BLUEBOX

1 Diagnosis and Baseline Establishment

METHODOLOGICAL GUIDE FOR CONDUCTING SOLID WASTE SAMPLING ON BEACHES

PROLOG

From the Ministry of Health and the Ministry of Environment and Energy of Costa Rica

The Ministry of Health, which is in charge of solid waste, and the Ministry of Environment and Energy, which is in charge of water and seas, are working together to strengthen the management and prevention of marine waste. As part of this effort, they provide support and technical follow-up to the PROMAR project: Prevention of Marine Waste in the Caribbean Sea - promoting circular economy solutions in the Dominican Republic, Costa Rica and Colombia. The project, financed by the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection, is led by the German organization adelphi and executed in Costa Rica by the Fundation Centro de Gestión Tecnológica e Información Industrial CEGESTI. Within the framework of this project, both institutions are pleased to present the Methodological Guide for Solid Waste Sampling on Beaches.

The objective of the Methodological Guide is to systematize the steps to obtain information on the amount and types of waste that accumulate on beaches, as well as information on the generators and/or producers of the items that end up becoming marine litter and that come from land-based sources. This type of sampling provides valuable baseline information from which to develop strategies and actions focused on the types of waste that are most critical for each beach or coastal community. It also helps to identify the actors that should be considered in the design and implementation of these actions, as part of the concept of Extended Producer Responsibility.

The methodological guide is aimed at municipalities, environmental groups, community development organizations, private companies and the general public involved in beach cleanups and protection. The methodology was applied for the first time in September 2021 in the beaches of Puerto Viejo, Cieneguita and Tortuguero in the Caribbean zone of our country. With the publication of the methodological guide, the Ministry of Health and the Ministry of Environment and Energy hope to motivate its use in all coastal communities and thereby contribute to the reduction of land-based waste flows that reach the sea.

ANDREA MEZA MURILLO
Minister of Environment

DANIEL SALAS PERAZA
Minister of Health

ABOUT THE PROJECT: PROMAR

The project aims to reduce the amount of plastics that reach the Caribbean Sea and to promote circular economy solutions in the Dominican Republic, Colombia and Costa Rica.

PROMAR is financially supported by the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection.

Ministerio de **Salud**
Costa Rica

MÍNAE
Ministerio de Ambiente y Energía

cegesti

On behalf of:

Federal Ministry
for the Environment, Nature Conservation,
Nuclear Safety and Consumer Protection

adelphi

of the Federal Republic of Germany

The PROMAR project was implemented in Costa Rica with the support of:
Abrelpe - Socya - Parley

CONTENT

INTRODUCTION

The project Prevention of Marine Litter in the Caribbean Sea (PROMAR): Promoting Circular Economy Solutions in the Dominican Republic, Costa Rica and Colombia is implemented by adelphi consultants, CEGESTI, Abrelpe, Parley, Socya and is financially supported by the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection.

1	2	3	4
Deployment and anchoring of monitoring	Development of circular economy solutions at demonstration sites	Participation in the national political dialogue	Awareness of stakeholders
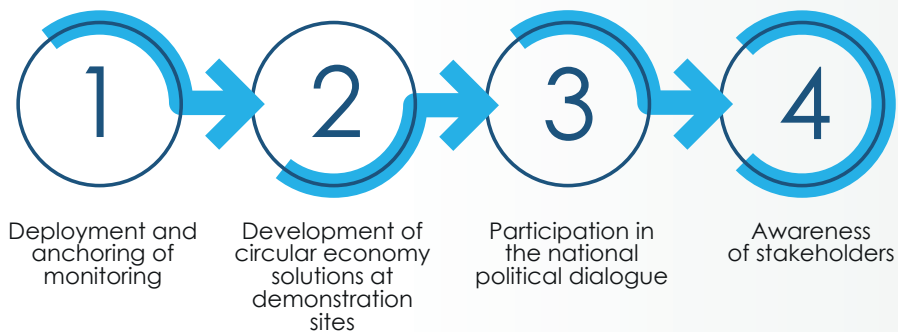
The first axis, Deployment and anchoring of monitoring systems, identified the need to standardize a methodology to determine the type of solid waste[1] found on the beaches and, based on its identification, to outline reduction strategies.

To meet this need, the Brazilian Association of Public Cleaning and Waste Management Companies (ABRELPE), one of PROMAR's implementing partners, provided a methodology that had been developed under the Waste Free Water project, funded by the Swedish Environmental Protection Agency (SEPA) and successfully applied in eleven municipalities in Brazil.

CEGESTI adapted the methodology to apply it in the Caribbean zone, and based on that experience, the present methodological guide was created in order to standardize sampling practices for solid waste on beaches.

Monitoring sites for project implementation were selected from among ten locations. These were rated numerically based on five aspects:

- **Need for improvement**
- **Local support**
- **Feasibility**
- **Representativeness**
- **Information Availability**

1.The study of liquid wastes is not considered in the scope of this guide because its monitoring is already contemplated in the regulation No. 33601: Regulation of discharge and reuse of wastewater.

Subsequently, the three sites that scored highest in this assessment were selected to implement the project (further details of the selection process are shown in Annex 1). The selected monitoring sites are:

Fig. 1: Demonstration sites selected to implement sampling in the Caribbean of Costa Rica. Photographs taken by CEGESTI (2021).

Fig. 2: Waste sampling on the beach of the PROMAR project, Cieneguita, Limón, Costa Rica in September, 2021. Source: CEGEST (2021).

▶ STEP 1:
1. SAMPLING COORDINATION AND PLANNING

1.1 Identification and coordination with local stakeholders..

It is important to have a network of local stakeholders identified at each of the sites prior to the planning of any sampling. This network must include the municipality, organizations that are related to waste management, organizations involved in beach cleaning and maintenance, and any other community group that has interest and influence in the development of the area.

When scheduling a sampling or establishing a timetable, participation must be coordinated with each of these local stakeholders and dates must be defined based on several aspects detailed in the following section.

Annex 2 of this methodological guide shows the network of local stakeholders identified in each of the demonstration sites.

