Valuing Marine Parks in a Small Island Developing State: A Travel Cost Analysis in the Seychelles

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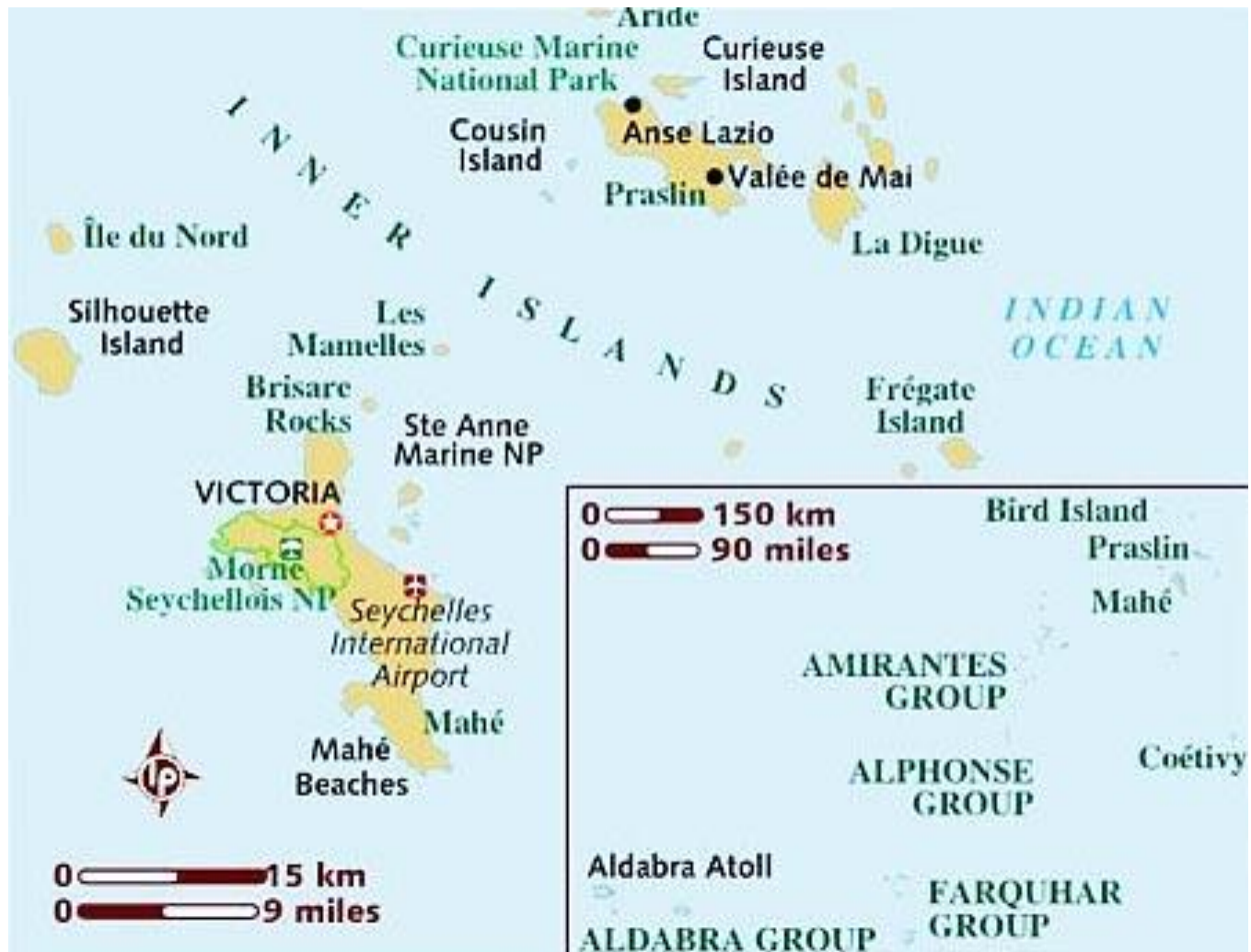
About this project

- A United Nations Development Programme (UNDP)-Global Environment Facility (GEF) funded project (2008-2009).

