Groundwater Assessment Using Electrical Resistivity Geophysics – North East Viti Levu, Fiji Islands

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**Outline**

- Introduction and objectives
- Approaches used
- Site characterisation
- Location maps and results
- Implications to community-water supply
- Lessons learnt
- Project Update
- Key conclusions & Future work
Micro-projects Program (MPP)

- EU’s contribution to the decline in Sugar Industry
- Reshaped as TC Winston recovery fund
- 3 components:
  - Including Groundwater Assessment

Objective of Assessment:
- Identification of groundwater sources to strengthen the resilience of 6 disaster-prone communities
- Focus will be Qerelevu community assessment
Approach

• Desktop study
  – Hydrogeological Conceptual Model
  – Lineaments Analysis

• Site reconnaissance
  – Accessibility
  – Community visit and district officers
  – Water supply considerations:
    • Community extent
    • Exiting water supply facilities including tanks and boreholes

• Field survey
  – Geophysics survey design
  – Elevation survey
Field Assessment

- Geological characterisation
  - Geo and hydro reports
  - Database
  - Lineaments
  - Spacing & orientation guided by observed geological and structural targets

- Geophysics:
  - ABEM terrameter
  - Gradient Array
  - 3-5 m spacing

- Groundwater sampling of existing boreholes

- PPK survey using R10 Trimble GPS
Qerelevu – Site Characterisation

• Geology and hydrogeology
  – Fractured andesite flow & Interbedded sandstone along regional anticline
  – GW conceptual model

• Landuse and water demand
  – Extensive sugar-cane farming
  – High water cartage for portable purposes and irrigation

• Rainfall
  – Rain shadow effects
  – Average annual of 2100 mm & monthly CV range of 0.5 - 1
  – 30% less than Suva with a monthly CV of range 0.4 - 0.7
  – Drought vulnerability
Preliminary Results – Fracture Zones
Geological Contacts
Namau profile
Implications on Qerelevu Community Water Supply

• Several groundwater targets
• Drilling required for further assessment and for validation of these findings
• Community engagement/discussion required for
  – Design of water supply
  – Use of water (daily vs emergency source)
  – Maintenance & operation aspects
Lessons learnt to date

• Thorough desktop review and site reconnaissance is critical

• All technical surveys require community engagement:
  – Managing community expectation
  – Understanding community needs
Project Linkages

• 3 phases approach

   a. Assessment of GW potential and selection of drill targets
   b. Groundwater drilling, construction and evaluation
   c. Equipping bores with water supply reticulation & water governance
Conclusions and Future work

• High resolution subsurface profiles on vertical and horizontal dimensions:
  – Well-defined and localised groundwater-bearing zones pointing towards fractures or fissured system and geological contacts
  – Improved geological understanding
  – Supports conceptual model and improved hydrogeological understanding

• Identified several potential drilling targets

• Follow-up drilling is essential for validation and resource evaluation

• Community engagement with a focus on water use and governance
VINAKA VAKALEVU!!!!