1.2 Establish dates and scheduling of samples..
In order to plan the sampling, aspects such as the following should be considered:

- **Schedule sampling during low tide hours**
- **Choose days when good weather conditions are expected**
- **Coordinate that no cleaning is performed at least two days before sampling**

Ideally, sampling should be scheduled during low tide to provide a larger area of exposed beach for sampling. However, depending on the situation, other aspects will have to be prioritized to increase the probability of sampling.

For example: If the low tide will be in the afternoon hours, when there is a higher probability of rain, it will be better to prioritize the weather aspect, and do it in the morning hours during high tide.

When sampling throughout the year, there will be events that need to be scheduled during the months with the most rainfall in the Caribbean. In these cases, it is recommended to try to schedule them during the early hours of the morning to avoid rain, and in case the day dawns with rain, to have enough time to wait for the rain to stop.

Regarding beach cleanups, these are usually carried out by organized groups such as development associations and neighborhood groups. Therefore, it is important to coordinate the date of the sampling with the local stakeholder network so that it is set at least 2 days after the

Fig. 3: Work team that participated in the residue sampling in Tortuguero in September, 2021. Sampling was coordinated by CEGESTI with support from ABRELPE, and the network of local stakeholders included SINAC officials and Tortuguero community members. Source: CEGESTI (2021).

1.3 Resources..

A team of at least eight people is recommended for each sampling. It is important that the people who participate are aware that the main objective of the sampling is to obtain information, NOT to clean the beach, so they should be familiar with this methodology.

In the event that more than one area is sampled in the same event, the participation of more people will be required, maintaining a ratio of eight people per area.

Each person should have equipment that protects them from the sun and any cuts when handling the waste. The protective equipment to be used consists of:

| Hats | Gloves | Sunglasses | Hydration | Sunscreen | Closed shoes |

Fig. 4: Hazardous residues may be encountered during sampling, so it is important to use protective equipment such as gloves. Sampling in Cieneguita, Limón. September, 2021. Source: CEGESTI (2021).

The following will be required to carry out the collection of waste on the beach resources and materials[2] :

Tape measure	Vehicle for carrying the waste	Bags or sacks to collect waste	Sheet and pencil to take notes	Camera or phone to take pictures	GPS to take coordinates
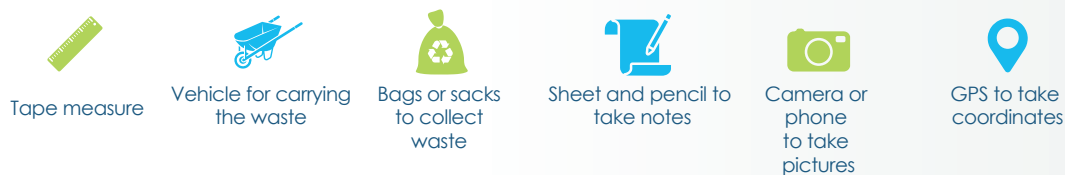
It is also important to have a site close to the beach where the waste can be moved to in order to perform the counting described in section 2.2 of this guide.

It is recommended that the site facilities have tables and chairs. In addition, it must be closed to prevent the wind from lifting and scattering lighter debris.

The availability and use of these facilities is another aspect that must be coordinated with the network of local stakeholders prior to scheduling sampling. The site selected for the count should have the following resources and materials:

2. Use preferably bags that can be reused

| Tables and chairs | Weigh or scale | Bags or sacks to collect waste | Sheets of paper and pencil | Telephone to take pictures |

1.4 Selection of the sampling areas

It is important to visit the beach to be sampled in advance to get to know the site, and to define the areas of the beach that are most optimal and representative for sampling. It is important that when selecting sampling areas, they are located at sites:

• **With an accumulation of waste that appears to be representative at first glance**
• **Easily accessible**
• **Which do not pose danger or risk to the work team**

If the entire beach to be monitored is homogeneous in terms of litter accumulation, it is sufficient to select only a portion of the beach. On the contrary, if it is observed that on the same beach there are different zones with different levels of accumulation, it is recommended to select more than one sampling area per beach, as long as there are enough people per area.

Note should be taken of the aspects surrounding these areas that could affect the accumulation of waste, such as: presence of businesses, ease of access, availability of containers for recoverable and non-recoverable waste, etc.

Once the sampling areas have been selected, they should be geo-referenced so that they can be easily located on the day of sampling and in future monitoring events. For this, it is recommended:

• **Take site coordinates**
• **Locate areas next to permanent structures such as: poles, kiosks or palm trees**
• **Label the area by placing markings on palm trees or nearby structures.**

Fig. 5: Coordinates can be taken or environmental elements, such as the image label, can be used to mark the sampling areas. Sampling in Tortuguero, Pococí. September, 2021. Source: CEGESTI (2021).

2. *Preferably bags that can be reused.*

▶ STEP 2:
2.FIELD SAMPLING IMPLEMENTATION

This section describes how to select and determine beach sampling areas according to the original methodology described by PROMAR's technical advisory partner (Abrelpe, 2021).

However, it is also recommended to review the different dimension proposals and collection techniques proposed in the National Marine Debris Plan (2021-2030) in case the sampling is to be carried out in marine environments other than a beach (mangroves, reefs, etc.) or on sites where the impact on marine biota is to be studied, such as turtle nesting beaches. These proposals are shown in Annex 4 of this Methodological Guide.

Sampling according to this methodology is divided into two stages:

- **Collection**
- **Counting**

2.1 Collection
Before getting started

A person responsible for taking photographs and noting all decisions, observations and comments that arise during the sampling should be designated.

It is important that responsibilities are not duplicated; that is, that the people in charge of recording the sampling are not involved in the collection and vice versa, as this could result in information being lost or duplicated.

This person must keep a photographic record with the following characteristics:

- **Photograph of the areas before sampling**
- **Photograph of the areas after sampling**
- **Photographs of the beach from different angles, some showing only the sand, and in others the sand with the sea**
- **Photographs of the team working on the collection**
- **Photographs showing the type of items encountered**
- **Photographs of items that cannot be collected**

Demarcation of the area
According to the methodology proposed in this guide, the sampling area should be no less than 10 m wide, and its length should extend from the beginning of the beach (where the sand borders the sidewalk, street or grass) to the point of greatest extension of the sea at low tide.

