JOURNAL OF MARITIME RESEARCH

Vol XVII. No. I (2020) pp 93–100

ISSN: 1697-4040, www.jmr.unican.es

Reception of waste in Spanish commercial ports: Trend models.

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ARTICLE INFO

Article history:
Received 30 March 2020;
in revised form 10 April 2020;
accepted 12 April 2020.

Keywords:
Ship waste, Spanish ports, Trend models, MARPOL Convention, Marine pollution.

ABSTRACT

In this study, a review of the port services for the collection of MARPOL waste from ships in Spanish commercial ports is carried out. In the first place, a characterization of the different Spanish ports is made in terms of their dimensioning, establishing as indicators the linear kilometres of berthing and the kilometres of railway service available to each port facility. Subsequently, an analysis of the situation of the waste collection service is made, looking for the type profile of the contracting company. Finally, trend models are developed to analyse the nearest future in terms of traffic and amounts of waste to be managed and an analysis is established from the port, considered as the most basic level, to the Autonomous Community, to end the analysis by coastal strips. North-Mediterranean-South differences are recognized.

1. Introduction.

Port waste reception facilities in Spain are regulated in accordance with the provisions of the MARPOL Convention (IMO, 2017), the Law of State Ports and the Merchant Marine (Ministry of Development, 2011) and Directive 2019/883 of the EU (European Parliament and of the Council, 2019), arising from the need to adapt to the successive amendments to the Convention and the ineffectiveness of the previous regulations.

The regulation of port reception facilities for waste from ships is in the process of reform. A part of the particular regulations and the plans for the reception and handling of waste used by the Spanish Port Authorities are prior to the State Ports Law and were developed following the directives of Directive 2000/59 / CE (European Parliament and Council, 2000), and R. D. 1381/2002 of our system (Ministry of the Presidency, 2002). The evaluation to which this Directive has been subjected (European Commission, 2016), revealed the need for a partial reform in the short term and a legislative review in the long term. As a result of this review and the need to adapt to the successive amendments to the MARPOL Convention, the new Directive 2019/883 mentioned above has emerged. In order to adapt to these new prerogatives established by the Union, it seems necessary to amend the current national legislation on port facilities for the reception of ship waste.

All the information managed in this work brings us closer to the real dimension of the service in each port and allows us to establish comparative analyses between ports (Camarero, A. et al., 2016, 2019; Gonzalez, F. et al., 2015), considered individually or grouped by Autonomous Communities or even broader geographical areas, such as coastal facades, as well as obtaining a global vision of the generic characteristics of our port system in terms of MARPOL waste management and determining whether to base on the laws for the development of this basic order set out above, is the Spanish port system really prepared to meet the requirements?.

2. Methodology and Data.

To prepare this analysis, the web pages of the State Ports and the different Port Authorities have been visited, and infor-

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mation has been extracted from:

- The plans for the reception and handling of waste generated by ships.
- The specifications of particular prescriptions of the waste reception service.
- The strategic plans.
- The annual reports.
- Statistical yearbooks.
- Environmental memories.
- Tariff regime.

In addition, the statistical information offered by the State Port Observatory and the available web pages of the different companies that license waste collection services were consulted.

As a result of this search, certain parameters are defined that were used to size the ports, to define the current situation of the waste collection service in Spanish ports and to calculate, through trend models, the variations in traffic and the quantities of waste that must be managed by each port, each Autonomous Community, or even each coastline, corresponding to Annexes I and V, establishing future values in the 2020-2025 period.

2.1. Approach to the size of ports.

By means of a brief description of the port facilities, the number of linear kilometres of berthing and the kilometres of rail service that each port has, an indicator, the latter, of a high level of development and sustainability were recorded as fixed data for each port. for a port (Barreiro, J. & Ruiz-Rua, A., 2012). The main traffics are also recorded, considering the number of ships that docked, of each type, in each port in 2018. In addition, historical data on the number of ships and Tons were collected, relative to the years 2000 to 2019, for the ports of each Autonomous Community.

2.2. Current situation of the waste collection service.

This section describes the different methods of waste collection that are offered in each Autonomous Community. The licensee companies were registered, including a brief description of each one of them, the equipment they have, the duration of the license and the type of waste or waste for which they provide service.

