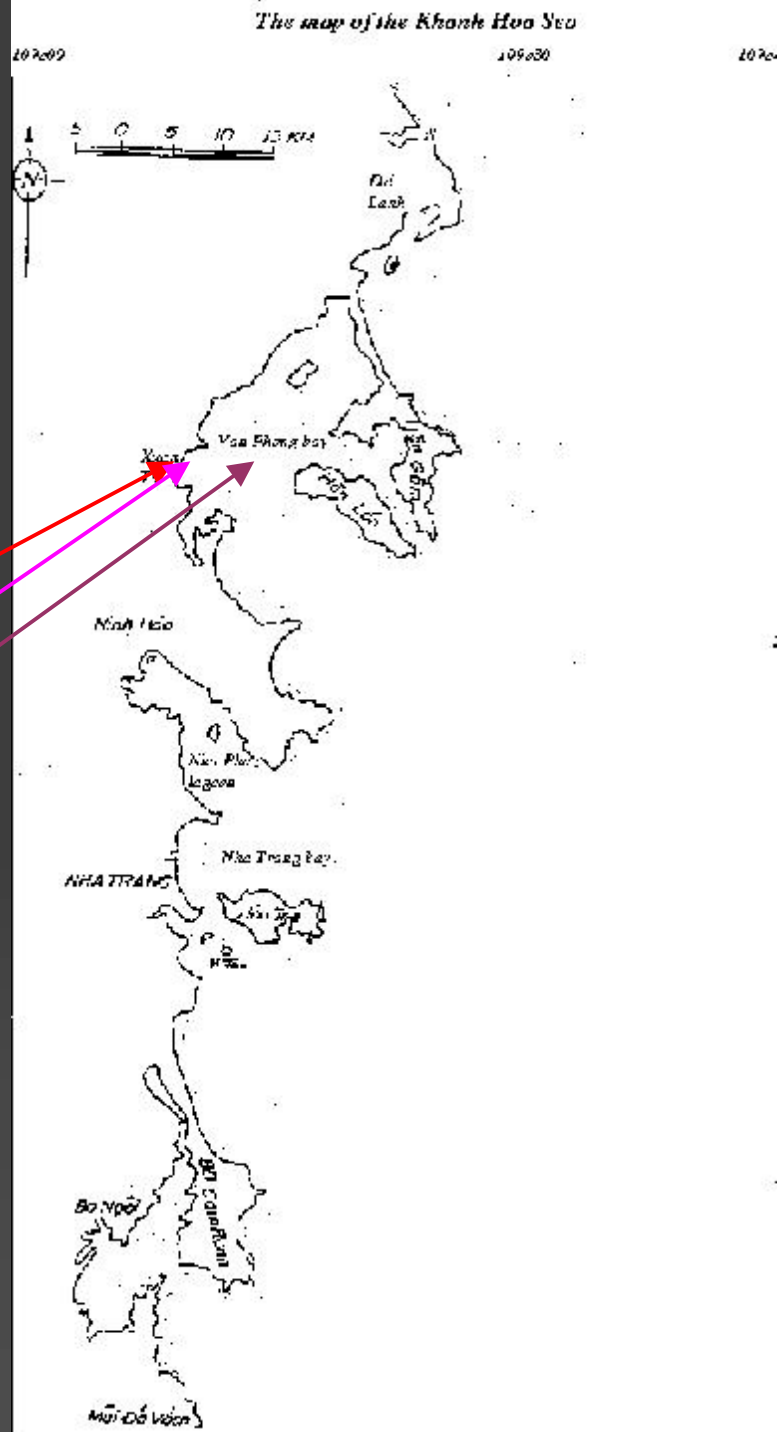
Lobster village Case study: Data & Analysis

