Contaminant and Erosion Control Baseline Database for the Puerto Mosquito Watershed In Vieques, Puerto Rico

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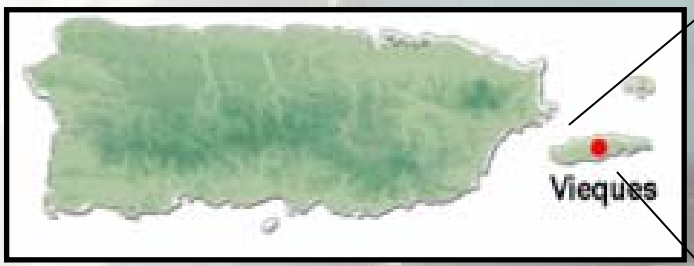
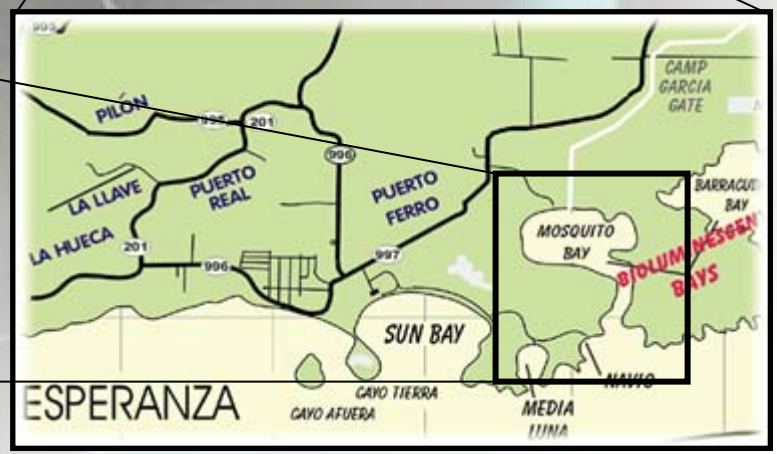
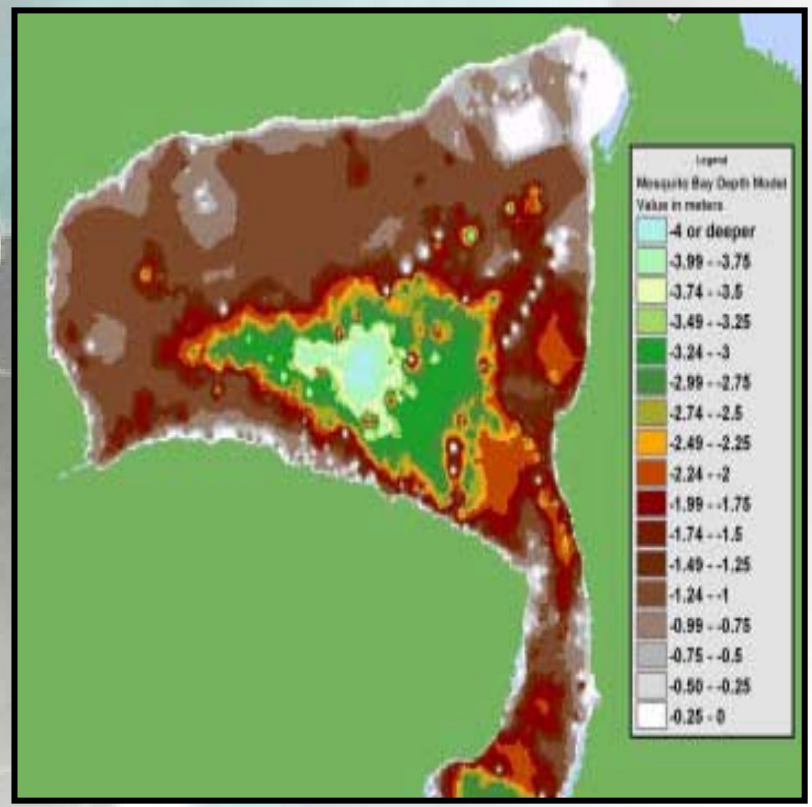
Puerto Mosquito Bioluminescence Bay



