

# TWM for conservation and development in the headwaters of the Coco, Honduras and Nicaragua:

A “snapshot” of the watershed



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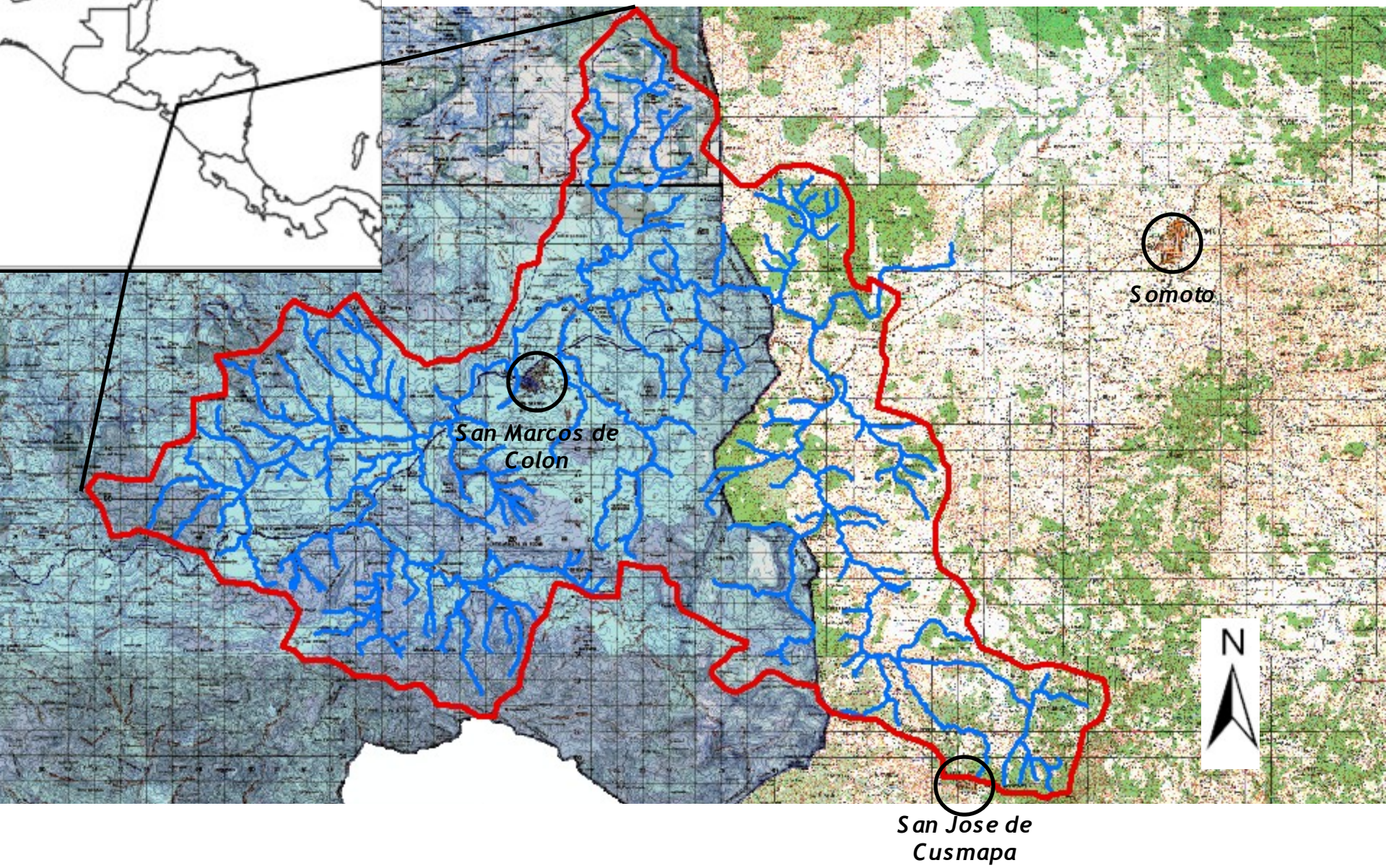
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# O v e r v i e w

