Site Analysis and Underwater Topography
Of Rodney's Rock

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To

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Abstract

Using depth and distance measuring devices, the underwater topography of Rodney's Rock was mapped. Seven equally distanced sample points were chosen and the depth of the water, up to 15 meters from the base of the rock, was recorded. Temperature and pH data were also collected to provide an underwater view of Rodney's Rock's coral reef community.

Introduction

Rodney's Rock, also known as Tarou Point on some maps, is an ideal site to observe the rich diversity of Dominica's reef fish community. It is a peninsular projection of volcanic rock with jagged edges that drop into water up to 14 meters deep, which makes it an ideal location to study reef walls. Besides being an important area for scientists and tourists, Rodney's Rock has a rich history that dates back to the eighteenth century. In 1782, Admiral Rodney of Her Majesty's Fleet illuminated the rock to look like a British warship. When the French fired upon it, he came up from behind them and destroyed their ship. Admiral Rodney's trickery helped secure Dominica once again under English control.

The rock juts out about 74 meters from the shore, is about 49 meters wide, and has a GPS location of 15 22 50N, 61 24 43W. It is roughly 2.9 kilometers north of Roseau. Because Rodney's Rock is located in such an isolated area, and because of construction blocking previous access from the road above, there is no easy way to get there. One must turn left after the Texaco and a little yellow bar into a dump. A car can travel about a hundred yards into the dump and then the divers must walk or swim northward, about four hundred meters, along the coast. A mild current runs from south to north along the coast stirring up the bottom sediment. This creates poor visibility on the southern side of Rodney's Rock. The current also creates greater drop offs on the southwestern side as sand is pushed around the point and settles on the northern side. As expected the North side has a gentler sloping contour. The best diving with good visibility occurs on the northern side, which is sheltered from the current. The main goal of this project was to create an underwater topographical map of Rodney's Rock up to 15 meters out from the

rock base. This can be used in later projects for detailed work on fish or invertebrates at specific depths.

Methods and Materials

To create an underwater topographical I first had to map Rodney's Rock. For this I took a pencil and paper and simply sketched the contour of the rock where it met the sea. I also marked where there were large submerged rocks within the area of study. Once the drawing was complete I selected seven relatively evenly spaced sampling points around the edge of the rock. Before getting in the water I constructed one depth measurement device and one distance measurement device. Both were made of a single rope wrapped around a stick with a weight on the end. The depth-measuring device was approximately 24.38 meters long, of which only 14 meters were actually used. The distance-measuring device was approximately 15 meters long, all of which was used. Both devices were marked with duct tape at certain intervals. For depth, the intervals were every 0.6 meters and for distance the intervals were every 1.5 meters. Once in the water, I would place the weighted end of the distance device in the first sample spot. As I swam out I would drop the depth device down to the bottom and record the depth every 1.5 meters out until I had reached 15 meters from the rock. All data were recorded on an underwater writing pad. I worked in a clockwise fashion around the rock and the same procedure was repeated for the other six sampling points. Sites 1-3 are considered southern while 5-7 are considered northern. Sample site 4, western, is at the tip of Rodney's Rock pointing out to the Caribbean Sea. The data were then transformed into an underwater topography map.

Other data collected included temperature and pH recordings. For temperature I first measured the surface waters by holding a thermometer just under the surface for five minutes. I then attached the thermometer to a line and weight and lowered it down to 14 meters. This was done only at site 4. The pH data was collected by diving down 4 meters and taking a water sample in a cup. This was then analyzed back at the lab with a pH meter.

Results

Table 1 gives the depth profile for seven 15 meters transects extending out from Rodney's Rock. Base lines for the seven transects are shown in figure 1.

Table 1. Depth Profile for Rodney's Rock

Sample Point Depth (m)	Distance from the Rock Base (m)									
	1.5	**3**	**4.5**	**6**	**7.5**	**9**	**10.5**	**12**	**13.5**	**15**
Site 1	0.6	1.5	3	3	3	3	3.4	3.4	3.7	3.7
Site 2	1.2	3.8	4.9	4.9	4.9	5.1	5.5	5.7	6.1	6.1
Site 3	7.6	8.5	8.5	8.8	8.8	8.8	8.8	9.1	9.1	9.1
Site 4	5.8	9.5	11	11.6	12.8	13.1	13.1	13.1	13.5	14
Site 5	3.4	3.7	4.9	5.5	6.1	6.4	6.7	7.3	7.3	7.6
Site 6	1.5	2.4	3.5	4.2	4.6	5.8	6.1	6.3	6.7	7.3
Site 7	2.7	3.7	3.4	3.7	3.9	4	4	4	4	4

The pH was 8.1, just within the 8.1-8.4 range for optimal coral growth. For temperature I expected to find a large difference between the surface and the bottom, especially since you can feel a difference, however, there was only a one degree Celsius break. The surface waters were 29 degrees Celsius while at 14 meters it was 28 degrees Celsius.

Discussion

Certain parts of Rodney's Rock provide good examples of a wall reef. Results of the project show that the greatest depth change occurs on the southwestern side of Rodney's Rock down to 14 meters deep. The northern side has a gentler sloping bottom down to depths of 7.6 meters. Site 4 shows the most dramatic depth change, as the water is already nearly 6 meters deep just 1.5 meters from the base of the rock. Site 1 and 7 represent the sampling points closest to the base of the rocky peninsula, and both points have flat areas where depth remains constant for at least 4.5 meters. The south to north current picks up bottom sediment, creating poor visibility and steeper slopes on the southern side, and moves it around the tip where it settles on the northern side. Because Rodney's Rock juts out from a relatively barrier free coastline, it provides a break in the current and good visibility in the northern waters. This is where the most diving occurs and here there are more submerged rocks with good coral growth. Two pinnacles also

rise up from the depths just off sampling point 3, the smaller one within 6 meters of the surface and the larger one within 4.5 meters.

The small degree of temperature change I recorded may be due to the site in which the data was collected. Site 4 was the only area in which I took temperature readings and this area has the strongest current. Significant mixing of the surface and bottom waters is most likely the reason for the small degree of temperature change. Had I tested in an area where the current's direction is not diverted then I believe there would be a much greater difference between surface and sea floor temperatures. As for the pH, 8.1 is the lowest reading that is within the range for sustained coral growth. This project information can be used in future projects for comparison with another site or to see if the reef community is declining, flourishing, or maintaining equilibrium after one year has passed. Sediments washed in from the city's sewer system or rivers will affect the pH and can have a detrimental effect on the coral reef. There is much construction being done in Dominica today and it is important to see how this will affect the fragile reef systems.

References

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