

SOCIOECONOMIC DYNAMICS OF SUNSCREEN **POLLUTION FROM COASTAL TOURISM:** A comprehensive assessment of beachgoer habits and preferences in southern Spain



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Only in 2021, Andalusia welcomed over 2 5, concentrated mostly in Málaga (26.5%) and Cádiz (19.2%), both typically beach tourism

What do you know about the challenges in coastal pollution attributed to SUNSCREENS?



403 questionnaires on two urban beaches to define **USES, HABITS and INTENTIONALITY** as well as beachgoer's profile, visit typology, perception, usage of sunscreens and willingness to pay for eco-labeled products

BACKGROUND



Sun and beach tourism contributes significantly to create economic and social opportunities ([1], [2], [3]), but its growing trend has not been accompanied by a proportional increase in research on its impacts and pressures on marine and coastal ecosystems ([4], [5]) such as some emerging pollutants.



Tourism at beach destinations typically involves multiple activities in which many beachgoers apply sunscreen to protect their skin from ultraviolet (UV) radiation exposure ([6], [7], [8]). When people swim or get into the sea, studies suggest that approximately 25% of the sunscreen applied washes directly into the sea ([7]).

We analyzed the potential consumer responses to a type of products that hypothetically help mitigating the environmental threat associated to sunscreen use.

Beachgoers habits and sunscreen usage

Input of sunscreen into coastal water

Willingness to pay for eco-labeled sunscreen

	La Caleta (Cádiz)	La Bajadilla (Málaga)
Local birthplace (domestic user)	45,4%	52,5%
Days of visits to the beach in summer season (#)	28,5	47,1
Days of visit to others Andalusian beaches (#)	22,9	8
% beachgoers using sunscreen	97.1%	89.4
Current eco-label sunscreen usage	5.6%	9.6%
Milliliters of sunscreen per application (ml)	7.9	11.9
Applications of sunscreen per day (#)	2.5	2

Total Input of Sunscreen per beachgoer (TISbeachgoer) in milliliters per user that enters the coastal water during the summer season (based on Casas-Beltrán et al. 2021 [9] and adjusted by reflecting the beachgoers' stated habits).

TISbeachgoer = SQap ×Ic× Td×0.25

SQap (quantity of sunscreen utilized per beachgoer and application); Ic (input coefficient into the coastal water considers the frequency of product discharge occurrences into the coastal water, which depends on the number of sunscreen applications per day and immersions into the sea per day). ;Td (total number of days on the beach in the summer season); The coefficient of 0.25 is the transfer rate of the sunscreen from the skin to the water ([19], [20], [40]). ; More info, asked to authors 🥝

		La Caleta (Cádiz)	La Bajadilla (Málaga)
Beachgoers that engaging in aquatic activities and reporting sunscreen use (%)		95,6%	89,4%
Input into coastal waters <i>(in summer season)</i>		76.3 ml /user	109.3 ml /user
CREAM	157,372 liters of sunscreen into Andalusian coastal waters only from domestic tourism*		

*Based on the DATAESTUR 2023 report, approximately **1.8 million Spanish tourists** specifically chose to visit Andalusia for sun and beach tourism during summer 2022.

- NOTE: Contingent valuation is a survey-based stated preference method that simulates a market for non-commercial goods or services to estimate their potential demand.
- We used the single-bounded format ([10]) in which respondents were presented with an amount to pay to buy an eco-labeled sunscreen.
- The amounts to be paid presented in each questionnaire were randomly selected from the following vector of bid values [$\in 3$, $\in 6$, $\in 9$, $\in 12$].
- We modelled a WTP function using a flexible specification of the explanatory variables that allows for a more direct interpretation of the associated coefficients ([11]).

La Caleta

(Cádiz)

11,5€

/250ml

Willing-to-pay

eco-label

sunscreen

(€ extra)

La Bajadilla (Málaga)		
14,2€ /250ml		
	OCEAN RESPECT ECO	at

N=198 La Bajadilla (Málaga)

SOME CONCLUSIONS...

The public's perception of the issue is still at a very rudimentary stage

The input vector derived from the declared behavior and their actual usage may included the sunscreen's application and entrance derived from aquatic activities

Due to the differences between the two case studies, there is a need to analyze more cases including the social dimension in the problem of pollution associated with sunscreens. Extrapolating from the average may not be valid underestimating or overestimating the pressure and potential to contaminate

- Its crucial analyze the amounts of sunscreen applied and the true quantity of this product that enters into aquatic systems, taking into consideration that not all the product that enters into aquatic systems and the true quantity of this product that enters into aquatic systems. applied reaches the coastal water
- The WTP amounts calculated demonstrate the significance of the issue (even considering a conservative scenario) and the need to explore management responses. This information can serve as a starting point for exploring alternative options as part of partial responses to the overall problem.
- Our results may serve as a initial step towards making more informed and considered decisions about sustainable tourism.

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