

Progress Report:  
Development of Software Applications for Assessing the  
Effects of Land Disturbance on Sediment Yields

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Fish Bay-St. John



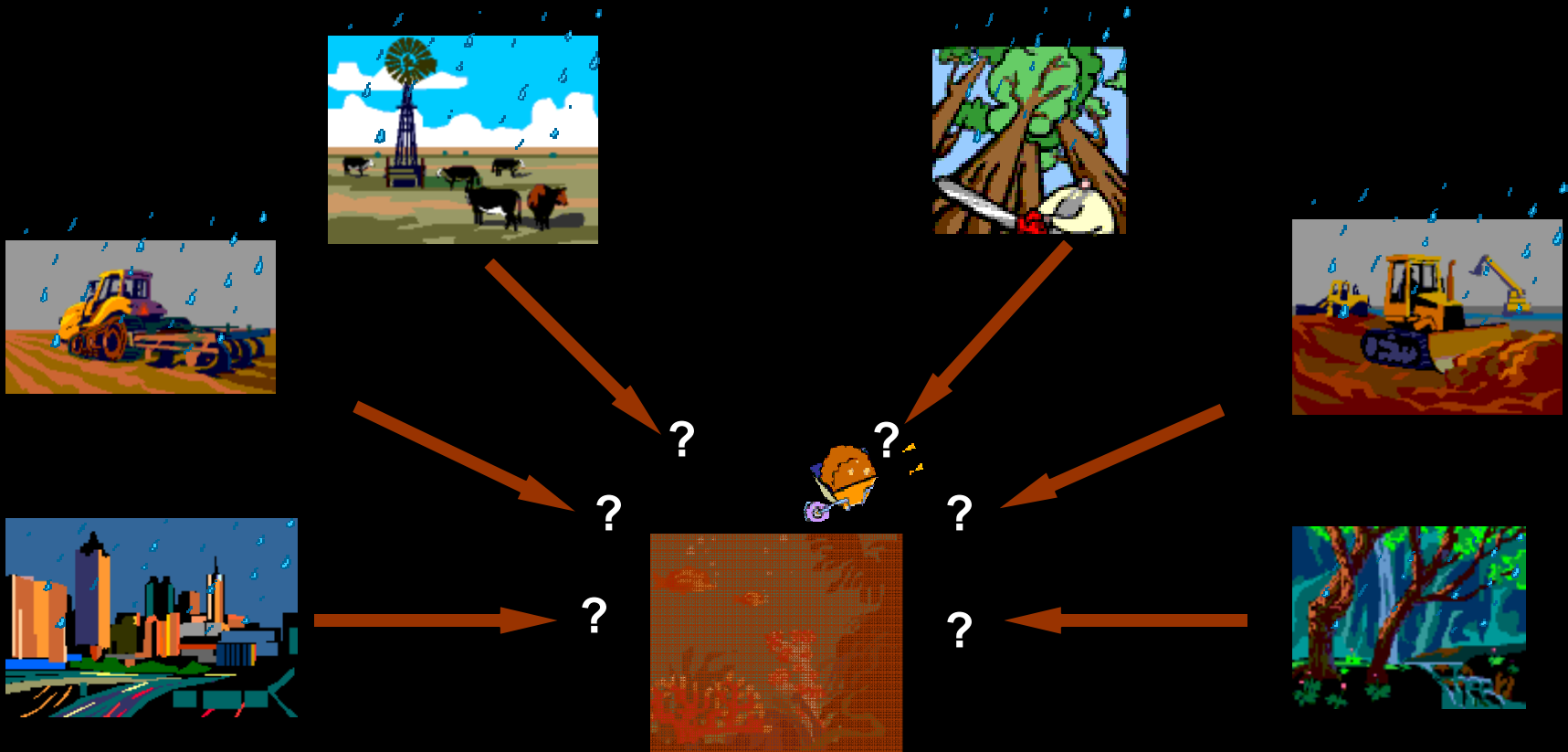
## Tortola-BVI

Photo courtesy of B. Potter-Island Resources Foundation

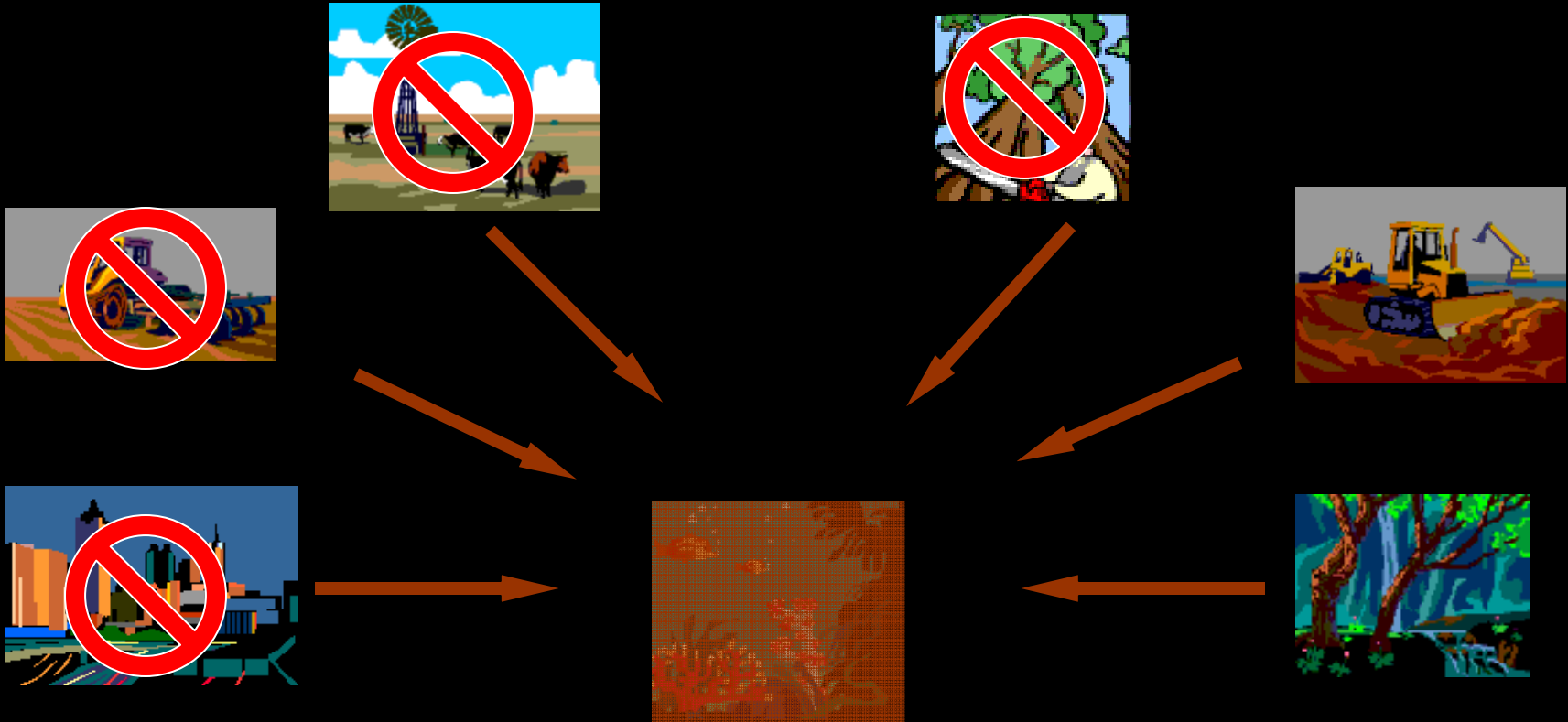


Puerto Rico (September 1989)





Sources of Sediment



Sources of Sediment  
(e.g., Parguera, Culebra, STT-STJ, BVI, etc.)

