A STATED PREFERENCE STUDY ON SHARK ECOTOURISM IN COSTA RICA

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MOTIVATION

- Overexploitation of shark species globally due to demand for shark products (Asian markets).
- Indicator of ocean health
- Costa Rica, a major exporter of shark fins to Asia.
- Ecotourism increasing globally in developing countries.

LITERATURE REVIEW

- **WILDLIFE & MARINE VALUATION**
  - Aziz et al. (2010)- WTP for Entrance Permit to Taman Negara National Park **(CVM)**
  - Tisdell & Wilson (2000) – WTP for conserving Sea Turtles at Mon Repos **(CVM)**
  - Saayman (2012)- WTP for seeing the Big 5 **(CVM)**
  - Saayman (2014) – Valuation of Big 7 species in South Africa **(CVM)**
  - Dikgang & Muchapondwa (2016) – Local communities' valuation of Kgalagadi Transfrontier Park in South Africa. **(DCE) using conditional logit.**

SHARK VALUATION

Country	Shark Species	Value Per Yr in USD	Reference	Method
Bahamas	Sharks	$ 78 million	Cline (2008)	Direct spend
Belize	Whale Shark	$ 3.7 million	Graham (2004)	Direct spend
Canary Islands	Shark and ray	$ 22.8 million	De la cruz Modino et al. (2010)	Direct spend
French Polynesia	Lemon Shark	$ 5.4 million	Clua et al. (2011)	TEV
Maldives	Sharks	$ 38.6 million	Martin et al. (2006)	Direct spend
Palau	Sharks	$ 18 million	Vianna et al. (2010)	Direct spend
Fiji	Sharks	$41.6 million	Vianna et al. (2012)	Direct spend
Seychelles	Sharks	$ 4.5 million	Topelko and Dearden. (2005)	Direct spend
Seychelles	Whale Shark	$ 4.99 million	Rowat and Engelhardt. (2007)	Direct spend
South Africa	Tiger Shark	$1.7 million	Dicken and Hosking. (2009)	Direct Spend
South Africa	White Shark	$ 4.2 million	Hara et al. (2003)	Direct spend
West Australia	Whale Shark	$ 12 million	Martin et al. (2006)	Direct spend
Fernando de Noronha Archipelago	Sharks	4% of total $92 million total recreational use value of the archipelago ($3.68 million)	Pires et al, 2016	TCM

RESEARCH OBJECTIVES

- How much are live sharks worth in Costa Rica?
- Specifically, how much are tourists willing to additionally pay for a new public program that would conserve the environment and improve touristic infrastructure?
- In terms of the latter, how much are tourists willing to pay to protect coral reefs, sea turtles, and sharks in Costa Rica?
- Are specific segments of tourists willing to pay more for shark conservation?
- Are tourists who visited the beach during their trip more willing to pay to protect shark species?
- Are regular tourists (visited more than once, twice) willing to pay less to protect shark populations?
- What are the benefits of reducing extinction risk for the three endangered hammerhead species in Costa Rica? (Scalloped, Smooth, Great- using DBDC, *not presented here)*

