Macroinvertebrates in Urban Streams

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ABSTRACT

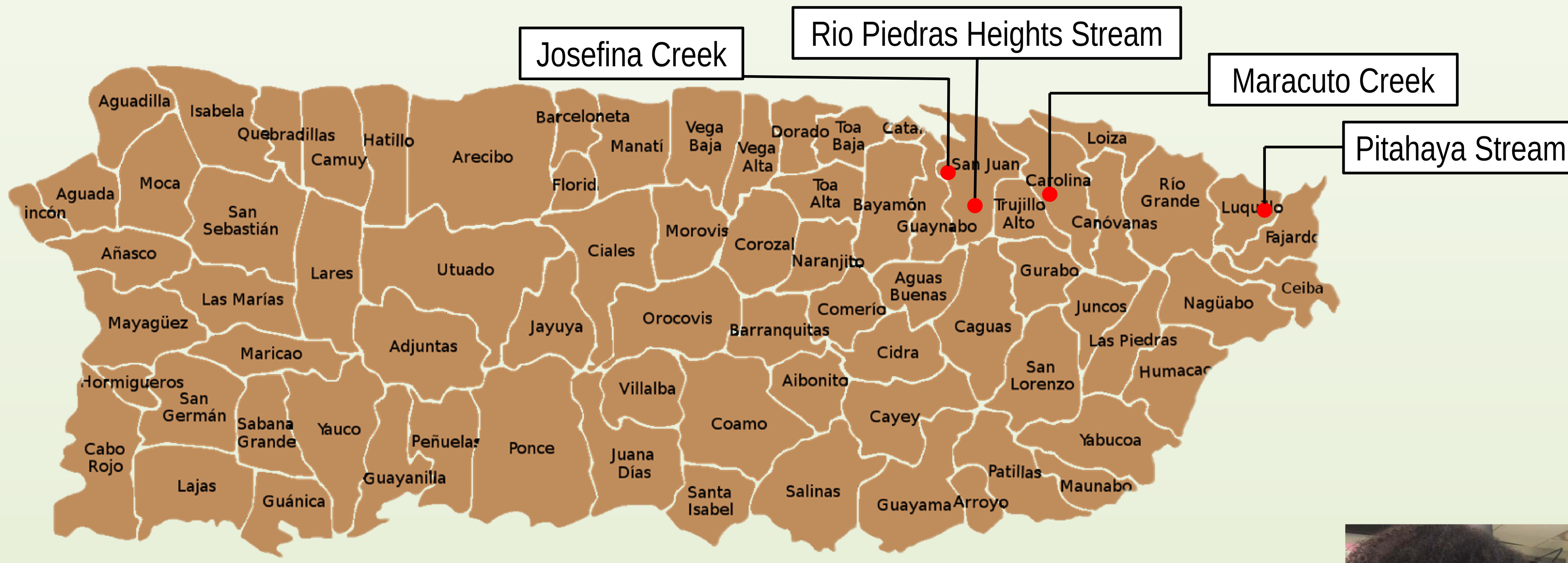
In most parts of the world, population is usually concentrated in urban areas. This has caused land usage to affect streams' ecosystems. The question is: Do we know what is in our backyards? Urban streams are a natural waterway that flows through a heavily populated area (Walsh, 2005). They usually flow right across our backyards; it is the *unknown* backyard for most people. The purpose of this project is to determine and to compare the population of macro invertebrates two out of four visited urban streams located in Carolina, San Juan, and Luquillo, Puerto Rico. Macro invertebrate population can help determine how healthy or unhealthy the river is in different locations. The sites were assessed, macro invertebrates were collected and identified, and water chemistry was tested. The results were taken in consideration and compared with the optimum levels, the levels in which the chemicals should be in order to determine whether the stream is healthy or not, which are the following: between 80 and 20ppm of Alkalinity, 5ppm or more of dissolved oxygen, 0.1ppm of phosphate, 20ppm of carbon dioxide, 0ppm of nitrate and 2ppm of ammonia nitrogen.

The data collected provides a more sensitive understanding of the *unknown* backyard to facilitate implementation of an effective stream rehabilitation program or any other remedy in response to urban development and urban streams' problem.

