination use preference, multinomial logit

JEL Classifications: C35, Q26

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Coastal areas provide quality of life in terms of economic activity, diverse biodiversity, protection of people and property from extreme weather events, and the provision of ecosystem services through the presence of marsh and wetland landscapes (Ebi et al., 2007). Coastal recreational sites have the potential to generate significant natural resource based revenue if they were managed to attract increasing numbers of visitors for activities such as fishing, surfing, boating, beach recreation, and wildlife viewing. The demand for these attractions is influenced by the site characteristics and the individuals' preferences (Parsons et al., 2000). Thus, understanding the factors that influence recreational visitation choices are a primary concern when developing and managing coastal areas for nature based coastal tourism. In addition, the process of determining factors that affect individual trip taking behavior can provide useful insight on the economic value of a specific recreational area.

Extensive research exists concerning coastal amenities and their effect on tourism, specifically from a beach visitation point of view (examples include Beharry-Borg and Scarpa, 2010; Cooper and Boyd, 2011; Lilley, Firestone, and Kemton, 2010 and references listed therein). Our objective is to identify the factors influencing individuals' choice for using coastal areas for different recreation activities. Consumer decisions, such as whether to take a trip at a particular time, where to go, and what form of recreation to enjoy, are affected by target site characteristics as well as the socioeconomic characteristics of the surveyed individuals. Therefore, the model developed should relate

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a visitor's recreation choice to the characteristics of available options (such as time, travel cost, distance, camping facilities) along with the characteristics of individuals (such as age, income, gender, etc). We explain individual preferences by specifying functions for the derived utility from the available alternative recreational choices. Our study results provide the probability of choosing an activity from a choice set which includes beach combing, bird watching, off-shore fishing, other unspecified recreational activities, swimming, and surf-fishing in coastal Louisiana.

Rationale

The Louisiana coastal zone is a source of nearly 30% of the commercial fisheries landings in the coterminous United States and provides overwintering habitat for an estimated 75% of migrating waterfowl along the central flyway zone (Twilley, 2007). It is a popular recreational destination for residents as well as out-of-state tourists who frequent the region to pursue outdoor recreation activities. Heavily influenced by the Mississippi River, the state's marsh-dominated coastline also provides significant habitat for numerous bird species and other forms of coastal marine life. These resources are the cornerstone of an economic sector that supports coastal communities through taxes and income derived from natural resource based tourism expenditures (e.g., purchase of food, beverage, lodging, etc.). Accordingly, the environmental health of this region is of significant concern to these communities because of its potential influence on the frequency of tourist visits. Unfortunately, this health has been threatened by a series of well-documented crises, including extremely high rates of coastal erosion, recent hurricane damages, and pollution from the recent Deepwater Horizon (Barras, 2009; Barras, Bernier, and Morton, 2008; National Oceanic and Atmospheric Association, 2010).

Louisiana's coastal parishes require information on recreational preferences in order to recover and improve their natural resource-based tourism amenities. Proper identification of recreational choice determinants aids in infrastructure development, fee setting for targeted activities, and for the development of sustainable coastal management strategies. Moreover, the analytical process of examining recreational site selection reveals information on the economic value of a particular area for coastal visitation. The derived information can eventually be helpful to evaluate coastal projects and policies and in the assessment of natural resource damages caused by environmental disasters such as hurricanes and oil spills.

Method

There are many methods available from the recreation literature that can be used to identify visitor numbers, activity choice, and site choice. Some of the most commonly used of these methods include the conditional logit model (Romando, 2000), hurdle model (Vesterinen et al., 2010), mixed logit or random parameter logit model (Albaladejo-Pina and Diaz-Delfa, 2009; Bestard and Font, 2009); dynamic random parameter model (Hicks and Schnier, 2006), nested logit model (Cutter, Pendleton, and DeShazo, 2007), repeated nested logit model (Lew and Larson, 2008) and Copula based discrete choice model (Bhat, Sener, and Eluru, 2010). When the individual choices are discrete and consist of more than two alternatives, a multinomial logit approach is used. The multinomial logit model has been used to evaluate the factors affecting the choice of recreational sites and recreational purposes.