APPROACH

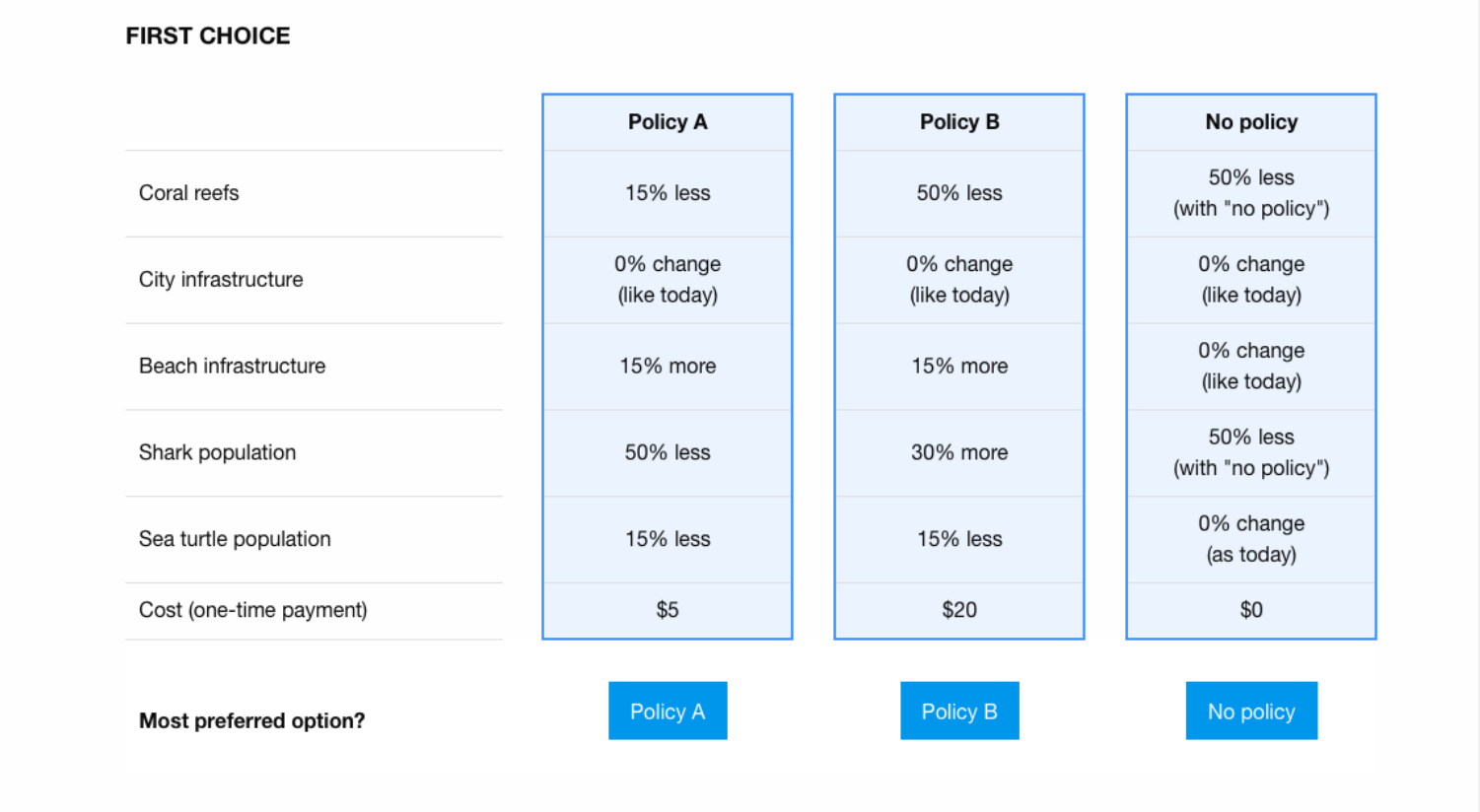
- Stated Preferences
- **1. DISCRETE CHOICE EXPERIMENT**

- 2 attributes on **touristic infrastructure**
  - increasing city or beach infrastructure
- 3 attributes on **environmental improvement**
  - improving coral reefs, shark populations, sea turtle populations

- COST, that is, mandatory **one-time payment** (local tax) to be paid by all tourists at the airport when entering the country.
  - bids at USD [0, 5, 10, 20, 50, 45, 90]

- Presented **6 choice cards** with **3 alternatives** at varying levels and costs given at random.
  - 120 choice tasks blocked into 20 blocks by 6, using D-efficient design (by NGENE)

- **Status Quo**
  - No Policy Option (as it is today)
  - For Sharks and Coral Reefs SQ= 50% less than today, which is the expected outcome in the future.



FIRST CHOICE

	Policy A	Policy B	No policy
Coral reefs	15% less	50% less	50% less (with "no policy")
City infrastructure	0% change (like today)	0% change (like today)	0% change (like today)
Beach infrastructure	15% more	15% more	0% change (like today)
Shark population	50% less	30% more	50% less (with "no policy")
Sea turtle population	15% less	15% less	0% change (as today)
Cost (one-time payment)	$5	$20	$0
Most preferred option?	Policy A	Policy B	No policy

ATTRIBUTES, POLICY OPTIONS, AND LEVELS

Name of the attribute	**SQ level**	**Number of levels after policy**	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**
Coral reefs	50% less than today	4	0% change (like today)	5% less	15% less	50% less (with "no policy")	
City infrastructure	no more city infrastructure than what exists today	2	0% change (like today)	15% more	30% more		
Beach infrastructure	no more beach infrastructure than what exists today	2	0% change (like today)	15% more	30% more		
Shark populations	50% less than today	5	30% less	10% less	0% change (like today)	10% more	30% more
Sea turtle populations	0% change (like today)	5	15% less	5% less	0% change (like today)	5% more	15% more

ECONOMETRIC MODEL

Tourists' choices driven by the Random Utility Model (McFadden 1974, RUM):

- Indirect utility function linear and additive w.r.t. program characteristics:

$$V_{ij} = \beta_0 + x_{ij}\beta_{ij} + (y_i - c_{ij})\beta_2 + \varepsilon_{ij}$$

$$V_{ij} = \alpha_1 * CITY_{ij} + \alpha_2 * BEACH_{ij} + \alpha_3 * CORAL_{ij} + \alpha_4 * SHARK_{ij} + \alpha_5 * TURTLE_{ij} + \beta_1(y_i - c_{ij}) + \varepsilon_{ij}$$

$*$ *where y and C are respondent's income and the costs of the alternative, error term (ε) is iid type I distributed.*