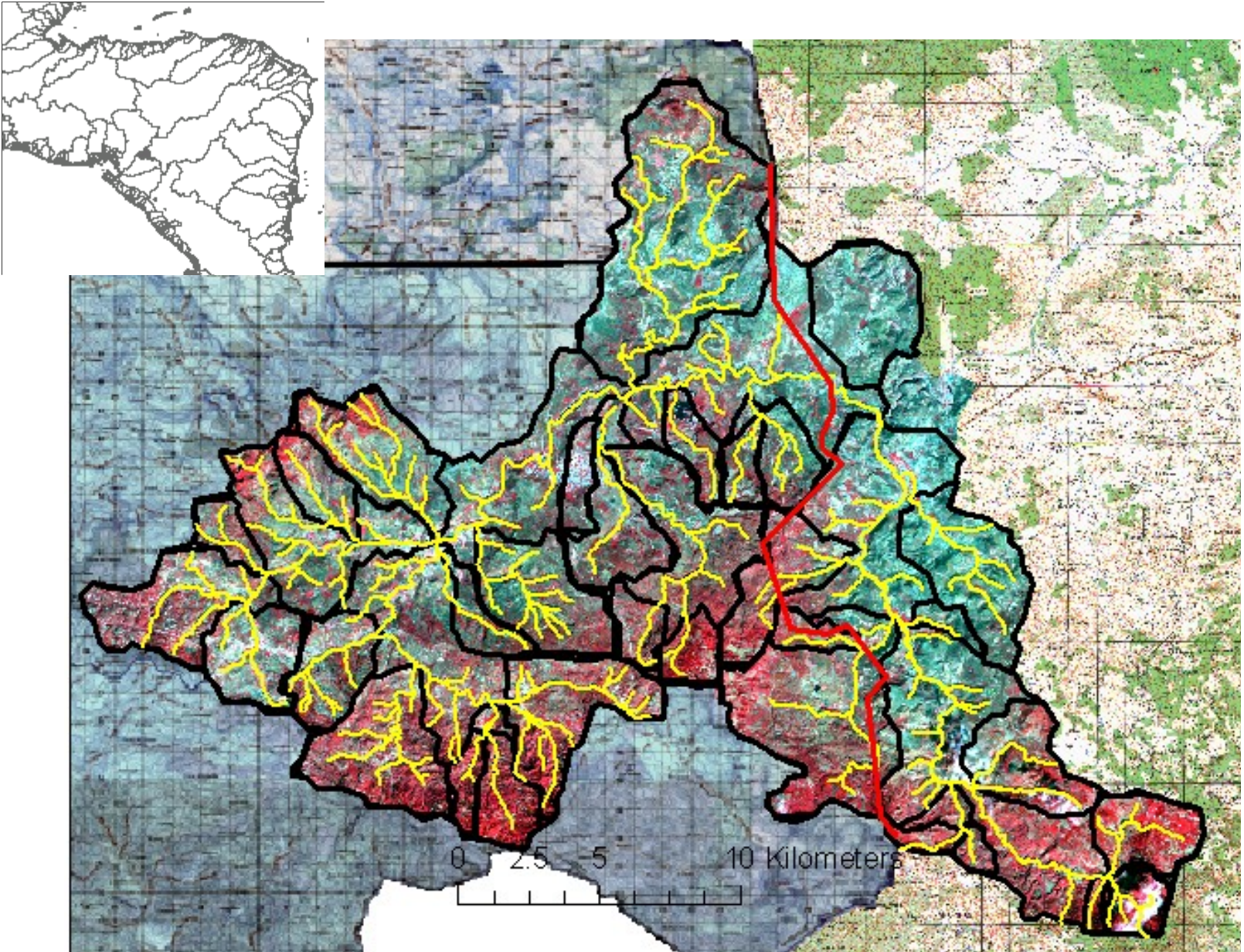
- Introduction to region
- The transboundary view
- Methodology
  - Design: Watershed snapshot
  - Implementation: Participatory data collection
- Results
  - Point source
  - Nonpoint source
- Evaluation of Approach
- Ongoing work



