



BEeS

The LifeWatch ERIC Biodiversity & Ecosystem eScience Conference

Seville
22-24/05/23



Threats and challenges to biodiversity and ecosystem conservation from an eScience perspective



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Leveraging Digital Technology and Analytics for Sustainable Management of Regions in National Parks: The Case of Smart Poqueira

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SMART POQUEIRA

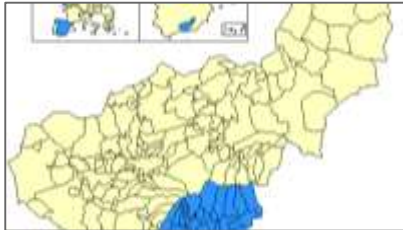
Introduction

- Threat of tourist activity in environmentally vulnerable areas.
- Smart Poqueira Project: Improving management and sustainability of Sierra Nevada Natural Park.
- Utilization of digital technology and big data to mitigate negative impacts of tourism and promote sustainable tourism.



What is Smart Poqueira?

- Innovative project by the University of Granada.
- Utilization of a network of smart sensors to collect real-time data.



What is Smart Poqueira?

- Vehicle mobility cameras to measure traffic flow and tourist behavior.
- Flow sensors in urban areas to record the number of people and concentration in the central square.
- Sensors in establishments and waste containers to monitor entry/exit flows and waste generation.

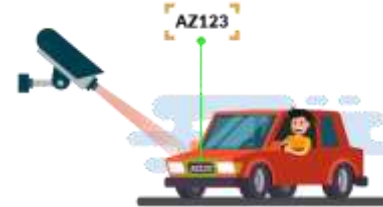


Objetives

- Apply the travel cost method to assess the environmental value of Sierra Nevada National Park.
- Obtain detailed information about visitor profiles and analyze their influence on responses and preferences.

Methodology

- Design of questionnaires and personal interviews with visitors.
- Integration of survey data and tracking camera data.
- Application of the individual travel cost method (ITC) to calculate travel costs and evaluate environmental impacts.



Individual travel cost method

Analysis of visitor data on an individual basis:

1. Use of regression and Poisson model.
2. Incorporation of variables such as gender, income, age, origin, education, employment status, and overnight stays.
3. Consumer surplus
4. Total recreational value



Results

Descriptive analysis of visitors:

- Gender: Male: 57.49%
Female: 42.51%
- Education: Seconary education: 75.36%
- Occupation: Employees: 65.70%
- Age: 20-39: 58.94%.
- Presence of children: Without children: 75%
- Monthly income: More than €2000: Over 70%



Results

Individual travel cost method

- Estimated coefficients of the Poisson regression model.
- Significant variables: travel cost, population, and gender (male).
- Average consumer surplus per individual and per trip: **€46.52**.
- Total valuation of the park: **€513,301.68**.

Poisson Regression Results

Dep. Variable:	P3	No. Observations:	207			
Model:	Poisson	Df Residuals:	199			
Method:	MLE	Df Model:	10			
Date:	Thu, 11 May 2023	Pseudo R-squ.:	0.2043			
Time:	10:15:04	log-likelihood:	-809.11			
Converged:	True	LL-Null:	-1231.6			
Covariance Type:	nonrobust	LLR p-value:	8.466e-164			
	coef	std err	z	P> z	[0.025	0.975]
const	0.0208	1.380	0.272	0.785	-5.793	7.545
coste_desp	-0.0215	0.002	-0.082	0.000	-0.028	-0.017
population	-0.1008	0.037	-2.644	0.003	-0.183	-0.017
avg_gross_income	0.0040	0.100	0.013	0.989	-0.701	0.710
P15_numbra	-0.1073	0.003	-4.294	0.000	-0.070	-0.210
nights	-0.0025	0.002	-1.540	0.121	-0.006	0.001
P18_EDAD_menor a 20	0.2000	0.389	0.092	0.489	-0.493	1.030
P18_EDAD_20 a 39	0.0483	0.412	0.117	0.907	-0.718	0.655
P18_EDAD_40 a 49	-1.0130	0.410	-2.437	0.015	-1.829	-0.198
P18_EDAD_50 a 59	-0.0707	0.398	-0.198	0.843	-0.810	0.701
P18_EDAD_60 a 69	-0.0707	0.394	-0.202	0.846	-0.812	0.692
P16_Bachillerato / CSU / FP	1.6003	0.585	2.895	0.004	0.553	2.646
P16_GD / EGR / BUP	0.4570	0.825	0.733	0.464	-0.766	1.682
P16_Universitario / Superior	1.0175	0.586	2.762	0.006	0.470	2.765
P17_Sin empleo actualmente	0.9486	0.317	2.960	0.003	0.320	1.562
P17_Trabajador por cuenta propia	1.3886	0.294	4.721	0.000	0.812	1.965
P17_Trabajador por cuenta ajena	0.5190	0.284	1.827	0.068	-0.038	1.079

Conclusions and Applications of Travel Cost Method

- Valuable for valuing recreational areas, understanding travel costs
- Estimate fees, evaluate investments, conduct data analysis
- Essential for decision-making, strategic planning
- Improve visitor experience by understanding costs



Discussion, Limitations, and Future Work

- Insights from evaluating recreational value and visitor opinions
- Explore alternative methodologies, expand sample, use machine learning
- Limitations in models and sample highlight need for comprehensive understanding
- Include additional variables, diverse evaluation methods for capturing visitor aspects





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Thank you! | www.lifewatch.eu/bees-2023

