

Water Quality Studies in the Vientiane Plains

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BACKGROUND

- Lao PDR has abundant groundwater resources
- Only 60% of urban and 51% of rural population have access to piped water supply (WRI, 1998)
- Use of packaged water is prevalent even in rural areas
- Shallow groundwater – prone to pollution
- Arsenic pollution reported in southern Laos
- Hardness and chloride – minor issue in Vientiane basin (Perttu et al. 2011)
- Limited data is recorded for assessment
- Access to clean water can contribute towards poverty reduction in rural communities (Ribolzi et al. 2001)

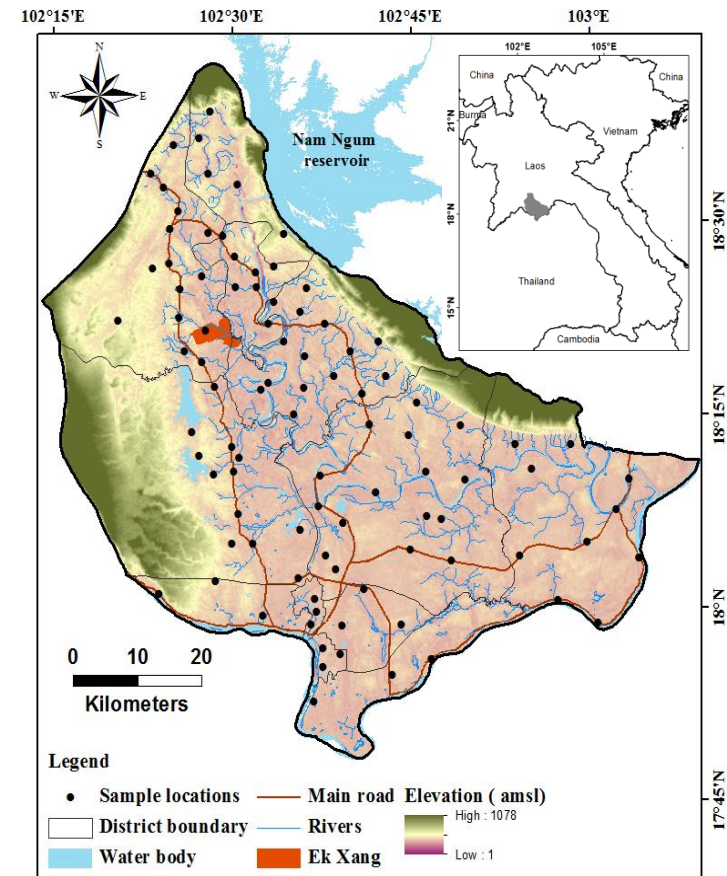
OBJECTIVES

- Vientiane plains
 - Water quality
 - Soil quality
- Ek Xang
 - Water quality- detailed assessment



METHODS

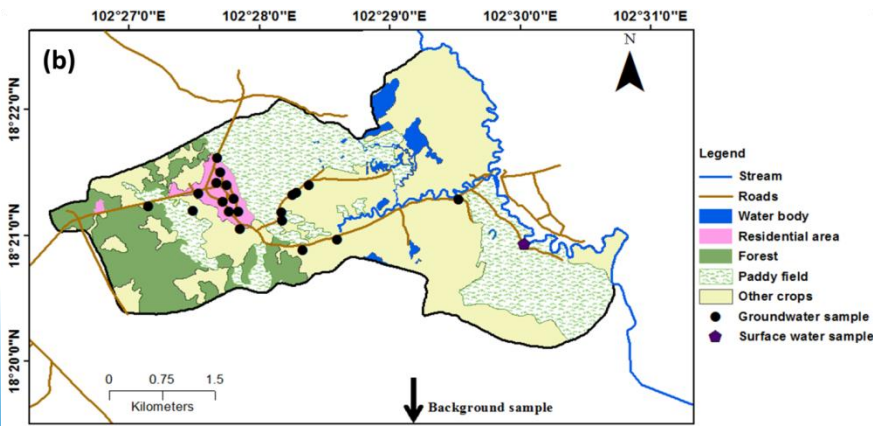
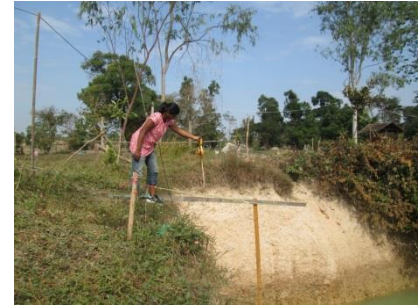
- Vientiane plains
 - Rapid assessment
 - 95 villages
 - Water and soil samples
 - Target open wells
 - In-situ testing
 - Field kits
 - Water : 7 parameters
 - Soil : 9 parameters