# Political boundaries



# Watershed boundaries



# A transboundary challenge

- Headwater area
  - Transboundary flows: water and fire
  - IUCN resolution 60
  - Canon de Somoto
  - Point source and nonpoint source
- Public health, sustainability of land use, development as protected area



# M e t h o d o l o g y

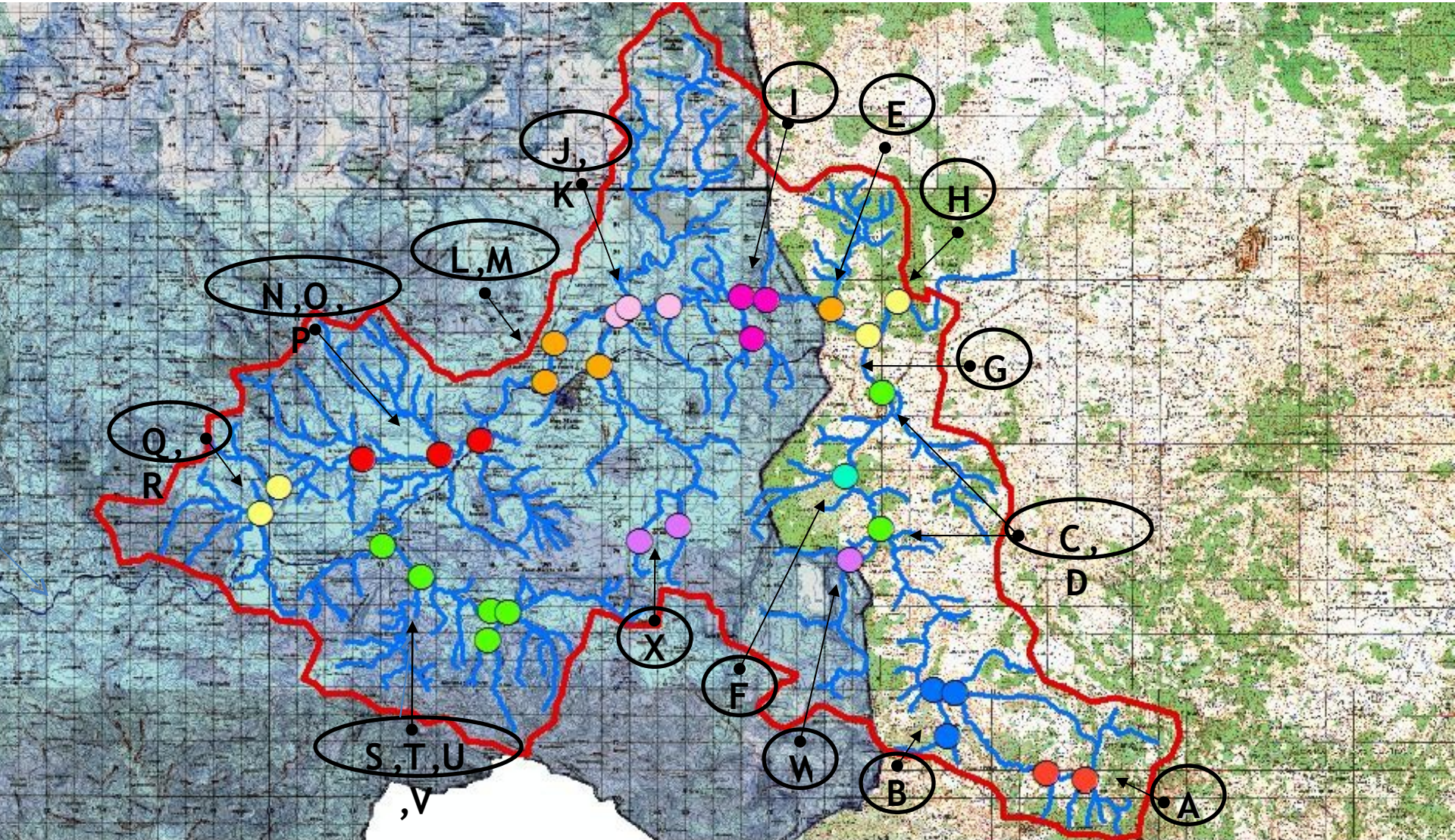
- W a t e r s h e d “s n a p s h o t” (G r a y s o n e t a l. 1 9 9 7<sup>1</sup>)
  - B a s e f l o w
  - C a p t u r e t r i b u t a r i e s a n d d i s c h a r g e p o i n t s
- A n a l y t e s : T N , T P , *E . c o l i*, ( p e s t i c i d e s )
  - A g r i c u l t u r a l p o l l u t a n t s
    - F e r t i l i z a t i o n
    - P e s t i c i d e A p p l i c a t i o n
    - A n i m a l a n d h u m a n w a s t e s
  - S i m p l e m e t h o d o l o g y , p r a c t i c a l i n s t u d y r e g i o n
- A n a l y t i c a l M e t h o d s : I d e x x C o l i l e r t , g r a b  
s a m p l e s

