

A Survey of Biodegradable and Non-Biodegradable Debris on
Dominica's Coastal Zones

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Abstract:

This report is a summary of the observations on beach debris on four beaches of Dominica. The beaches surveyed were Batalie Beach (15° 27.128' N, 61° 26.468' W), Castle Bruce (15° 26.162' N, 61° 15.450' W), Rodney's Rock (15° 22.667' N, 61° 24.468' W) and Rosalie Beach (15° 22.494' N, 61° 15.080' W). Batalie Beach and Rodney's Rock are located on the Caribbean side and Castle Bruce and Rosalie Beach are located on the Atlantic Side. The overall purpose of this project was to investigate the amount of biodegradable and non-biodegradable debris located on coastal zones on each side of the island. This information could provide a glimpse of a larger scale issue of accumulating debris lining coastal zones.

Introduction:

The Commonwealth of Dominica is located at 15° N, 61° W and is in the middle of the Lesser Antillean islands. Dominica boasts 153km of coastline with a variety of coastal habitats. The beaches are generally narrow and consist of mostly black volcanic sand and cobblestones. Sea grass beds, mangroves and coral reef habitats are present along Dominica's coastline, while true coral reefs are extremely limited due to the steep topography and rugged terrain. Dominica's coastline helps contribute to the growing tourism industry from the appeal of being the nature island of the Caribbean. (Island Resources Foundation 1991)

This study is important to Dominica because it demonstrates that non-biodegradable debris is a growing concern that could potentially upset the balance of the coastal zone ecosystems. The purpose of this survey was to look at the accumulation of biodegradable and non-biodegradable debris located along the different coastal zones. Two beaches were surveyed on the Atlantic (East) coast and two beaches on the Caribbean (West) coast, with one each of rocky and black volcanic sand characteristics. In our group we have members with interests in marine biology and herpetology and we found out through our class seminar that the coastlines of Dominica provided interest for everyone involved in our

group. We decided on this project because we all have interest in the various wildlife that inhabit the coastline and were interested in investigating the accumulation of debris in these habitats. It was hypothesized that the Caribbean coastal zones would contain more non-biodegradable debris because of its increased commercial usage, larger population density, and heavy cruise ship traffic.

Materials and Methods:

The materials we used for our survey were a 50M tape measure and 4 biodegradable post/sticks collected from each site. Our classification of biodegradable debris includes, but is not limited to, fallen tree branches, fallen coconuts, dried seaweed and algae. Our classification of non-biodegradable debris includes, but is not limited to, plastic bottles and containers, food wrappers, tires, metal, wires, old fishing traps and clothing. Non-biodegradable debris was easily distinguished and was counted individually. However, biodegradable debris was found in copious amounts and was therefore not feasible or practical to count individually. Therefore, biodegradable debris was counted in bulk. For example, a 1x1 square meter area of branches was counted as 1 item.

In total, four beaches were visited to ensure a balanced outcome. Two beaches were surveyed on each coast; one rocky and one sandy beach on each coast. Two plots were measured on either side of a naturally occurring landmark. The landmarks selected included an estuary, a drainage ditch, a prominent boulder and a beach entrance path. Though we strived to survey a standard of 1250 square meters for each plot, some plots were modified due to various obstructions. Once the designated areas were selected, we used posts to mark the four corners of the plots. Each member of the group lined up at one end of the plot an equal distance apart. A tally of debris located in each members vicinity was recorded approximately every 5m.

Results:

Table 1 describes the amount of each type of debris for each plot within each beach. Table 2 describes the calculation of the total amount of debris per square meter. The figures that follow the tables depict the four beaches surveyed.