The probability that respondent *i* chooses the alternative *k* out of *K*, estimated by conditional logit:

$$\Pr(k) = \frac{\exp(\boldsymbol{\alpha_1 CITY_{ij}} + \boldsymbol{\alpha_2 BEACH_{ij}} + \boldsymbol{\alpha_3 CORAL_{ij}} + \boldsymbol{\alpha_4 SHARK_{ij}} + \boldsymbol{\alpha_5 TURTLE_{ij}} + \beta_1 C_{ij})}{\sum_{j=1}^{K} \exp(\boldsymbol{\alpha_1 CITY_{ij}} + \boldsymbol{\alpha_2 BEACH_{ij}} + \boldsymbol{\alpha_3 CORAL_{ij}} + \boldsymbol{\alpha_4 SHARK_{ij}} + \boldsymbol{\alpha_5 TURTLE_{ij}} + \beta_1 C_{ij})}$$

And this probability contributes to log-likelihood (and d_{ik}=1 if alternative *k* was chosen by respondent *i*)

$$\log L = \sum_{i=1}^{n} \sum_{k=1}^{K} d_{ik} \log \Pr(k)$$

DATA

- **Surveys conducted at the Juan Santamaria Airport in San Jose, Costa Rica.**
- In-person surveys conducted at the departure gate as tourists were leaving the country.
- Respondents screened (> 18 years old, and not a resident of CR)
- 11 minute-median time (10% with less than 5 mins)
- **Sample:**
- N=801
- Quota-based sampling
- Quotas based on statistics obtained from the Costa Rican Tourism Board.

	Quota	Actual
Male	54%	55%
N America	47%	46%
Latin America	35%	35%
Europe	13%	17%
Other	4%	3%
18 - 34	38%	39%
35 - 54	38%	40%
55 - 100	24%	21%

RESULTS
CONDITIONAL LOGIT, N=4,680 (IDS=780)

	Coeff		t stat	WTP per %point	Coeff		t stat	WTP per %point
CITY	0.0123	***	7.24	$ 1.04	0.0124	***	7.31	$ 1.05
BEACH	0.0102	***	6.24	$ 0.86	0.0156	***	7.17	$ 1.32
BEACHsee					-0.0100	***	-3.79	$ -0.85
CORAL	0.0000		-0.01	$ -0.00	0.0000		0.03	$ 0.00
SHARK	0.0041	***	4.8	$ 0.35	0.0035	***	3.94	$ 0.30
SHARKsee					0.0036	**	1.97	$ 0.31
SHARKdive					0.0012		0.43	$ 0.10
TURTLE	0.0029		1.37	$ 0.24	0.0043	*	1.89	$ 0.36
TURTLEsee					-0.0154	**	-2.32	$ -1.31
TURTLEdive					0.0160		1.58	$ 1.36
COST	-0.0118	***	-10.01		-0.0118	***	-9.99	

***: 1%, **: 5%, *: 10%

RESULTS

- Not finished, data analysis still in progress, however **preliminary results suggest that…**
  - Tourists were willing to pay **$60**, as a local tax, if it would go into a fund that would focus on environmental improvement **or** for infrastructure development.
  - Tourists are wiling to pay 3-4 times more for **touristic infrastructure** (around $1 per each %p) than for **conserving species.**
  - Tourists are willing to pay more for a **shark conserving policy** rather than a **sea turtle** conserving policy, but not for improving **coral reefs** (coeff. for is not statistically different from zero).

RESULTS

- Respondents are willing to pay on average $0.35 (s.e. 0.07) for each %point for avoiding the reduction of shark populations.
- This means $17 ($10.5 to $24.2) per individual tourist to avoid the 50% extinction of shark populations in CR or $35 ($21 to $48) to avoid their full extinction in Costa Rica.
- Preferences of males to protect sharks are the same as of women
- WTP for sharks is increasing with income (by $1.31 per %p for each $100,000 of annual household income)
- WTP of tourists who observed sharks in their natural habitat (but did not dive) is larger (+$.31 per %p), than those who dove with sharks or the reference group (for that is the same, approx. $.30/%p)

CONCLUSIONS

- Tourists are willing to pay more for **improved touristic infrastructure** rather than environmental improvement.
  - This was surprising since Costa Rica has a large amount of ecotourists.
- Nonetheless, they place significant value on **the preservation of shark and turtle** populations.
- Tourists may not place a significant value on **coral reefs** since they may not understand all of the benefits that coral reefs provide.

STRUCTURE OF QUESTIONNAIRE

- A. Screening Questions
- B. Demographic Information
- C. Tourism Information
- D. DCE
- E. Environmental and Tourism Preferences
- F. Contingent Valuation Exercise (DBDC)
- E. Socio-Demographic Information continued (income, education)

GRANT

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