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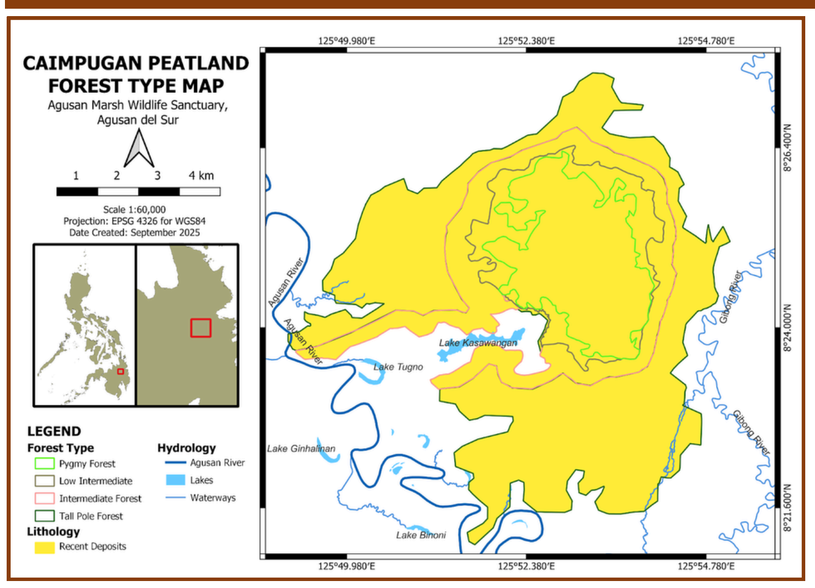
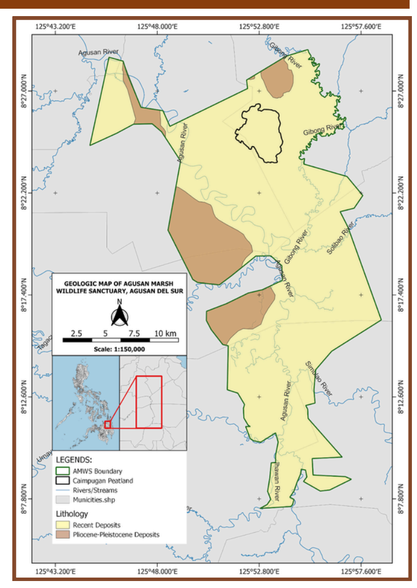
# Investigating Redox Geochemistry and Peat Soil Characteristic of the Caimpugan Peatland, Agusan Marsh Wildlife Sanctuary: Implications for Carbon Sequestration

Matt Andrew Graban[1]*,Jasey Jay C. Yu[1]*, Shaira E. Balidoy[1], Nichole Anthony D. Pacle[1] and Chandeuon Eng[2]

[1]Department of Geology, College of Engineering and Geosciences, Caraga State University, Butuan City 8600, Philippines
[2]Faculty of Geo-resources and Geotechnical Engineering, Institute of Technology of Cambodia
*Corresponding Authors: mattandrew.graban@carsu.edu.ph, jaseyjay.yu@carsu.edu.ph

