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The Vanishing River: Water Availability and Tourism in Uvita, Costa Rica

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Abstract

Tourism is one of Costa Rica’s main economic sectors with over 2 million international arrivals in 2014. To sustain and develop tourism in the country, water must be kept clean and accessible for tourists while continuing to support the 4.8 million people currently residing within its borders. A notable characteristic of tropical climate is the variability in precipitation which generates ‘wet’ (May – November) and ‘dry’ (December – April) seasons. In particular, the majority of tourists arriving into the country is during the dry season, which corresponds to winter in the northern hemispheric mid-latitudes (e.g., Ohio). The addition of the significant number of tourists during the dry seasons places a stress on the availability of water during the dry season. To analyze the effect of this water stress on the hydrologic system, water quality measurements, including discharge, temperature, and pH at five sites were recorded for the watershed encompassing the southwestern coastal town of Uvita. Results show that water discharge was relatively low (between 0.071 - 0.821 m³s⁻¹), and streams were observed to not reach the ocean. This confirms that the low water flow during the dry season is partially responsible for the strict water restrictions for the resident population.

Purpose and Methods

Gather preliminary data on water quality and stream discharge in the Uvita, Costa Rica watershed during the “dry” season (December – April).

- Discharge was recorded in five locations on the Rio Ballena and the Rio Uvita which converge to form the Rio Morete.
- Measurements were taken with a wading rod with each point made half a meter apart.
- In addition to discharge, temperature, pH levels, and sediment levels in ppm were taken in six locations.

Results

- Collected data shows low stream discharge, between 0.071 – 0.821 m³s⁻¹.
- Corresponds to 1125 US GPM – 13,010 US GPM of water flow through the stream.
- River was unable to reach the ocean by a significant distance.