INTRODUCTION

Most people are not aware of the damage everyday house activities, urban developments and land uses do to these streams' ecosystems. Sometimes you can not reverse the damage done to the streams. However, taking an initiative to investigate more about urban streams' health is an option and a step closer to improving the stream's health. There are many indicators that scientists use to demonstrate the conditions of a stream, yet benthic macroinvertebrates represent a crucial part in any biological monitoring study. By definition, macroinvertebrates are organisms without backbones, which are visible to the eye without the aid of a microscope. Macroinvertebrates found in streams live on rocks and sediment on the stream's bottom. A freshwater benthic community may contain flies, beetles, mayflies, caddisflies, stoneflies, dragonflies, aquatic worms, snails, leeches and many other organisms. Their presence and abundance indicate that the system is at or near optimum health, and the absence of which indicate that the rivers health has been impacted. Through patterns of increase or decrease in quantity, macroinvertebrates can also demonstrate the stream's water quality during a period of time.

By investigating the macroinvertebrate population in their nearest stream, the community may know if their streams are in shape or if it requires the implementation of an efficient stream restoration program or any other cure in response to urban development and any other damaging problem it may be facing.



METHODOLOGY

Stream Site General Assessment

- Physical characteristics of the stream are recorded: stream characterization, thalweg measurement, stream reach, and perceive impact of local land use.

Detailed Habitat Assessment

- The biological condition of a stream system is determined through a visual assessment of in-stream and riparian habitat quality.

Water Quality Assessment

- Dissolved oxygen, pH, alkalinity, phosphate, carbon dioxide, nitrate, water temperature and visible physical observations

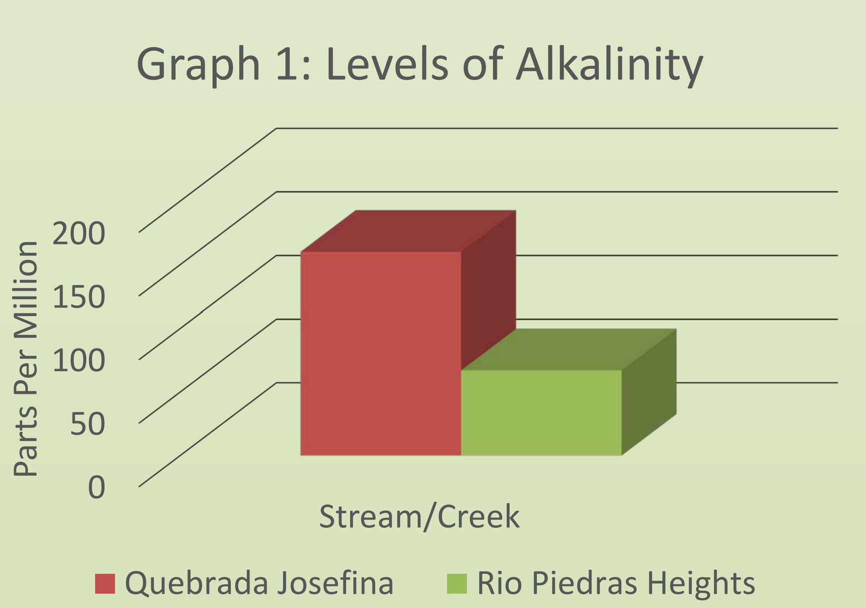
Discharge

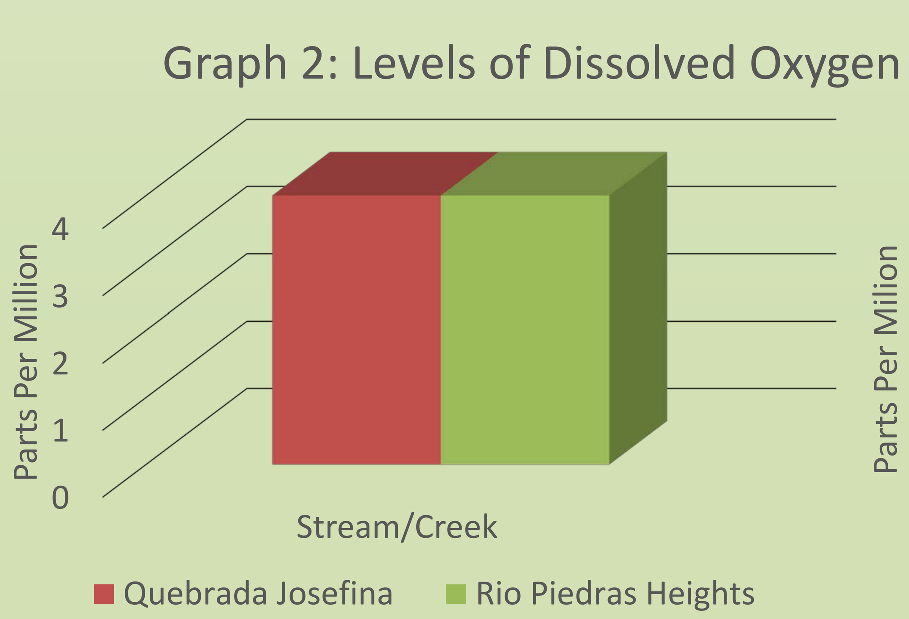
- Flow was calculated by solving for the equation: Flow=(ALC)/T
  - A=Average cross-sectional area of the stream
  - C=Coefficient for rocky streams (0.8)
  - T=Time

