DEVELOPMENT OF A FRESH WATER LENS ASSESSMENT PROTOCOL FOR KARST ISLANDS: A CASE STUDY; BANTAYAN ISLAND, CEBU PROVINCE, PHILIPPINES

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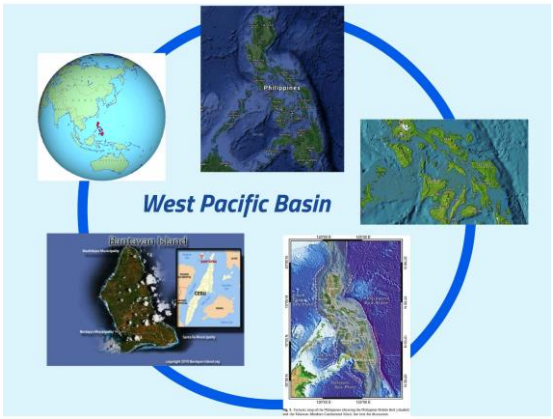

Presentation Structure

- My Background
- Aims and Objectives
- The Problem
- Research Questions
- Research Methods
- Project Status
- Research Schedule and Work Plan
- Questions

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- Academic:
  - BS: Geology University of Rhode Island
  - MA: West Chester University
  - Research: Loughborough University (CBE/WEDC)
- Professional
  - Aquaterra Technologies Inc.: Environmental Characterization and Remediation Consulting Corporation
- Volunteerism-Appointments
  - Engineers Without Borders USA
  - Stroud Water Research Center
  - National Groundwater Research and Education Foundation

Research Aim

- Assess the impact of Salt Water Intrusion on karst island water resources through the application of a Freshwater Lens Assessment Protocol integrated into a Participatory Adaptive Water Resource Management framework for Stakeholder engagement.

Research Objectives

EXAMINE	•The influence of land development & Anthropogenic Climate Change factors on the availability of water resources on karst islands (non-invasive techniques will be applied).
UNDERSTAND	•The extent to which local stakeholders are aware of the sustainability of the Freshwater Lens (a community based survey will be developed and administered at the village level). •The position of Municipal, Provincial and National Government Leaders (Semi-structured Interviews will be developed & administered).
DEVELOP	•A systematic methodology to evaluate the Freshwater Lens titled: Freshwater Lens Assessment Protocol (FLAP)
ASSESS	•The hydrogeologic environ and the interaction of precipitation & aquifer recharge (a Hydrogeologic Characterization Plan will be developed).
EVALUATE	•The distribution of Salt Water Intrusion to the aquifer beneath karst islands (a Groundwater Monitoring Plan will be designed and implemented).
INVESTIGATE	•How stakeholders could play an active role in a local groundwater awareness program emphasizing Participatory Adaptive Water Resource Management principles.

Problem Statement

* The water resources beneath karst islands is poorly understood, resulting in the unsustainable management of the natural resource. The path forward to arrest the scenario is through the application of refined scientific assessment protocols and utilizing appropriate concepts of Adaptive Water Resource Management.

Vulnerability & Adaptation

* Salt Water Intrusion can be characterized as the most widespread and important process impacting water quality on the planet.
* The problem is intensified due to population growth and the fact that ~ 70% of the worlds population occupy coastal regions. (J. Bears et.al. (eds.) 1998)

Hydrogeologic Regime

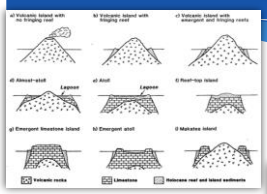


Figure 1. Main types of mid-oceanic islands in the Pacific. (Woodroffe, 1989).

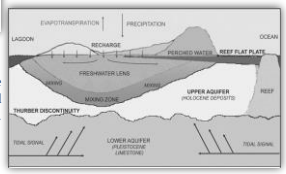
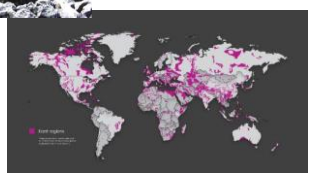


Figure 2. Conceptual model of the hydrogeology of an atoll island (after Ayers and Vacher [1986]).

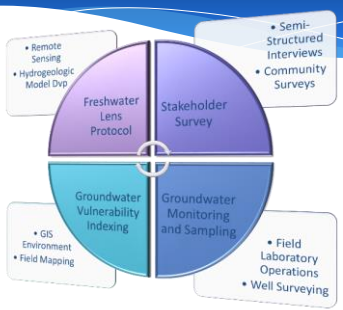
Global Karst Regions



Research Questions

* What is the morphology of the Freshwater Lens beneath Bantayan Island?
* What is the configuration of the saline plume?
* How does Anthropogenic Climate Change and Land Development effect aquifer recharge and the associated water resources?
* What is the sentiment of Stakeholders on the issues surrounding Water Resource Management?
* Can a non-invasive tool be applied to yield viable output on the characteristics of the Freshwater Lens?

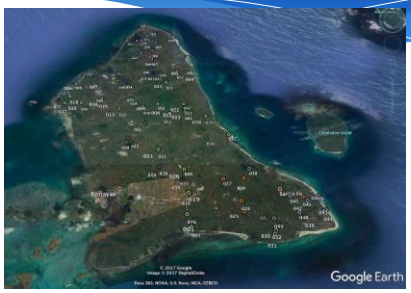
Research Methods



Project Status

- Literature Review progresses towards finalization of my Research Plan.
- Field reconnaissance for well field inspection, Stakeholder meetings, and signing of Memorandum of Agreement with Municipal Government.
- Collegial relationship has been secured with Cebu Technological University and the University of the Philippines, to support field equipment needs, analytical services and technical resource guidance.
- Freshwater Lens Assessment Protocol Development.
- Survey Instrument Development for Stakeholder Assessment.
- Semi-Structured Interview Instrument development for Stakeholder Assessment.

Bantayan Island Well Field



Elevation Survey

Island Geomorphology

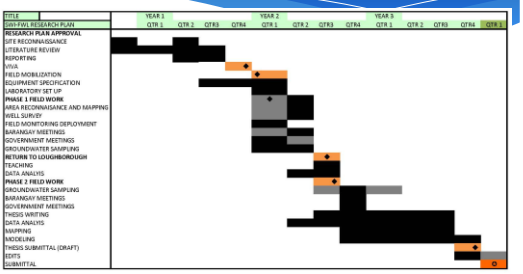
Island Geomorphology

Freshwater Lens Discharge Point

Typical Private Well

Laboratory Operations

Research Work Plan



THANK YOU! QUESTIONS?