American Water Works Association

SUSTAINABLE
Water Management Conference

2018

Water for our Island

How One Community Survived after Losing their Sole Source of Fresh Water

Water for our Island

Ron Gonzales, PE Island Life Engineering, LLC

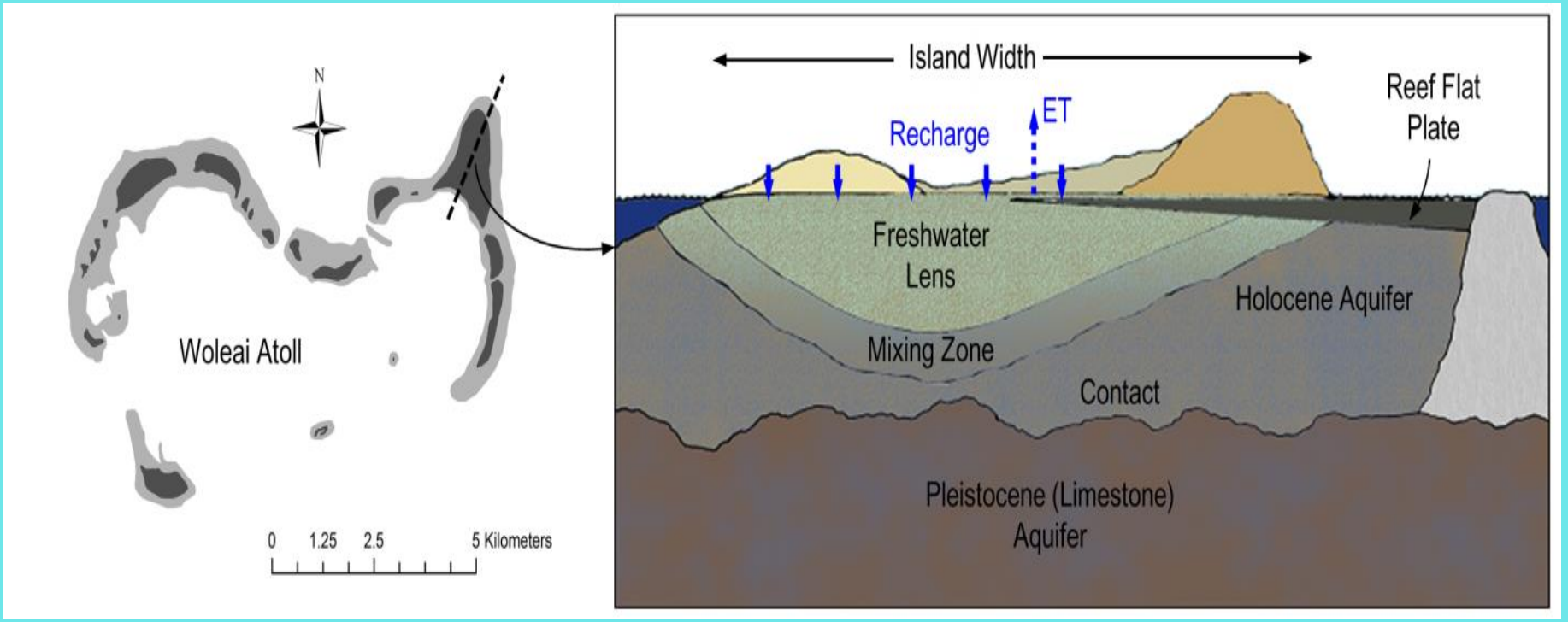
Kayangel Atoll, Palau

Photo by Wallpaperweb.org

How Kayangel Lost its Water Supply

Ngerimel Reservoir,
Airai, Palau

Atoll Hydrogeology



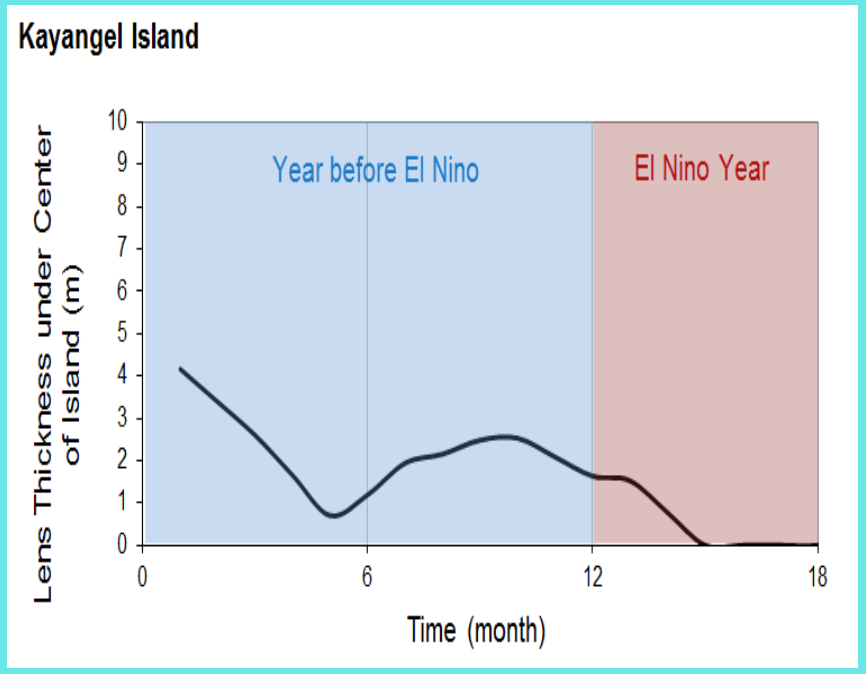
Conceptual model of atoll island hydrogeology (after Ayers and Vacher, 1986)