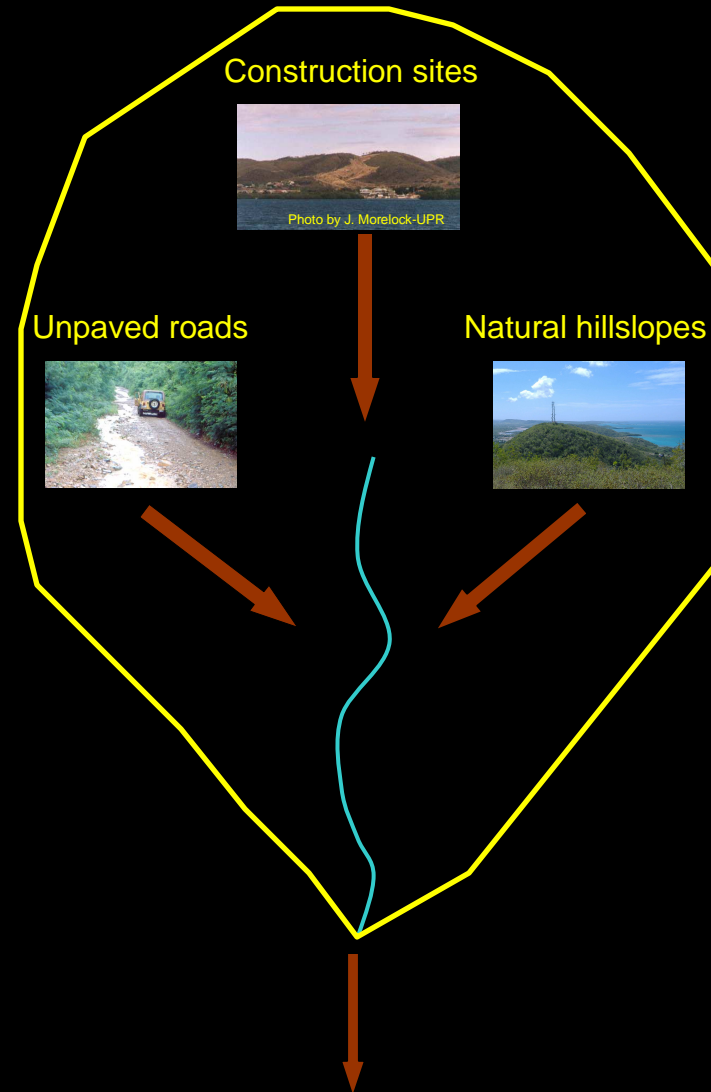
Construction sites



Unpaved roads



Natural hillslopes



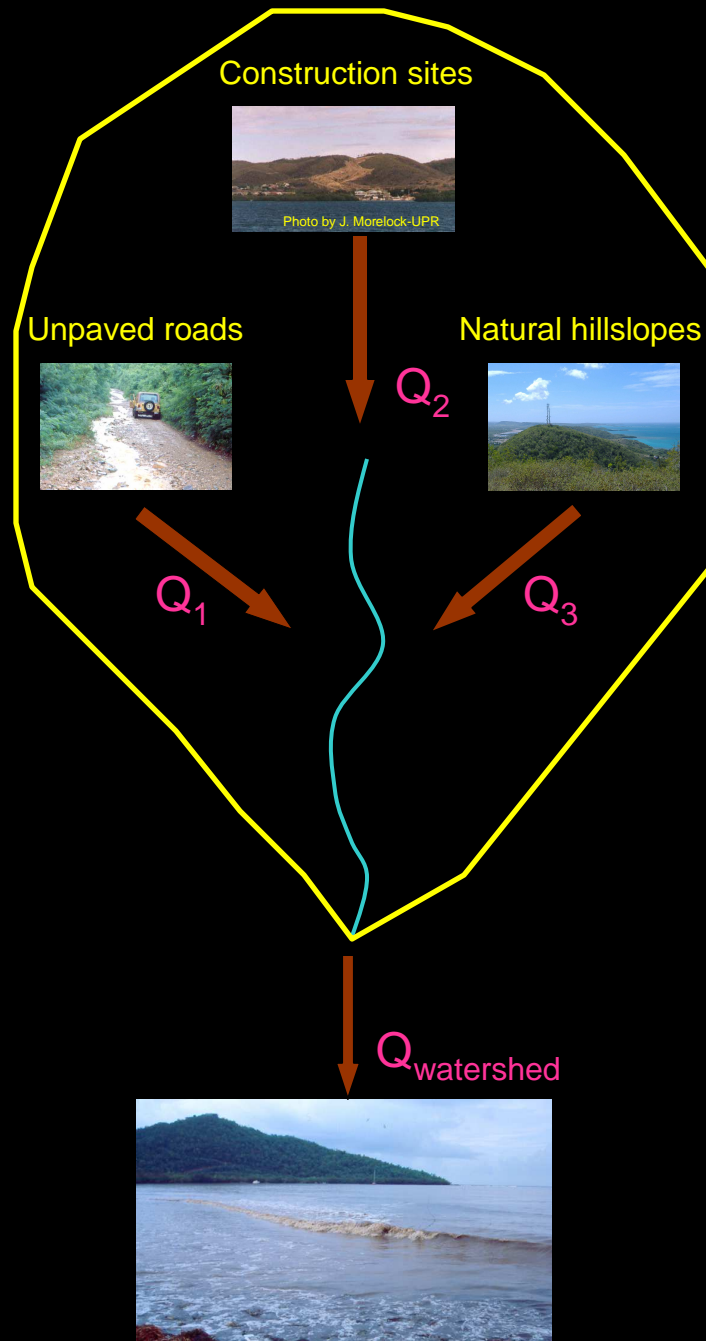
Sources of Sediment

(e.g., Parguera, Culebra, STT-STJ, BVI, etc.)



## Watershed-scale

- + Direct measurement of  $Q_{\text{watershed}}$
- System variability restricts data extrapolation
- Inability to characterize  $Q_i$ 's
- Inability to incorporate sediment sources with direct links with the marine environment



## Plot & Hillslope-scale

- +  $Q_i$ 's have lower variability than  $Q_{\text{watershed}}$
- + Predictive models & extrapolation of results
- + Identification of 'hot spots'
- Indirect estimate of  $Q_{\text{watershed}}$



# Study objectives

## (Field-based component)

- Quantify the effect of construction sites and unpaved roads on sediment production relative to undisturbed areas.