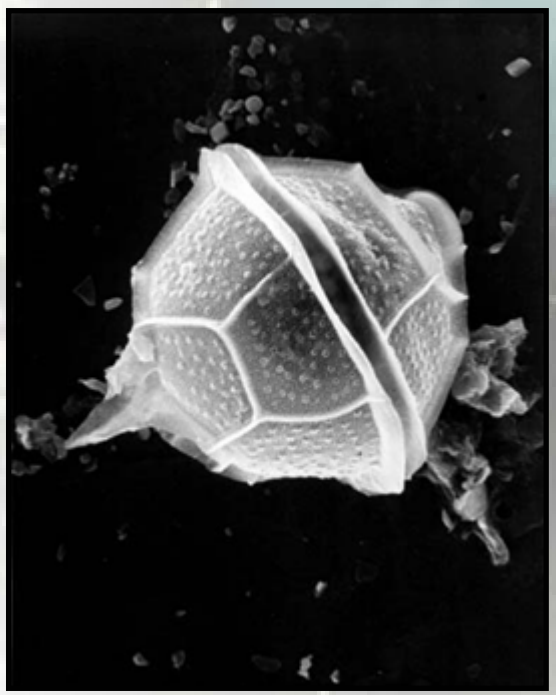


Watershed and bottom depth of Puerto Mosquito Bay

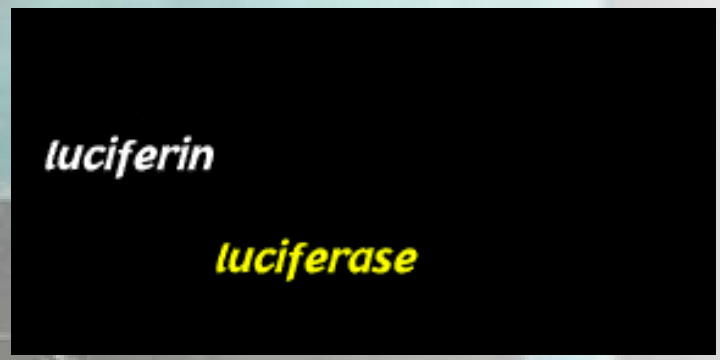


***As published by L. E. Mitchel (2004)**

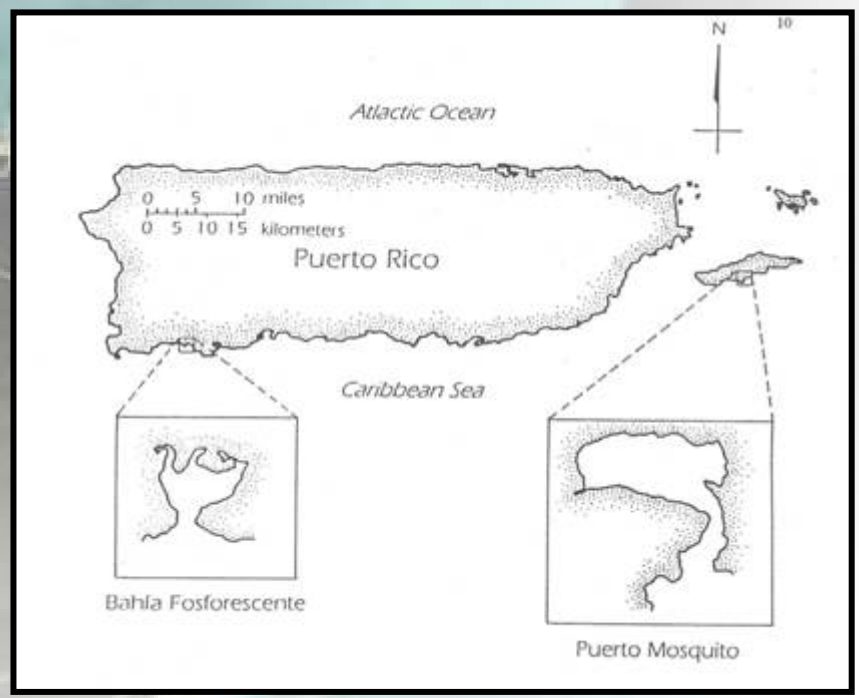
Bioluminescence is the emission of light by living organisms



PYRODINIUM BAHAMENSE



La Parguera Bioluminescence Bay



Bioluminescence of these bays is at risk due to the rapid development of the surrounding areas

Urban Development

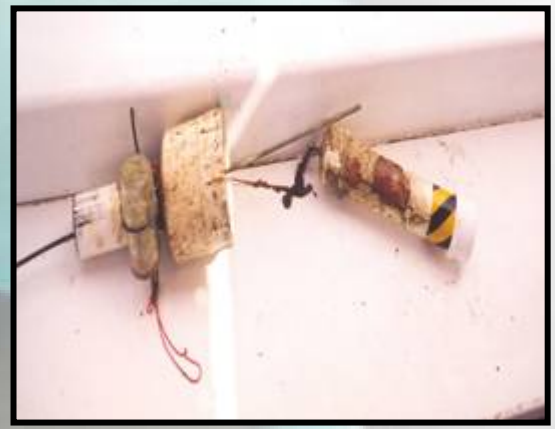
Light Pollution

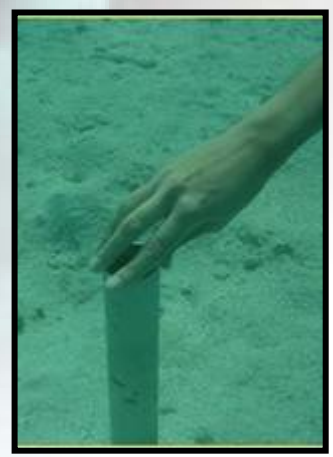
Objectives of this study

- **Evaluate the impact of sedimentation processes.**
- **Determine the land use and land cover of the area by using image processing and GIS.**
- **Evaluate the latest technology in field instruments for measuring bioluminescence.**
- **Compare the conditions in Puerto Mosquito Bay and in La Parguera Bay.**