2.3. Trend models.

From the records of the number of ships, tons and the quantities, expressed in m3, of both liquid and solid waste, corresponding to Annexes I and V of the MARPOL Convention, the trend models are prepared, which can be represented, for each port, for each Autonomous Community or in groups of these by means of corresponding coastal facades.

3. Results.

One of the main difficulties that we have encountered in preparing this analysis is the disparity, or no information, in some cases, provided by the different Port Authorities. Thus, for example, in the annual reports corresponding to the years 2016 and 2017, the concept appears: "Fees for the service of reception of waste generated by ships", within the group "Net amount of turnover", corresponding to the "Profit and Loss Account", published by eight Authorities (Pasajes, Santander, Vilagarcía, Huelva, Bahía de Algeciras, Ceuta, Baleares and Tenerife), a heading that only the Canary Islands Authority maintains until the memory of 2018 and that no longer it is currently broken down in none of the reports.

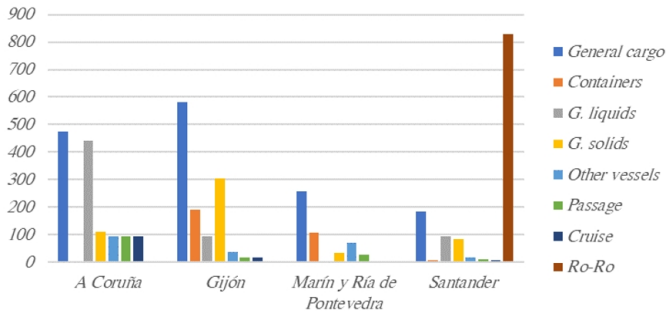
On the other hand, the specifications of particular prescriptions for the provision of the port waste collection service are published, in many cases, before the Port Law, a provision to which the ordinance of each Port Authority has had to subsequently submit, either with the preparation of new specifications or through the updating of the reception plans.

The first step has consisted in defining the physical dimensioning of each port, for which the values of total linear berthing length and kilometres of railway line available to each port, have been considered.

18% of Spanish ports do not have a rail network. Although it is true that ports such as Cádiz or Almería are in the process of adapting their lines, Motril is the only port in mainland Spain that lacks this service. On the other hand, the port of Palma has 3.7 kilometres, but these are out of service.

According to the report of the Railway Observatory in Spain (2018, p. 186) it has been possible to verify that small ports such as Santander or Marín have the highest share of rail transport with respect to total movements, followed by other ports on the Atlantic façade such as Gijón and A Coruña, data that agree with the main traffic with which these ports operate, despite not being any of them, a port specialized in container traffic. As can be seen in figure 1.

Figure 1: Main traffic in ports with the highest share of rail transport.

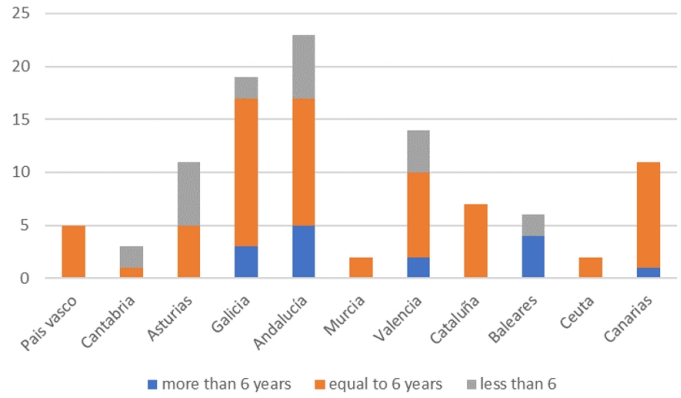


Source: Authors.

The type of service was defined as terrestrial, maritime and optional, the latter being the one that recognizes the possibility of providing maritime service, but it is not carried out effectively or its provision is not imperative. 43% of the ports

studied offer the possibility of collection by sea for liquid waste and 50% for solid waste. And, in this sense, there are ports that show very differential or exclusive specifications, as has been collected, for example, in the ports of Bilbao, Tarragona or Santa Cruz de Tenerife, where maritime collection is established as exclusive or preferential, depending on the cases. Or in the port of Santander, where the maritime collection service is not explicitly contemplated, but a terminal is authorized to subcontract vessels for the reception of solid waste.