Table 1: Debris within plots 1 and 2

	Plot 1			Plot 2		
	Bio total	Non-bio total	Area (m ²)	Bio total	Non-bio total	Area (m ²)
Batalie Beach	74	278	1250	58	46	900
Castle Bruce	109	62	1250	127	143	1250
Rodney's Rock	61	169	400	39	155	300
Rosalie Beach	268	415	1250	215	187	1250

Table 2: Calculation of Total Amount of Debris per square meter

	Non-bio/m ²	Bio/m ²	(Total bio + Total non-bio)/ m ²
Batalie Beach	0.1507	0.0614	0.2121
Castle Bruce	0.082	0.0944	0.1764
Rodney's Rock	0.4629	0.1429	0.6057
Rosalie Beach	0.2408	0.1932	0.434

Figure 1: Batalie Beach

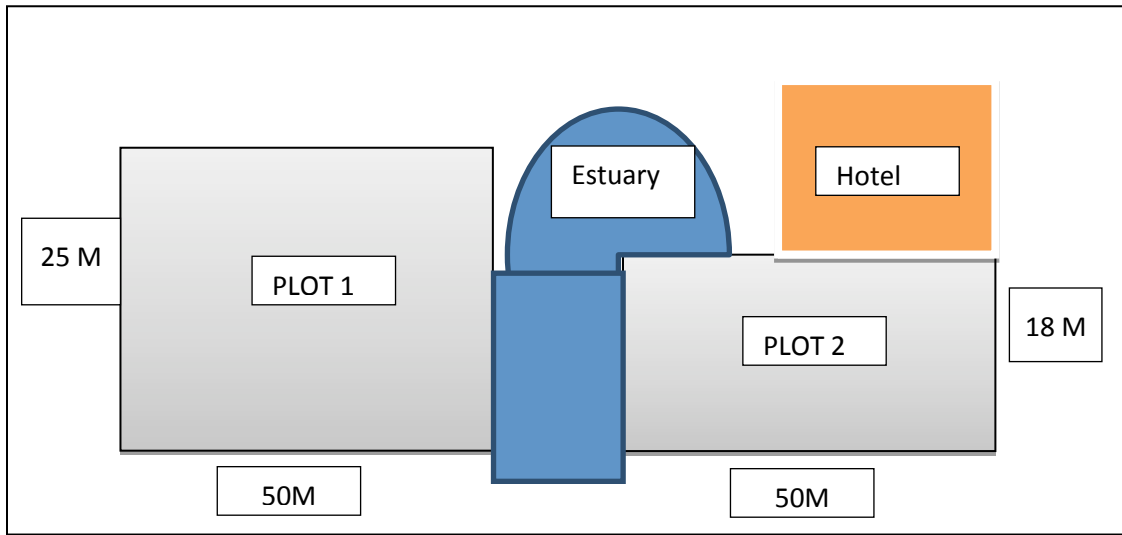


Figure 2: Castle Bruce

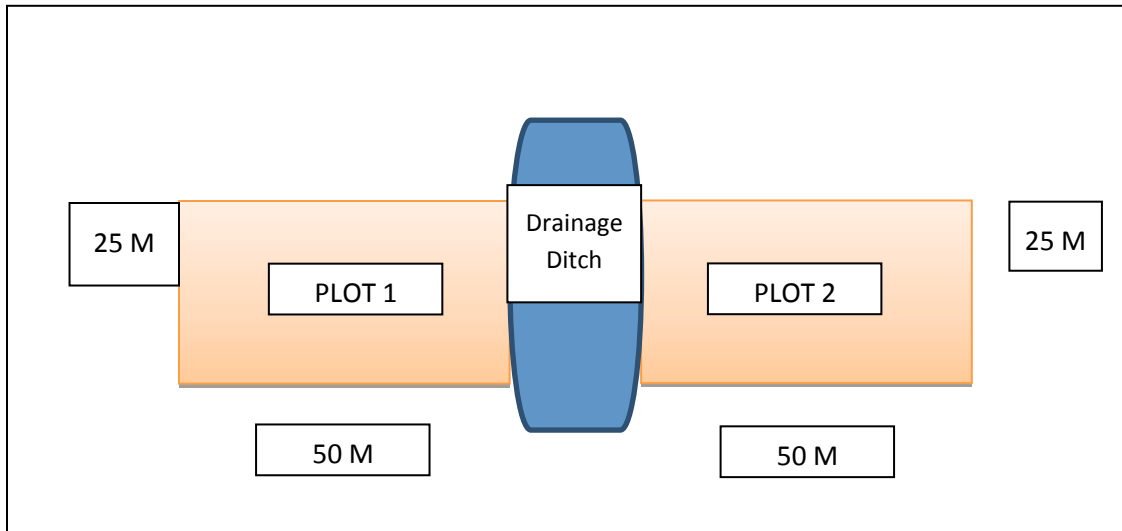


Figure 3: Rodney's Rock

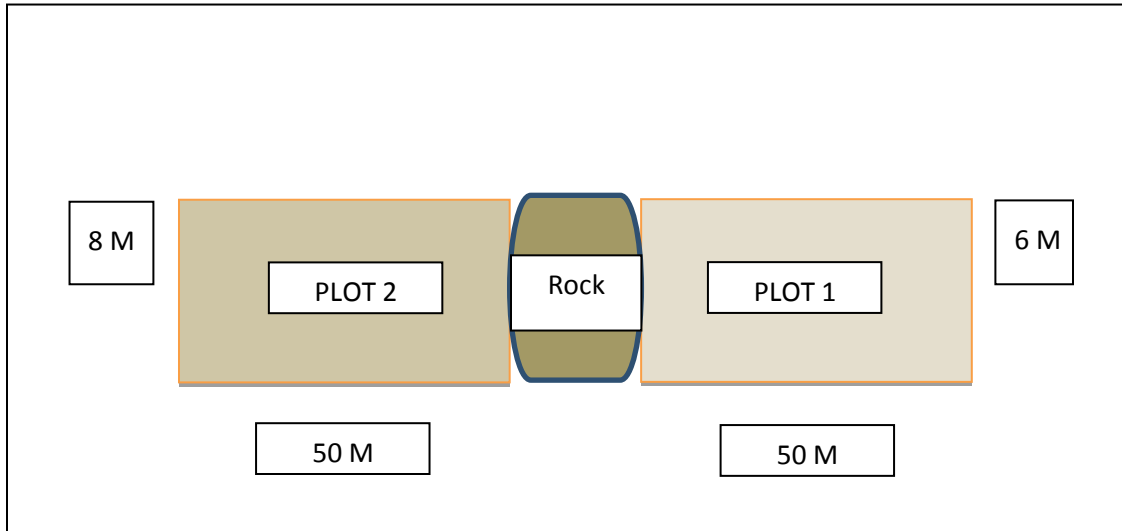
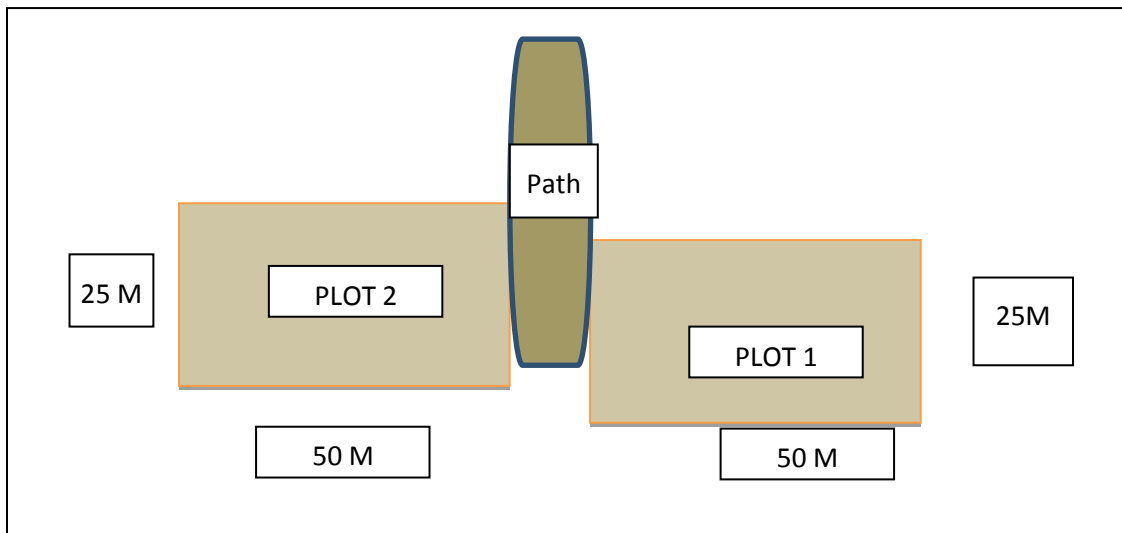