Sediment traps

- **Made with 15 cm wide and 15 cm long *PVC* tubes with a rod of 2 cm wide and 1 m long for stabilizing the trap in the bottom.**
- **Placed at three different locations in both bays.**
- **The collected sediment was recovered every 24 days during one year period.**



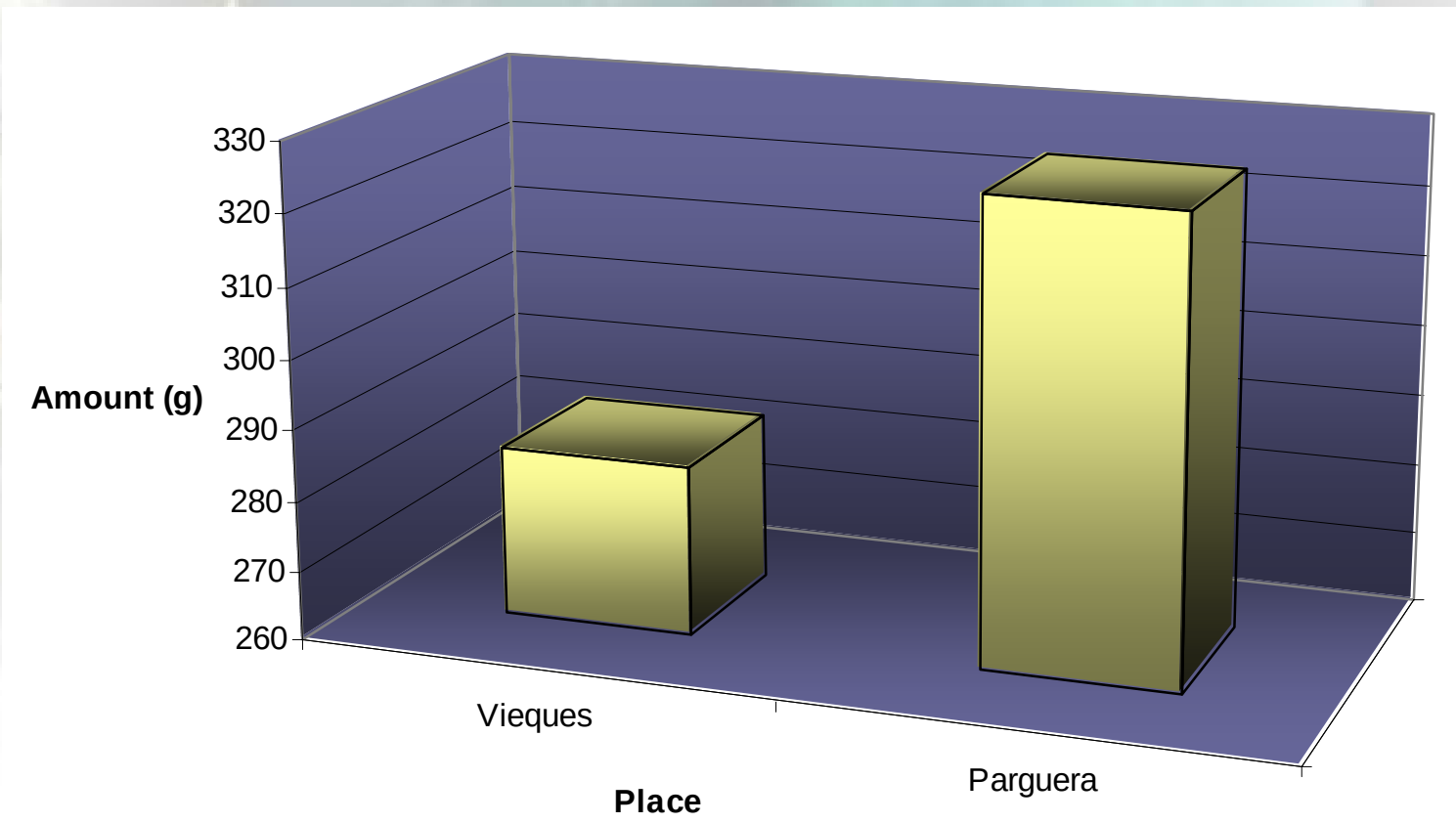


Laboratory analyses

