FACULTY OF BIOSCIENCE ENGINEERING

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FROM SEDIMENT TO CONSUMER: RISK ASSESSMENT OF POLLUTANTS PRESENT IN THE GUAYAS ESTUARY AND RED MANGROVE CRABS IN ECUADOR

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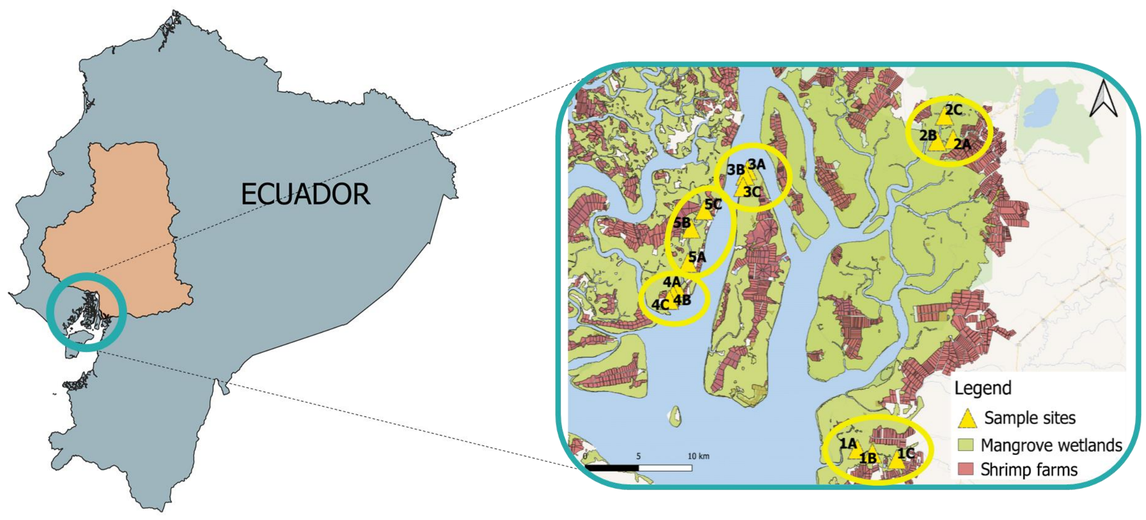
Introduction

Mangrove forests provide essential ecosystem services such as coastal protection and food production. However, contamination by metals and pesticides caused by industrial and agricultural activities is an issue of growing concern for mangroves in Ecuador. In this study, the levels of pesticide residues and metals were investigated in red crab (*Ucides occidentalis*) tissues and its habitat (sediment, leaves, and water) in the Guayas estuary, Ecuador. The results presented are an important step towards raising awareness about the ongoing contamination of important ecosystems, the associated food products and the corresponding consequences for the environment and human health around the world.

Method

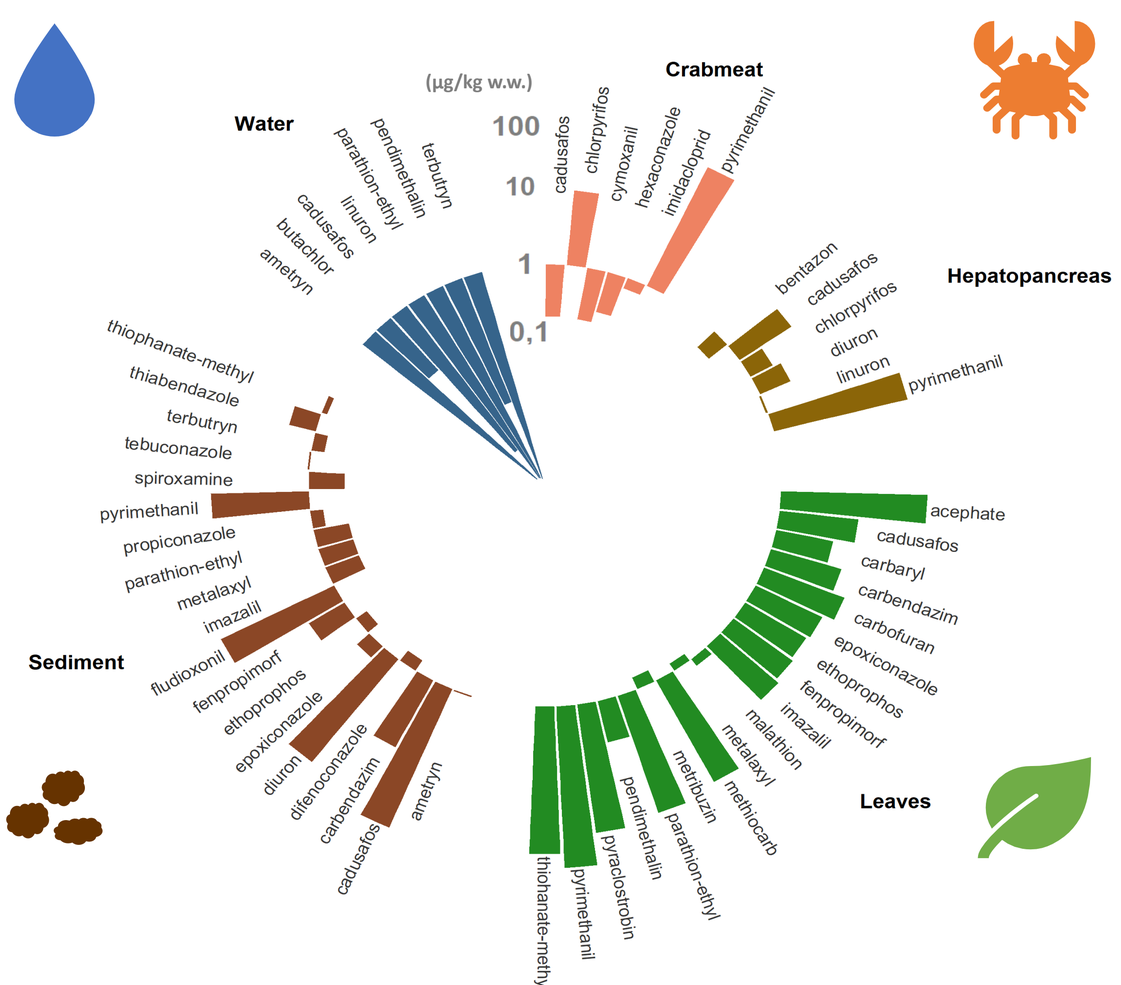
- Within the Guayas Estuary, 15 sampling sites were selected.
- At each site:
  - Collection of **water**, **sediment**, **leaves** and **crab samples**