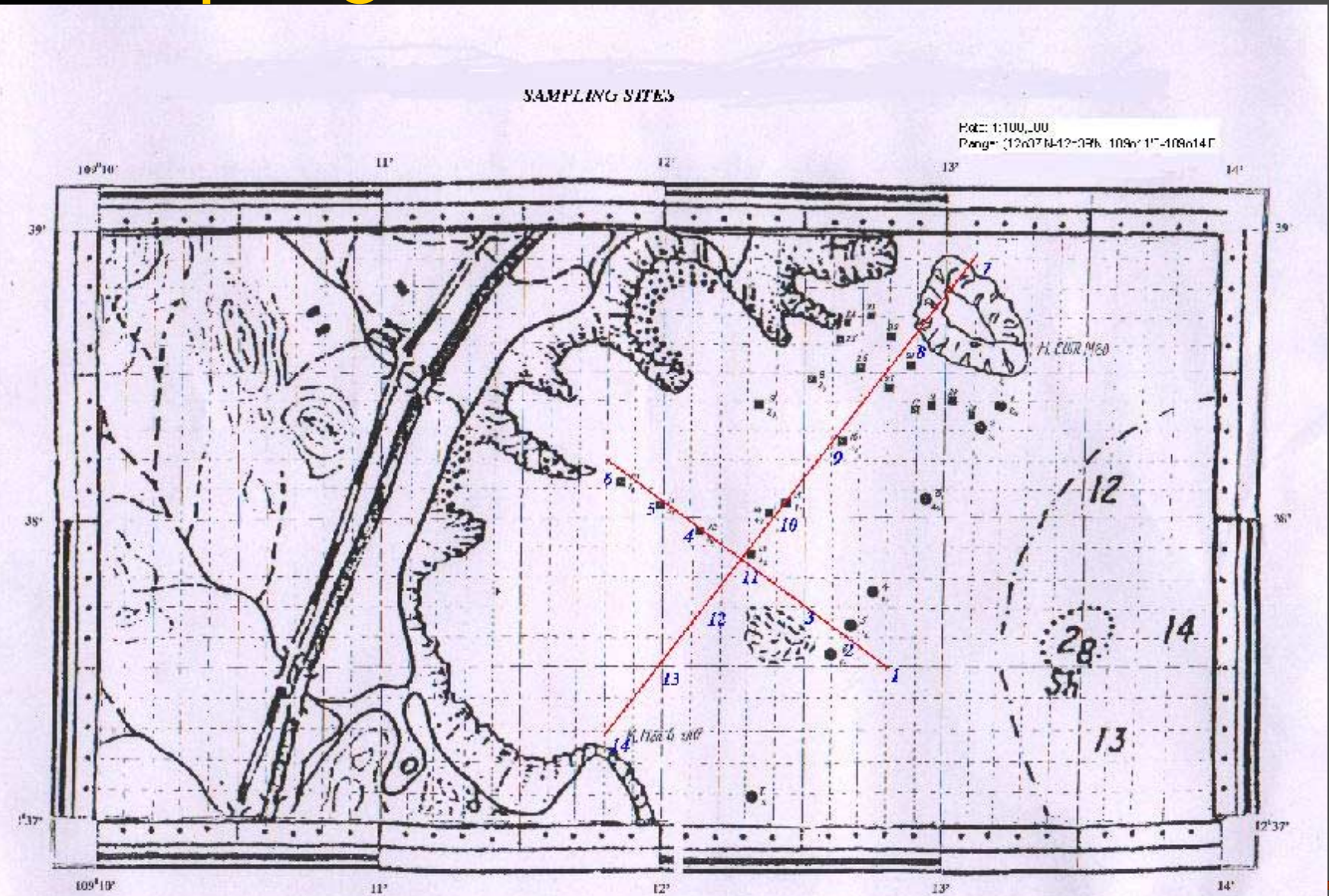
Le Anh Tuan

Introduction

- Xuan Tu Village:
  - 60km N of Nha Trang
  - Size:
    - culture area = 118 ha
    - Xuan Tu sea = 472 ha
    - Van Phong = 503 km²
- Problems
  - 30% farms failed
  - Survival rate low
- Causes:
  - Polluted
  - Disease



Sampling sites



Sample collecting (1)

- Water data were collected *in situ*
- Variables measured and used in subsequent analyses were:
  - Temperature
  - Salinity
  - pH
  - Dissolved O_2
  - Transparency

Sample collecting (2)

- Sediment samples were collected using a tube piston corer
- This enabled approximately 300 cm^2 of sediment to be collected
- The sediment was stored in plastic bags containing 10% formaldehyde and refrigerated
- The following sediment variables that were used in subsequent analyses were measured in the laboratory:
  - Soil pH
  - % Organic C
  - Total Nitrogen
  - Total phosphorus
  - % Clay
  - % Silt
  - % Sand.