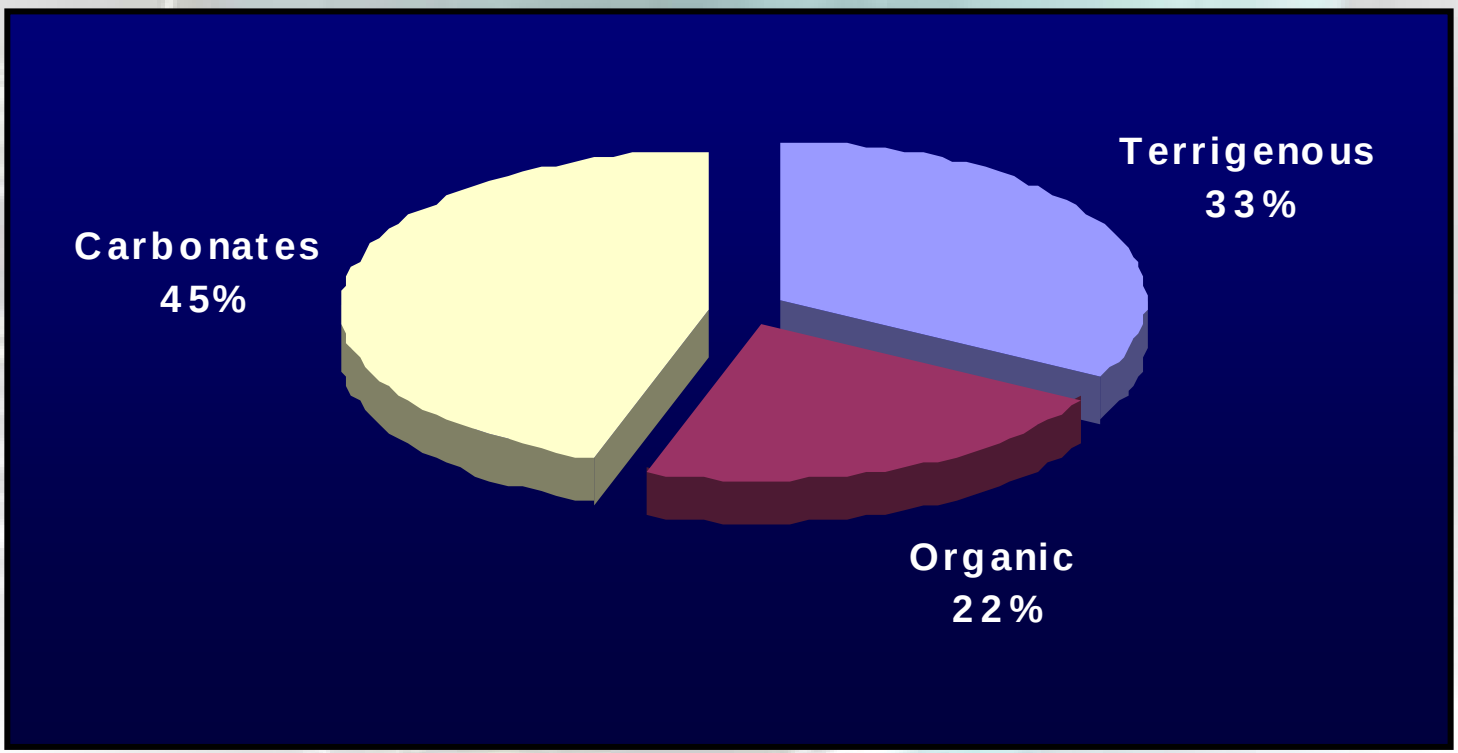
- **Sediment composition: the samples were washed with Clorox until the fezzes stopped, they were washed again, dried and weighed. The lost material was the organic fraction. Then, they were washed with HCl at 10%, this process takes the carbonate fraction away, the sample was dried and weighted again. Everything left were terrigenous materials.**

