

Fish Health and pH in the Sibun River

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Introduction:

This research project is designed to determine the pH of the Sibun River near the Sibun Education & Adventure Lodge in Belmopan, Belize and the healthiness of the fish that reside in it. The locals depend on the Sibun River for many things including water and food supply. A local fish that is consumed often and lives in the Sibun River is the tilapia. The tilapia is also a big source of income for Belizeans as it is a major export (FAO). The pH of the river is important because if it is too high or too low, the Belizeans will not be able to use it for drinking water and the fish, like the tilapia, will not be able to survive. Even a small change in pH can affect the survival of the fish due to the prey that it consumes. Some macroinvertebrates are very sensitive to water quality and pH levels and will not survive if it is altered (Cleveland and Grable). Determining the pH of the Sibun will ensure that the fish will continue to survive and support the local communities. The pH of the river has a direct impact on the survival of the fish that inhabit it.

Materials and Methods:

The materials that will be used to test the pH will be test tubes and pH tablets. A total of three test tubes will be needed to complete the pH analysis. One test tube will be needed to collect the water sample from the site. The remaining two test tubes will be used to verify the pH in two trials. Two pH tablets will be needed in order to test the pH twice. Water samples will be collected at the sight in test tubes and will be taken back to the lab to test the pH level twice to ensure accuracy. A LaMotte GREEN Low Cost Water Monitoring Kit will be used for this process. The expected pH of a river is between 6.5 and 9.0 (Water Quality Indicators).

Samples of local fish will also be caught to be measured, weighed, and examined for health. These findings will be used in correlation with the water quality levels that are also found.

There are many different methods to use to collect fish from the river. The method used for this project was performed by a team of individuals and a local guide. After locating a school of fish with a seining net in hand, individuals in the group would surround the school with the net and secure the bottom to prevent fish from escaping. Then the bottom of the net was drawn in and lifted out of the water to collect the specimens. This process was performed in waist deep water that was slow moving. One ruler, one scale, one seining net, and 20 petri dishes will be used to examine and capture the fish. (Note: depending on the desired method of collecting fish, the materials in this experiment will vary. Also the number of petri dishes used will change depending on the number of specimens caught).

Results:

Using the LaMotte GREEN Low Cost Water Monitoring Kit, the river was tested for pH. The pH was tested to be 8 in both trials (Table 1). This is in the range of the expected river pH (Water Quality Indicators).

There were two different species of fish that were caught in the Sibun River near the Sibun Education & Adventure Lodge. The first species that was caught was *Cichlasoma urophthalmus*, common name Mayan Cichlid (Figure 1). Only one specimen was caught of this specific species. The length of the specimen caught measured to be 7cm while the weight came to be 7.1g (Table 2).

The second type of fish that was caught is in the genus *Gambusia*, but the exact species cannot be identified (Figure 2). It is believed to be of the species *yucatanana*. Twelve of these specimens were caught in the Sibun River near the Sibun Education & Adventure Lodge. Of the twelve specimens caught the average length measured to be 8.02cm and the average weight came to be 8.725g (Table 3). Table 3 has a complete list of each specimen's recorded length and weight.

Table 1. Water Quality

| | pH |
|----------------|----------|
| Test 1 | 8 |
| Test 2 | 8 |
| Average | 8 |

Table 2. *Cichlasoma urophthalmus*

| | Length (cm) | Weight (g) |
|----------------|-------------|------------|
| Fish 1 | 7 | 7.1 |
| Average | 7 | 7.1 |

Table 3. *Gambusia* sp.

| | Length (cm) | Weight (g) |
|----------------|-------------|--------------|
| Fish 1 | 9 | 9.2 |
| Fish 2 | 8.5 | 9.4 |
| Fish 3 | 7.5 | 7.1 |
| Fish 4 | 8.75 | 11.4 |
| Fish 5 | 8.25 | 8.8 |
| Fish 6 | 8 | 10.3 |
| Fish 7 | 8.25 | 11.1 |
| Fish 8 | 8.5 | 10.7 |
| Fish 9 | 7.5 | 6.4 |
| Fish 10 | 8 | 7.0 |
| Fish 11 | 6.75 | 6.9 |
| Fish 12 | 7.25 | 6.4 |
| Average | 8.02 | 8.725 |

Conclusion:

The pH of the river was found to be 8, which is in the expected range. This is important for the local communities that live off the river water and its inhabitants. They can be ensured that the water that they are drinking is safe and will not pose a immediate threat to their lives.

A study done by Florida's Everglades National Park concluded that the Mayan Cichlid in its first year grows to an average length in the range of 33-66mm (Robins). Mayan Cichlid's in their second year grow to an average length in the range of 44-130mm (Robins). This data shows that the Mayan Cichlid that was caught would be in its second year and would be within the average length. This means that the specimen was in healthy condition and growing at the proper rate.

The average length of a *Gambusia yucatana*, the species thought to represent the specimen caught, ranges from 5.5 to 8 cm, depending upon the sex (Torres). This means that the specimens caught are above average of the species that they are believed to represent.

All specimens captured were either in the average or above average length of their respected species. With this data and the knowledge that the pH of the river was in the normal range, it can be concluded that the fish in the Sibun River thrive in normal pH levels.

This project could easily be followed up to determine the validity of the results found. pH is easy to test and therefore could be repeated in most situations and areas. As mentioned before, catching the fish can be done in multiple ways. Another technique that could be used would be to set up seining nets in a fast moving section of the river and secure it to the bottom. Then members of the group could go a short distance upstream to kick up rocks and stir around the bottom to flush fish into the net. This method could also be used to collect macroinvertebrates which could be used to determine water quality.

Sources:

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Figure 1



Figure 2