METHODS

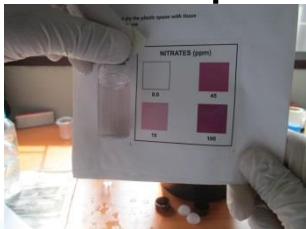
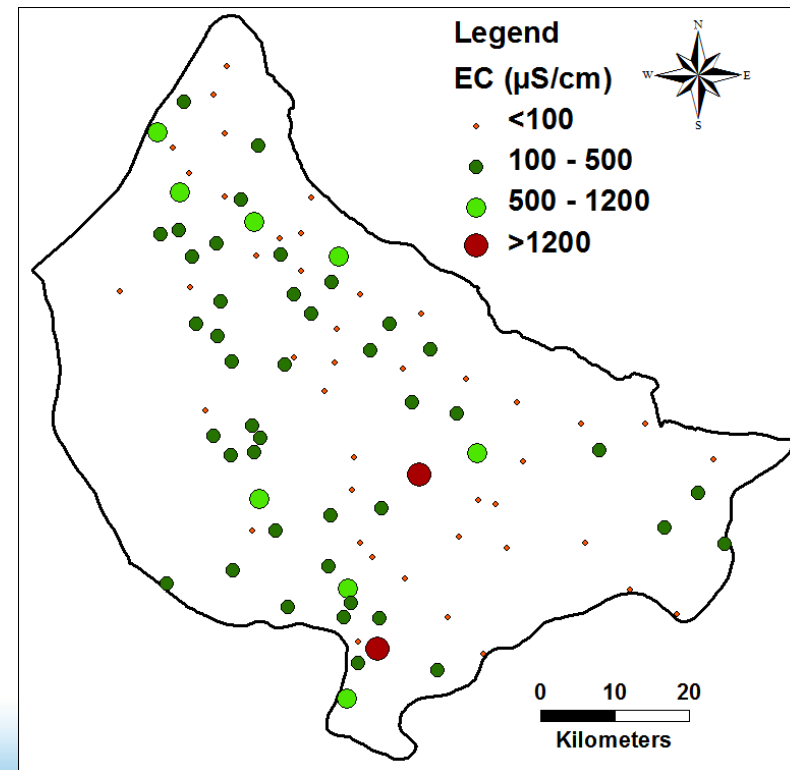
- Ek Xang

- Water samples
- Inventory survey in Dec 2014
- Subsequent sampling – Jan and May 2015
- Background sample – 5 km from village
- One bottled water sample
- Major ions and heavy metals analysed



RESULTS

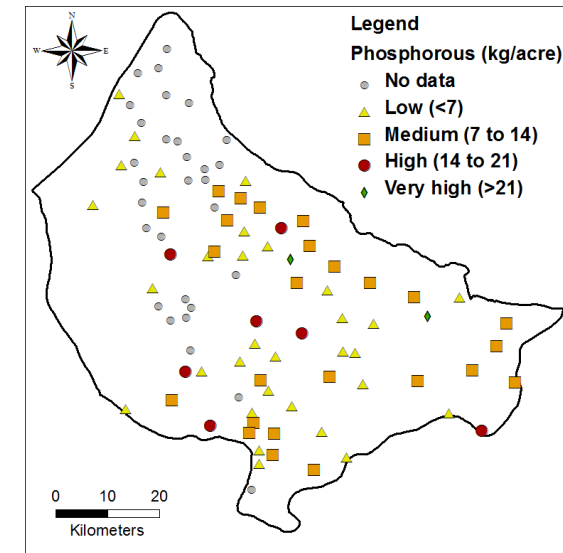
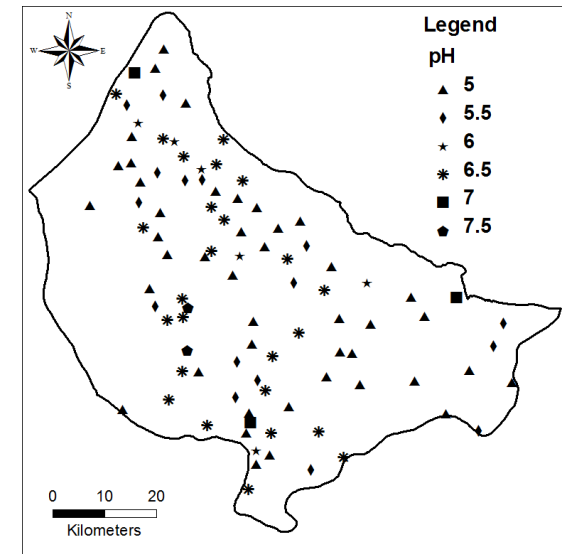
- Groundwater not used for drinking except 6 villages
- Maximum depth to water level- 9 m
- Acidic groundwater at most areas
- EC and chloride high in 2 locations – source from marine rocksalt
- Nitrate – 2 locations- fertilizer impact
- Faecal coliforms- 7 locations – impact of sewage contamination
- Arsenic, iron, fluoride- no hazard at present levels