- **Grain size: The samples were sieved and serigraph analyses were made.**

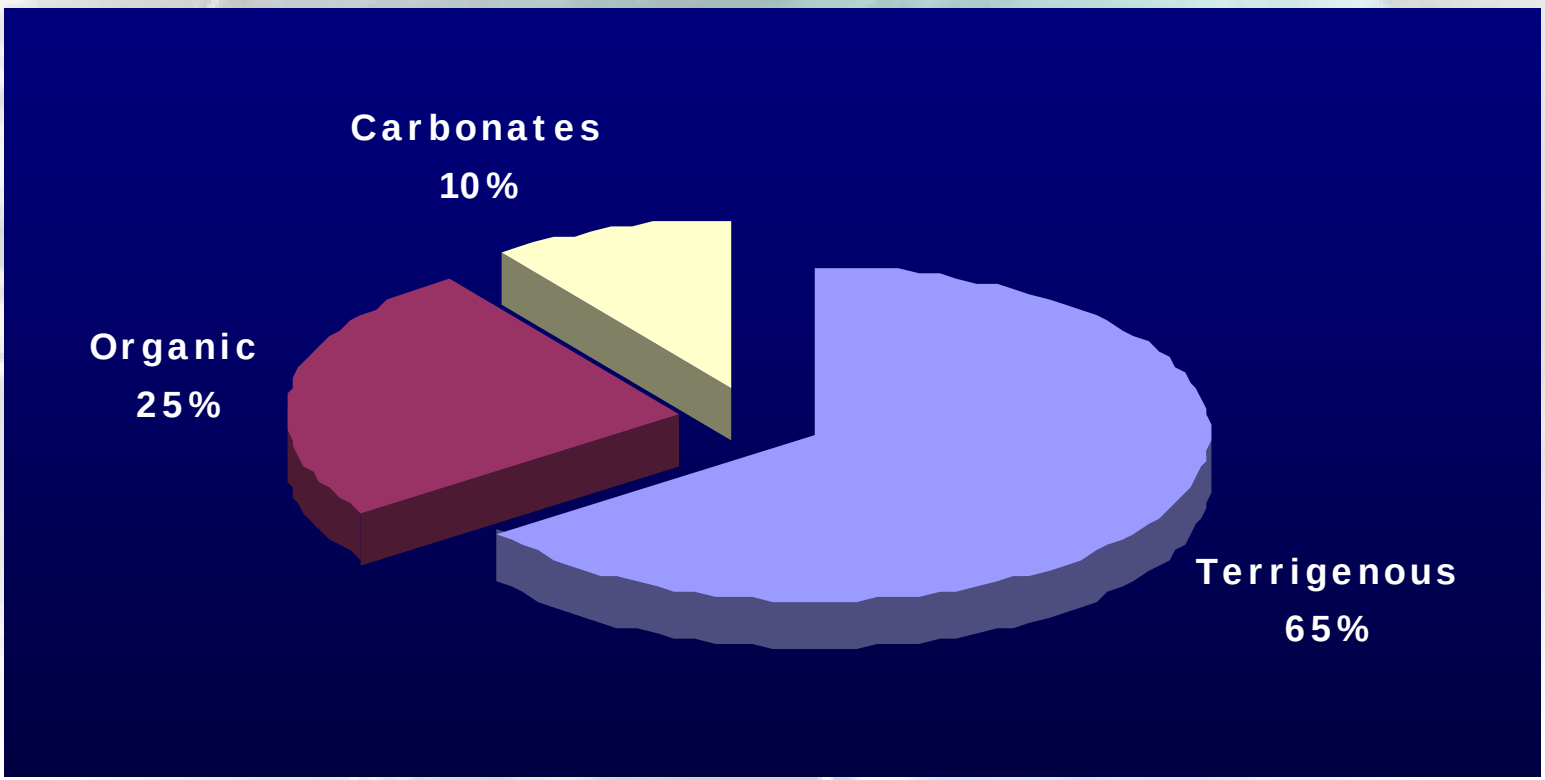
Average Collected Sediments



Grain Composition of Mosquito Bay, Vieques

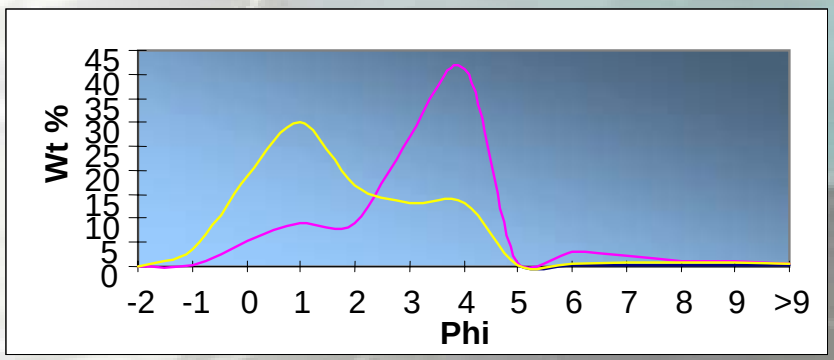


Grain Composition of La Parquera Bay, Lajas

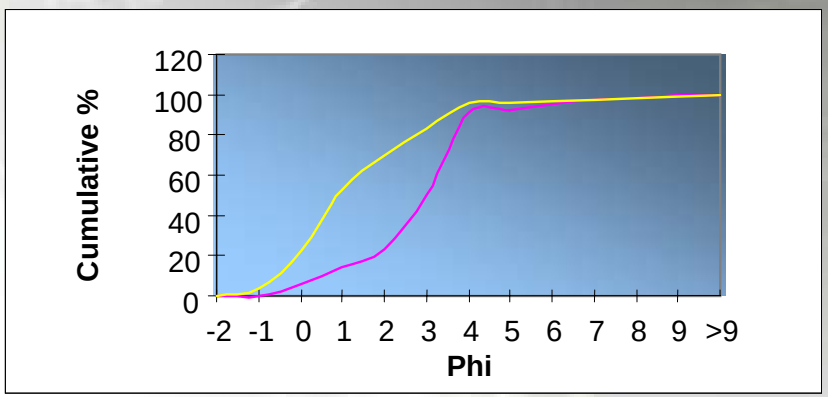