A discrete choice random utility model is used to explain how an individual chooses a specific alternative when a number of alternatives are available. The model estimates the use value of recreational activities through indirect utility functions specified for each of the alternatives. It has been widely used to explain individual choices over substitutes in the studies related to recreational hunting, fishing, rock climbing, and lake recreations (Kurt et al., 2001; Loomis, Yorizane, and Larson, 2000; Morey, Shaw, and Watson, 1993; Parsons, Massey, and Tomasi, 2000).

Individuals' conditional indirect utility functions have components that are random from the analyst's point of view. The random components

of the utilities associated with choices are assumed to be independent and identically distributed with type I extreme value (Gumbel) distribution. This distribution gives rise to the multinomial logit model when the available information is individual-specific (Green, 2002). If each of the random components is independently drawn from a logistic distribution, then it is a multinomial logit model. These random components also allow for preference differences among individuals.

The model is derived from the utility maximization hypothesis, which assumes that recreational decision-making depends on the availability of alternative choices. Individuals' decisions concerning recreational choices are driven by the utilities that an individual gains from using each of the alternative choices available. In addition, the model reflects the decision based on the derived utility. In recreational choice estimations, the derived utility from a recreation is considered to be a function of the quality of a destination site and the individuals' demographic characteristics.

The recreational choice decision is assumed to be dependent on the quality of the sites and consumers' preference behaviors. The preference that a decision-maker relates to the alternative choices is specified to be the sum of a deterministic and random component in the multinomial logit model. The deterministic part of the individuals' indirect utilities is composed of the observed attributes of the recreational alternatives and individual characteristics.

Assuming that an individual i faces m exhaustive and mutually exclusive recreational choices, the derived utility from choosing alternative j is represented as:

$$(1) \qquad U_{ij} = V_{ij} + \varepsilon_{ij}$$

where, V_{ij} is the non-stochastic component of total utility function and ε_{ij} is the unobservable random component. V_{ij} depends on the characteristics of alternatives and individuals. Recreational choices are specified as the multinomial logistic function of the linear combination of a vector of explanatory variables and unknown parameters expressed as $V_{ij} = X_{ij}\beta$, where X_{ij} is a vector of observable site characteristics of chosen location and demographic characteristics of a chooser. The parameter vector β is the coefficients associated with characteristics X and alternatives j. The choice made $\{C_i\}$ is expressed using utility function as:

$$(2) \qquad U_{ij} \geq \max_{k \in C_i, k \neq j} U_{ik}$$

An individual chooses an alternative that provides a greater level of utility among the choices available. Considering such a discrete choice problem, where only the most preferred choice is observed, the probability of choosing an alternative is expressed as:

$$(3) \qquad P_{y_i=j} = \frac{\exp(x'_{ij}\beta)}{\sum_{k \in C_i} \exp(x'_{ik}\beta)}.$$

Here, y_i is the set of choice variables containing possible alternatives (beach combing, bird watching, off-shore fishing, other activities, swimming, and surf-fishing) for each individual.

In the multinomial logit, explanatory variables do not vary across choices; therefore, coefficients are estimated for every choice except the base category. The multinomial logit model requires one of the choice (j) variables to be treated as a base category and the corresponding β_j is constrained to be zero (Long, 1997). Assuming one of the parameters, $\beta_j = 0$, the model can be expressed as following:

$$(4) \qquad P_{y_i=j} = \frac{\exp(x'_{ij}\beta)}{1 + \sum_{k \in C_i} \exp(x'_{ik}\beta)}$$

and the log likelihood function of the model is expressed as (Green, 2002):

$$(5) \qquad \ell = \sum_{i=1}^{N} \sum_{j=}^{m} d_{ij} \ \ln p[y_i = j]$$

where, $d_{ij} = 1$ if the individual i chooses an alternative j, and 0 otherwise.

Since the dependent variable is a logarithmic form of the ratio of the choices available, direct interpretation of the coefficients is difficult. As a result, the marginal effects and elasticities are estimated at the means of the variables.