Students: Mr. Toumeyang Khaeyang and Mr.Lengya Valee,
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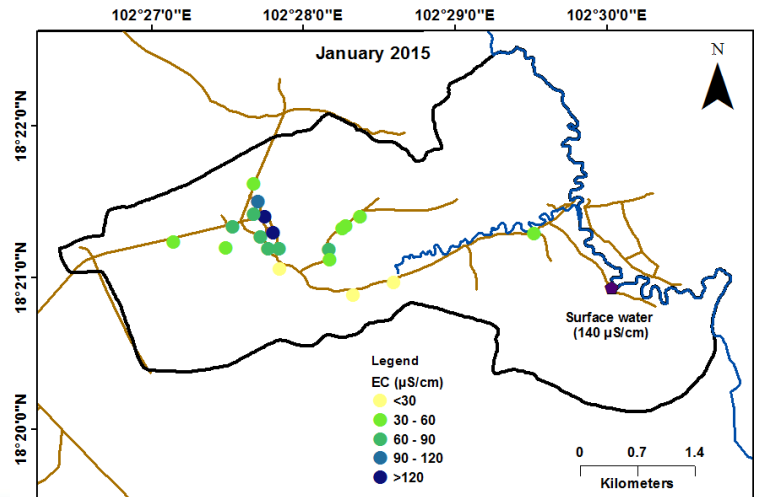
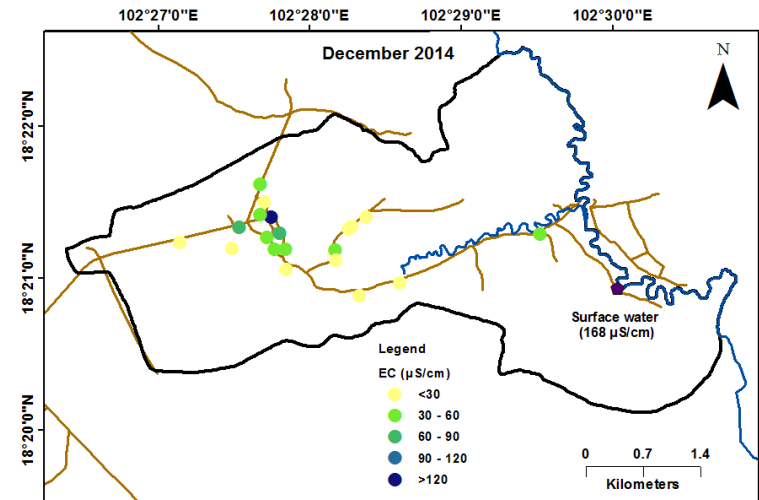
RESULTS

- Acidic soil (5 to 7.5)
 - Acidic soil can cause toxicity due to certain minerals and affect soil microbial growth
 - Accelerated by use of ammonium based fertilizer
- Sulphate is high, still at no-hazard range
- Ca, Mg, K, PO₄, N compounds- no deficiency nor any threat



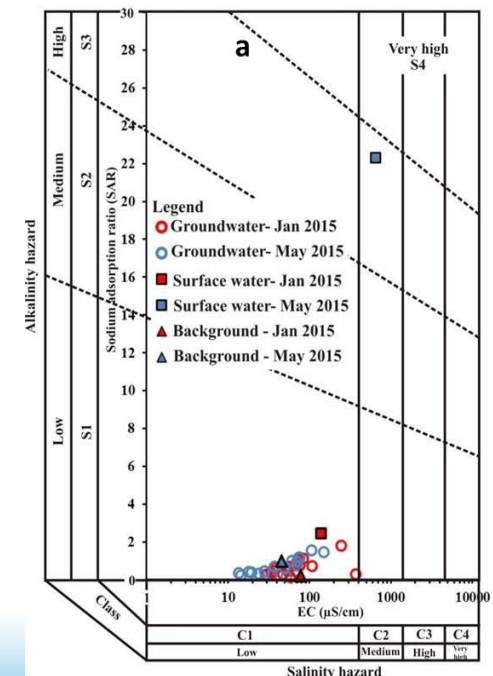
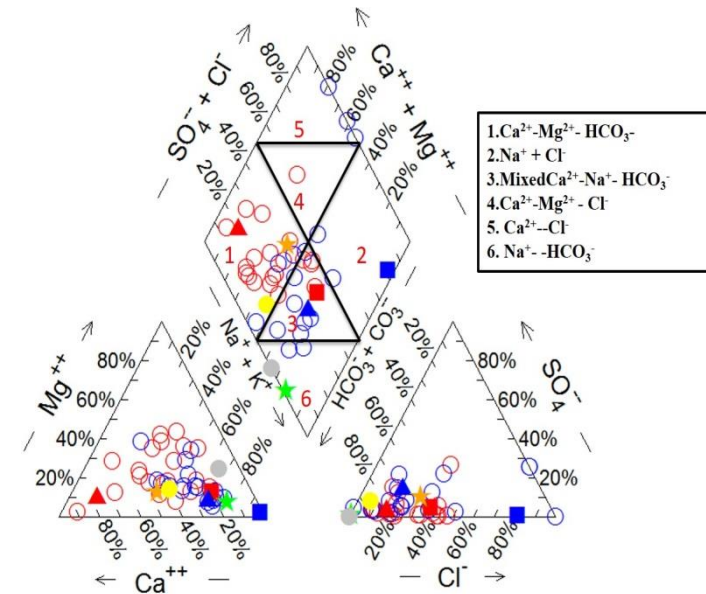
RESULTS