Figure 4: Rosalie Beach



Discussion:

The first beach surveyed was Batalie Beach. It is located on the west coast and primarily a fishing village at one end and a hotel on the opposite end. The hotel property line only allowed us to survey an area of 900 square meters for plot 2 as opposed to 1250 square meters we surveyed for plot 1. The beach characteristics include black volcanic sand mixed with rocks. The natural landmark used at this beach was an estuary. While this beach did not have the most debris it had the largest sized non-biodegradable debris such as abandoned boats and old fishing equipment. The total amount of non-biodegradable debris found per square meter was 0.1507. The total amount of biodegradable debris found per square meter was 0.0614.

The second beach surveyed was Castle Bruce, which is a sandy beach located on the east coast. The point that separated the two plots was a naturally occurring drainage ditch. Plot 1 and 2 did not have any obstruction to prevent us from surveying a full 1250 square meters. Though this beach was aesthetically appealing, swimming was not recommended due to unpredictable currents, therefore tourist occurrence was not common. This fact could account for the minimal amount of non-biodegradable debris found was only 0.082 per square meter and really only consisted of pieces of clothing. The total amount of biodegradable debris found per square meter was 0.0944.

Thirdly, we surveyed Rodney's Rock. This is a cobble stone beach on the west side of the island primarily used for diving and other recreational activities. The vegetation line hindered our ability to survey a full 1250 meters for each plot. We modified each plot individually to 300 square meters for plot 1 and 400 square meters for plot 2. This beach contained 0.4629 total amount of non-biodegradable debris per square meter and it was mostly scrap car parts and clothing. The total amount of biodegradable debris per square meter was 0.1429.

Finally, our last beach we surveyed was Rosalie beach. This beach was also a rocky beach but located on the east coast just north of an exclusive resort. Plot 1 and 2 did not have any obstructions to prevent us from surveying a full 1250 square meters. The majority of non-biodegradable debris was plastic bottles and containers. It was assumed these plastic products originated from nearby boats. Rosalie beach contained 0.2408 total amount of non-biodegradable debris per square meter and 0.1932 total amount of biodegradable debris per square meter.

After reviewing the statistics calculated for each beach we have decided to accept our hypothesis. When comparing the amount of debris on each coast, the Caribbean side totaled 0.8178 debris per square meter and the Atlantic side totaled 0.6104 debris per square meter. This is clear evidence that both biodegradable and non-biodegradable coastal debris is a rising issue concerning the wellbeing of Dominica. In order to limit and control the growth of this issue the following suggestions have been made: enforce the Litter Act of 1997, implement education programs in the communities and schools and advertise proper disposal of biodegradable and non-biodegradable debris (Raymond 2001).

We recommend that future studies take place to further investigate other aspects of this issue, such as government interaction, waste management efficiency and the effect of debris on their coastal habitats as well as Dominica's gross income.

Acknowledgments

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Work Cited:

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