The marginal effects for continuous variables are computed by taking the derivative of Equation (3) (Long, 1997) and expressed as follows:

$$(6) \qquad \frac{\partial y_{ij}}{\partial x_{ij}} = \left(\beta_{jx} - \sum_{k \in C_i} y_{ij}\beta_{jx}\right) y_{ij}.$$

The sign of the marginal effect depends on the point of evaluation and thus, can differ in sign from that of the coefficients. The elasticity of the alternatives, with respect to explanatory variables, is calculated as:

$$(7) \qquad e_{ijx} = \frac{\partial y_{ij}}{\partial x_{ij}} \cdot \frac{x_i}{y_i} = \left(\beta_{jx} - \sum_{k \in C_i} y_{ij}\beta_{jx}\right) x_{ij}.$$

The sign of the elasticity estimates may also vary from that of the parameter estimates. The standard errors for marginal effects and elasticities are calculated using a delta method.

Data

Samples obtained using face-to-face interviews from only one or two sites may not accurately capture all the recreational visitors who visit various parts of the coast. The population consists of only those respondents who visit the site at the particular time of the survey. Furthermore, the approach is extremely costly. Mail surveys yield a lower response rate at a high cost since most of the prospective households contain zero visits.[1] We, therefore, used data collected from a limited number of face-to-face interviews, along with internet-based surveys in which respondents were self-selective. Using intercept and internet surveys, we purport to reduce some interview and self-selection biases, under a constrained budget.

The majority of observations (92%) were gathered from the online survey, which was posted on a web server provided by Louisiana State University, Department of Agricultural Economics and Agribusiness. The internet survey remained active for a period of 77 days, starting from May 15 to July 31, 2003. When submitted, online survey responses were automatically formatted into a Microsoft Excel (Microsoft Corp., Redmond, WA) spreadsheet. Duplicate responses were identified and deleted for any submissions with an identical internet protocol address. Solicitation for the responses and announcements were posted on 28 different types of media including: newspapers, magazines, radio programs, and websites. While selection bias is a limitation of this open-ended approach, validity of the data and its representativeness has been established in the previous research (Paudel et al., 2005).

Intercept surveys were conducted at Grand Isle State Park and Holley Beach—two of the most popular coastal recreation sites in Louisiana and the only two road-accessible beaches available at the time of the survey. Two hundred and three cooperating individuals filled out a survey containing 34 individual questions. The intercept surveys were conducted within a timeframe of 42 days consisting of numerous data collection trips to the specified sites during June and July 2003. Table 1 presents the summary of variables used in our analysis.

Out of 2,691 online responses, 252 observations were dropped from the survey due to insufficient information making final combined intercept and online observations 2,642. Individuals listing as their most preferred category of recreation such as bird watching, camping, offshore fishing, other recreational activities, swimming, and surf fishing were 3%, 3%, 10%, 2%, 4%, and 77% of total observations, respectively. The dependent variable is a category comprised of individuals' preferred recreational activities (bird watching, camping, offshore fishing, others, swimming, and surf fishing) when visiting the Louisiana coast. In addition, the survey gathered a variety of information from visitors, including demographic variables such as age, gender, income, preference over the quality of different sites, as well as the purpose of their visit (to evaluate whether joint or incidental visits have any effect on recreational choice).

Travel cost variables included prices paid by individuals for recreational and non-recreational activities during the trip. The expenditure variables include the cost of lodging, food, fuel, recreational supplies, and other associated costs. Loomis, Yorizane, and Larson (2000) suggest avoiding "reliance on the fraction of the wage

[1] Information on nonvisitors to a site can be relevant for managerial decisions on finding out what factors determine a visit or nonvisit to a given recreation site. However, this issue is beyond the scope of this study.

Table 1. Characteristics of Variables

Variables	Mean	SD	Min	Max
Purpose of visit, 1 = primary, 0 = joint + incidental			0	1
Type of visit, 1 = day visit, 2 = night visit			0	1
Total time spent in site (hours)	44.05	36.92	2	160
Total expenditure (dollars)	381.29	343.20	14	2,485
Importance of environmental quality in trip decision			0	1
Site environmental characteristics	11.82	3.35	2	15
Familiarity, 1 = familiar, 0 = not			0	1
Travel time (hours two way)	2.84	1.01	0.15	18
Gender, 1 = female, 0 = male			0	1
Marital status, 1 = married, 0 = single			0	1
Flexibility of job, 1 = flexible, 0 = not			0	1
Income (per year)	3.17	0.86	1	4
Job status, 1 = full time, 0 = not			0	1
Age (years)	42.35	11.08	18	81