- Study conducted by economists from the Food and Environment Research Agency (Fera), UK.

Presentation Outline

- Background

- Marine Protected Areas

- Objectives

- Methodology

- Results

- Conclusions

Seychelles

Seychelles (Cont.)

- Small Island Developing State (pop<90,000).

- Significant economic growth since independence in 1976. Per capita GDP increased from US$1,000 in 1976 to US$8,720 in 2010 (IMF, 2011)!

- Growth has been driven by tourism and fisheries.

- Tourism accounted for 26% of GDP, 70% of foreign exchange and 30% of employment (2010 statistics).

- Fishing industry generated 8% of GDP, 7% of jobs and 35% of exports in 2009.

Marine Protected Areas

Marine Parks and Shell Reserve
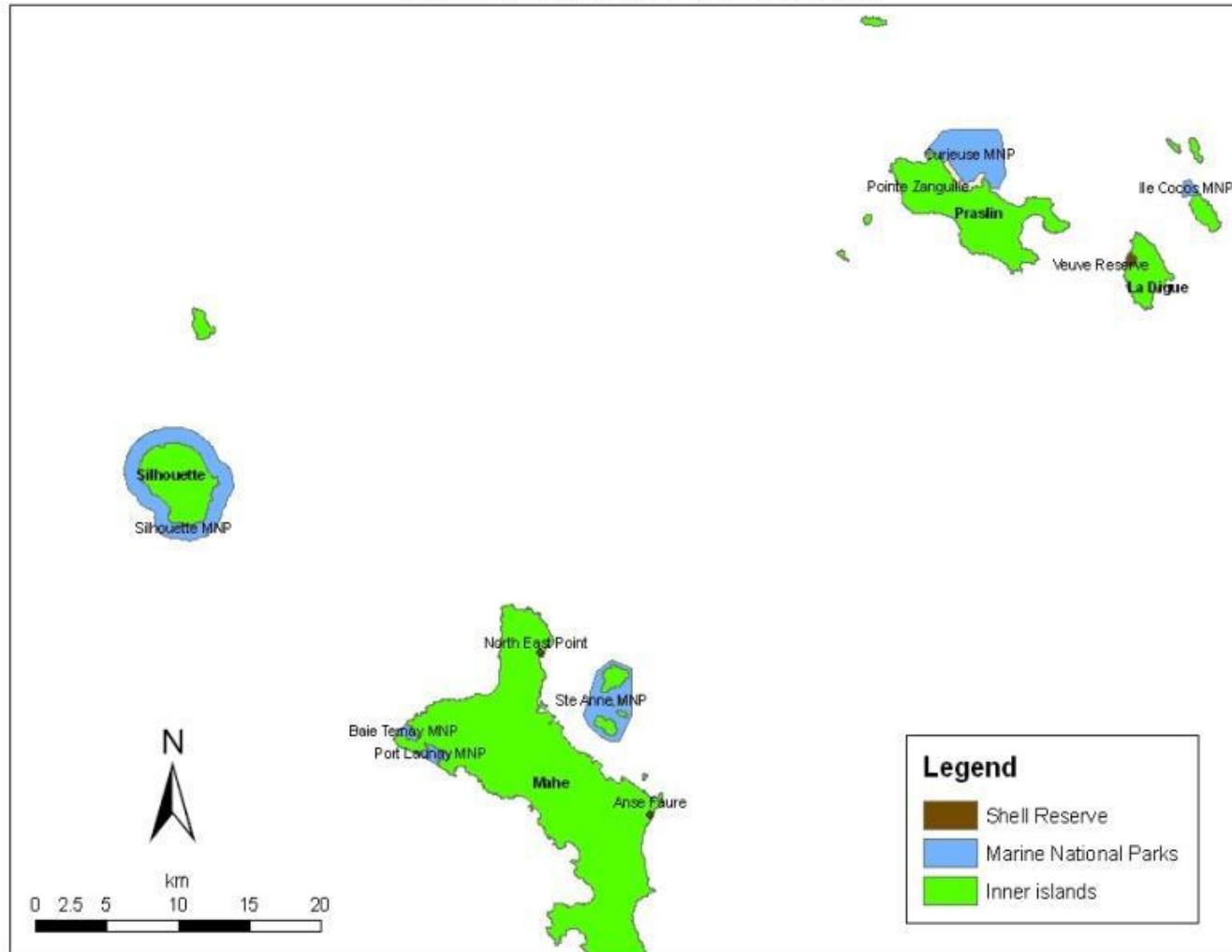
MPAs (Cont)