- Identify factors controlling sediment production rates and develop empirical predictive functions.
- Compare sediment production rates to previously measured rates from Parguera & St. John-USVI and to commonly used models (e.g., RUSLE, USFS WEPP, etc.).

# Study objectives

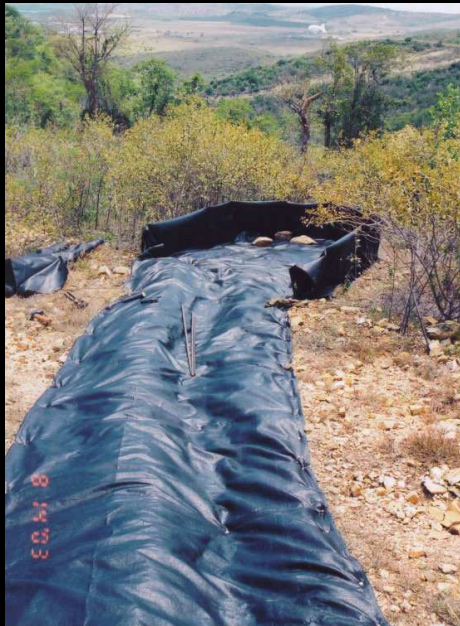
## (Software applications component)

- Develop a user-friendly desktop application to estimate sediment production rates from construction sites and unpaved roads.
- Develop a new watershed-scale GIS model that incorporates construction sites, unpaved roads, and natural sources of sediment.
- Apply the GIS model to reconstruct sediment yield rates into the La Parguera marine environment for the past 70 years.