Figure 2: Duration of licenses by CCAA.



Source: Puertos del Estado. Authors.

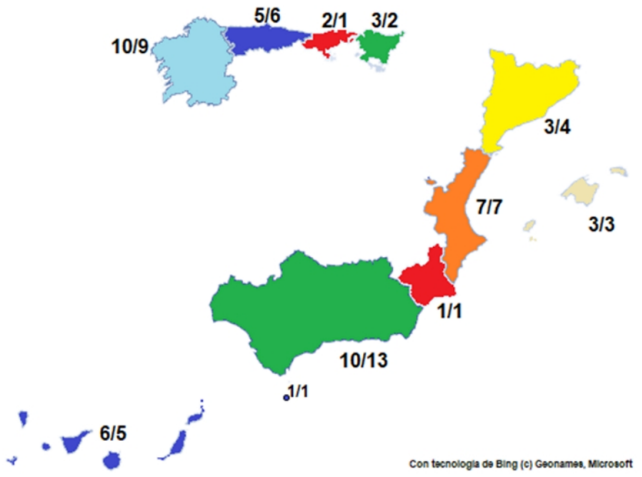
It has been possible to verify through the start and end dates of the licenses that are currently working, that only around 15% of them, is greater than six years, and that 25% of the licenses are not enough that period of time. None of the licenses of the port of Palma have specifically that duration. In Cantabria, two of the three licenses have a shorter duration and in Communities such as Andalusia or Asturias, approximately half of them are granted for those six years. Only Galicia, Andalusia, Valencia, the Balearic Islands and the Canary Islands have licenses for a longer period.

Next, in figure 3, the number of licensee companies, for the management of liquid and solid waste, respectively, for each Autonomous Community, are represented.

In the Basque Country, companies belonging to the TRADEBE group are the only licensees for the collection of waste from both Annex I and V. The PETRONOR refinery terminal, located within the limits of the Bilbao port area, has a waste collection license from Annex I, restricted to the uses of said terminal.

The community of Cantabria has two licenses for Annex I and one for waste collection of Annex V, the licensee companies do not provide service to more than one Annex. Large groups such as TRADEBE, URBASER Y FOMENTO DE CONSTRUCCIONES Y CONTRATAS, S.A. They are the licensees in the port of the Cantabrian capital.

Figure 3: Number of licensee companies for the collection of liquid and solid waste.



Source: Puertos del Estado. Authors.

The Asturian ports of Gijón and Avilés have a total of 11 licenses. While the Gijón Port Authority encourages the joint management of waste from different Annexes, in the port of Avilés two of the licenses granted only provide collection service for waste corresponding to Annex V. In addition to large business groups in the sector such as TRADEBE, URBASER, SADISA Y FOMENTO DE CONSTRUCCIONES Y CONTRATAS, SA, Other independent, local companies such as Lubricantes Vigón SL and Ecoastur Limpiezas Industriales S.A., provide service in the ports of the Asturian Community.

The community of Galicia has up to ten licenses for waste collection belonging to Annex I of MARPOL and nine for Annex V. The TOYSAL group is established in Coruña, Vigo and Vilagarcía. For its part, the Ferrol Port Authority grants a collection license to three independent companies, Marpol Ferrol, S.L., Navantia, S.A. and Atlantic Forest. The service, in the rest of the ports, is completed with licenses to local companies such as MARPOLGAL A.I.E. in Vigo, CODISOIL S.A. in Marín and Vilagarcía, or INGAROIL in A Coruña.

On the other hand, the Andalusian community is, in absolute numbers, the one with the highest number of licenses granted. ten for the collection of liquid waste and thirteen for the collection of solids. The URBASER Group, SA, has a license for the collection of liquid waste in all the ports of the Community, the rest of the service is completed, with independent regional or local companies that are mainly in charge of solid waste corresponding to Annex V of the Agreement.

On the other side of the strait, the Port Authority of the autonomous city of Ceuta has a license for the local company Ecoceuta, S.L., which offers a management service for liquid and solid waste. For its part, the Port Authority of the Autonomous City of Melilla offers a solid waste collection service MARPOL through a company with public participation. In the regulations on waste management of the city itself, the possibility of treatment, recycling and recovery within local facilities or the need for transfer and recycling in the peninsula is contemplated, de-

pending on the nature of the waste and due to restrictions on the time of incineration, as appropriate.