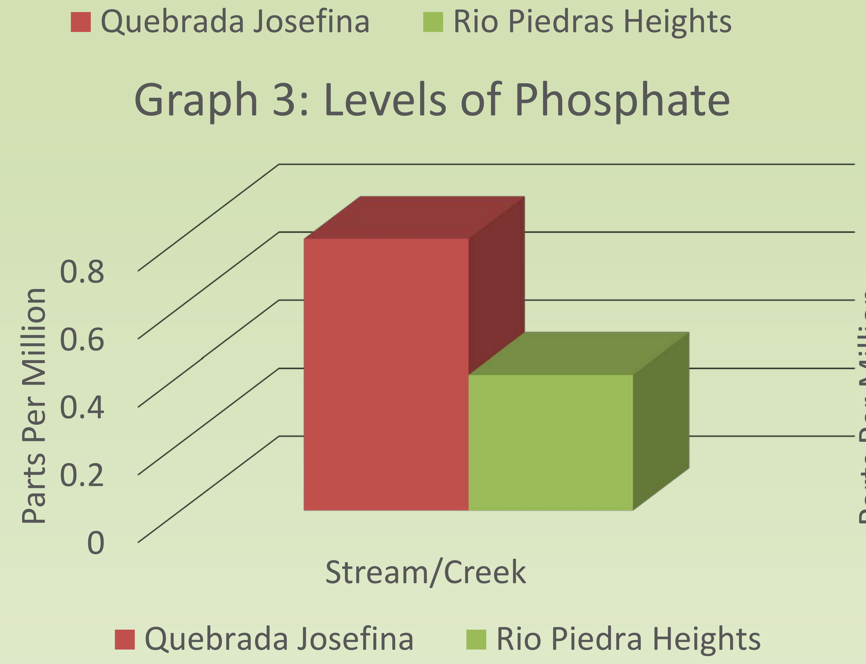
Macroinvertebrates

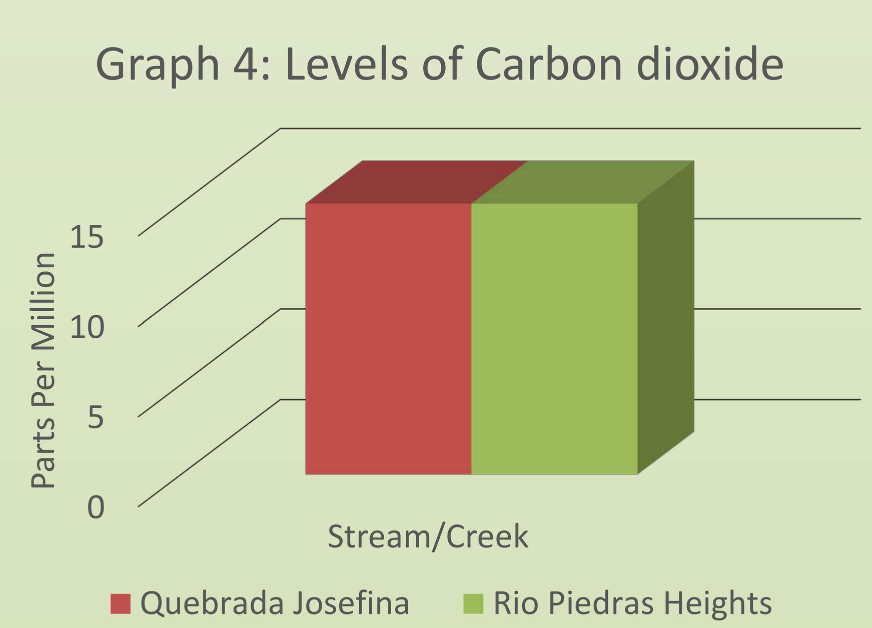
- Macroinvertebrates are collected according to protocols used by the Biomonitoring and Aquatic Studies Section of the VT Department of Environmental Conservation.