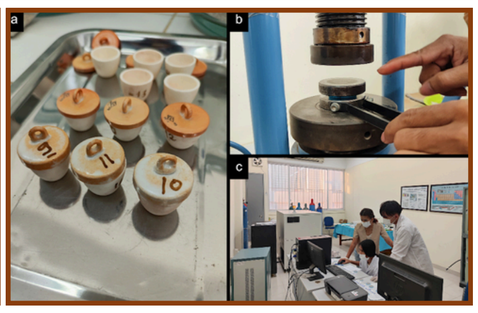
## INTRODUCTION & AIM

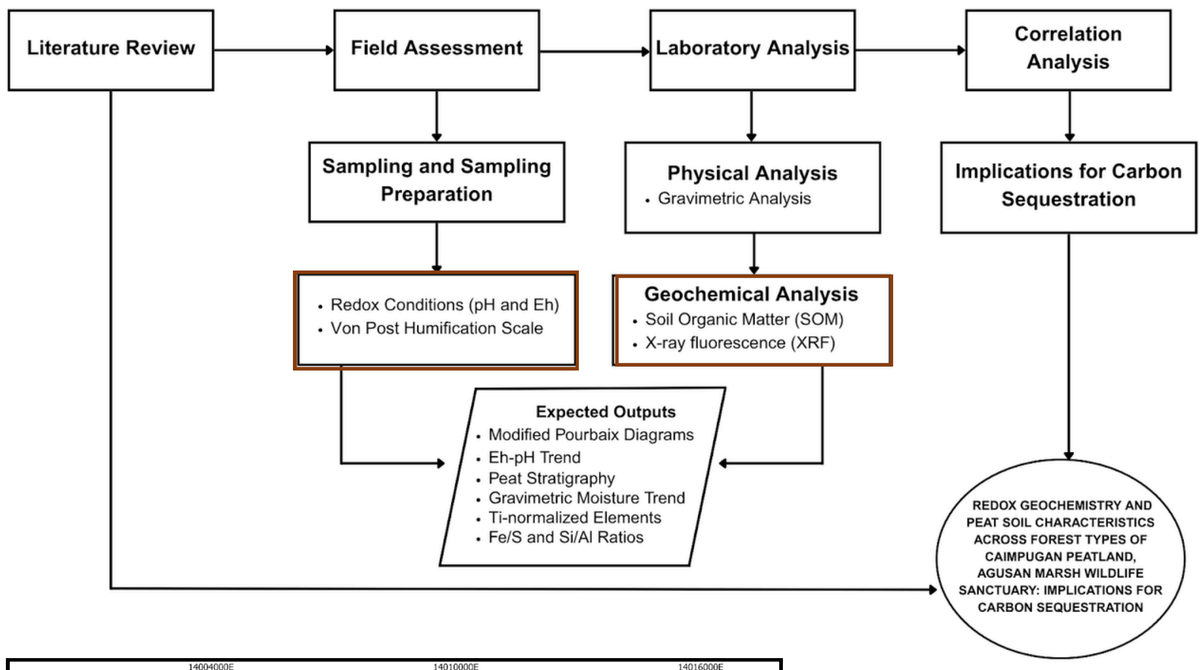


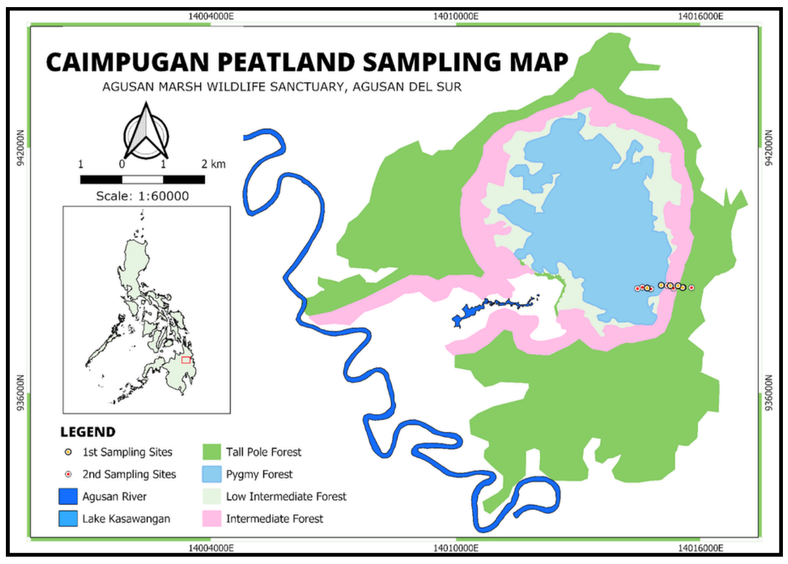




This study examines **Eh–pH redox conditions** and associated peat physical and geochemical properties across depth and forest types, assesses **depth-related redox zonation** and its relationship with peat maturity, moisture, organic matter, and elemental composition, and evaluates their **implications for carbon sequestration.**

