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## Plastics Study and Protocol

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Island Sustainability Pro...



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**We use this protocol and it's working**

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## Abstract

Plastic waste washed upon shores have anthropogenically impacted communities and wildlife. However, the information related to the scale and urgency of this concern is not well quantitatively defined. The procedure uses case studied areas of Mo'orea's coast to collect and assess the amount and type of plastic waste - this is then extrapolated Island wide to gather more insight into this issue.

## Guidelines

**Expected Results:** The results we are expecting from this field study/collection is that there is an abundance of plastic pollutants, ranging from small, medium, and large. Of those three categories, small would be the most abundant, then medium, then large, however each of them have their various effects and conflicts with both some similar and different marine ecosystems. We expect to find that from poor waste management and underfunded recycling initiatives here in French Polynesia, the amount of plastic waste in the Ocean will surpass and shock the observer. We also expect this estimated amount of plastic waste to be an underestimate, since methods of surveying and the area surveyed may have been disproportionately cleaner than other regions of the island. We surveyed a nice residential area in Temae beach, whereas if we surveyed some of the bays or commercial areas, those numbers of plastic pollutants are likely to be higher.

### Broader Impacts

Impacts on:

- Other islands in French Polynesia
- French Polynesian waste/recycling management
- Other Nations/Islands in the Pacific
- Communities in both
- Research focuses, shift to understanding plastic pollution and its negative attribute on marine/coastal conservation
- Government policies
- Foreign Relations and the call of urgency on this critical plastic pollution situation
- Economical effects



## Materials

Garbage Bag

Scale

Pen

Paper

Internet

Transect

Calculator

## Troubleshooting

## Safety warnings

- ⚠ CAUTION: watch out for oncoming water along coastlines, currents may be rough and the coast is likely to have very rugged terrain. Wear shoes that are comfortable and will protect your feet from the sharp rocks and coral. Gain proper permissions in case the shoreline your surveying is private property or culturally inappropriate.

## Ethics statement

please pick up all trash, but only use plastic for study

## Before start

Objective: Precisely survey and measure the types and amounts of plastic found on a designated transect along the coast of Moorea, in an effort to estimate the total amount of plastic polluted on the island's coast, as well as learn more about the characteristics and composition of the plastics.

## Plastic Collection and Coastal Pollution Evaluation

- 1 Objective: Precisely survey and measure the types and amounts of plastic found on a designated transect along the coast of Moorea, in an effort to estimate the total amount of plastic polluted on the island's coast, as well as learn more about the characteristics and composition of the plastics.
- 2 CAUTION: watch out for oncoming water along coastlines, currents may be rough and the coast is likely to have very rugged terrain. Wear shoes that are comfortable and will protect your feet from the sharp rocks and coral. Gain proper permissions in case the shoreline your surveying is private property or culturally inappropriate.
- 3 Allocate a defined fraction of coastline in Mo'orea that is representative of the average.
- 4 Measure/Calculate the surface area covered by the studied area using google Earth
- 5 Assemble a team of researchers to collect and document plastic waste.
- 6 For the designated transect, 10meters from the coastal waterline, inland, have a row of 5 researchers or trash collectors pick up plastic, only the plastic that is in front of them, nothing to the left or right, or outside the transect
- 7 Implement a second degree of certainty by either having a trailing row of researchers/collectors or sweep through the area again.
- 8 After all plastics are collected, sort into three groups based upon size, "Small", "Medium", and "Large" pieces - define the cutoffs and boundaries towards what these sizings will be.
- 9 Weigh the three size groups and analyze the distribution of waste sizings - determine the distribution, example: x% small, y% medium, z% large
- 10 Calculate what % of Mo'orea that the researched coastline encompasses, example 0.05% by perimeter.
- 10.1
  1. Example case study
  2. Case studied coastline fraction was  $385\text{m} \times 5\text{m} = 1925\text{m}^2$ .
  3. Mo'orea has been calculated to have 60,000m of coastline, with the assumed 5m of beach width, Mo'orea's coastline surface area is  $60,000\text{m} \times 5\text{m} = 300,000\text{m}^2$



4. This means that the example case study encompassed  $1925\text{m}^2/300,000\text{m}^2 = 0.006416666667$  of Mo'orea's coastline,  $\sim .64\%$ .
  5. Take the reciprocal of  $.64\%$ ,  $1/0.0064 = 156$ . This means that we multiply our plastic waste in our case study by 156 to estimate the total plastic on Mo'orea's coastline.
  6.  $7.1\text{ kg} * 156 = 1,106\text{ kg}$  of plastic predicted to be on Mo'orea's coastline.
- 11 Repeat steps 1-9 multiple times and find an average of the trials across multiple days
  - 12 Run p value analysis to determine statistical significance of results.
  - 13 Assess the distribution of plastic types and hypothesize sources and mitigation methods.

## Protocol references

Ricardo