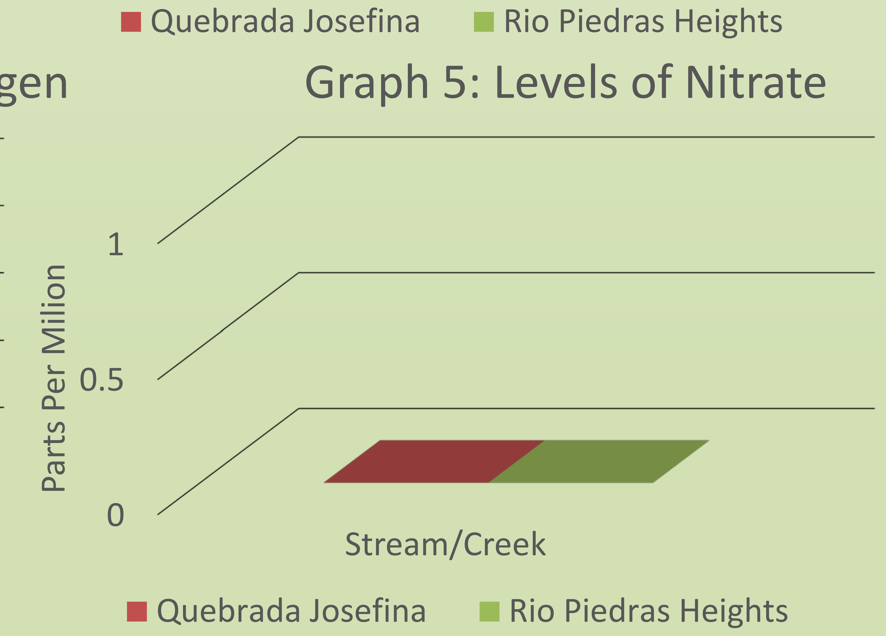
RESULTS

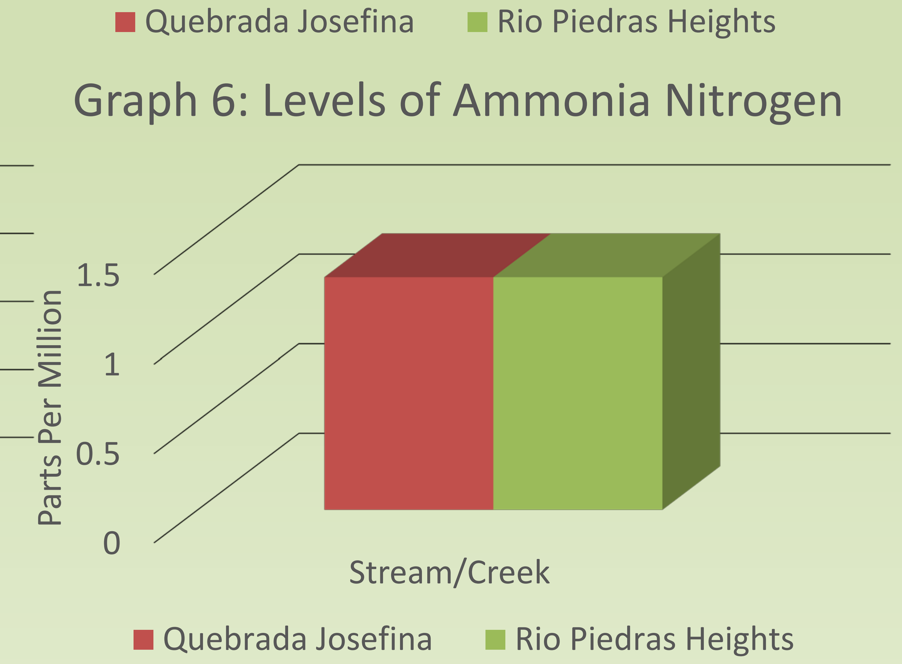


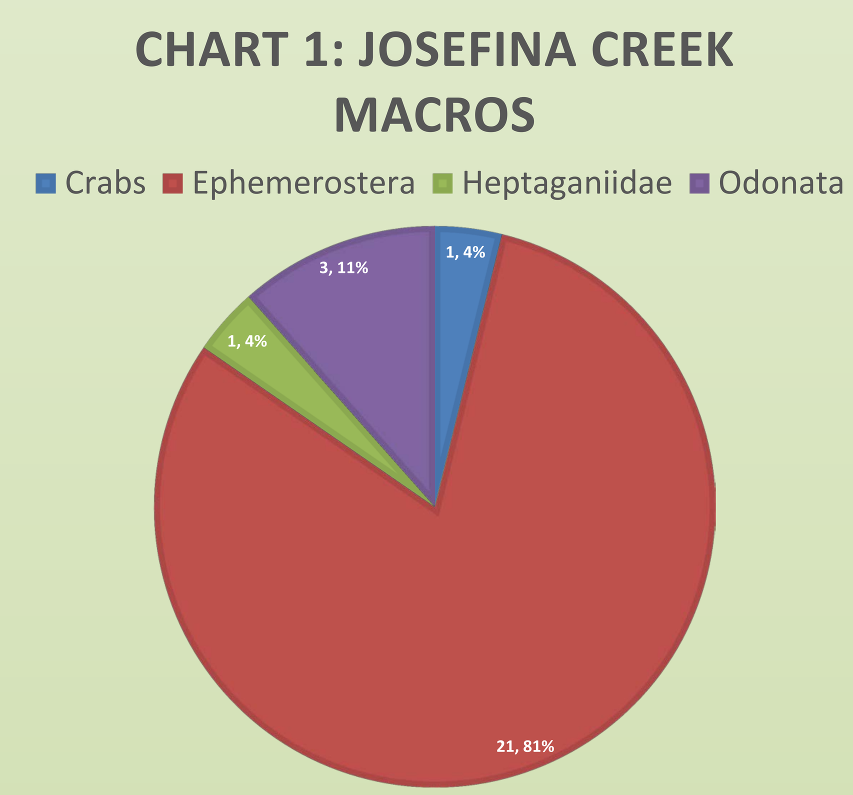


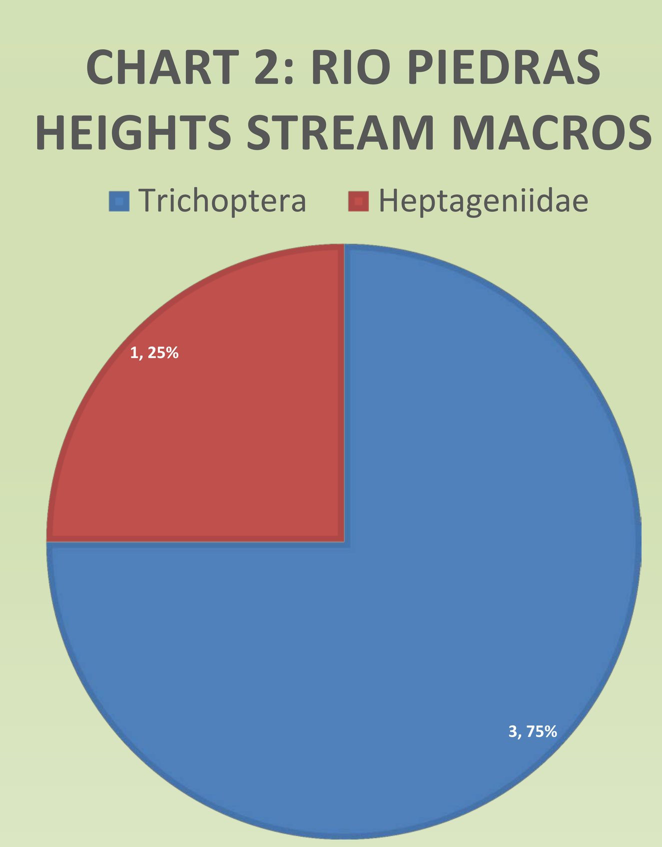












CONCLUSION

After visiting the streams, testing the water chemistry and gathering macros, all data was analyzed. Water chemistry for Josefina Creek resulted that the levels of alkalinity were 160ppm, above the optimum level; dissolved O_2 was 4ppm, bellow the optimum level; PO_4 was 0.8ppm, above optimum levels; CO_2 was 15ppm, bellow the optimum level; NO_3 resulted 0ppm which is the optimum level, and NH_3 1.3ppm, bellow the optimum levels. When identifying Macros not much of a variety was found and the macros found were very small with exception of a crab, yet it was a small one. While water chemistry results for Río Piedras Heights Stream were: 67ppm of Alkalinity, bellow optimum level; 4ppm of dissolved O_2 which is bellow optimum levels, PO_4 was 0.4ppm, above optimum levels; CO_2 was 15ppm, bellow optimum level; NO_3 resulted 0ppm which is the optimum level and NH_3 resulted in 1.3ppm which is bellow optimum levels. When gathering macros almost none were found which indicates that the stream is definitively not in good conditions, neither is Josefina Creek, even though more macros were found.

ACKNOWLEDGMENTS

We give a special thanks to our mentor, Yiria Muñiz, who gave us this amazing opportunity to submerge ourselves in the challenging field of science and accompanied us every step of the way. In addition, we are extremely grateful to St. Michaels College and the EPSCoR Program for helping us carry out this investigation. RACC: Funding provided by NSF EPS Grant #1101317

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