Effects of seasonal hydrology and land use on in-stream *Escherichia coli* concentration in the lower Mekong basin, Lao PDR.

Presented by Paty NAKHLE

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Context & objectives

- Fecal contamination in tropical streams of South-east Asia
  - Limited access to safe drinking water
  - Inadequate hygiene practices
  - Lack of health infrastructure
  - Rapid climate and land use changes

- Fecal Indicator Bacteria (FIB) like *Escherichia coli*

Objectives:

- Examine seasonality of *E. coli* dynamics at watershed-scale in Mekong river and its tributaries in Lao PDR

- Identify environmental and anthropogenic key drivers
  - Hydro-meteorological regime
  - Physicochemical conditions
  - Human activities (land use, livestock and human densities)
Lao PDR
- 6.5 million people; mainly rural population (70%)
- Sub-humid climate (rainy/dry seasons)
- Average annual rainfall: 1300 - 3500 mm

Datasets:
- 2016 campaign during dry season (March) and rainy season (July): Mekong and 19 tributaries
- 2017/2018 regular sampling at 10 days interval: Nam Ou (Nou), Nam Suang (Ns), Mekong (MK17)

Parameters:
- E. coli, turbidity, total suspended sediments, total nitrogen, total particulate carbon, total nitrogen, pH, electrical conductivity, dissolved oxygen, temperature, slope, area, rainfall, land use, human and livestock density

Method: Partial least square regression analysis (PLS)
Main results

- Seasonal variability of *E. coli* concentration with higher values occurring during wet season in response to rainfall events (overland flow and resuspension)

- Strong correlation with in stream suspended solids (attached bacteria), and unstocked forest area (vulnerable to erosion processes)

- Indirect impact of *E. coli* primary sources, human & livestock, on fecal contamination of water (urban-rural disparities in improved sanitation facilities, diffuse sources)
Conclusion

- Continuous fecal contamination in surface water on which rural population directly depends
- Importance of adequate land management in tropical context to reduce soil loss and water quality degradation
- Need to better assess the environmental fate and transport of fecal contamination through field monitoring at various spatial and temporal scales

Thank you for stopping by
Questions are welcomed!
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