Note: The value in "site environmental characteristics" comes from the sum of the values of three variables—lack of pollution, abundant wildlife, and catch per trip in terms of their importance to visitors. The importance of these components to a visitor is ranked from 1 (not important) to 5 (very important). Income categories are 1) <60 k per year, 2) 60 k to <100 k per year, 3) 100–150 k per year, and 4) more than 150 k per year.

rate by controlling for differences in travel time by including a separate variable in the demand function." Bockstael and Hanemann (1987) suggest that time constraints cannot be incorporated into budget constraints, therefore, time and costs are treated separately in this paper. The travel time in our study includes the duration of time it took to travel to the destination in addition to the time spent on-site. Existing literature has already dealt with the role of time spent on-site in recreational activities and has found this time to be an important implication in welfare estimates (Acharya, Hatch, and Clonts, 2003).

Measuring the Site Characteristics

The important role in which the environmental characteristics played in choosing the recreational site was obtained using a 5-point Likert-scale index (5 being "very important"). Site characteristics are important factors in determining the recreational choices. However, the existing literature does not determine which variables should enter the model as the measure of environmental quality of a recreational site. Therefore, we used our knowledge to select the variables, which may have affected some impact on consumers' recreational choices. Respondents were asked about the role played by the sites' environmental characteristics in the visitation decision-making using a 5-point scale.

The levels of importance for all variables within environmental characteristics are aggregated in order to develop a preference score, which was then used as one of the explanatory variables in the logit model. Table 2 presents the site characteristics presented to the individuals as factors which affected their decision-making in regards to recreational choice.

Results and Discussion

As indicated in the data section, we utilized observations collected from both onsite and online surveys to derive the conclusions of the study. There may be a concern pertaining to whether data can be combined as those are, in fact, collected from two different methods. To test the validity of pooling, we initially ran a regression model with a dummy variable indicating a value of "1" (for observations collected using an online method) and "0" (for the observations collected using an onsite method). The coefficient of the dummy variable was found to be insignificant at a level of 5%, supporting the hypothesis that the pooling of the data should be acceptable. Hence, the results presented in this section are derived from the analysis of combined observations.

Table 2. Importance Rating of Site Characteristics on Travel Decision

Description	Total Observation	Internet Survey	Intercept Survey
Lack of pollution	4.77	4.78	4.47
Ease of access to site	4.31	4.31	4.33
Active enforcement of rules	4.15	4.14	4.32
Abundant wildlife	4.12	4.12	4.17
Low human congestion	3.95	3.96	3.87
Catch per trip	3.78	3.08	3.62
Lack of development	3.47	3.47	3.48
Nearby/onsite food and lodging	3.25	3.2	3.98
Interpretive signs/naturalists	2.21	2.07	2.84
Camper hookups	2.05	1.98	2.91

Note: Multi-attribute characteristics of site in determining a recreation visit is common in existing literature. Researchers such as Eggert and Olsson (2005), Economics for the Environment Consultancy Limited (2002), and Parsons and Thur (2008) have used these approaches to measure water quality, site quality, and their link to frequency of recreational visitors to a given site.

Direct interpretation of coefficients from the multinomial logit model has very limited applications. Therefore, marginal effects and elasticities are used to describe the estimated effects of individuals and site characteristics pertaining to choices of costal recreational activities such as swimming, fishing, camping, etc.

Since the multinomial logit model involves individuals' decisions over the alternative choices, testing the violation of the property called the "Independence of Irrelevant Alternative" (IIA) is crucial. We employed the Hausman test for the purpose, which can be expressed as

$$H_{IIA}=(\hat{\beta}_R-\hat{\beta}_F^*)'[\hat{V}ar(\hat{\beta}_R)-\hat{V}ar(\hat{\beta}_F^*)]^{-1}(\hat{\beta}_R-\hat{\beta}_F^*).$$

The assumption implies that adding or removing a choice from the set of choices does not change the relative probability associated with any other pairs of the remaining alternatives (Long, 1997). Table 3 presents the test statistics and p values associated with the test. Failure to reject such hypotheses in this study shows that the probability of choosing one recreational activity relative to another is independent of the existence of other alternatives. The negative sign on the estimations appears due to the term $[\hat{V}ar((\hat{\beta}_R)-\hat{V}ar(\hat{\beta}_F^*)]$ not being positive semidefinite, which is also evidence that the IIA assumption holds (Long, 1997).

