Precipitation and Gray Water Effects on the Check Hall River

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Abstract: This research project was conducted between 5-24-2000, and 5-29-2000. The location was the Springfield Center for Environmental Protection, Research and Education on the Island of Dominica, West Indies. The purpose was to examine water quality of the Check Hall River, and what role gray water and rainfall plays in water quality. The findings show that while the overall mineral content of the Check Hall River is not detectable, run-off from the research station is adding trace amounts of phosphates into the river. After a significant amount of rainfall, water quality was re-evaluated to find that phosphate levels did fluctuate, but following mixing with the Check Hall River phosphate content is restored to its original level. Future projects concerning water quality, and/or other pollutants in the river are recommended.

Introduction: This project examined correlations between rainfall, gray water run-off, and their effects on the water quality of the Check Hall River. The hypothesis is that the gray water run-off from Springfield would add significant amounts of pollution into the river. Also, with increased amounts of significant rainfall, chemicals in the soil would wash into the water and further increase pollution levels.

Materials:

Hach water test kit
Collection jars
Rain gauge
Patience

Methods: For this project three rain gauges were placed around SCEPTRE on May 24th. Water samples were collected from four locations. Above Springfield in the secured pristine watershed for the Check Hall, across the entrance from Springfield where the feeder stream is pristine, halfway down the trail to the river below Springfield gray water input, and where the feeder stream and the Check Hall converge. Tests were run on these water samples for chlorine, pH, dissolved oxygen, nitrates, and phosphates. May 29th the three rain gauges were averaged, water samples recollected from the four locations previously stated and re-tested.

Results: This experiment has two data sets. The first one is from pre-storm conditions (Figure 1). Results from water testing found no chlorine, or nitrates, and trace amounts of phosphates in the gray water, and stream output. Levels of pH for all four sites were at a constant 7.8. Dissolved oxygen levels for the pristine sources were 11 mg/L, and 9 mg/L for the gray water sites. Over a period of 5 days the rainfall level was 66mm, with a good portion coming from several large storms. The post-storm results were collected from the same sites, and tested for the same parameters as the pre-storm samples (Figure 2). Test results showed still no chlorine or nitrates. Levels of pH ranged from 7.7-7.9. Dissolved oxygen in the two pristine sources was 8 mg/L, 7 mg/L in the gray water, and 9 mg/L in the stream output. Phosphates after the rainfall in the pristine stream went from 0 to . 14 mg/L. The gray water had a decrease from .36-. 2 mg/L and the stream output stayed at a constant of .08 mg/L.

Discussion: The increase in rainfall caused trace amounts of phosphates to leach into the feeder stream. With this increase of contaminant into the feeder stream, logically the gray water measurement of the same contaminant should also increase. The lack of increase suggests that the amounts of phosphates found in the gray water were diluted by the increased water flow. By the time the feeder stream reaches the Check Hall and mixes, the phosphate level is back to normal. This may be because of the amount of vegetation the stream must flow through in order to reaching its output. This effect could also be related to the fact that the volume of water in the Check Hall is so great that anything brought into it by the feeder stream is easily diluted. Other projects could use this information to help in determining water potability, geographical water quality of Dominica, and natural water filtration methods. In conclusion, the hypothesis was proven wrong in some ways. An increase in rainfall led to increased levels of contamination, but levels returned to low concentrations by the time the flow reached the output. Any future projects could be done to determine the source of contamination, bacterial content, and why the water is returned to normal levels when it reaches its output.

Figure .1

Pre-Storm Collection Results

5-24-2000

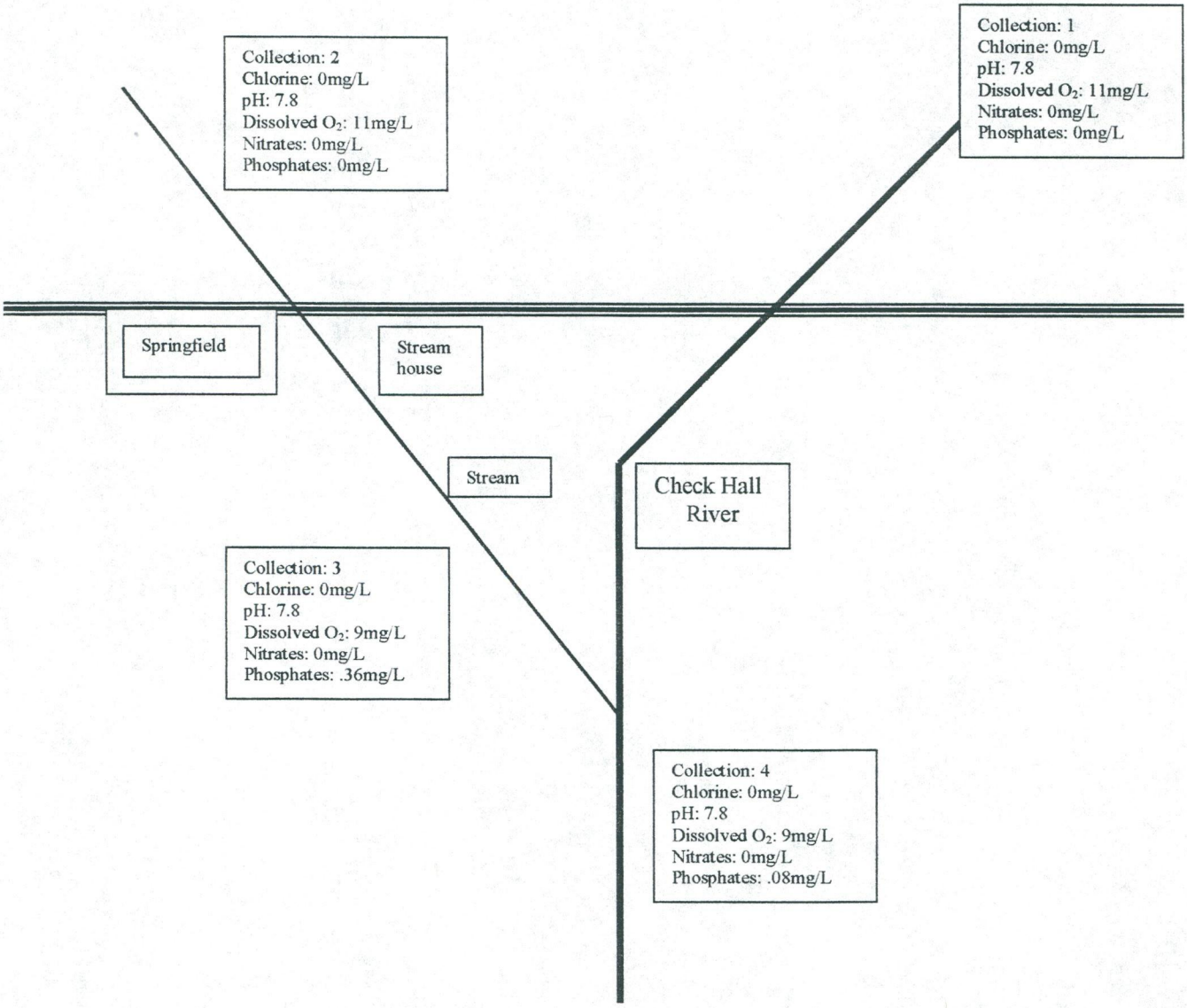

Figure .2

Post-Storm Collection Results

5-29-2000