

A large barge is shown from a high-angle perspective, moving across a vast expanse of blue ocean. The barge is heavily loaded with numerous large, white, cylindrical waste containers. In the background, several other ships are visible on the horizon under a clear sky. The overall scene depicts a maritime waste collection operation.

Solutions for waste collection on rural islands

The increased volume of domestic waste and its impact on the environment have driven diverse investigations on the design and planning of waste collection systems. In particular, advances are being made in the development of mathematical models and tools that support waste collection and management.

To tackle this challenge, the investigation “Design and planning of a solid waste collection system for rural households,” which is funded by Fondecyt, proposes a new solution for the particular situation of the Chiloé and Palena provinces.

“The problem under study cannot be handled by existing models; therefore we propose an innovative, integrative approach for undertaking the design of solid residential waste collection across an archipelago using a barge,” explains Dr. Carola Blázquez, investigator at the Department of Engineering Sciences of the Faculty of Engineering, Universidad Andrés Bello. “The main goal of this project is to develop mathematical tools that can efficiently determine designs and planning,” adds Dr. Blázquez.

The project, in which Dr. Pablo Miranda from the Pontificia Universidad Católica de Valparaíso also participates, proposes representing this problem through a model of mixed integer linear programming. The goal is to minimize operating costs and system inversions, optimize the points and frequency of collection for every island, and to create system collection routes.

According to Dr. Blázquez, the proposed methodology is subject to a maximum period of time between consecutive visits at each collection point, with the aim of reducing population and environmental exposure to wastes. The methodology must also comply with environmental restrictions and regulations. Moreover, this investigation is evaluating two strategies for system operation, one in which a waste compactor is located onboard the barge and another in which the barge transports waste containers.

Finally, another goal of the project is to implement a geographic information system (GIS) to facilitate decision making and assist in the visualization and analysis of the proposed methodologies and project results.

recolección
as rurales insulares