Sample collecting (Bottom fauna)

- The sediment samples in 10% formaldehyde were sieved
- It was then decanted (gentle sieving and decanting of the suspension)
- Next it was placed in 4% formaldehyde
- And the fauna identified and counted.

Data analysis: Multivariate analysis using PRIMER routines

- **PCA Plot of Environmental Data**
- **MDS plot of fauna**
- **ANOSIM (ANalysis Of SIMilarities) to look for statistically significant differences between groups of samples**
- **SIMPER *(SIMilarity PERcentages)* : *to see which species are most important in accounting for the differences between groups of samples.***
- **BIOENV correlates the two data matrices with one another & will select the best correlation**

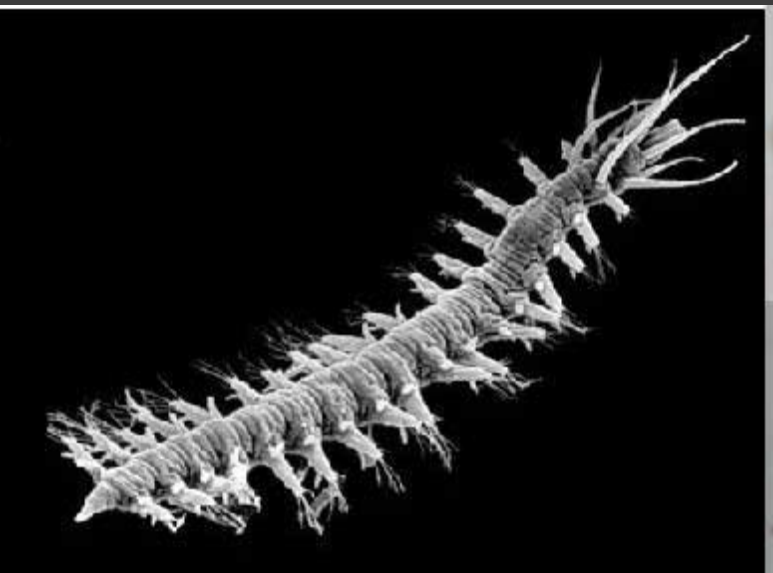
Data analysis: Mass balance model

- Nitrogen and Phosphorus budgets
- **C=N/FU**
  - C the elevation of nutrient concentrations caused by lobster farms (or any other source of nutrient input)
  - N the rate of nutrient input
  - F the flushing rate
  - U the volume

Preliminary results: *Practical indicators*

Indicators: need to confirm with farmers.

- Fauna: Polychaetes vs molluscs
- Sediment smell, and
- Sediment colour



Preliminary results: *nutrient (Nitrogen) accumulation in Xuan Tu sea*

- Scenario 1: min FCRs
  - the rate of nutrient input = **3454.1 mt/yr**
    - From shrimp farms: 2593.0 mt/yr (?)
    - From sweet snail farms: 309.0 mt/yr
    - From lobster farms: 552.1 mt/yr
  - the flushing rate = **0.5**
  - Water volume (m^3) = **10,856,000**
  - Nutrient concentration (g/ m^3) = **0.6**
  - Standard for Aquaculture water (g/ m^3) = **0.4**
  - Overload (g/ m^3) = **0.2**
- ***Comment****: Need to check where the shrimp farms' sludge was*

Preliminary results: *nutrient (Nitrogen) accumulation in Xuan Tu sea*

- Scenario 2: max FCRs
  - the rate of nutrient input = **4221.4 mt/yr**
    - From shrimp farms: 3298.2 mt/yr (?)
    - From sweet snail farms: 332.1 mt/yr
    - From lobster farms: 591.1 mt/yr
  - the flushing rate = **0.5**
  - Water volume (m^3) = **10,856,000**
  - Nutrient concentration (g/ m^3) = **0.75**
  - Standard for Aquaculture water (g/ m^3) = **0.4**
  - Overload (g/ m^3) = **0.35**
- ***Comment****: Need to check where the shrimp farms' sludge was*

Suggestions

- Data collection: clarify (re-collect) data related to shrimp sludge and sweet snail farms (FCRs, N/P content in snail carcase) and Carbon data for all kinds of farms.
- Data analysis: finalise the methodology, esp. how to use models effectively in analysing data


Thank you!