The Cartagena Port Authority has a license granted to a locally established company, Cartago MARPOL, S.L., for the comprehensive service of waste management of the Annexes contemplated in the study.

The URBASER group is the licensee for the collection of liquid waste for each of the three Port Authorities of the Valencian community. For its part, the Catalan group GRIÑÓ has a license for the collection of liquid and solid waste in the port of Castellón. The rest of the licenses belong to regional or local companies. BP Oil España S.A. Gestril Alicante SL, and Marpoles del Este have a restricted license for waste management at the Castellón port terminal, and finally SEROIL Valencia and GARBAPORT port services have a waste collection license. solid.

In the port of Barcelona there are two companies that cover the collection of waste from all the MARPOL Annexes, Ecoimsa from the TRADEBE group and the company TMA with implantation in Catalonia, the Valencian Community and Castilla la Mancha. In addition, the local company Floating Services Otto Schwandt S.L., is the licensee of the solid waste collection service. On the other hand, in the port of Tarragona, the TRADEBE group also operates through the Ecoimsa company for the collection of liquid waste, while solid waste is managed by the local GRIÑÓ Group.

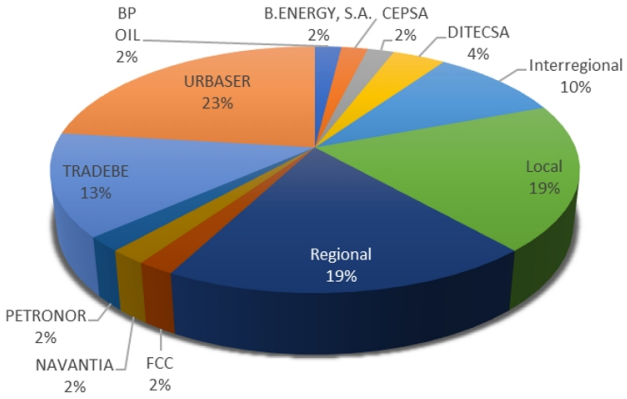
The Sertego company, of the URBASER Group, has a liquid waste collection license in the port of Palma de Mallorca. The MARPOL service is completed with the licenses to the local companies Servmar Balear, S.L., and Adalmo, S.L. for the provision of collection service for both solid and liquid waste and the license of the regional company Serviport Balear S.L., for solid waste collection.

The licenses granted by the Port Authority of Las Palmas for the waste collection service show an absolute disaggregation, so that no licensee company of liquid waste from Annex I and solid waste from Annex V at the same time. The Sertego company of the URBASER Group and the company Ecología Canaria, S.A. belonging to DITECSA, they are in charge of managing the former, while solid waste collection corresponds to the FOMENTO DE CONSTRUCCIONES Y CONTRATAS group and independent local companies, to which are added two licenses for Puerto del Rosario and Solid waste collection reef.

The MARPOL waste collection service, offered by the Port Authority of Santa Cruz de Tenerife, is distributed between the company Ecología Canaria, S.A. belonging to DITECSA and the local companies Hernández Bello, S.L., Treatment of Electronic Waste of Canaries, S.L.U, and La Esponja del Teide.

To analyse the profiles of the companies that provide waste collection services, in the main Spanish ports, these companies have been defined as local, regional or interregional, when they are not part of a supranational business group.

Figure 4: Companies that provide liquid waste collection services.

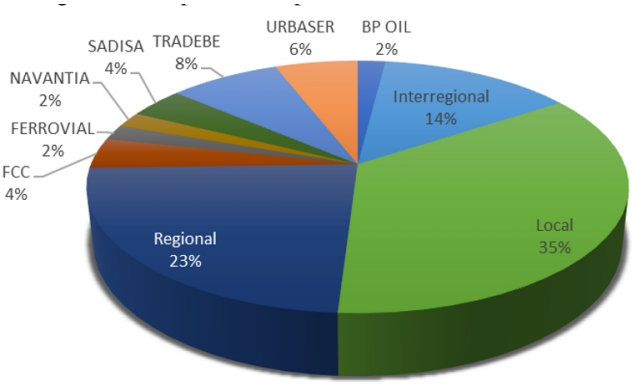


Source: Puertos del Estado. Authors.