# Study area



# Study background



**Sediment  
Traps**

Study period: Aug-03 to May-05  
32 sediment traps: 137 measurements

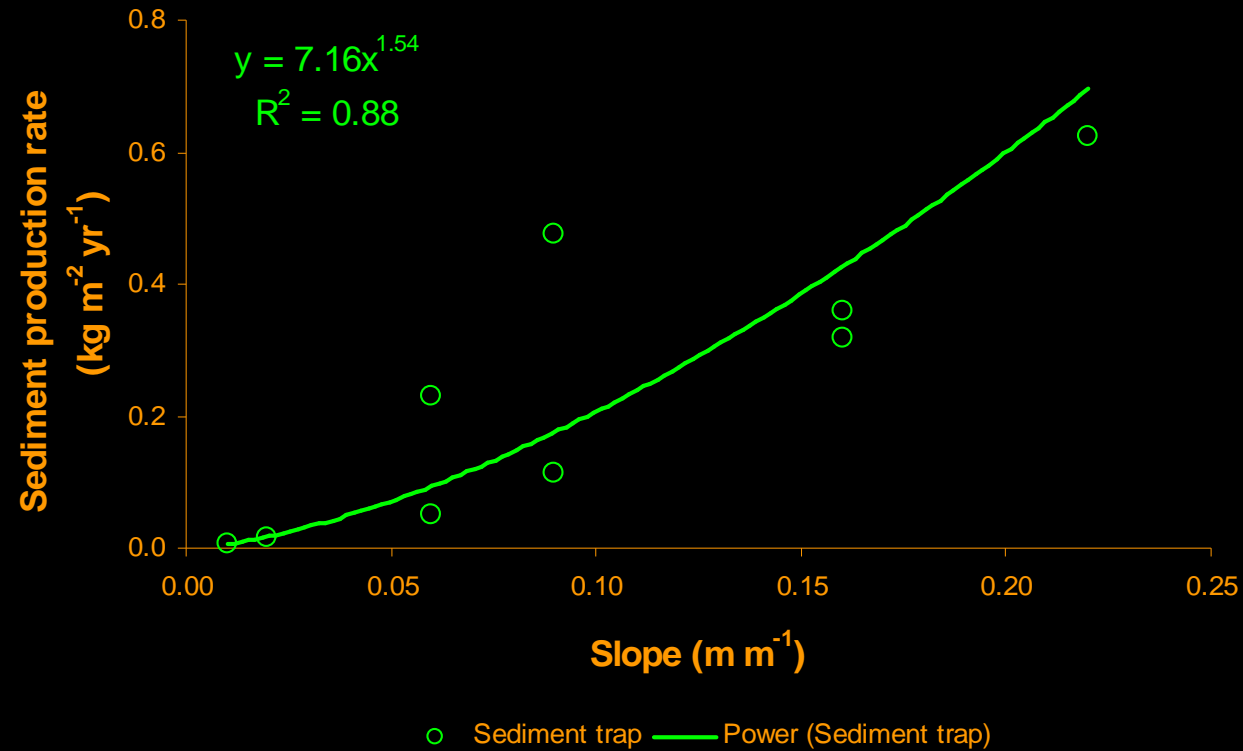


**Bounded  
Plots**

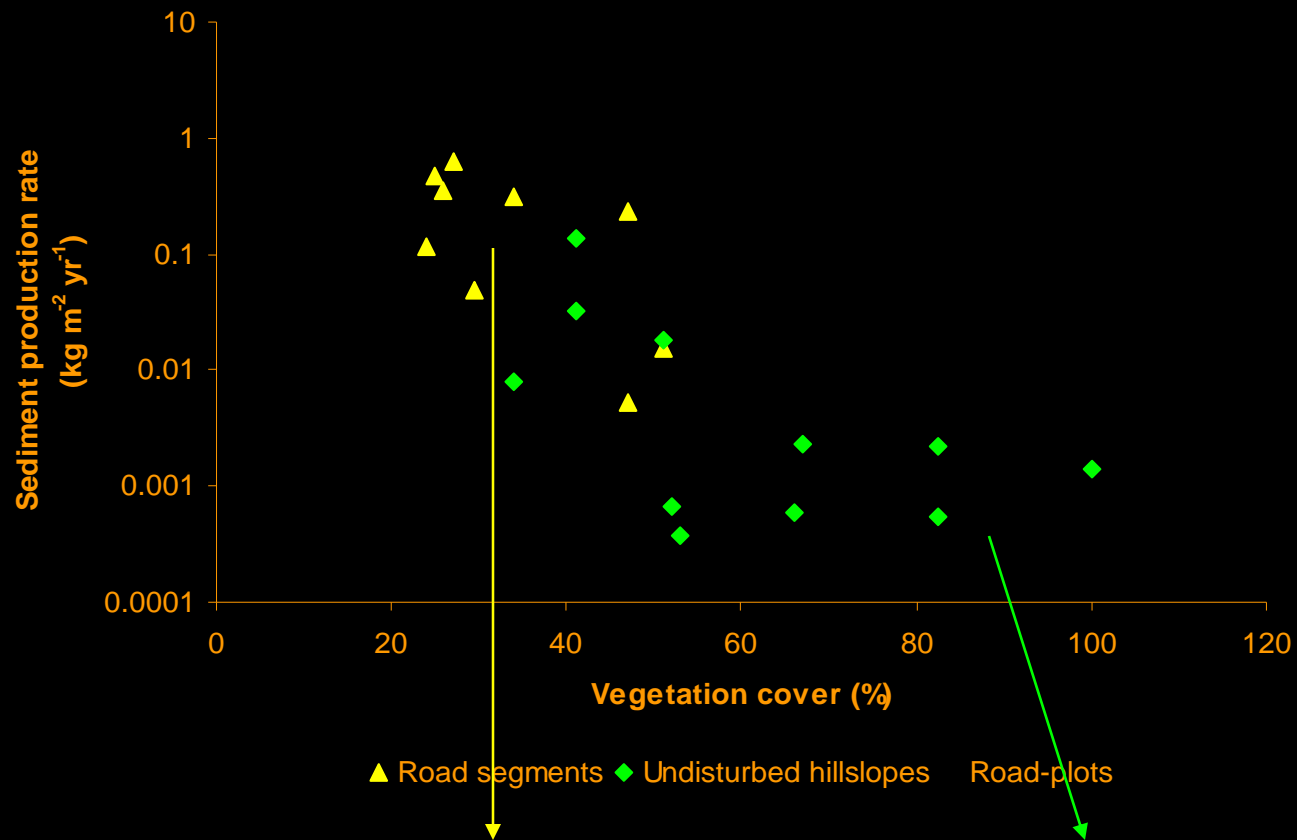
Study period: Jul-04 to May-05  
7 plots: 98 measurements