Once the sampling areas have been delimited, it is important to demarcate them so that the participants know where to concentrate the sampling collection.

Areas can be marked by sticks in the ground, drawing on the sand, or extending a rope.

Fig. 6: Measurement of the sampling area and delimitation before starting collection. Sampling in Cieneguita, Limón. September, 2021. Source: CEGESTI (2021).

Waste collection

Once the area has been demarcated, any items or fragments that are visible within the area should be collected and stored.

This activity should focus on trying to collect as much waste as possible, not on separating or categorizing it. This will be done in the next stage.

Do not pick up objects from the habitat such as: shells, branches, logs, leaves, algae and other similar objects.
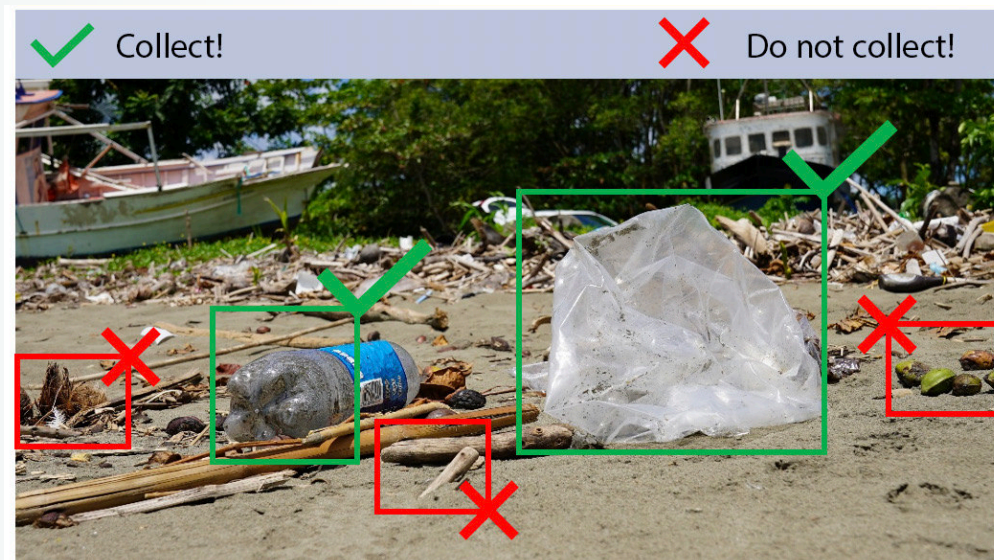

Fig. 7: Only solid waste should be collected, and everything organic should be left behind. Sampling in Cieneguita, Limón. September, 2021. Source: CEGESTI (2021).

It is also not recommended to collect very large items such as mattresses and appliances. In these cases they are left in place but are still counted, taking note of their dimensions, the place where they were observed and a photographic record.

After sampling, the presence and location of these larger wastes can be reported to the municipality to coordinate their proper collection and disposal in an authorized landfill.

If the areas have an excessive accumulation of debris, a time limit of 1 hour may be determined. After this time, collection activities will stop, leaving the missing items on site. In these cases, a note should be taken of the situation and a photographic record should be made of how the site was left at the end of the sampling.

Upon completion, all collected waste should be taken to the site designated for the collection of the waste, to be able to perform the next stage (counting).

Fig. 8: Waste collected in an area of 200m². Sampling prepared by CEGESTI with support from ABRELPE, EcoTours staff and SENARA officials. Sampling in Cieneguita, Limón. September, 2021.
Source: CEGESTI (2021).

2.2 Counting
Before getting started

This activity requires much more attention and concentration than the previous one. Therefore, if the collecting stage proves to be too strenuous, it is recommended to carry it out on another day, or to give a rest period before starting.

During this activity, waste should be separated and categorized by type of item; and subsequently, count how many units were collected for each.

The trademarks to which they correspond should also be determined, if possible.
SImilar to the collection process, it is recommended that a person be designated to be exclusively responsible for keeping the photographic record and the data generated during the activity. Before starting to separate, the weight of all the waste collected should be noted.

Fig. 9: Designate a person who is dedicated exclusively to taking note of the information to be provided generated during sampling. Sampling in Puerto Viejo, Talamanca. August, 2021. Source: CEGESTI (2021).

Separation

For tidiness and to facilitate cleaning, it is recommended to spread a plastic sheet on the tables and empty all the collected waste on it. Each participant should then be assigned the responsibility of identifying and separating specific items. The list of items shown in Annex 3 , which was developed based on the categories for solid waste of anthropogenic origin proposed by the National Marine Debris Plan (2021-2030), can be used as a guide.

It is recommended to start with the identification of the most common items that can be seen at first sight as the most abundant, for example: plastic bottles, bottle caps, cigarettes, etc. Once these have been separated, other less common items can be designated as they arise.

Fig. 10: During the separation process, waste should be separated according to the type of item. Sampling in Puerto Viejo, Talamanca. August, 2021. Source: CEGESTI (2021).
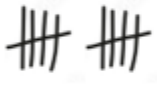

Fig. 11: Start the separation stage with those items that are most common or easy to identify. The image shows single-use plastic cutlery. Sampling in Puerto Viejo, Talamanca. August, 2021. Source: CEGESTI (2021).

Counting

Once the waste has been separated, each person should count the number of units identified for each type of item. If possible, you should also count the number of times the same trademark was observed on each item.

All participants should report quantities to the person designated as responsible for taking sampling notes, who should keep a record of total quantities by item and brand name. An example of how such a record can be kept is as follows:

Waste Type	Brands
Bottles 卌 卌	A: /// B: 卌
Cans 卌	A: //// B: ///

Fig. 12: Example of how to keep a simple record of information during the counting stage of sampling. Source: CEGESTI (2021).

It is important that the person responsible for recording the information keeps a clear and legible record, as this is the only record that will be used to process the information.

Annex 3 shows a list of the most common items that may be encountered during sampling. However, it is recommended that the collection of information is done on a blank sheet of paper, noting items as they arise. Using pre-made cores or formats could delay the process, since the items included in the format will not always be the same as those that arise during the sampling.

