May 1st, 10:00 AM - 11:00 AM

Weighing the Cost and Benefits of Ecotourism: A Quantitative Evaluation of Six Preserves around the World

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Weighing the Costs and Benefits of Ecotourism: A quantitative evaluation of six preserves around the world

Savannah Judge, Andrew Newcomb, Vera Zhou

Abstract

Ecotourism is considered an effective way to preserve biodiversity, educate tourists, economically benefit local communities, and foster respect for different cultures. The ecotourism industry is booming, yet this growth may result in the degradation of local ecological systems while contributing little to local communities socioeconomically. We compare the negative effects of the operation on the environment and positive socioeconomic effects for local communities in three pairs of large and small parks in Canada, Chile and China. While the conservation benefits of ecotourism are important, we focus on the negative environmental impacts that may be brought by ecotourists. We predicted that relatively large ecotourism operations will have greater socioeconomic benefits for their community but greater environmental impacts. Results suggest that benefits and impacts are relatively balanced for very small and large parks, but the presence of confounding variables renders these results inconclusive.

Methods

Rationale for case selections:
Three case study pairs cover a large geographic range Individual pairs control for area and climate

- Independent variable:
Average number of annual visitors, used to represent the level of ecotourism. Visitors provide revenue but also pose environmental threats.

- Dependent variables:
Environmental impacts:
  - Total length of roads (km)
  - Number of buildings
  - Area of tourist-caused fire damage (2013)
  - Percent of species present that are endangered
Social economic benefits:
  - Number of hotels and restaurants
  - Number of bus companies

- Data collected from a variety of sources, including: national databases, park management documents, news reports, ecological research, independent tourism operators, and personal experiences

- Each variable scored by ranking them according to value, and then summing the ranks in each variable of each case for socioeconomic benefit points and environmental impact points. Points for % Endangered Species, points were deducted.

Cases Studies

Case 1: Huize Black-necked Crane National Nature Reserve
Location: Yunnan, China
Area (sq km): 129.1
Annual visitors: 30,000
Climate type: Tropical wet and dry or savanna
Managing organization: county government
How long it’s been protected: Feb 2006
Description: To protect the threatened bird, Black-necked Crane (Grus nigricollis) and its natural habitat, Chinese government founded this national reserve since 2006 and started to promote ecotourism in this site recently.

Case 2: Mt.Wuzhi National Park
Location: Hainan, China
Area (sq km): 134.4
Annual visitors: 500,000
Climate type: Tropical rainforest
Managing organization: province government
How long it’s been protected: 2003
Description: Being one of the oldest national park, Mt. Wuzhi National park obtains high diversity of all kind of species: 2146 of plant species, more than 1700 insect species, 67 fish species and 289 vertebrate species, with 39 species are listed as endangered in CITES.

Case 3: Torres del Paine National Park
Location: Aysen, Chile
Area (sq km): 2,671
Annual visitors: 4,751
Climate type: Patagonian Steppe, Glacier, Alpine, Temperate Forest
Managing organization: Conservacion Patagonica , Chilean
How long it’s been protected: 2004
Description: Chile’s newest protected area that will combine two existing national reserves and the Chacabuco Valley, which was purchased by American NGO Conservacion Patagonia in 2004.

Case 4: Future Patagonia National Park
Location: Magallanes, Chile
Area (sq km): 2,422
Annual visitors: 170,032
Climate type: Patagonian Steppe, Temperate Forest, Alpine, Glacier
Managing organization: Chilean National Forest Corporation
How long it’s been protected: 1990
Description: Most popular national Park in Chile, and a flagship for park tourism world wide. Dramatic terrain featuring high mountains and rock towers, the southern Patagonian ice field, surrounded by lakes, grasslands and temperate forests.

Case 5: Jasper National Park
Location: Alberta, Canada
Area (sq km): 6641
Annual visitors: 1,358,206
Climate type: Subarctic
Managing organization: Parks Canada
How long it’s been protected: 1907
Description: The largest national park in the Canadian Rockies. Rugged terrain with varying altitude that is significantly drier than the western side of the Rockies.

Case 6: Banff National Park
Location: Alberta, Canada
Area (sq km): 564321
Annual visitors: 4,000,000
Climate type: Subarctic
Managing organization: Parks Canada
How long it’s been protected: 1885
Description: The oldest national park in the Canadian Rockies. Covers a wide range of ecoregions and habitats, with a number of microclimates created by the varying terrain and altitude. The park is predominately subalpine, which consists of dense forests of spruce, fir, and pines.

Results

<table>
<thead>
<tr>
<th>National Nature Reserve</th>
<th>National Park (China)</th>
<th>National Park (Chile)</th>
<th>Canada</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Visitors (thousands)</td>
<td>30,000</td>
<td>500,000</td>
<td>170,032</td>
<td></td>
</tr>
<tr>
<td>Area (km²)</td>
<td>129</td>
<td>134</td>
<td>2,422</td>
<td></td>
</tr>
<tr>
<td>Length of Roads (km)</td>
<td>10</td>
<td>80</td>
<td>201</td>
<td></td>
</tr>
<tr>
<td>Total Buildings</td>
<td>120</td>
<td>120</td>
<td>28</td>
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</tr>
<tr>
<td>Fire Damage (Km²)</td>
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<td>0</td>
<td>181</td>
<td></td>
</tr>
<tr>
<td>Total Species</td>
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<td>356</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>Endangered Species</td>
<td>4</td>
<td>6</td>
<td>6</td>
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<tr>
<td>Richness</td>
<td>211</td>
<td>295</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>Tourism Businesses</td>
<td>4</td>
<td>8</td>
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<tr>
<td>Company</td>
<td>3</td>
<td>2</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Data collected on the independent and dependent variables for each case.

Discussion

- Ecotourism score (green line) represents the difference between socioeconomic benefits and environmental impacts
- Benefits and impacts appear relatively balanced at low and high levels of visitation, suggesting that the environmental impacts of mass tourism are "balanced" by the opportunities it creates for local businesses

Conclusion

- These results refute the hypothesis, however many confounding variables exist (e.g. age of park, type of management, etc.), making it impossible to estimate a “sweet spot” for visitation.
- Future studies may try to quantify other aspects of ecotourism such as the impacts of travel to and from national parks and the level of engagement that tourists have with each site.

Acknowledgements

We would like to thank Russ Cole for helping us through each stage of the research process, Abby Pearson for teaching us how to develop research posters, and Sahan Dissanayake for suggesting relevant literature on ecotourism.

Literature Cited


Figure 1. A rank-based analysis of level of ecotourism (blue line), displayed as the difference between socioeconomic benefits (green line) and environmental impacts (red line).