Grain Size

Decrease Size ⟶

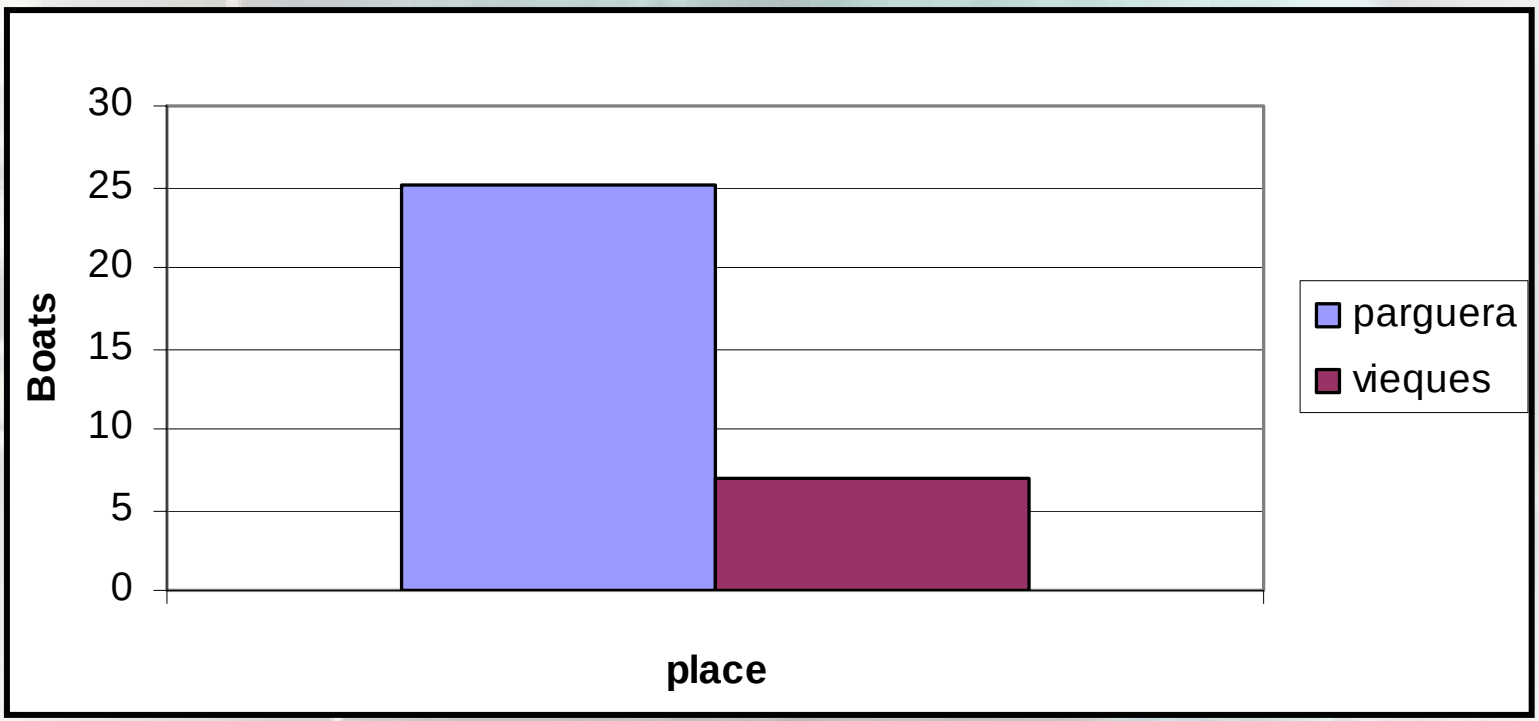


Vieques Parguera



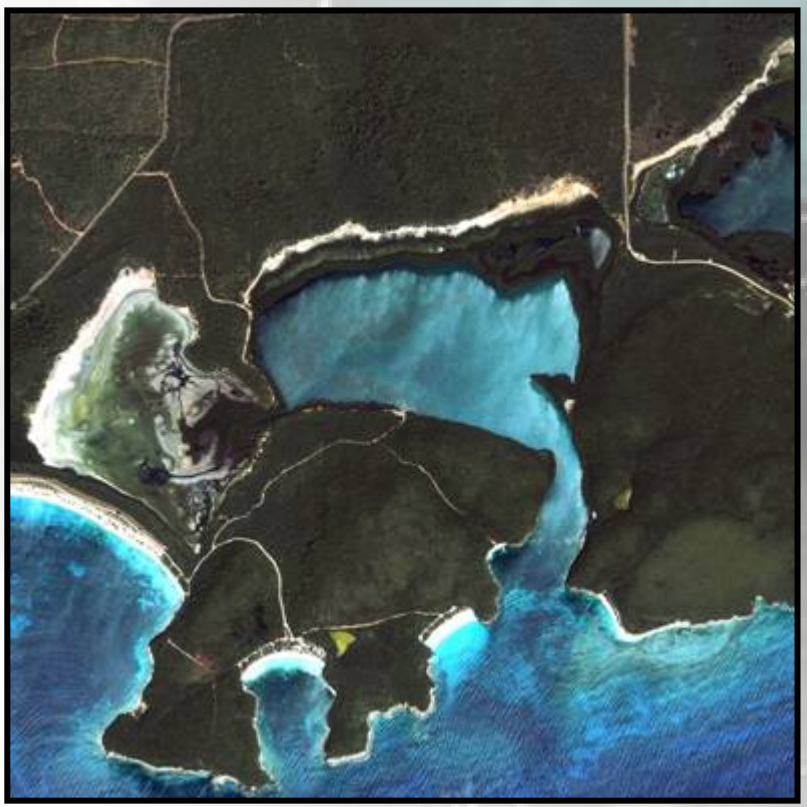
- **Puerto Mosquito Bay had coarse and medium grain size (Φ=0 and 1).**
- **La Parquera Bay had very fine grain size (Φ=3 and 4).**