▶ STEP3:
REGISTRATION AND ANALYSIS OF THE INFORMATION

3.1 Tool for data recording and analysis...

CEGESTI prepared a tool in Excel format to enter and analyze the data collected during the sampling. The tool contains a list of 119 items categorized into 13 types according to the proposed National Marine Debris Plan:

• **Plastics associated with fishing**	• **Wood**
• **Plastics associated with consumer products**	• **Metal**
• **Plastics associated with everyday use**	• **Glass**
• **Plastic partitions**	• **Ceramics**
• **Rubber**	• **Sanitary implements**
• **Fabric**	• **Others**
• **Paper and Cardboard**	

This list was based on the most common items found during the Waste Free Water Project in Brazil, and was modified to adapt it to the types of items observed during the initial sampling. The complete list of items is the same as shown in Annex 3 of this Guide.

How to use the tool for data analysis?
The document has 3 spreadsheets:

1. **General:** In this sheet you enter the general information of the sampling such as:

    • Name of site where sampling was performed
    • Sampling number
    • Number, name and dimensions of sampled areas
    • Dates and times at which each stage of sampling was performed
    • Climatic conditions
    • Number of participants
    • General comments to be recorded

2. **Data:** The information generated during identification is entered on this sheet. The number of the items and brands identified should be entered.

3. **Results:** This sheet generates tables and graphs that can be used to analyze sampling information.

Enter Information

To record the information of a sample, the Excel file must be opened and saved with another name that allows identifying the sample which it refers to. By doing so, the original file will remain unedited so that it can be used in another record.

Start by filling out the information requested on the sheet **"1. General"** (see figure 13). For the user's convenience, the tool indicates with gray shading and blue font the cells in which the information should be included.

Fig. 13: Image of what Sheet 1: "General" of the tool looks like. for recording and analysis of waste sampling on beaches. Source: CEGESTI (2021).

Subsequently, the count data should be entered on the sheet "2 **2. Data"**. In the table shown in Figure 14, labeled **"Item Identification"**, the quantities counted for each of the items listed are entered.

If it is necessary to include items that are not included in the list, they can be entered in the spaces marked **"ADD"**.

As you enter the quantities, the sheet will calculate the total amount of waste and the percentages represented by each of the material types.

Sampling Data

item identification

Material	No.	Article	Amount	
Plastics associated with fishing	1	plastic buoys	215	
	2	fishing lines	199	
	3	Nets and/or trammel nets	95	
	4	Hooks or lures	54	
	5	nylon strings	52	
	6	thick ropes	36	656
	7	Boat waste (fiberglass)	5	
	8	ADD		
	9	ADD		
	10	ADD		
	11	ADD		
	12	ADD		

Fig. 14: Image of what Sheet 2: "Data" of the tool for recording and analyzing beach debris sampling looks like. In the table labeled "Item identification" the quantities obtained during the count are entered. Source: CEGESTI (2021).

In the table in Figure 15, identified with the title **"Registration of marks"**, the name of the marks identified in the sampling is entered in the first column.

In the column with the heading **"No."** The identification number corresponding to the item must be entered in the table **"Identification of items".** When the identification number is entered, the item name will appear in the next column. It is necessary to verify that the name shown corresponds to the correct item. In the column **"Quantity",** the number of units that were identified for that item with that specific brand is entered.

Trademark registration by article		
Brand	**No.**	**Article**
A	4	Hooks or lures
B	5	nylon strings
C	35	Security seals (tetra-pack containers)
D	6	thick ropes
E	13	drink bottles

Fig. 15: Image of what Sheet 2: "Data" of the tool for recording and analyzing beach debris sampling looks like. In the table labeled "Trademark Registration" the count of trademarks is entered. Source: CEGESTI (2021).

In case more than one item of the same brand is collected in the sampling, for example: cans and bottles of the same brand of beverages, it should be entered in the table twice, once for each item, as shown in Figure 16.

Trademark registration by article			
Brand	**No.**	**Article**	**Amount**
A	4	PET Bottles	12
A	19	Food container "at home" (plastic)	2
C	35	Security seals (tetra-pack containers)	5
D	6	thick ropes	3

Fig. 16: Example of how to enter a trademark that appears on more than one type of item. Source: CEGESTI (2021).

All trademarks entered will be automatically listed in another table on the far right side of the sheet called **"Total items by trademark"**. In this table a space is designated in which you can enter the possible **"Source"** from which you believe each mark originates (see figure 17). This can be especially useful in sampling where trademarks from other countries are identified.

Total items by brand		
Brand	**Total quantity**	**Source**
A	14	CR
C	5	CR
D	3	Panamá
E	44	CR
0	0	

Fig. 17: The table labeled "Total Items by Brand" summarizes the total number of items that correspond to the same brand. Source: CEGESTI (2021).

Information Analysis

On the sheet **"3. Results"** shows tables and graphs generated by the tool. The tool processes the following information:

- **Table and graphs showing the quantity and percentage of waste by type of material (figure 18)**
- **Top 10 items most frequently found in the sample (figure 19)**
- **Table and graph of main items identified with trademarks (figure 20)**
- **Table and graph of main identified trademarks (figure 21)**
- **Table and graph of the sources of waste (figure 22)**

Summary by type of material

Material	Quantity	
Plastic (Fishing)	273	21,03%
P Consumption	338	26,04%
P. Everyday use	599	46,15%
P. Particulate	0	0,00%
Rubber	22	1,69%
Fabric	12	0,92%
Paper and paperboa	0	0,00%
Wood	0	0,00%
Metal	0	0,00%
Glass	0	0,00%
Ceramics	0	0,00%
health and medical	0	0,00%
Others	54	4,16%
Total	**1298**	**100%**