The estimated parameters, along with their p values within the parentheses, are presented in Table 4. The analysis used bird-watching as a comparison base. Since the observations used are cross section, the error terms may be heteroskedastic. To overcome this concern, we used robust standard errors for hypotheses tests. Coefficients of a multinomial logit model are not that useful compared with marginal effect or elasticity. Nonetheless, for an illustration purpose, we explain the interpretation of these coefficients. Consider the coefficient of a variable "total time spent on site." For 1 hour more time spent on a site, the log of the ratio of two

Table 3. Hausman Tests for the Violation of Independence of Irrelevant Alternatives

Omitted	Chi Square	Degrees of Freedom	$p >$ Chi Square	Evidence
Offshore fishing	0.087	45	1	For Null Hypothesis (Ho)
Bird watching	1.061	45	1	For Ho
Camping	−0.467	44	1	For Ho
Swimming	1.118	45	1	For Ho
Others	0.184	44	1	For Ho
Surf fishing	−2.842	44	1	For Ho

Table 4. Multinomial Logit Estimation for Recreational Choice in Louisiana's Coast (Base = Bird Watching)

	Coefficients				
Variables	Offshore Fishing	Surf Fishing	Camping	Swimming	Others
Constant	3.984	7.096*	4.881	5.829*	5.308
	(0.119)	(0.007)	(0.094)	(0.033)	(0.117)
Purpose of visit, 1 = primary, 0 = joint + incidental	0.101	0.022	0.210	0.095	0.161
	(0.879)	(0.975)	(0.801)	(0.902)	(0.849)
Type of visit, 1 = day, 0 = night	−1.141	−1.101	−2.554*	−1.066	−1.802
	(0.263)	(0.292)	(0.043)	(0.340)	(0.125)
Total time spent on site (hours)	0.049	0.043	0.048	0.043	0.037
	(0.248)	(0.308)	(0.259)	(0.318)	(0.407)
Total expenditure (dollars)	0.005*	0.005*	0.005*	0.005*	0.003
	(0.017)	(0.014)	(0.037)	(0.036)	(0.205)
Site environmental characteristics	0.018	−0.301	−0.352	−0.317	0.004
	(0.927)	(0.125)	(0.081)	(0.110)	(0.984)
Travel time (hours)	−0.796*	−0.804*	−0.817	−0.878	−1.526*
	(0.033)	(0.046)	(0.111)	(0.054)	(0.004)
Gender, 1 = female, 0 = male	−2.682*	−2.767*	−1.370	−0.485	−1.414
	(0.000)	(0.000)	(0.127)	(0.512)	(0.212)
Marital status, 1 = married, 0 = single	−3.056*	−3.327*	−2.128	−2.444*	−3.196*
	(0.006)	(0.003)	(0.093)	(0.040)	(0.017)
Flexibility of job, 1 = flexible, 0 = not	−0.547	−0.255	−0.212	−1.089	−2.281
	(0.443)	(0.730)	(0.811)	(0.201)	(0.071)
Income	1.267*	1.284*	0.690	0.785	1.117
	(0.007)	(0.009)	(0.237)	(0.148)	(0.051)
Age	0.014	−0.008	0.031	0.014	−0.010
	(0.638)	(0.802)	(0.399)	(0.715)	(0.795)

Note: *p* values are on the parentheses. In a multinomial logit model, any of the categories in the dependent variable can be a base category. We used "Bird watching" as the base category given a significant rise of bird watching in national outdoor recreation activities as indicated in the findings from the National Survey on Recreation and the Environment (2000).
* Indicates significance at a 5% or less level.

probabilities P (option = offshore fishing)/P (option = bird watching) will be increased by 0.049. As noticed, all the coefficients associated with this variable for other categories are positive as well. Therefore, we can say that in general the more an individual spends time on site, the less likely he will visit the site for bird watching.