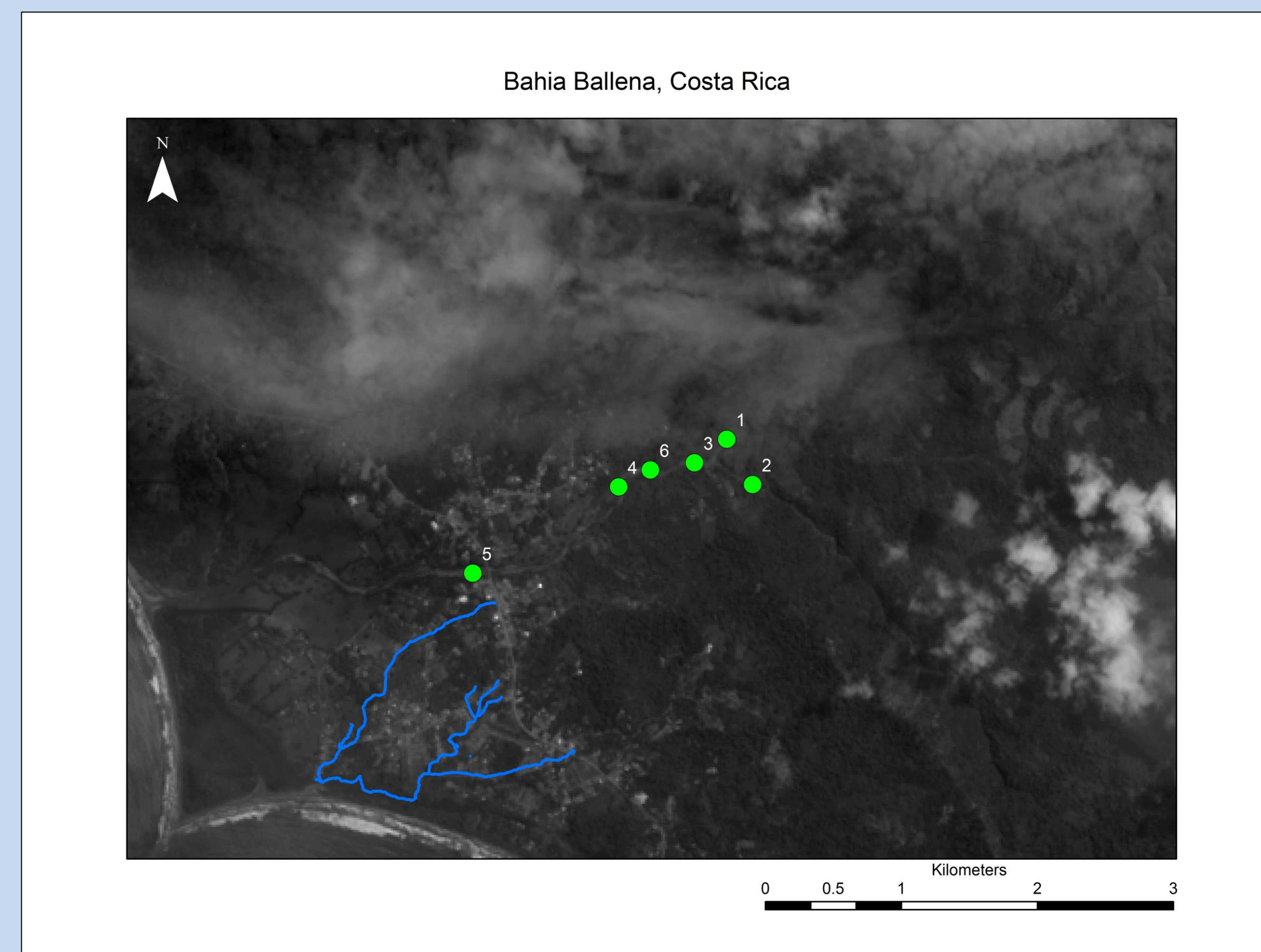


Figure 1A. Chromatic Landsat image of Bahia Ballena, Costa Rica. Numbered points dictate area where discharge measurements were taken. Blue lines are local streams that empty to sea. Image from EarthExplorer USGS. *No discharge was taken at Point 6.

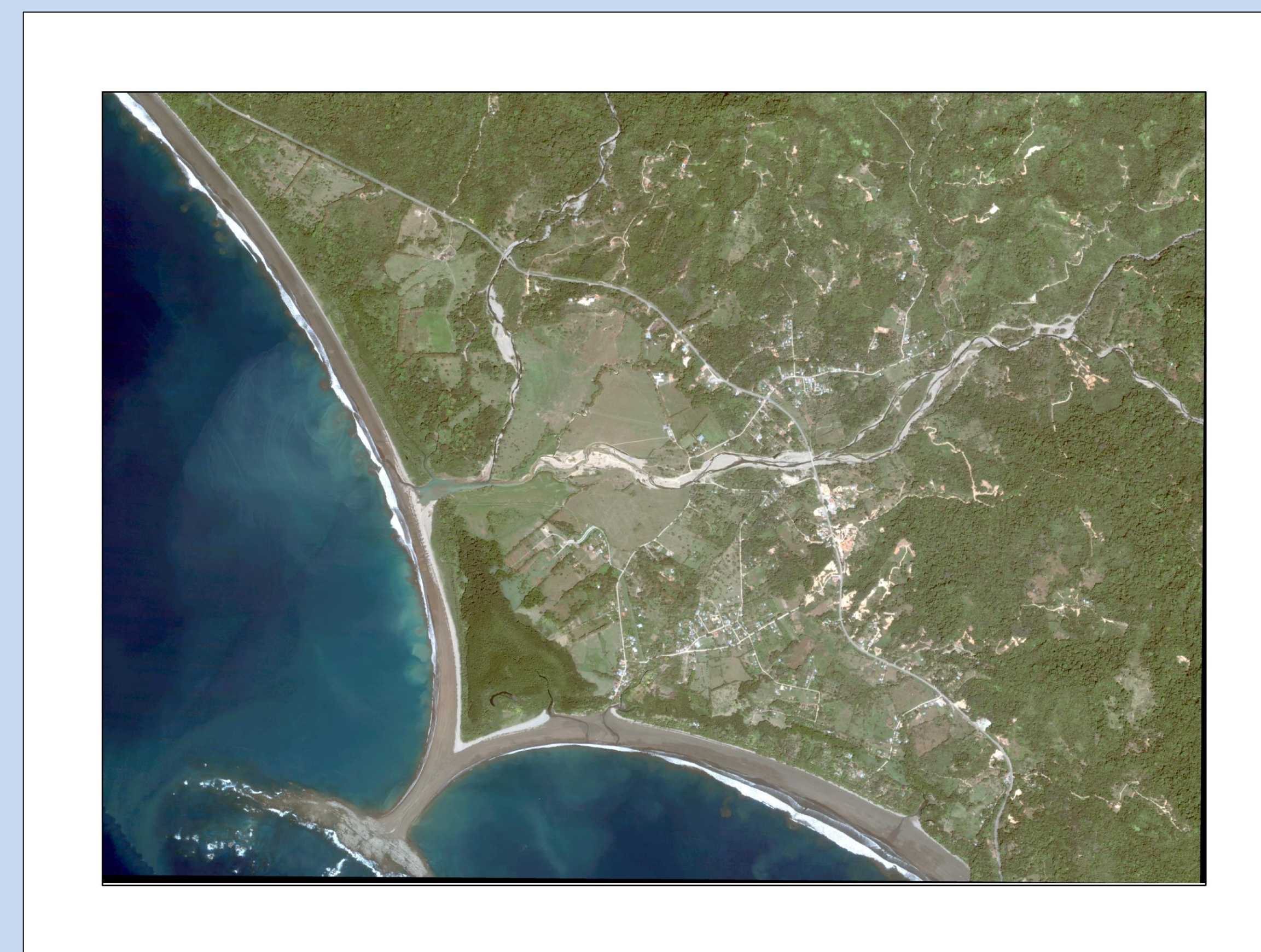


Figure 2. Full color image of Bahia Ballena, Costa Rica. Image from Quickbird, through Geoporter.



