A Hydrogeology Course Structured Around a Community's Need for Understanding Groundwater Resources

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Quadra Island, BC

ICAN – (Quadra) Island Climate Action Network

- Water Security Team
- Questions about water resources
- Increased development and pressure on groundwater resources?
- Longer-term climate-related effects on hydrology?
- Motivated and engaged citizens
- Desire to take an active role in water management and decision making

Data: Aquifer 751





An opportunity for students...

- nearing graduation, many interested in 'environmental geoscience'.
- to work on a 'real' and complex problem
- to develop a project: questions, structure, data, management, deliverables
- an entry point into the application of sustainability
- pre-existing connections between VIU Earth
 Science and Quadra Island
- Let's build the course around this project!



The goal ...

 Develop a hydrostratigraphic model of sediment aquifers for the southern Quadra Island region

"Based on the available lithology... The mapped aquifer represents a lumped aquifer system rather than a single aquifer. Detailed mapping would be required to differentiate hydrostratigraphy and potentially identify multiple aquifer units within the extents of the mapped aquifer"

Hinnel et al. (2020)

Data: Aquifer 751



Data: Water Wells

- iMap BC
- Database structures
- QA/QC
- Quaternary Stratigraphic Framework

- Static water levels, well construction methods, drilling methods, etc.

Water Well Log Standardization

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drilled

- Reconciling well log descriptions with geology
- Geologically-informed standardization.
- 'Defendable' decisionmaking.
- Group work and collaborations

Sedimentary architecture and variabilityMaterial variability

- Variability within a stratigraphic unit (Quadra Sand)
- Sampling for estimates of aquifer parameters (mostly K)

Converting to Hydrostratigraphy

Building models...

... that raise questions

- Confined vs. Unconfined?
- Hydraulic windows in recharge areas and elsewhere
- Linking geomorphology, Quaternary processes, groundwater.

Building models...

Introduction to basic flow modeling using TopoDrive

Students are currently learning and using LeapFrog to build their hydrostratigraphic model.

In the coming weeks....

- Complete LeapFrog model
- Assess aquifer vulnerability using DRASTIC method
- Prepare the deliverables and present to Quadra Island community.

Wrap up the course by revisiting the starting questions and some future challenges

- What does sustainable groundwater management require?
 - Surface-groundwater interactions
 - What do you want/need to measure?
 - Targeted aquifer tests within a predictive framework
 - Governance (ICAN group question)