Quantity of waste collected by material type

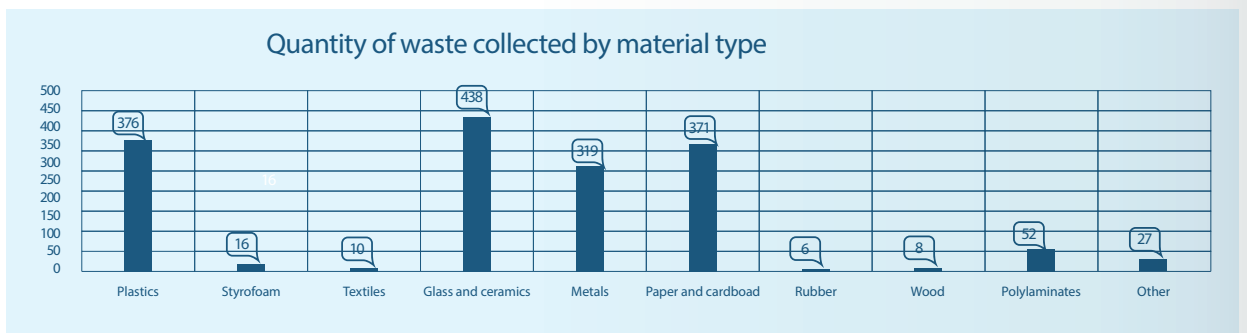| Plastics	Styrofoam	Textiles	Glass and ceramics	Metals	Paper and cardboad	Rubber	Wood	Polylaminates	Other
376	16	10	438	319	371	6	8	52	27

Fig. 18: Image of what Sheet 3: "Results" of the tool looks like. Image of the table and graph showing the amount and percentage of waste collected by type of material.

Top 10 items collected

No.	Item	Quantity	
1	Plastic bags	545	43,85%
2	drink bottles	120	9,65%
3	fishing lines	99	7,96%
4	Disposable plates (stereophone)	64	5,15%
5	Food container "delivered" (smooth stereo)	55	4,42%
6	Hooks or lures	54	4,34%
7	Paste and cream tubes (plastic)	54	4,34%
8	Electronic devices	54	4,34%
9	straws	45	3,62%
10	nylon strings	25	2,01%
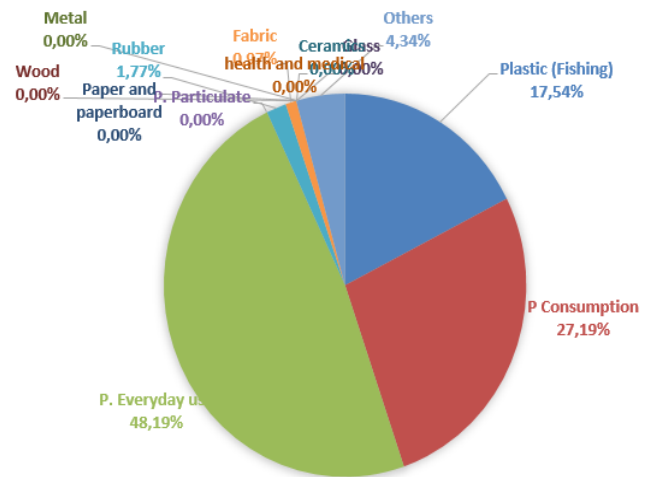
Fig. 19: Image of what Sheet 3: "Results" of the tool looks like. The table on the left summarizes the top 10 items found in a sample, and the graph on the right shows the percentage of waste collected by material type.

Top 10 brands identified by item

No.	Brand	Item	Quantity	Percentage
1	Coca Cola	drink bottles	64	77,11%
2	Danone	Plastic containers (includes t	11	13,25%
3	Pepsi	drink bottles	8	9,64%
4	0	#NV	0	0,00%
5	0	#NV	0	0,00%
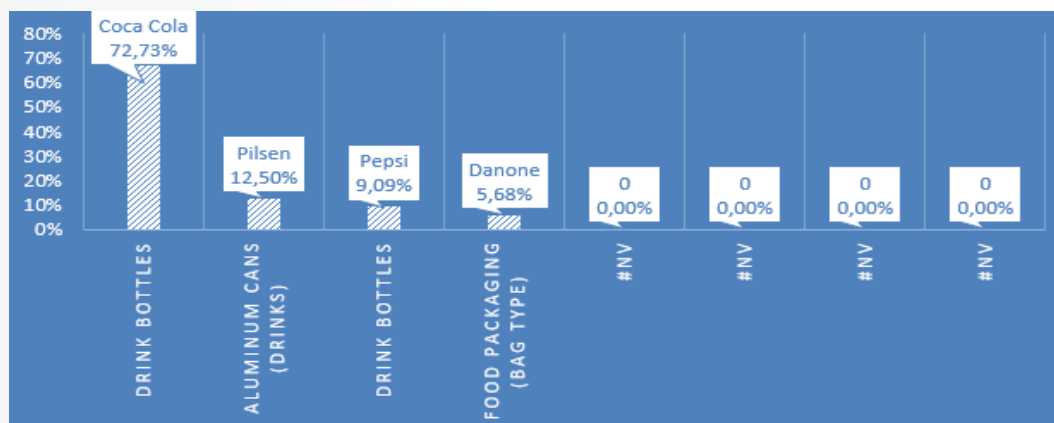
Fig. 20: Image of what Sheet 3: "Results" of the tool looks like. The table on the left summarizes the most common types of trademarked items. Source: exemplary.

PERCENTAGE OF BRANDS (TOP 10)

Coca Cola 77,11%
Danone 13,25%
Pepsi 9,64%
0,00%
0,00%
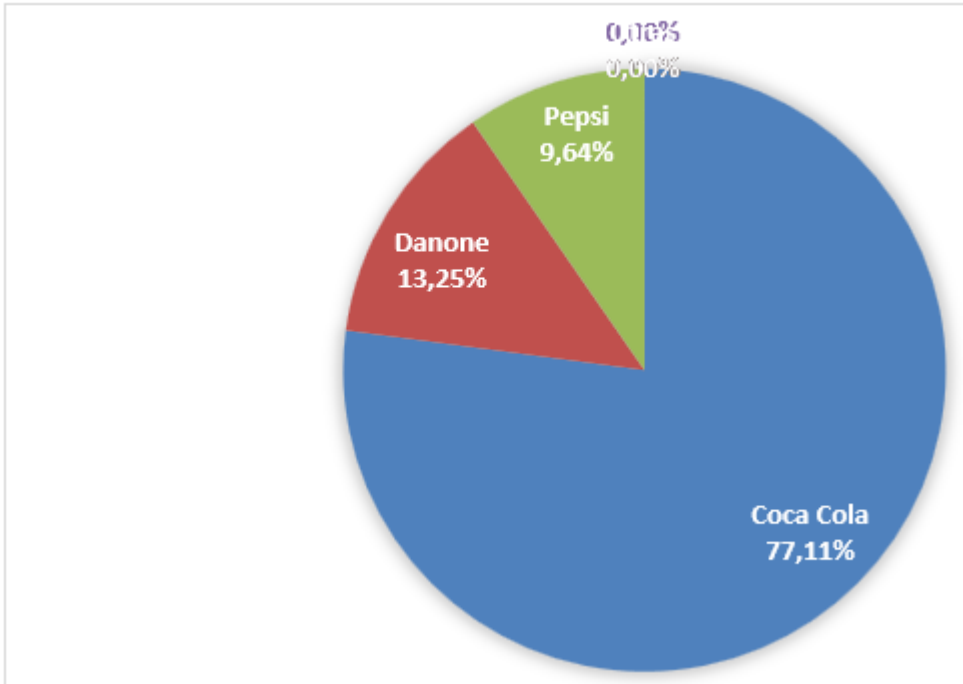
PERCENTAGE OF TOTAL WASTE ACCOUNTED FOR BY TRADEMARKS