<sup>1</sup>Grayson R.B., C.J. Gippel, B. L. Finlayson and B. T. Hart. 1997. Catchment-wide impacts on water quality: The use of 'snapshot' sampling during stable flow. Journal of Hydrology 199: 1-2, 121-134.

# Implementation

- Simultaneous sampling
  - 90 sites, 60 people, 13 teams of 3+
- Recruitment
  - Local institutions: schools, government, civil society
- “Capacitaciones”
- Equipment distribution
  - Local products

# Sampling locations





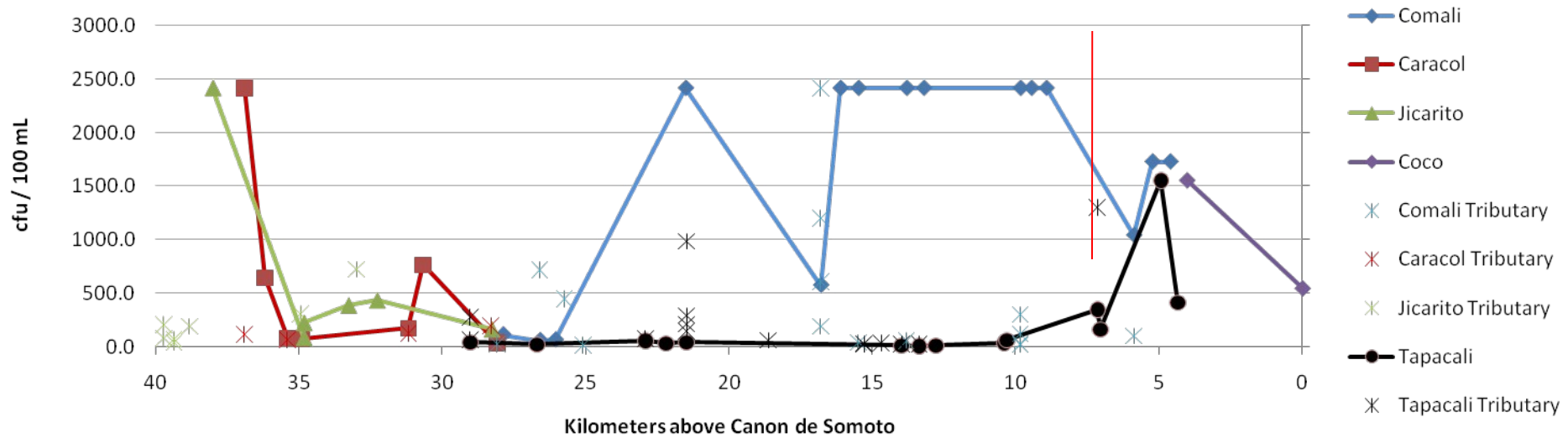






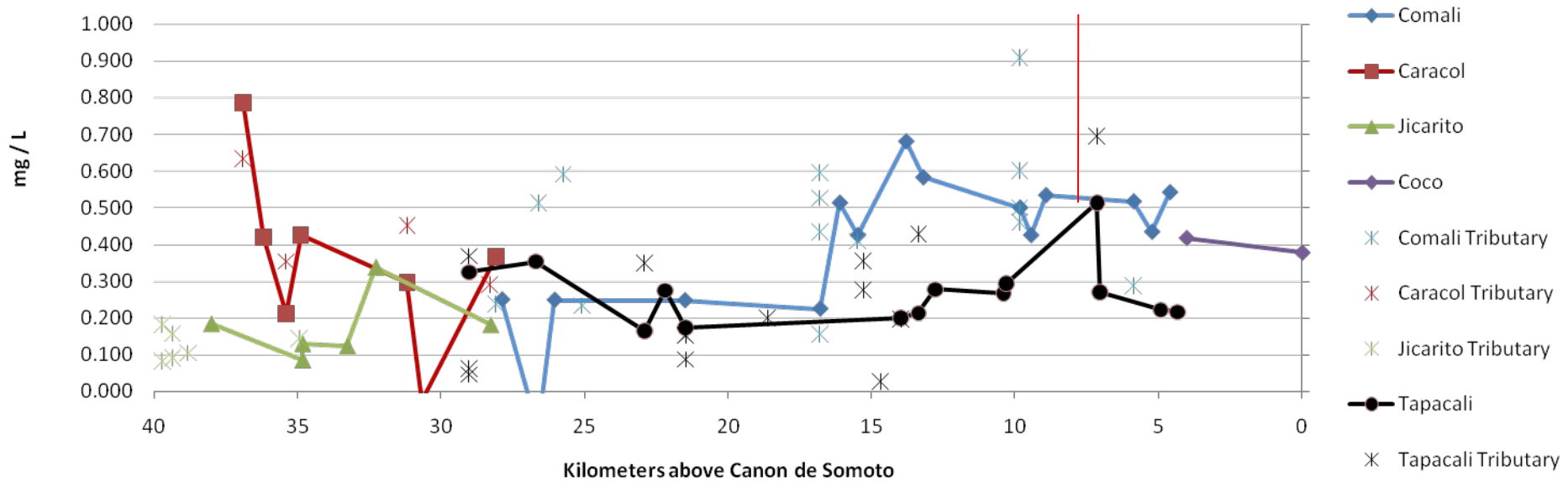