## METHODS

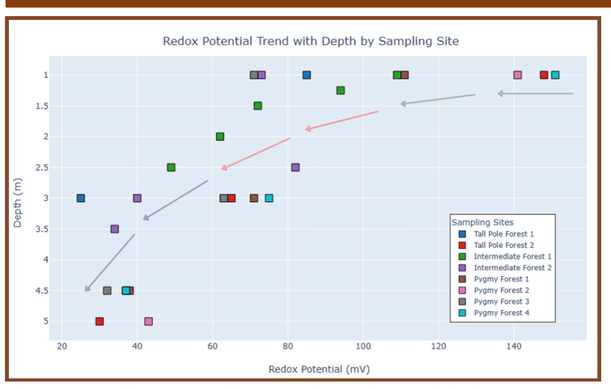


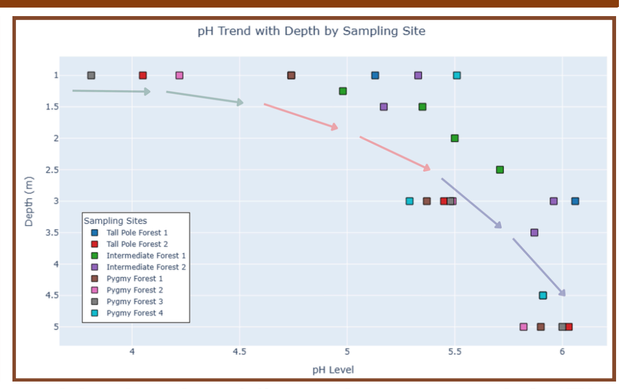


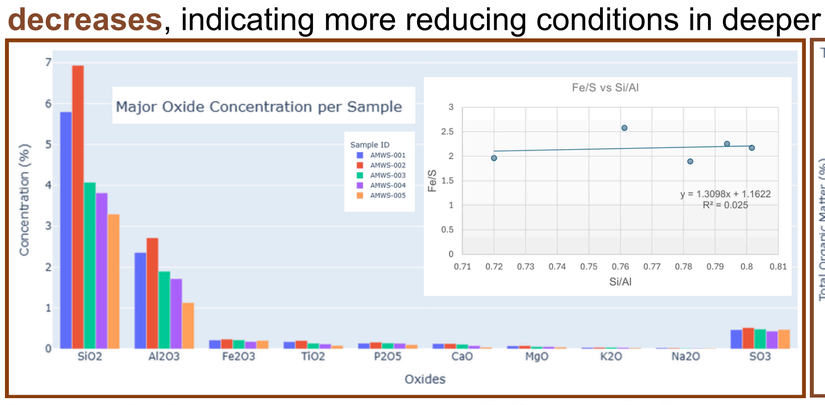

Field and laboratory analyses evaluated the redox geochemistry of Caimpugan peat soils. **pH and Eh** were measured using an ORP meter, peat maturity by the **Von Post Scale**, **moisture content** by oven-drying, **organic matter by LOI**, and **major oxides by XRF** to assess properties related to carbon sequestration.