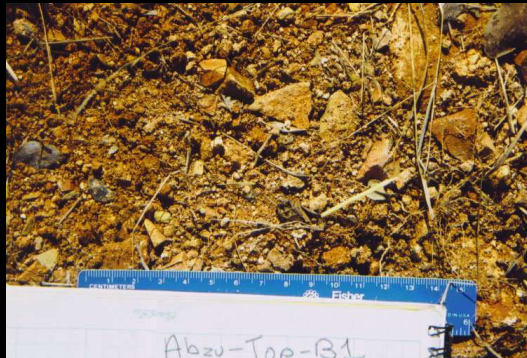
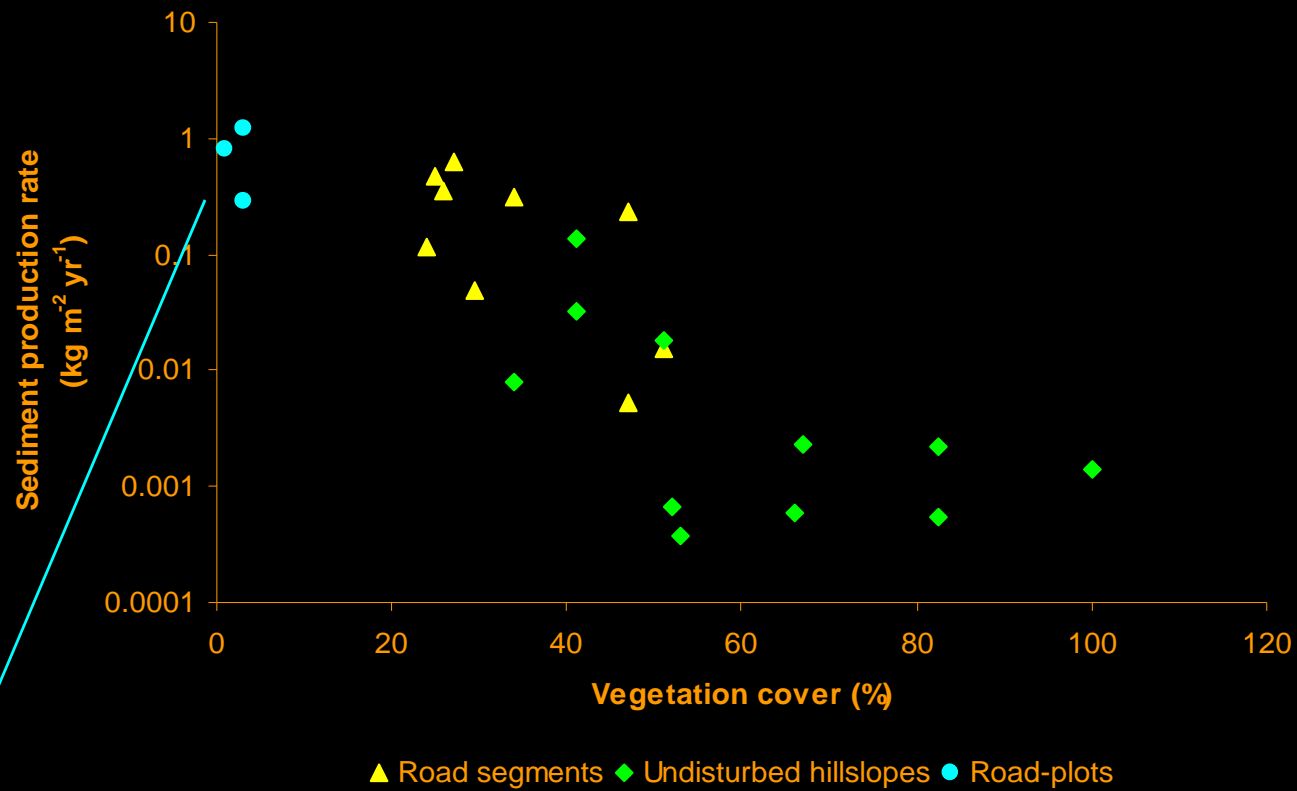
# Study background