Figure 3. Picture of a particularly low point in a stream.



Figure 4. Students measuring temperature and pH of a stream. Images from Geoporter via Flickr.



Figure 5. Students measuring discharge using a wading rod. Images from Geoporter via Flickr.

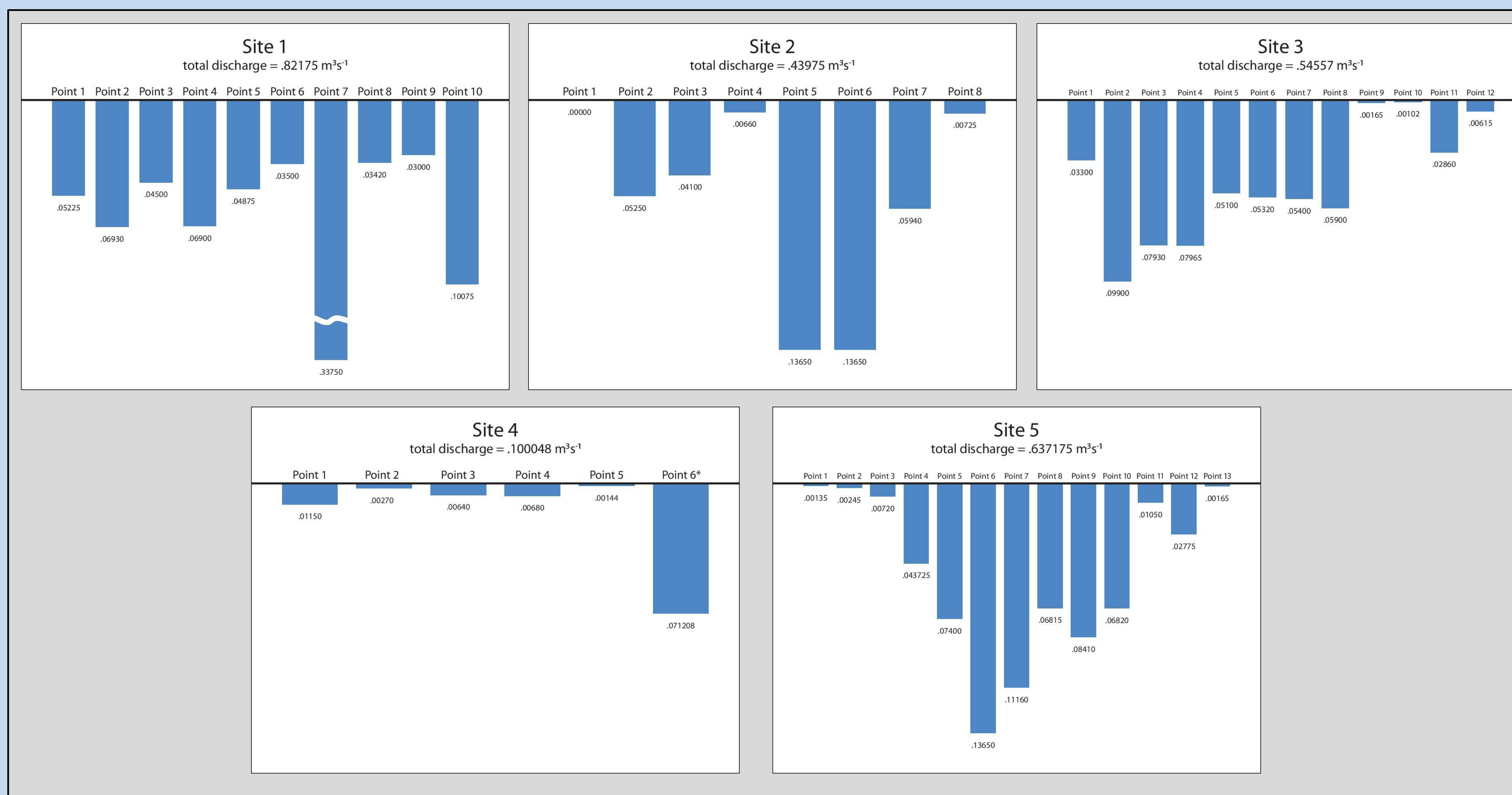


Figure 1B. Graphs displaying the discharge at each point when data was collected with the overall discharge for that site. Each site number corresponds to the number on Figure 1A.

Conclusions and Further Work

- Low stream discharge in the local watershed is insufficient for the amount of water consumed by residence and tourists.
- Due to low discharge, residents in Uvita are placed under water restrictions. Tourists are not put under these same restrictions.
- To expand upon this preliminary data, further water discharge will need to be recorded during future “wet” and “dry” seasons.

References

Earth Explorer USGS(2005) *Bahia Ballena, Costa Rica* [Landsat Image]. Retrieved from <http://earthexplorer.usgs.gov/>.

Quickbird (2014) *Bahia Ballena, Costa Rica*. Retrieved from Geoporter.