6,24% Coca Cola
1,07% Danone
0,78% Pepsi
0,00%
0,00% 0,00%
0,00%
0,00% Otras
91,90% Sin marca
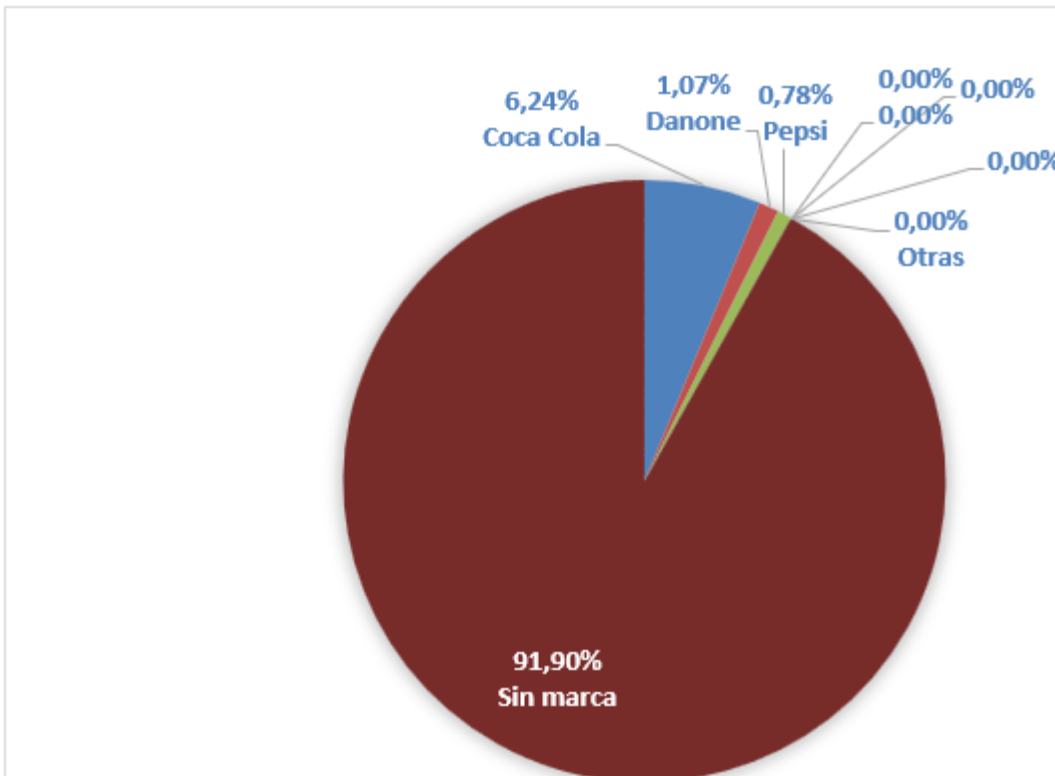
Fig. 21: Image of what Sheet 3: "Results" of the tool looks like. The graph at the top summarizes the most commonly encountered trademarks in a sample; and the graph at the bottom shows the percentage that trademarks represent in the total waste collected.

Probable origin of the marks

Costa Rica 2   Countries 3

International 1

No.	Country	Quantity	Percentage
1	Costa Rica	75	85,23%
2	Panama	8	9,09%
3	USA	5	5,68%
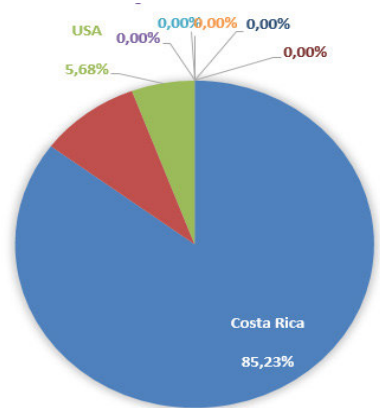
Fig. 22: Image of what Sheet 3: "Results" of the tool looks like. Image of the table and graph summarizing the sources of waste whose origin can be identified from the trademarks. Source: exemplary

The graphs can be modified for later use in reports and reports. You can modify the titles, colors, position of the labels and the amount of data to be displayed. To do the latter, right-click on the graph and select the **"select data" option.**

A window will be displayed with a box on the right showing the data included in the chart. The boxes you want to remove from the chart are unchecked. When you click "OK", the chart will be modified to show only the data of the marks you selected.
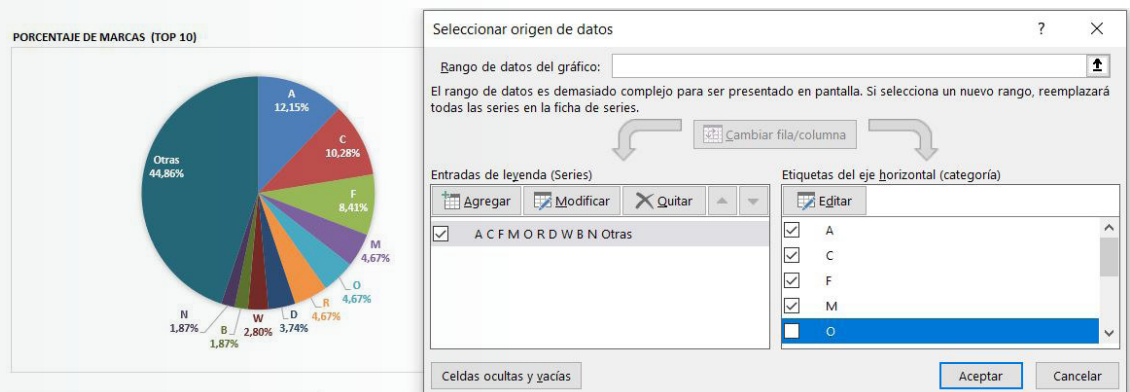
Fig. 23: Steps select the data to be displayed in the chart. Source: CEGESTI (2021).