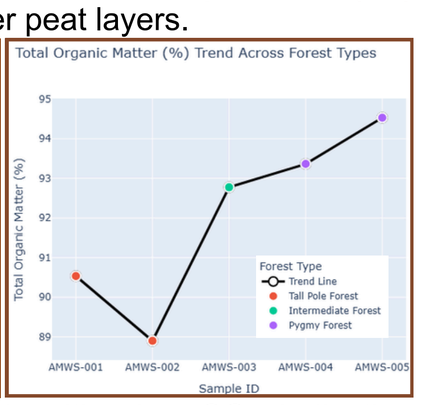
## RESULTS & DISCUSSION



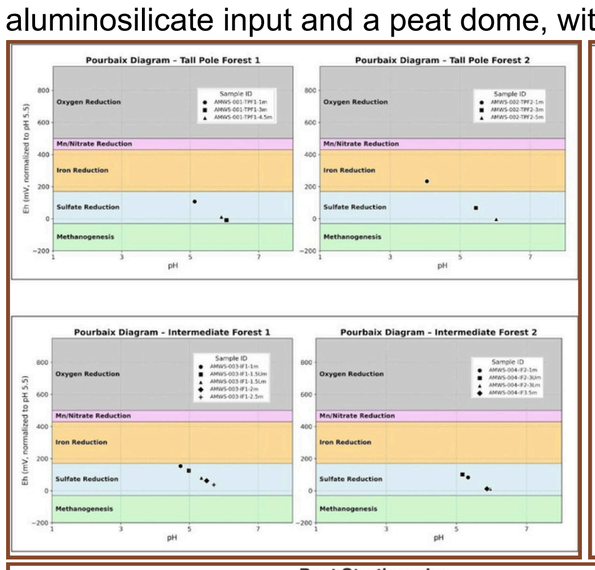



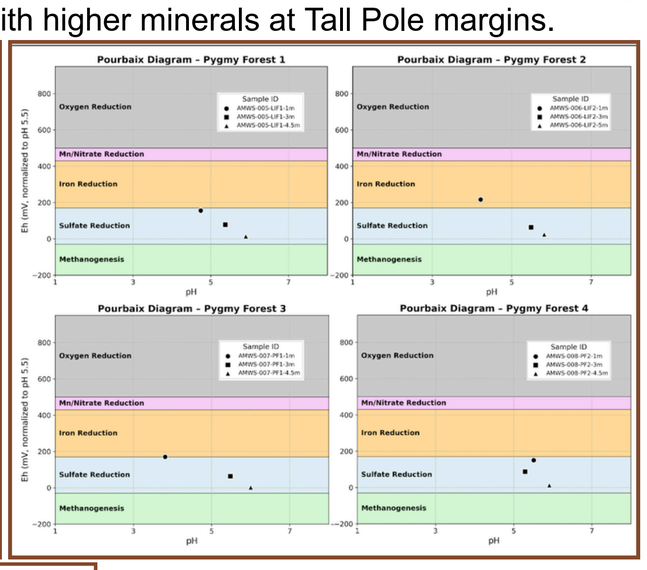

Across forested peatlands, **pH increases with depth** while **redox potential (Eh) decreases**, indicating more reducing conditions in deeper peat layers.

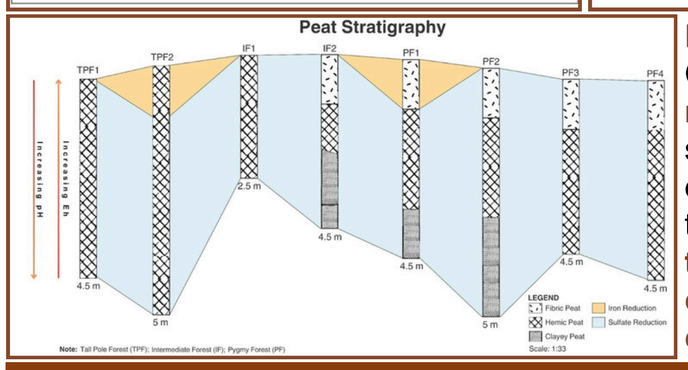



**C-organic increases centrally**. $SiO_2$ and $Al_2O_3$ dominate with minor $SO_3$, indicating aluminosilicate input and a peat dome, with higher minerals at Tall Pole margins.




**Low-Eh anoxic conditions** in Caimpugan Peatland **drive iron reduction and sulfur enrichment**, stabilizing thick Hemic peat and enabling carbon storage. However, this carbon sink remains **vulnerable to hydrological disturbance** and **climate-driven environmental change**.

## CONCLUSIONS

The Caimpugan Peatland is a significant, stable carbon reservoir, with thick hemic peat layers preserved by permanent waterlogging and acidic, anoxic conditions. Sulfate reduction stabilizes carbon, delaying methane release, while intense chemical weathering enriches sulfur. However, deep peat layers are nearing methanogenesis, highlighting potential vulnerability in long-term carbon stora

## FUTURE WORK / REFERENCES

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*In acknowledgment of the support provided by these institutions.*