# Results: Bacteria profile

## Bacteria concentration (E. coli) 16-7-08



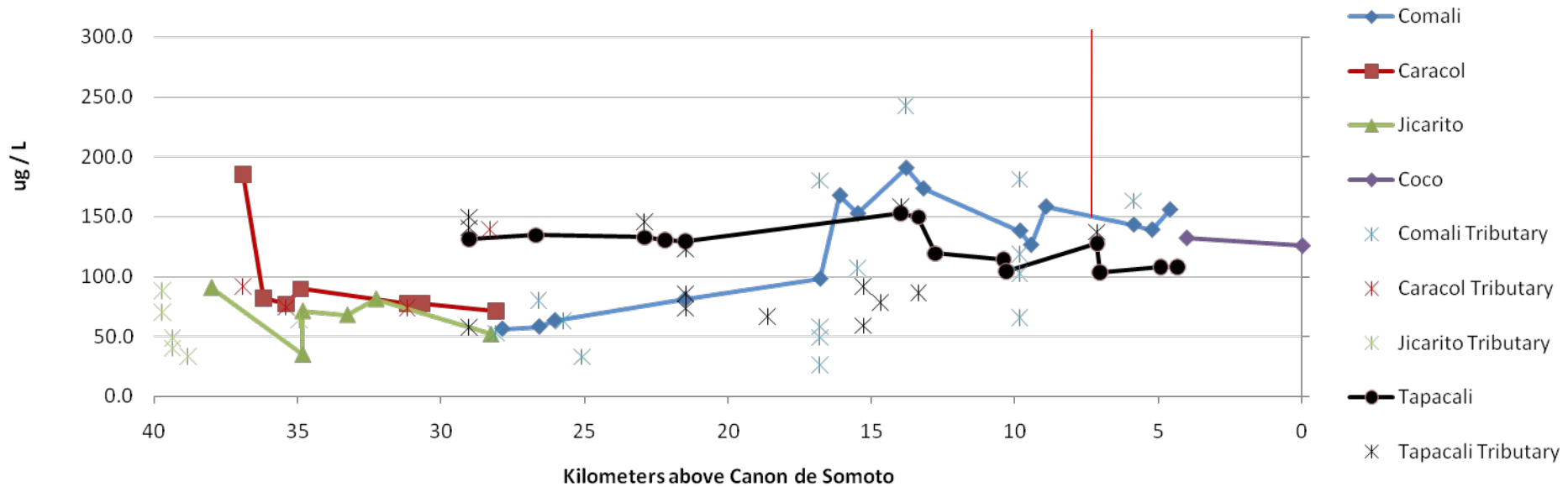
# Results: Nitrogen profile

## TN concentration 16-7-08

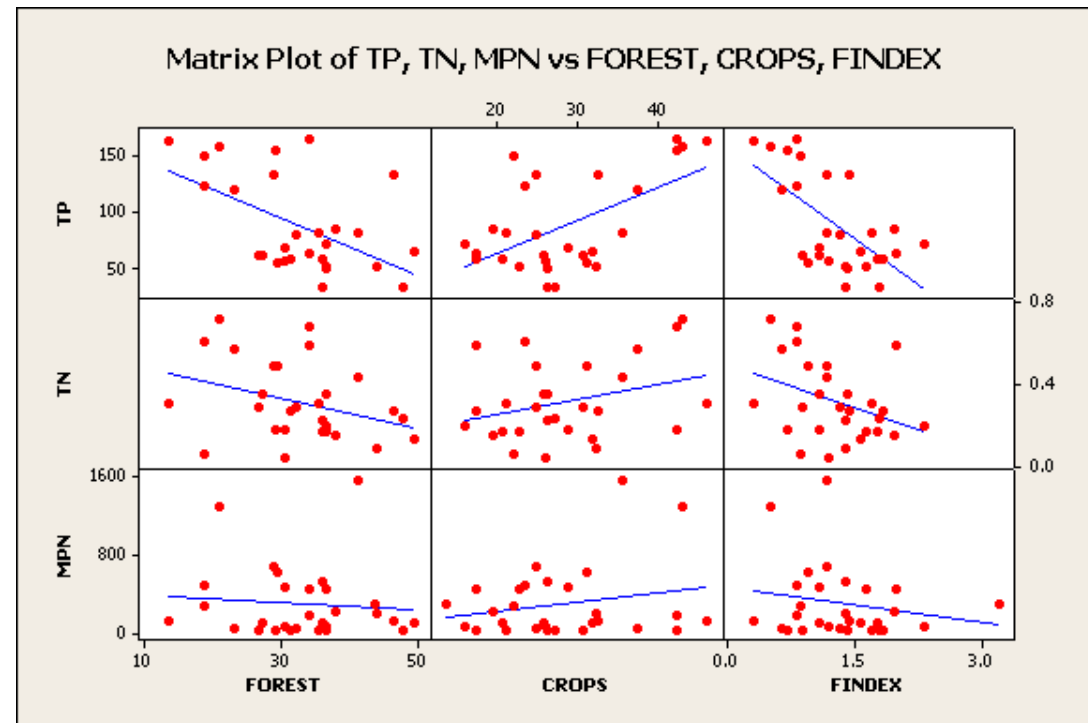
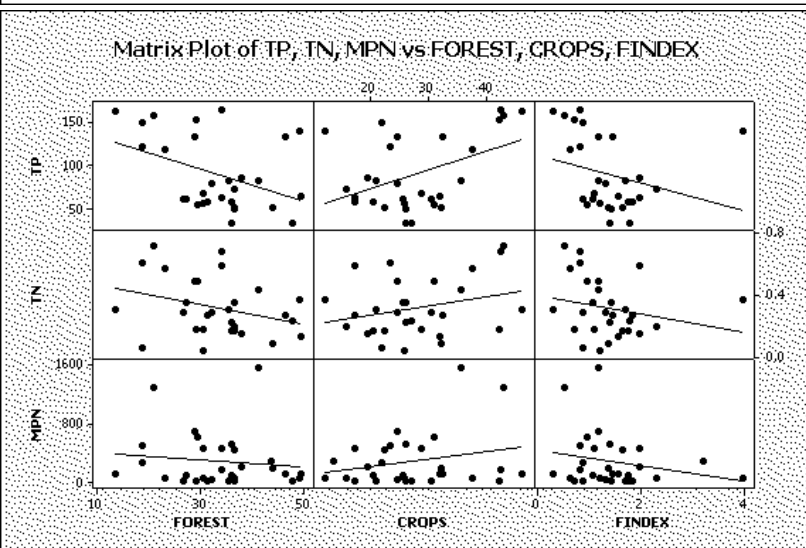
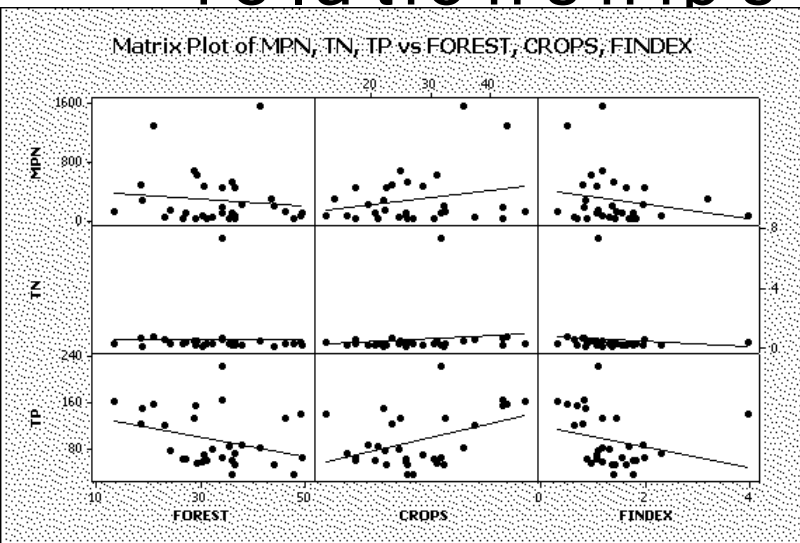