The important variable "income" reveals the expected sign with statistically significant marginal effects. However, in contrary to theory, the recreational trip-related expenditures reveal positive signs for all the alternatives provided except for the choice "others." This finding suggests that coastal recreation in Louisiana might have some unique characteristics with no close substitutes. One of these characteristics is access to surf-based fishing, an activity preferred by more than half of survey respondents. An important point to note is that there are only three beaches in Louisiana accessible to surf fisherman by road, and one of these locations was closed at the time of this survey.

This study treats the total time spent for recreation as two separate variables. The first being the amount of time spent on said recreational site and the other consisting of the time spent traveling to the recreational destination. The condition index test did not reflect any concern regarding the multicollinearity problem between travel time and time spent at the site. The travel time to the destination is significant resulting in a negative sign for all the recreational alternatives available for Louisiana's coasts. This implies that the probability of choosing any recreational alternative decreases as the time required to travel to the destination increases. However, the actual time spent at said recreational site has no significant impact on the probability of choosing a specific activity from a choice set for Louisiana's coasts.

Income is positive and significant for fishermen and individuals frequenting the coast for other activities such as walking and sunbathing (listed under the 'others' category in this analysis). This finding is consistent with the results of a Loomis, Yorizane, and Larson (2000) study in which they found increased demand for whale watching with increased levels of income. However, the variable is not significant for campers and swimmers.

The results also imply that recreationists traveling to the Louisiana coast for more than a day are more likely to do so for the purpose of camping. However, the purpose of taking the trip has no impact on the probability of choosing any recreational activities at the coast. Surprisingly, age has no significant relationship in determining the probability of participating in any type of recreational activities related to Louisiana's coastal beaches.

The sites' environmental characteristics proved quite important in the decision-making for campers and swimmers regarding their recreational choice decision. This result reveals that individuals who place greater value on environmental quality of said sites are less likely to choose swimming. The more concerned an individual is about the environmental characteristics of a site, the less the likelihood is of choosing swimming as an activity of a recreational trip. This is understandable since the coastal waters in Louisiana are influenced by the Mississippi River and the associated turbidity makes them less desirable for swimming. Correspondingly, individuals who are more concerned with the environmental quality of a site are less likely to choose camping in Louisiana's coasts.

Table 5 shows the estimated marginal effects and their standard errors within parentheses. The marginal effects vary with the points of evaluation of independent variables so signs of the regression do not match the signs of marginal effect values. The marginal effects of the independent variable on the probability of choosing a recreational activity are calculated at their means. The study result shows that the effects for most of the variables are small. Total time spent on-site significantly affects the probability of choosing the coast for surf-fishing, showing that a 10 hour increase in the amount of leisure time spent on the site increases the probability of choosing surf-fishing by slightly less than 0.01. However, the variable proved insignificant for other alternatives. Results also show that a dummy variable for the type of visit (day = 1) has significant marginal effect.

Environmental characteristics of the site proved important only to those individuals interested in offshore fishing, camping, and swimming. The results indicate that individuals

Table 5. Estimated Marginal Effect for Recreation Choice

Variables	Marginal Effect Estimates					
	Offshore Fishing	Surf Fishing	Bird Watching	Camping	Swimming	Others
Purpose of visit, 1 = primary, 0 = joint + incidental	0.0065	−0.0086	−0.0001	0.0015	0.0000	0.0008
	(0.028)	(0.025)	(0.001)	(0.006)	(0.009)	(0.006)
Type of visit, 1 = day, 0 = night	0.0136	0.0067	0.0013	−0.0168**	0.0022	−0.0070
	(0.032)	(0.028)	(0.001)	(0.008)	(0.012)	(0.006)
Total time spent on site (hours)	0.0008**	−0.0006	0.0000	0.0000	−0.0001	−0.0001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Total expenditure (dollars)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Site environmental characteristics	0.0423***	−0.0319***	0.0000	−0.0040***	−0.0068***	0.0004
	(0.005)	(0.004)	(0.000)	(0.001)	(0.002)	(0.001)
Travel time (hours)	0.0088	0.0003	0.0008	−0.0001	−0.0017	−0.0081*
	(0.019)	(0.016)	(0.001)	(0.004)	(0.006)	(0.005)
Gender, 1 = female, 0 = male	−0.1498**	−0.0296	0.0086	0.0234	0.1279***	0.0196
	(0.068)	(0.037)	(0.013)	(0.022)	(0.048)	(0.023)
Marital status, 1 = married, 0 = single	0.0102	−0.0329	0.0019	0.0096*	0.0128	−0.0015
	(0.036)	(0.033)	(0.002)	(0.006)	(0.009)	(0.009)
Flexibility of job, 1 = flexible, 0 = not	−0.0132	0.0350	0.0006	0.0043	−0.0118	−0.0150**
	(0.031)	(0.028)	(0.001)	(0.008)	(0.009)	(0.006)
Income	0.0163	0.0044	−0.0012	−0.0070	−0.0110	−0.0015
	(0.020)	(0.018)	(0.001)	(0.005)	(0.007)	(0.004)
Age	0.0023*	−0.0024*	0.0000	0.0002	0.0001	−0.0002
	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)