- **The results suggest that there is a process in La Parquera that favors the movement and deposition of very fine grains.**

Boat counting during a weekend



Note: Boat counting were made during a weekend with crecent moon.

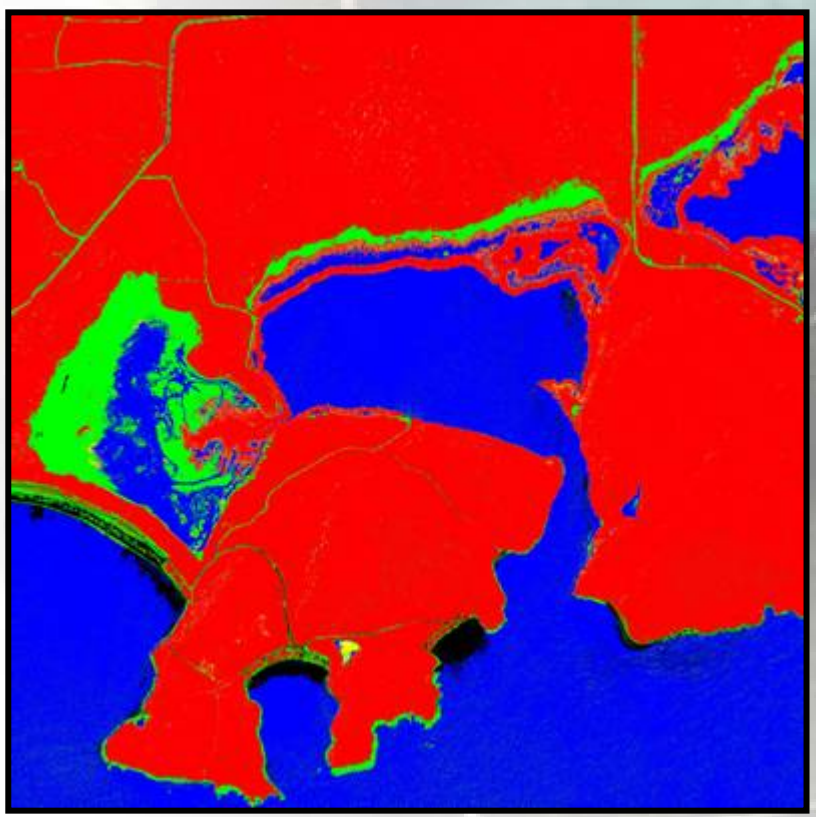
IKONOS images for land-use and land-cover analyses