Slightly more than half of the liquid waste collection services in Spanish ports are in the hands of large business groups, TRADEBE and URBASER standing out, accounting for 36% of the licenses.

Regarding the data referring to the collection of solid waste, it is the companies with a marked local, regional and interregional character, which gather more than 70% of the licenses, highlighting the local companies with 35% of the total of said licenses.

Figure 5: Companies that provide solid waste collection services.

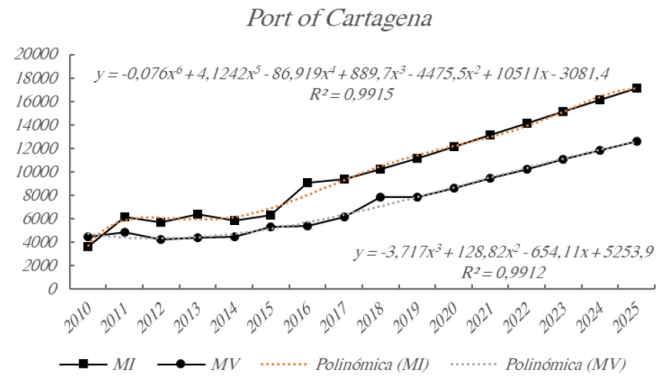


Source: Puertos del Estado. Authors.

In order to make a forecast of the traffic and quantities of MARPOL waste that the different Port Authorities must manage, trend models have been developed and different relationships between the values obtained have been established. The study goes from the representation of the different quantities for a specific port, as, for example, the following figure shows with the values obtained for the port of Cartagena:

The formula associated with each curve, as can be seen in the figure 6, representing the por of Cartagena, presents polynomial typology of different degrees. This is something that is repeated for most ports, although some specific cases responded to a linear variation criterion.

Figure 6: MARPOL I and V waste quantity trend in the port of Cartagena.



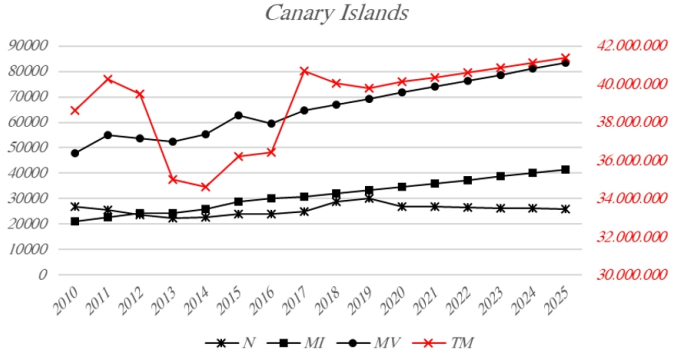
Source: Authors.

The following figure shows the model used for grouping by Autonomous Communities, serve as an example the one used for the Canary Islands.

The data represented in these graphs correspond to:

- TM: Total of the Tons dispatched in the ports of each of the Autonomous Communities.
- N: Number of vessels that carried out loading and / or unloading operations in said ports.
- M_I: Quantities of liquid waste managed by the ports.
- M_V: Quantities of solid waste managed by the ports.

Figure 7: Traffic trend and quantities MARPOL, I and V in the Canary Islands Community.



Source: Authors.

And finally, the grouping based on the three coastal facades: Cantabrian, Strait and Canary Islands and Mediterranean. The following figure shows the data obtained for the communities that are part of the Cantabrian façade.

The values corresponding to traffic have been defined since 2000, while the quantities referring to MARPOL waste begin in 2010. This responds to the fact that not all ports began to register the quantities of waste at the same time, so in order to obtain comparable values, the list was started in the year in which most of the ports had already registered such quantity.