- 6 marine parks
- Major tourist attraction
- Snorkeling/diving experience
- Whale shark tours
- Night dives
- 47,493 visitors in 2009

St. Anne Marine National Park

The problem

- Marine ecosystems in small island developing states (SIDS) facing serious threats from pollution, over-exploitation, conflicting use, damage and destruction to habitat.

- Seychelles facing similar threats to marine resources (Cesar et al., 2004).
  - Coral bleaching episode in 1998 (Antha, 2010).
  - Invasive alien species (IAS).
  - Local pollution, sewage, sedimentation, land filling
  - Over-fishing, poaching etc

Objectives

1. To establish the economic value of a group of marine parks in the Seychelles

2. To provide policy makers with a strong justification for government investment in the management of marine parks.

3. To generate data which may be used in assessing current pricing policy for visitors to marine parks.

Methodology

- A single-site individual Travel Cost Method (TCM) applied to a group of marine parks (Maille and Mendelsohn, 1993).

- Choice between the Zonal and individual TCM (Ward and Beal, 2000).
  - Individual TCM appropriate for sites with high individual visitation rates?

- Dealing with multiple site trips??

Model Specification

$$V_i = f(TC_i, SS_i, X_i, e_i) \tag{1}$$

$$\ln V_r = \beta_0 - \beta_1 TC_i - \beta_2 D_i - \beta_3(D_i * TC_i) + ..\beta_n X_n \tag{2}$$

$$CS_1 = -\frac{1}{\beta_1} \tag{3}$$

$$CS_2 = -\frac{1}{(\beta_1 + \beta_3)} \tag{4}$$

V_r is the expected number of trips in the past 12 months, TC_i is travel costs by individual i to group of marine parks, D_i is a dummy variable to capture multiple site visitors (Di=1 for multiple sites and zero otherwise). X_n denotes preferences/tastes of individual i (represented by socio-economic characteristics such as income, age, gender). B_1 to β_n are parameters to be estimated

Model (Cont.)

- Dependent variable takes only non-zero integer values

- Count data models—Poisson or negative binomial models.

- Over-dispersion issues (Cameron and Trivedi, 1990).

- Other problems arising from on-site surveys.
  - Endogenous stratification
  - Truncation

- Poisson with correction for endogenous stratification (ES Poisson) and the zero truncated negative binomial model (ZTNB).
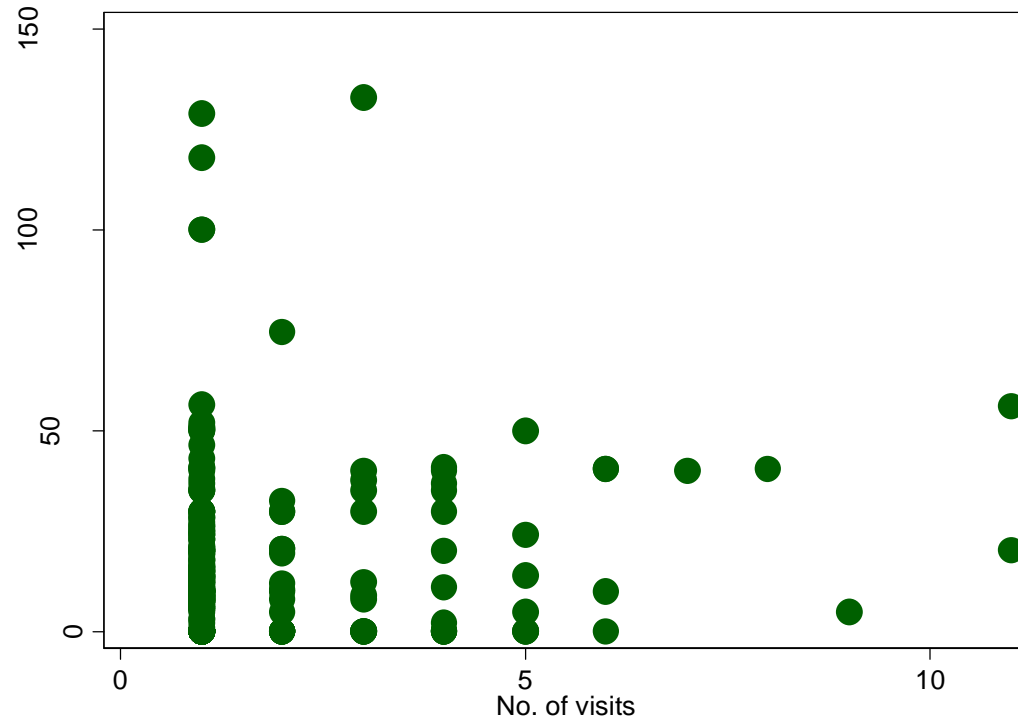
The Survey