  - Assessment of **88 pesticides** through GC-ECD and LC-MS/MS
  - Assessment of **8 metals** through ICP-MS (Cu, Ni, Cr, As, Pb, Cd, and Hg) and ICP-OES (Zn)
- Ecotoxicological risk analysis
- Probabilistic consumer risk assessment



Results 1 – Pesticides

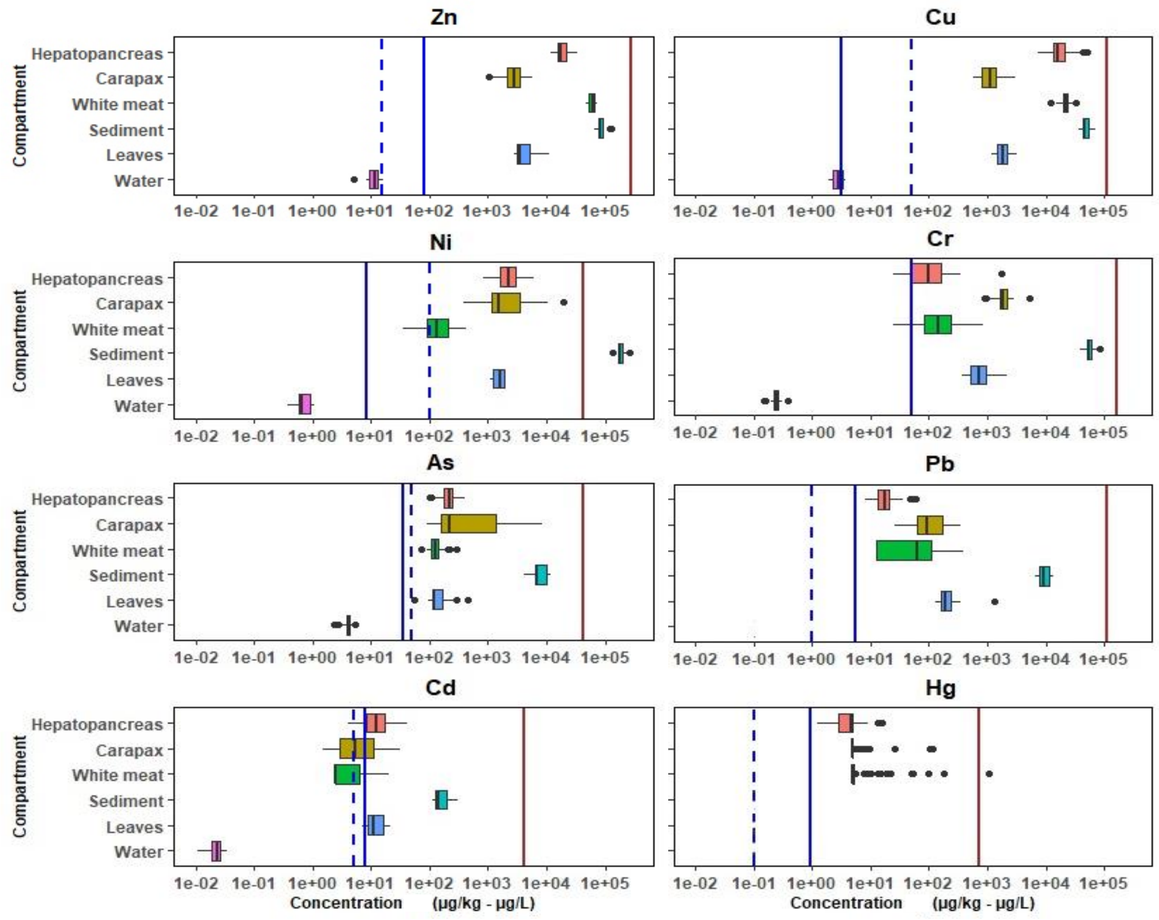
- **35 pesticides** detected throughout the Guayas estuary (including mangroves).
- **Cadusafos, diuron, and carbendazim** posed the highest potential aquatic health risk.
- The health risk for crab consumers due to the presence of pesticide residues is **low**.



Pesticide concentrations in crab tissues, leaves, sediment, and water samples (in µg/kg wet weight).

Results 2 – Metals

- **Elevated Ni concentrations** in the mangrove sediments could lead to potential adverse health effects for sensible aquatic organisms.
- The **presence of As** in the crabs generated potential concerns on the consumers' health.



Metal concentrations in crab tissues, leaves, sediment (in µg/kg dry weight), and water samples (in µg/L). Vertical lines indicate Probable Effect Level for sediment (brown), Criterion Continuous Concentration for water (blue), and the national legislation thresholds for metals in water (dashed blue).

Conclusion

- A **monthly limit** of **eight crabs** for adults and **four crabs** for children is advised based on the As concentrations in the crab tissues. This threshold is proposed as a first advise for crab consumption, until more evidence is generated.

References

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