Note: Robust standard errors are on parentheses.
*, **, *** indicate significance level at 10%, 5%, and 1%, respectively.

who place a higher importance on environmental quality of the prospective site are less likely to choose Louisiana's coasts for swimming, camping, and offshore fishing. On the other hand, those individuals who find the environmental quality to be less important are more likely to choose surf-based fishing as their primary activity.

The one-way travel time from an individual's residence to the recreational site shows a significant effect on the preference for camping and other types of recreation. Travel time to the recreational destination reflects a significant marginal effect only for other types of recreational activities. Similarly, flexibility of working hours is another factor affecting the probability of choosing Louisiana's coasts for the "other" category of recreational activities. The results indicate that going from a nonflexible job to a flexible job decreases the probability of choosing coastal-based recreation by 0.015.

The individuals' demographic characteristics, such as age, do not have significant effects on the probability of taking a recreational trip to costal Louisiana. There is a negative marginal effect of age pertaining to surf-based fishing and a positive marginal effect on offshore fishing. The results show that an increase of 10 years in age decreases the probability of choosing surf-based fishing by 0.024 and increases offshore fishing by 0.023. Marital status proved significant for camping, but not for other variables. Married individuals are more likely to choose coastal visitation for camping and surf-based fishing in comparison with single individuals. Being married increases the probability of choosing camping on coastal Louisiana by approximately 0.01. In addition, this estimation reveals that the recreation choice is unresponsive in relation to the money spent for the recreational trip since the marginal effect proved to be zero up to three decimal points (0.000).

Since the price of recreation, normally measured by travel cost and income, are included in our model, we estimated the elasticities of these variables as well. The elasticity measures the percentage change in the probability of choosing j^{th} choice with a 1% change in variables such as cost, time, and income.

Elasticity estimates revealed that the importance of environmental characteristics of the site has the highest negative effect on fishing, swimming, and camping (Table 6). Income, on the other hand, showed negative and highly elastic effects on bird-watching. This implies that a 1% increase in income decreases the probability of choosing bird-watching by more than 3%—other things remaining constant. The total expenditure reveals a negative elasticity in regards to bird-watching. Such results also suggest that an individual who is able to spend more on recreation is less likely to choose bird-watching. Also, a 1% increase in recreation-related costs decreases the probability of bird-watching by more than 2%. This finding is inconsistent with other studies that show positive correlations between income and bird watching (National Survey on Recreation and the Environment, 2000; Leones, Colby, and Crandall, 1998).

Policy Implications and Conclusions

The characteristics of target sites and individuals' preferences play a vital role in the recreational decisions. Therefore, understanding the choices of recreational visitors and the factors affecting those choices becomes a primary concern at the policy level. Our study revealed that the environmental quality of a site, travel distance, and income are major factors affecting visitors' decisions regarding which form of recreational opportunity is chosen during visits to coastal Louisiana. The identification of recreational visitation rationale provides useful inputs into the policy makers' decision portfolio, ensuring that an effort can be vested in making coastal sites an attractive place for the targeted type of recreationists. This is especially important due to the availability of limited resources as well as tradeoffs among choices, which are unavoidable realities. Therefore, the goal is to provide the maximum economic benefit from the use of limited resources that recreational authorities are entrusted with. The methodology discussed here provides a means for selecting future development plans so as to acquire maximum potential economic benefits.