- TCM questionnaire

- Initial pretesting in the UK (with 10 staff).

- 2 pilot surveys in Seychelles (20 people)

- Full on-site surveys at 4 marine parks.
  - St. Anne
  - Baie Ternay/Port Launey
  - Curieuse

- Total No of respondents—350 tourists (Jan-March, 2009).

Result: Reason for trip to Seychelles?
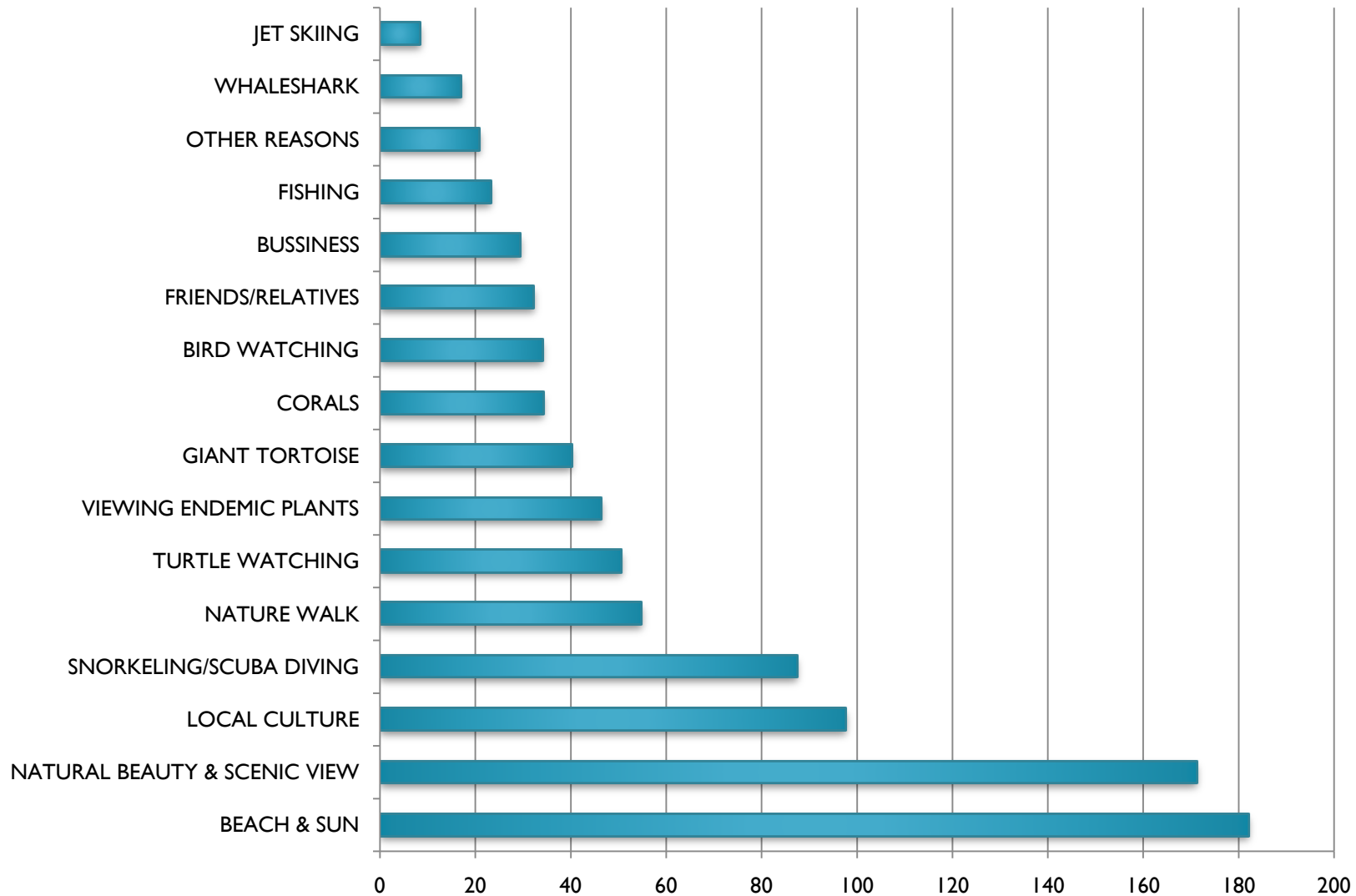
The Relationship between travel cost and the number of trips