- Groundwater used for drinking only in 4 HH
- Water level deeper in central part i.e. residential areas
- Acidic waters, moderately hard
- Maximum EC was 463 $\mu\text{S}/\text{cm}$



RESULTS

- Ca-Mg- HCO_3 and mixed Ca-Na- HCO_3 - dominant groundwater types
- Groundwater within drinking water standards (WREA 2009)
- Lead in groundwater in Dec 2014, but lack of seasonal correlation
- Groundwater good for irrigation
- Background sample similar to Ek Xang
- Bottled water – within standard limits



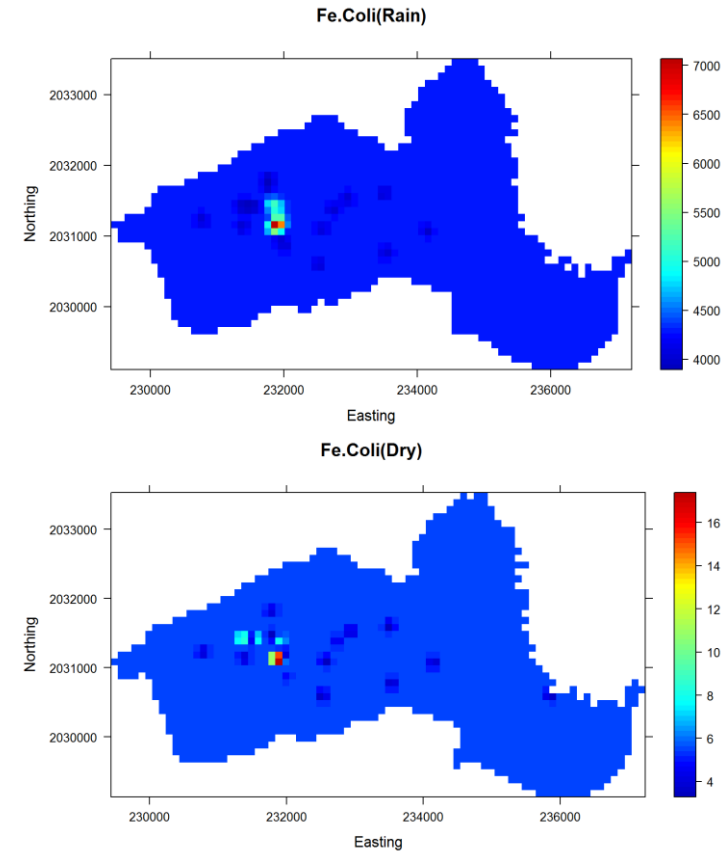


RESULTS

Masters thesis: Chindavanh Souriyapahck (ONE), 2016



- Sept and Dec 2015
- 7 parameters – all within WREA limits
- Faecal coliforms – both in dry (up to 35,000 MPN/100ml) and wet season (up to 54 MPN/100ml)
- Poorer water quality in residential areas



LIMITATIONS

- Rapid assessment of large area
- Concentration of ions given only as a range
- Heavy metals, pesticides not analysed
- Temporal data not collected

SUMMARY

- Water quality overall good except in few villages
- Faecal coliform- major threat
- Soil quality – neither threat nor deficient

RECOMMENDATIONS

- Using field kits is a rapid and inexpensive way to be informed of the status of water and soil
- Parameters to be included in regular monitoring for GW– pH, EC, nitrate and coliforms
- Due to presence of agricultural impacts need to study heavy metal and pesticide pollution in Vientiane plains
- Important to monitor the soil pH regularly to avoid further acidification which may affect the occurrence of ions in soil and their uptake by plants



Questions??

ຂອບໃຈຫຼາຍໆ
Thank you