Most of the findings are intuitive and consistent with the existing literature on coastal

Table 6. Elasticity Estimates for Recreational Choice in Louisiana Coast

Variables	Elasticity Estimates					
	Offshore Fishing	Surf Fishing	Bird Watching	Camping	Swimming	Others
Purpose of visit, 1 = primary, 0 = joint + incidental	0.0047	−0.0438	−0.0569	0.0707	0.0007	0.0410
	(0.021)	(0.125)	(0.403)	(0.307)	(0.242)	(0.321)
Type of visit, 1 = day, 0 = night	0.0073	0.0236	0.4771	−0.5747*	0.0382	−0.2649
	(0.016)	(0.095)	(0.418)	(0.314)	(0.201)	(0.226)
Total time spent on site (hours)	0.0442**	−0.2019	−2.0835	0.0151	−0.2273	−0.4877
	(0.023)	(0.146)	(1.848)	(0.287)	(0.284)	(0.567)
Total expenditure (dollars)	0.0072	0.0845	−2.0246**	−0.1611	−0.1581	−0.7369
	(0.023)	(0.130)	(0.852)	(0.271)	(0.277)	(0.564)
Site environmental characteristics	0.6092***	−3.2153***	0.3957	−3.8278***	−3.4054***	0.4495
	(0.082)	(0.464)	(2.310)	(0.798)	(0.670)	(1.454)
Travel time (hours)	0.0303	0.0080	2.3072**	−0.0283	−0.2041	−2.0555**
	(0.065)	(0.389)	(1.052)	(0.995)	(0.742)	(1.054)
Gender, 1 = female, 0 = male	−0.0062	−0.0131	0.2134***	0.1012*	0.1736***	0.0976
	(0.005)	(0.033)	(0.052)	(0.056)	(0.038)	(0.073)
Marital status, 1 = married, 0 = single	0.0035	−0.2038	2.3437***	0.7140	0.4724	−0.1033
	(0.032)	(0.189)	(0.848)	(0.486)	(0.379)	(0.554)
Flexibility of job, 1 = flexible, 0 = not	−0.0020	0.0784	0.1483	0.0901	−0.1506	−0.4778*
	(0.010)	(0.058)	(0.196)	(0.148)	(0.130)	(0.294)
Income	0.0497	0.0938	−3.1633***	−1.4127	−1.1719	−0.3297
	(0.062)	(0.380)	(1.191)	(0.920)	(0.763)	(0.902)
Age	0.1132*	−0.8054*	-0.4732	0.7904	0.0954	-0.8970
	(0.072)	(0.433)	(1.237)	(0.815)	(0.951)	(1.006)

Note: Robust standard errors are on parentheses.
*, **, *** indicate significance level at 10%, 5%, and 1% level, respectively.

recreational determinants; however, some of the results may indicate unique preferences that derive from either the specific geographical context of the study or as an artifact of the sampling process. For example, our results confirm that campers and swimmers are understandably concerned about the environmental quality of the destination. However the study also indicated that individuals with higher income are more likely to go fishing and less likely to go bird-watching, camping, and swimming. This finding, while perhaps inconsistent with many other destinations, is understandable within the geographic context of this survey. Coastal Louisiana is heavily influenced by the Mississippi River, which provides abundant, productive fisheries but leaves estuarine waters highly turbid and creates a marsh-dominated coastline with limited terrestrial access to nonconsumptive forms of recreation. Recreationalists attracted to this unique coastal landscape (and this survey) tend to be anglers with an average utility function that is more consumption-oriented.

In the management of coastal Louisiana's natural resource-based tourism destinations, several factors should be considered. Since fishing seems to be the preferred recreational choice, an effort to attract coastal anglers may pay off in the long run. Policy-makers or recreational industries should focus on developing sites along the coast that allow for increased fishing opportunities. Examples might include terrestrial-based investments in beaches and fishing piers and aquatic access points such as marinas and boat launches. Environmental quality at these sites should also be a key management concern, as indicated by the high elasticity and large marginal effect of this variable on the probability of choosing most coastal activities identified in this study. Although a series of natural and man-made disasters has recently impacted the region, Coastal Louisiana remains a popular destination that provides visitors with nature-based recreational opportunities such as fishing, swimming, beach recreation, and bird watching. Sustaining and expanding this economic activity requires that state and local authorities manage coastal resources in a manner that caters to multiple use preferences while maintaining the quality and quantity of natural resources.

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