- Expected inverse relationship
- Over-dispersion issues?
- A few outliers/extreme values

Estimated Travel-Cost Models

	ES Poisson (visits-1)	ZTNB (visits)
Travel Cost	-0.0058 (-2.12)***	-0.0081 (-2.15)***
Multiple Sites	-0.7500 (-2.74)**	-1.3213 (-2.49)**
Travel cost*Multiple sites	-0.0066 (-2.72)***	-0.0084 (-2.25)***
Income	1.5097 (2.83)***	2.2076 (2.50)**
Constant	-0.3469 (-0.55)	-0.1591 (-0.15)
Log-likelihood	-312.39	-240.78
Dispersion	-	4.01
Mean CS/trip-single site (€)	172.46 (95.11-923.45)	122.98 (64.32-397.82)

TCM Results

- Travel cost is negative and highly significant. Interactive travel cost term with dummy variable for multiple sites is also significant.

- Over-dispersion parameter is statistically significant (so we choose the ZTNB over the ES Poisson??).

- Mean CS for single-site visitors $=-1/\beta_1=-1/-0.0081=$ €123.

- Mean CS for multiple-site visitors $= -1/(\beta_1+ \beta_3) =-1/(-0.0081+-0.0084) =$ €60.

- But the mean WTP for access to marine parks using the CVM was \$12.2 (Mathieu et al., 2003). ???

Aggregate Consumer Surplus

	ES Poisson	ZTNB
Mean CS-single site visitors (€)	172	123
Mean CS-multiple site visitors (€)	81	60
No. of single-site visitors	9,499	9,499
No. of multiple-site visitors	37,994	37,994
Est. CS single-site visitors (€)	1,638,129	1,168,138
Est. CS multiple-site visitors (€)	3,063,488	2,298,281
Total consumer surplus (€)	4,701,617	3,466,419

Note: Total number of visitors to marine parks in 2009 was 47,493

Conclusions

- Economic analysis can help guide policy makers and the public to understand the values of marine resources and the cost of neglecting MPAs.

- Foreign tourists place a high value for the recreational experience in marine parks in Seychelles.

- Mean CS of €123 per trip for single-site visitors and €60 per trip for multiple-site visitors. These figures exceed the current entrance fee of $10 (€8).

- Price elasticity of demand is approximately -0.021. Hence the marine park agency is clearly in the 'inelastic' region of demand curve. There is scope to raise entrance fees in light of international demand.

Conclusions (Cont.)

- The issue of maintenance of MPAs to prevent further degradation.

- Need for increased Government funding.

- Investments in tourism services, additional attractions, better collection of entrance fees, enforcement, education etc

Thanks for listening!
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