The analysis of this information will allow us to identify the items with the greatest accumulation and the commercial brands with the greatest contribution of waste at the sampling sites.

With this, it is intended that the organizations and individuals who implement this methodology will have valuable information that will allow them to reconstruct the history of the waste that accumulates on Carribean beaches, as well as to identify the main consumption habits that are generating the problem within the nearby communities.

Fig. 24: Frequent sampling makes it possible to reconstruct the history of the waste that accumulates on the beaches and to identify the main consumption habits that generate it. Sampling in Cieneguita, Limón. September, 2021. Source: CEGESTI (2021).

STEP 4:
DISCLOSURE OF INFORMATION

The last step to follow after the implementation of sampling is to design and execute actions to cut the flow of waste that is accumulating on the beaches.

To achieve this, it is of vital importance to share and disseminate the results with the communities of the sampled site.

It is for this reason that the analysis tool developed by CEGESTI includes the automatic elaboration of graphs, with the intention of helping users to more easily disseminate the information generated by their sampling. The people of the communities are the ones who can identify all the aspects that are generating the accumulation of waste that indicate the results of a sampling, such as:

- **Consumption habits related to the identified items**
- **Behavior contributing to the release of these items into the environment**
- **Lack of infrastructure and services favoring site contamination**

It is recommended that this analysis is carried out in a participatory process involving the main stakeholders, community organizations and local authorities at the sites. In this way, strategies can be developed to solve the problems identified, which should focus on cutting the flow of those items that represent the highest percentage of accumulation.

Item-specific information allows the community to implement strategies directly with the businesses that sell them in the community, as well as with the industries and companies in charge of their manufacture, importation and distribution.

On the other hand, with the specific information on commercial brands, we intend to create a database that will allow us to identify the main companies within the national industry with which the communities can implement different strategies of extended producer responsibility that involve all parts of the commercial and industrial chain of the article as a product, and its subsequent treatment as waste.

In addition, frequent sampling would also make it possible to establish on-site monitoring to evaluate the efficiency of the measures being implemented. If the actions and strategies aimed at cutting the flow of specific items are efficient, sampling should show over time a decrease in the percentage that these items represent in the results.

Fig. 25: Sampling also allows communities to be involved in monitoring and to take care of their beaches. Sampling in Puerto Viejo, Talamanca. August, 2021. Source: CEGESTI (2021).

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ANNEX 1:
SITE SELECTION CRITERIA
PROMAR PROJECT DEMONSTRATION

The selection of the three demonstration sites was based on five evaluation criteria with differentiated weights:

• **Need for Improvement (Weight: 35%):** Describes the urgency to reduce the solid waste stream. It can be considered as a direct measure of the perceived level of contamination at the site.

• **Local support (Weight: 25%):** Support by local government and/or community organizations in charge of waste management to develop and implement strategies to reduce the flow of waste from their territories to the sea.

• **Feasibility (Weight: 15%):** Aspects that make it feasible to implement the project at the site such as access and physical conditions of the beach.

• **Representativeness (Weight: 15%):** Describes how well the site represents the population and economic activity of the country or region.

• **Availability of information (Weight: 10%):** Amount of previous information available from interviews, monitoring or beach cleanups.

In total, ten sites were assessed along the entire Caribbean coast, and all were evaluated through a field visit. At each site, a numerical rating between 0 and 10 was given for each of the evaluation criteria.

The numerical value assigned to each criterion was multiplied by its weight, and the sum of all the products gave a score for each site. The three highest scoring sites were selected for monitoring.

Table 1. Qualification of the sites considered for PROMAR project monitoring in the Caribbean Region of Costa Rica.

Site	Need for improvement	Local support	Feasibility	Representative-ness	Information Availability	Score
Cieneguita	10	9	10	10	6	9.65
Puerto Viejo	7	9	10	10	5	8.45
Tortuguero	8	8	6	10	5	7.95
Moín	8	6	10	8	0	7.00
Cahuita	7	8	6	8	3	7.00
Cocles	8	7	10	5	0	6.80
Sixaola-Gandoca	8	5	4	4	4	5.85
Manzanillo	5	5	0	10	8	5.70
Punta Uva	2	6	9	5	0	4.30
Playa Chiquita	1	6	8	5	0	3.80

Source: CEGESTI (2021).

ANNEX 2:
LOCAL STAKEHOLDERS NETWORK IDENTIFIED FOR THE PROMAR PROJECT

Table 2. List of local stakeholders involved in the PROMAR Costa Rica project.

Sampling	Site	Relationship to the project
Municipality of Pococí	Tortuguero	Waste manager and the territory to which the site belongs
Barra de Tortuguero Waste Treatment Plant	Tortuguero	Local waste manager
SINAC - Tortuguero Conservation Area	Tortuguero	Tortuguero National Park Manager
Sea Turtle Conservancy	Tortuguero	Organizes beach cleanups and carries out environmental education activities in the community
ASVO	Tortuguero	Volunteering for sea turtle protection
Covirenas	Tortuguero	Surveillance and protection of natural resources
Caño Palma Biological Station	Tortuguero	Sea turtle research and protection
Municipality of Limón	Cieneguita	Waste manager and the territory to which the site belongs
Committee for the Ecological Blue Flag of Cieneguita Beach	Cieneguita	Organizes beach cleanups
SENARA	Cieneguita	Flood control
Regional Directorate of the MEP (Limón)	Cieneguita - Puerto Viejo	Environmental education in the region's schools
Municipality of Talamanca	Puerto Viejo	Waste manager and the territory to which the site belongs
Chamber of Tourism and Commerce of the Southern Caribbean	Puerto Viejo	Groups the commercial sector of Puerto Viejo
Caño Palma Biological Station	Puerto Viejo	Community environmental education
Puerto Viejo Development Association	Puerto Viejo	Community grouping
Puerto Viejo Cleaner	Puerto Viejo	Executes beach cleanups

Source: CEGESTI (2021).