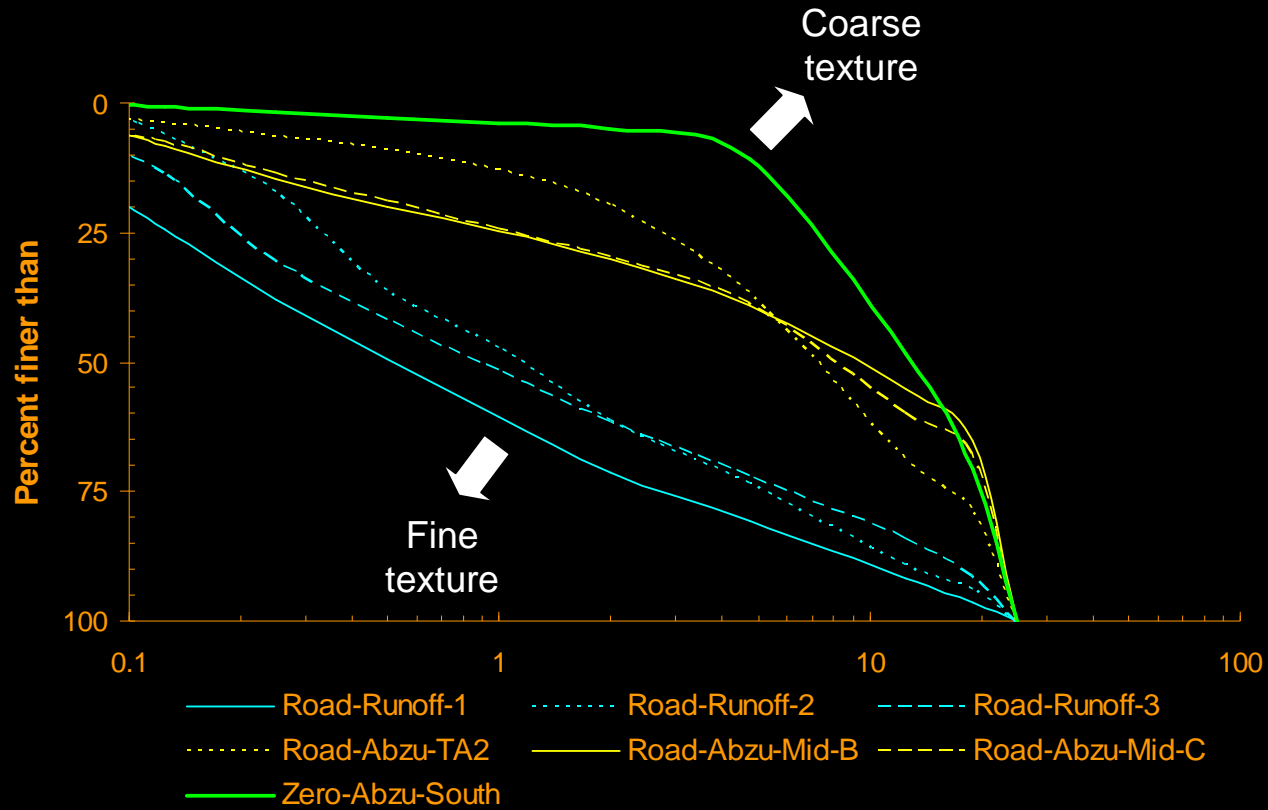
# Study background



# Study background



# Study background





# Study background



Road grading-St. John

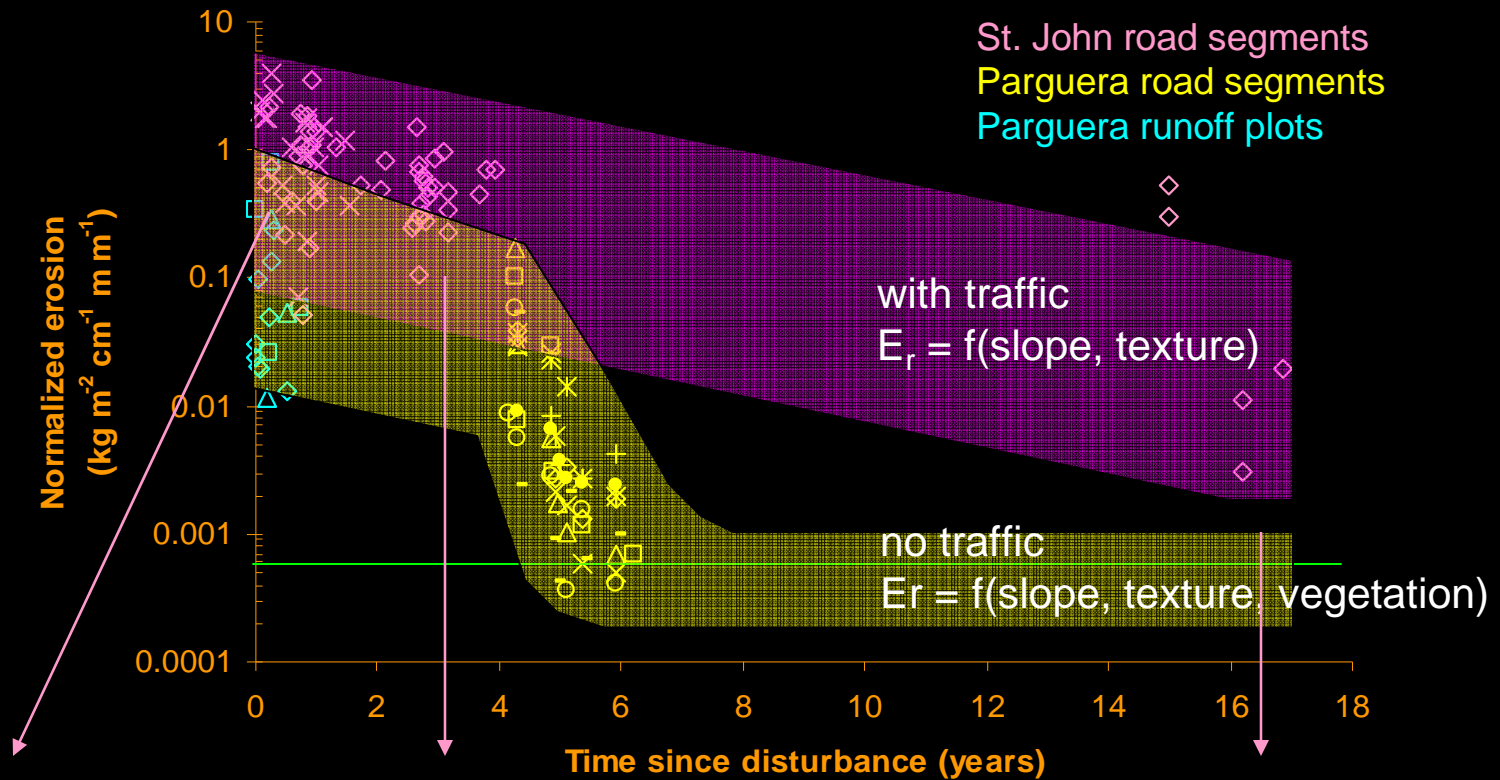