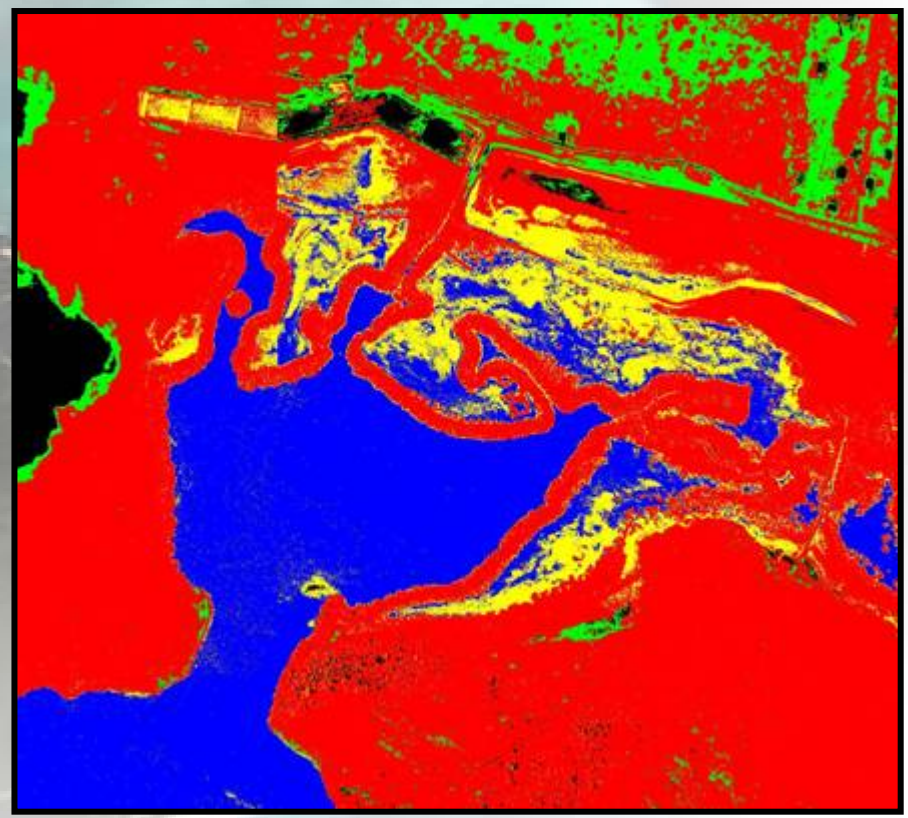


Puerto Mosquito Bay

La Parguera Bay

Supervised classifications using IKONOS images of 2002

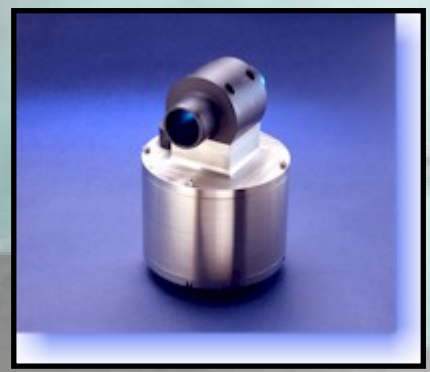




Blue=Water Red=Vegetation Green=Exposed Soil Yellow=Other

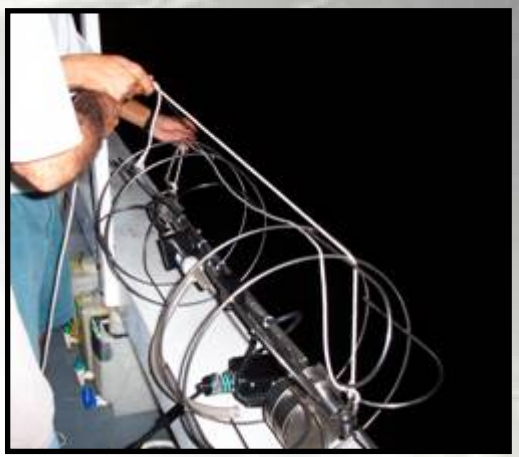
Condition of the areas as detected on August 19, 2004

GLOWTracka Bioluminescence sensor



GLOW*tracka's* precision flow meter stimulates bioluminescent organisms – principally dinoflagellates. The instrument then measures the light flashes as the organisms pass the detector. The complete range of flashes that can occur – from single events to mesoscale – is measured.

Testing the GLOWTracka in La Parguera



Conclusions

- **This study clearly demonstrates that La Parguera Bay received much more terrigenous material than Vieques Bay during the studied period.**
- **It suggests important differences in the processes affecting the sedimentation.**
- **GIS analyses showed that La Parguera has less vegetation and more human development closed to the bay than in Vieques.**

Conclusions

- **Such conditions in combination with the geology of the areas could explain the sedimentation trends found during this study.**
- **A baseline database has been created for Puerto Mosquito and La Parguera bays.**
- **Future work is necessary to fully understand the impact of these sedimentation on the bioluminescence.**

Acknowledgment to the involved students

- **Amarylis Arocho**
  Department of Geology
  - **Field work, laboratory work, and data analyses**
- **Pamela Torres**
  Department of Mechanical Engineering
  - **Image processing and GIS development**
- **Nazira Mejia and Diana Beltran**
  Department of Marine Sciences
  - **Field work**


Thank You!