ANNEX 3:
LIST OF ITEMS FOR THE WASTE CATEGORIZATION

The following list was prepared based on the proposed classification according to categories for solid waste of anthropogenic origin described in Annex 1 of the National Marine Litter Plan (2021-2030).

Table 3. List of items for waste categorization in sampling.

Material	No.	Article
Plastics associated with fishing	1	Plastic buoys
	2	Fishing lines
	3	Nets and/or trammel nets
	4	Hooks or lures
	5	Nylon ropes
	6	Thick ropes
	7	Waste from boats (fiberglass)
Plastics associated with fishing Consumer products	8	Beverage Bottles
	9	Other PET bottles
	10	Bottle rings
	11	Plastic bottle caps
	12	General plastic caps
	13	Plastic food containers (including the lid)
	14	Food container "at home" (plastic)
	15	Meal container "at home" (smooth stereophone)
	16	Food packaging (bag type)
	17	Seasoning packets
	18	Disposable spoons and cutlery (plastic)
	19	Disposable plates (plastic)
	20	Disposable plates (stereophon)
	21	Disposable cups (plastic)
	22	Disposable cups (stereophone)
	23	Plastic wrapping and packaging
	24	Popi sticks
	25	Straw
	26	Pen packs
	27	Fruit and vegetable netting (plastic or stereophon)
	28	Cigarette butts

	29	Tetrapack - Tetrabrick packages
	30	Security seals (tetrapack containers)
	31	Metallized snack packaging
Plastics associated to everyday use	32	Personal hygiene containers (shampoo, etc.)
	33	Cleaning product containers
	34	Chemical and agricultural containers
	35	Fuel and oil containers
	36	Pharmaceutical, medicine and ointment packaging (plastic)
	37	Paste and cream tubes (plastic)
	38	Plastic bags
	39	Foams
	40	Ethylene vinyl acetate (EVA - foam)
	41	Sponges
	42	Toothbrushes
	43	Garment press
	44	Croc footwear
	45	PVC pipe
	46	Toys
	47	Gangoche bags
	48	Lighters
	49	Pencils
Particulate plastic	50	Unidentified plastic fragments (loose)
	51	Unidentified plastic fragments (hard)
	52	Stereophon packaging fragments (granulated or laminated)
	53	Fragments of food container (smooth stereophon)
Rubber	54	Undefined rubber fragments
	55	Shoes (including soles and insoles)
	56	Sandals
	57	Boots
	58	Balloons
	59	Balls
	60	Gloves
	61	Tires

Fabric	62	Textile fragments (undefined)
	63	Clothing
	64	Thread
Paper and Cardboard	65	Disposable plates (cardboard)
	66	Disposable cups (cardboard)
	67	Food container "at home" (plastic)
	68	Fragments of paper and documents
	69	Paper wrapping
	70	Paper bags
	71	Fragments of cardboard
	72	Cardboard boxes
	73	Cigarette packs
	74	Fragments of cardboard
	75	Advertising
	76	Newspaper
	77	Bracelets
	78	Napkins
	79	Receipts and invoices
Wood	80	Undefined wood fragments
	81	Cutlery
	82	Toothpicks
	83	Ice cream popsicles
	84	Broomsticks
	85	Furniture (wood)
Metal	86	Metal fragments (undefined)
	87	Aluminum cans (beverages)
	88	Tinplate
	89	Aluminum foil
	90	Can tabs
	91	Metallic covers (plates)
	92	Paste and cream tubes (metal)
	93	Chemical and paint containers (metal)
	94	Insecticide and pesticide containers (metal)
	95	Coins
	96	Spoons and cutlery (metal)
	97	Furniture (metal)

Glass	98	Glass fragments (undefined)
	99	Shattered glass bottles
	100	Whole glass bottles
	101	Pharmaceutical bottles, medicine and ointments (glass)
	102	Chemical and agricultural flasks (glass)
	103	Light bulbs and luminaires
Ceramics	104	Ceramics (Fragments)
	105	Kitchen utensils
	106	Floor slabs or facade
Sanitary implements and physicians	107	Swabs (applicators)
	108	Condom
	109	Blister of tablets

Source: CEGESTI based on the proposed classification according to categories for solid waste of anthropogenic origin of the National Marine Waste Plan 2021-2030 (Ministry of Health and Ministry of Environment and Energy, 2021) and items found on the beaches of Cieneguita, Puerto Viejo and Tortuguero (2021).

ANNEX 4:
COLLECTION TECHNIQUES AND AREAS OF SAMPLING FOR DIFFERENT NATIONAL ECOLOGICAL MONITORING PROGRAMS (PRONAMEC)

The following table describes techniques and sampling areas for the different national ecological monitoring programs (PRONAMEC), which are recommended in the National Marine Debris Plan for 2021-2030.

PRONAMEC	Collection technique of waste	Metric unit for sampling	Total area
Sandy beaches	Walking, parallel to the coast	100 m long x 3 m wide	300 m²
Rocky beaches	Walking, parallel to the coast	20 m long x 2m wide	40m²
Sea turtle animation beaches	Walking, parallel to the coast	100 m long x 3 m wide	300m²
Aggregations of marine mammals	From the boat with butterfly nets, to the sides of the boat	Meter traveled on the vessel x 25 m wide, on each side of this	Depends on the meters traveled by 5m wide
Formations coral	By means of diving, it is collected with a net	30 m long x 1m wide	30 m²
Mangroves	Walking inside the plot	10 m x 10 m type of plot of land	100 m²
Rocky reefs	By means of diving, it is collected with a net	50 m linear x 1m wide	50 m²
Pelagic fish and large predators	Through videos	Minutes of video by functional group	Not applicable

Source: National Marine Debris Plan 2021-2030 (Ministry of Health and Ministry of Environment and Energy, 2021).

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