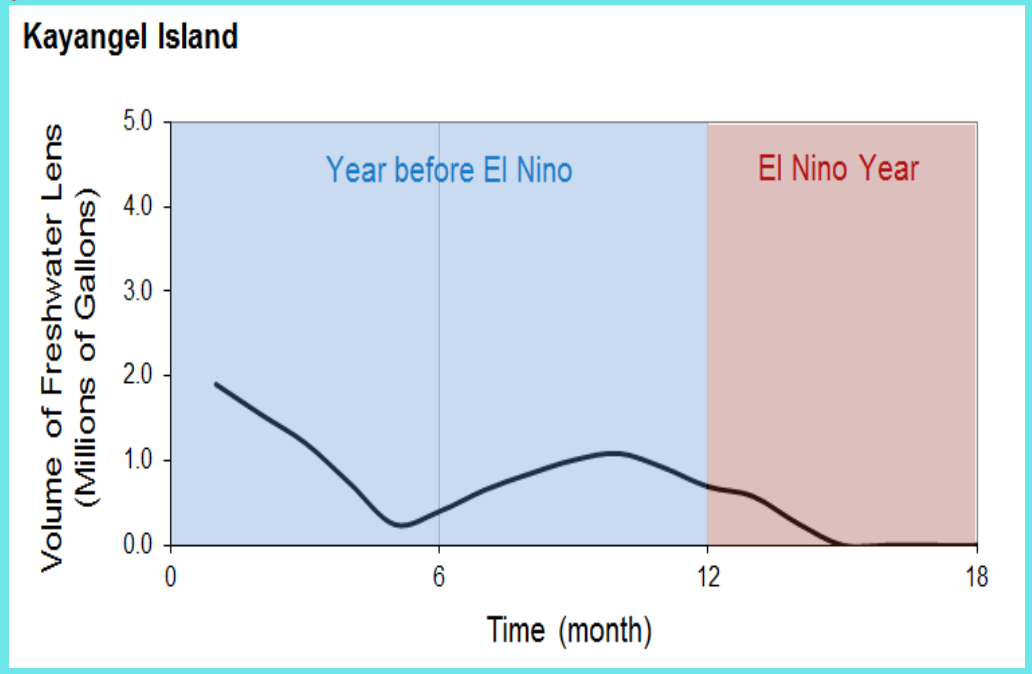
Climate Change Impacts

- 2013 Supertyphoon Haiyan
- 2016 Severe El Nino
- 2017 Mild El Nino
- Brackish water intrusion
- All potable water imported

Image by Oceania TV

Kayangel Freshwater Lens Depletion





Estimated (A) lens thickness under the northern section of Kayangel and (B) total lens volume during an El Nino drought, comparable to the 1998 drought. The estimates are calculated using a recently published algebraic model by Bailey et al. (2010) and Bailey et al. (2014)

Climate Change Adaptation

- Water Storage
- PV power to pumphouse & chlorination unit
- Connect desal unit to existing water system
- Rainwater catchment

Photo by Allied Pacific Environmental Consultants, Inc.

Technical Scope/Objectives

- Provide alternate potable water supply to 70 residents
- Restore fresh water lens
- Provide 3000g storage
- MMP (Mobile MaxPure)

Unit Provides 3500gpd potable water @ 20psi

(50gpd/capita)

30,000 TDS seawater to <1,000 TDS

Image by World Water & Solar Technologies

Kayangel Solution

- SPREP Grant Install tank and PV pump
- USDA Grant for portable PV desal unit
- Shut down groundwater lens for recovery
- Estimate 2 year recovery under normal rainfall/no typhoons

Photo by APEC, Inc


Questions?
Ke Kmal Mesulang!
Ron Gonzales, P.E.