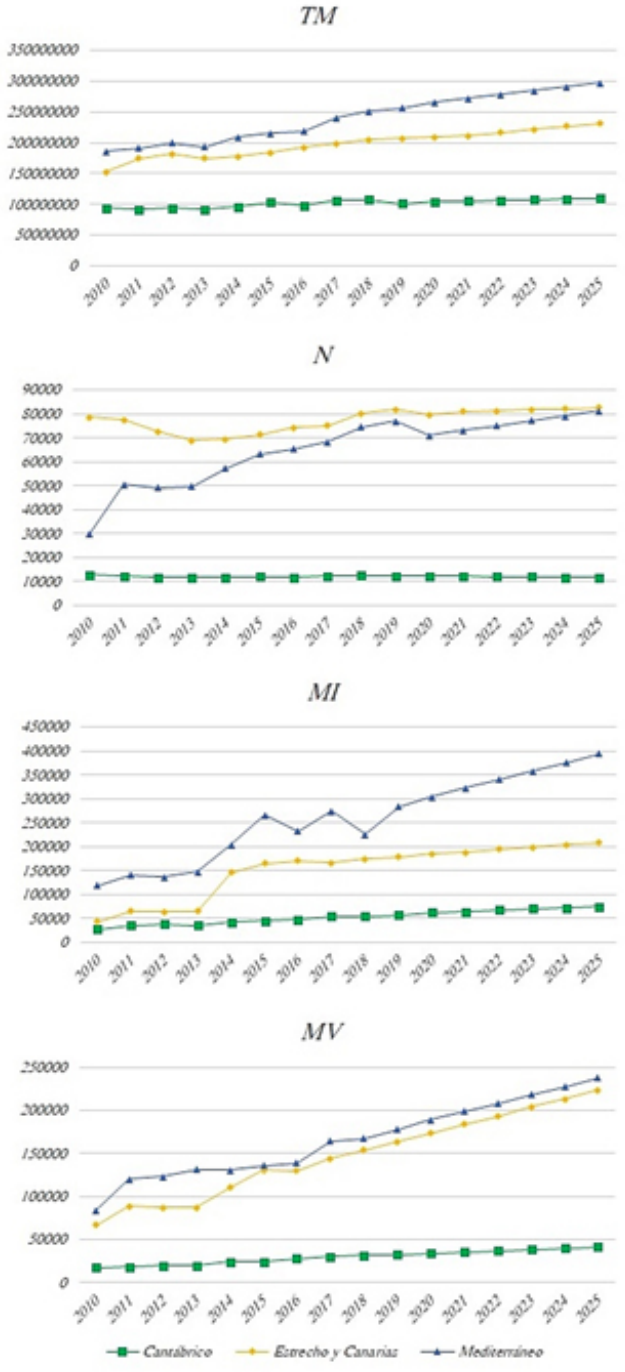
Figure 8: Cantabrian Communities Results.

Source: Authors.

The comparison of each community with those of the rest of its coastal facade, gives us an idea of the dimension of each port in relation to those that surround it. Thus, for example, from the previous figure, it can be seen how Asturias is the Northern Community with the highest freight traffic, but which shows

a greater drop in the number of ships dispatched. Cantabria presents very stable values both in the number of ships and merchandise and in terms of waste management, it is found that Galicia presents much higher numbers than the rest, with this difference in solid waste being more palpable.

Figure 9: Cantabrian Communities Results.



Source: Authors.

The figure 9 shows the comparison of the different coastal facades with each other, in terms of tonnage, number of ships, liquid and solid waste:

It was found that all the variables studied in the Cantabrian region show lower variations and that the growth of solid waste, both in the South and in the Mediterranean, represents an increase of around 300% while the values of liquid waste experience a growth of more than 400% in the Strait-Canary Islands.

4. Conclusions.

The legislation on the management of MARPOL waste from ships, in Spanish ports, represented by the particular regulations as a development standard, is very disparate and presents many differences depending on the specificities of each port.

The port rail service, as an index of a high level of development and sustainability, is not yet well established in our port system.

Only half of the Spanish ports offer the possibility of collecting MARPOL waste by sea.

The typical licensee company can be defined as that belonging to a large business group in the case of liquid waste collection and one with a local, regional or interregional profile, for the collection of solids and that has an average duration license of 6 years, being its average implantation of 2 or 3 companies per province.

The trend models indicate, in general, an increase in the Tons managed in each port compared to a slower growth or even a decrease in the number of vessels, which implies, in a generic way, a larger size of these. Only the port of Palma shows a considerable growth in the number of ships, which is accompanied by an increase in the amount of solid waste, well above the values registered for liquids in this port. This parameter is only repeated for the ports of the Canary Islands and Melilla, although it is true that the specificities of the autonomous city may distort this specific analysis.

The comparison between coastal strips shows less variation in traffic and waste generation in the north of the country, the values of all the parameters studied being much more stable.

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