# Results: Phosphorus profile

## TP concentration 16-7-08



# Results: land use and water quality relationships in rural watersheds



# Implications of Results

- High P
  - N limitation and P saturation?
  - Role of orthophosphates?
- Damming of cleaner tributary to Lajas
- Need for treatment of San Marcos sewage



# B e n e f i t s o f a p p r o a c h

- C r o s s - b o r d e r s h a r e d a c t i v i t i e s
- D i r e c t s t a k e h o l d e r i n v o l v e m e n t
  - T r u s t b u i l d i n g
  - E d u c a t i o n a n d a w a r e n e s s
- D a t a q u a l i t y – i n c r e a s e d s i m u l t a n e i t y
- P o t e n t i a l f o r c o n t i n u e d m o n i t o r i n g

# Limitations of approach

- Reliability of sampling
  - Blanks, photos
  - Reproducibility of subjective measures:  
discharge

# Improvements and Extensions

- Storm flow concentrations
- Time series

# C o n t i n u i n g   w o r k

- B u f f e r   a r e a   t e s t i n g
- P e s t i c i d e   c o n c e n t r a t i o n s
- S e l f - c l e a n i n g   c a p a c i t y   ( c o n s e r v a t i v e   i o n s )
- O n - s i t e   c a p a c i t y   b u i l d i n g
- M a n a g e m e n t   r e c o m m e n d a t i o n s
  - N o n p o i n t   h o t s p o t   i n v e s t i g a t i o n s