St. John



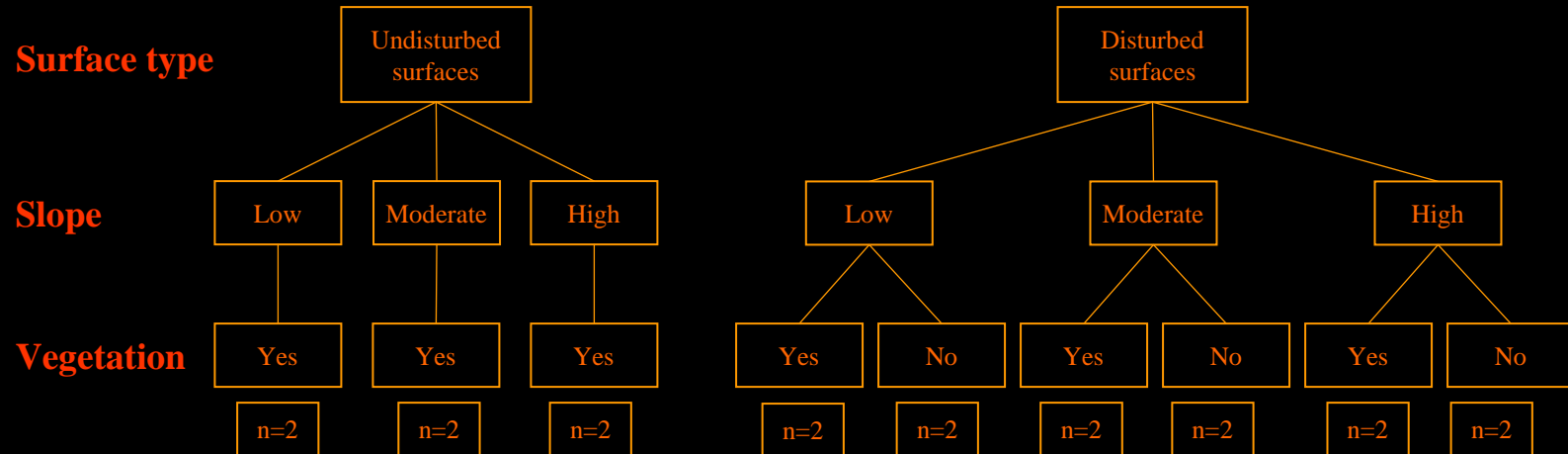
Culebra

# Study background



# Study design

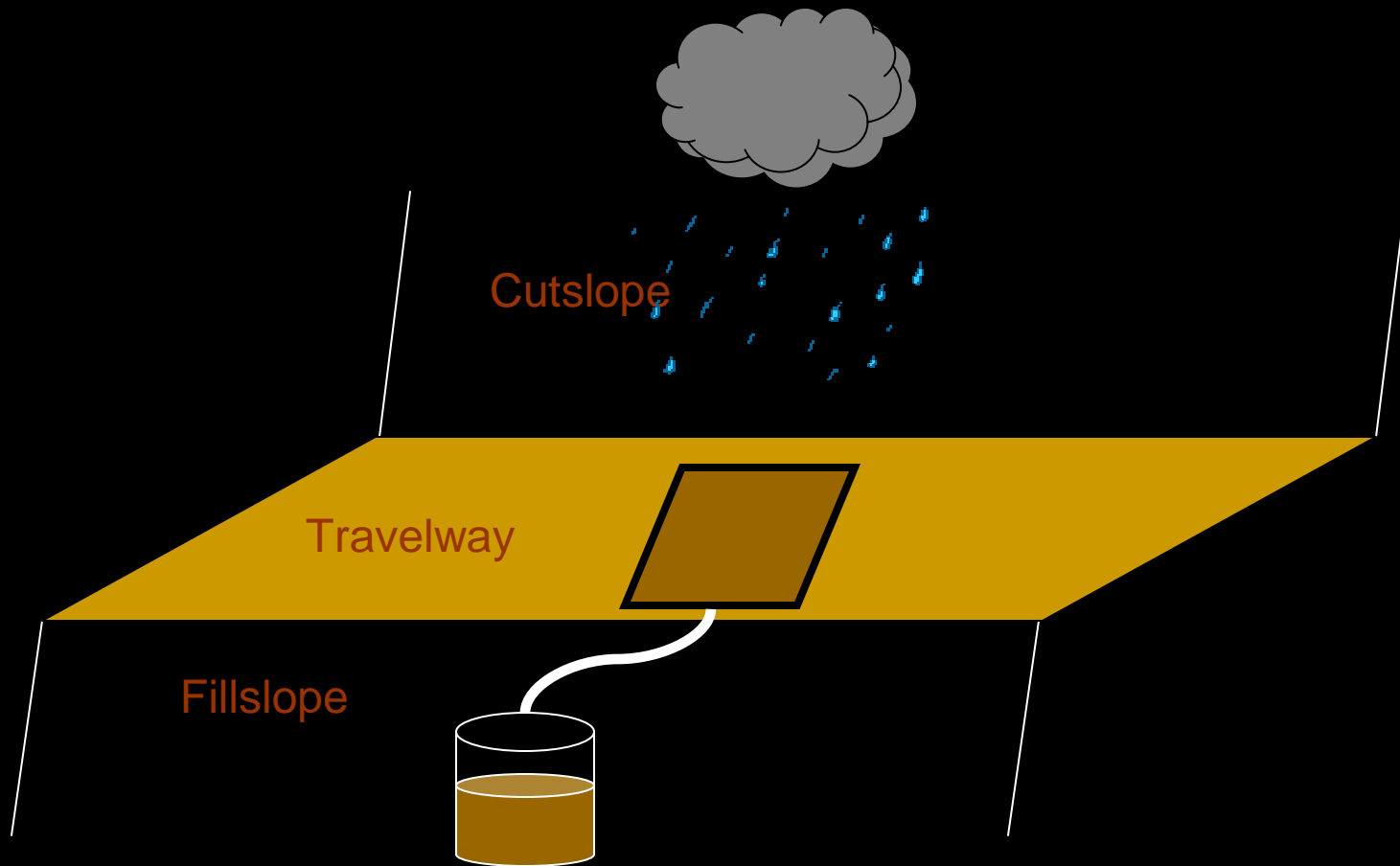
## Factor



As of Aug-06 only missing:

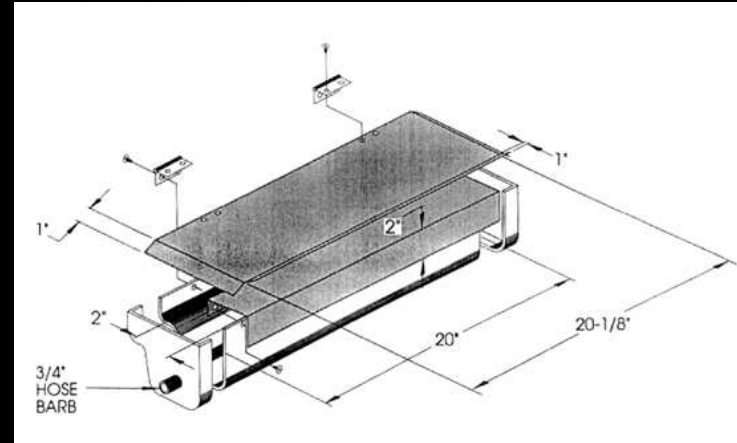
- 1 undisturbed low-slope plot
- 1 disturbed high-slope plot

# Methods





# Methods



Bounded plots with Gerlach troughs

# Methods





# Methods





# Methods

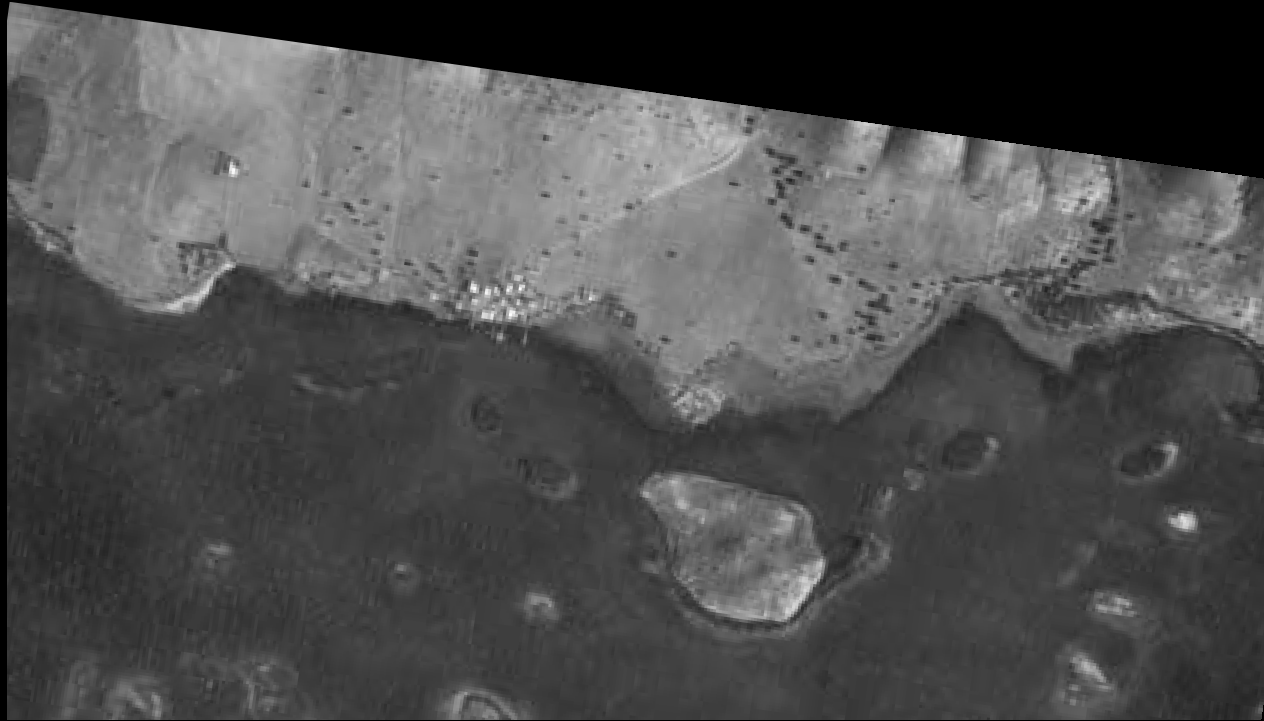




# Methods



# GIS-based sediment yield modeling



La Parguera-PR  
(1936)





La Parguera-PR  
(1950)



La Parguera-PR  
(1963)



La Parguera-PR  
(2005)

# Other Developments

- Gulf of Mexico Foundation-Community-based erosion control project on Fish Bay-STJ (Scheduled to begin Fall-06)
- National Fish & Wildlife Foundation-Erosion control project on STJ (Pending approval)
- UPR Sea Grant-Seed Funds- Culebra sediment yield modeling (Scheduled to begin Fall-06)



