Feasibility assessment: Lagoon dredging on Funafuti
Outline

• Motivation
  • The aggregates issue in the region
  • The issue in Tuvalu
• Methods used: why economics?
• Data
• Results and their all-important caveats
• So how did economics help? Why not just use an accountant?
The aggregates issue

**Aggregate**: “granular materials, such as sand, gravel, and rip-rap, used in construction” *(McKenzie et al. 2006)*

- Small island countries face a problem of aggregate shortage
- *Economic/Social demand*: growing urban centers
- *Environmental demand*: land reclamation, seawalls
- SOPAC studies in Kiribati, RMI
Some pictures…
Motivation: why economic study?

**DEMAND**
- Borrow pits, low-lying areas
- Construction, maintenance

**SUPPLY**
- Lagoon dredging

The solution?
- Insufficient amount
- Damages foreshore
- Not always legal!
- Expensive
- Quarantine risks
Proposed alternative: lagoon dredging

Potential lagoon supply:

- Mostly *Halimeda* and *foraminifera* sand
- Suitable for **nonstructural construction** and **filling the borrow pits**
- So could satisfy all environmental needs + some social needs

24 million m$^3$
Methods used

FINANCIAL ANALYSIS
Will a lagoon dredge make any profits?

ECONOMIC ANALYSIS
Will a lagoon dredge benefit the community?

SENSITIVITY ANALYSIS
What happens when something changes?
Data: How big is demand?

DEMAND

- Borrow pits, low-lying areas
- Construction, maintenance

566,000 m³ (Smith 1995)

6,300 m³ on average* per year (2007 SOPAC household survey, official records)

2,500 m³ per year (satisfied by dredge)

* excluding big development projects
Lagoon dredge alternative

Pilot Project

• 1992-1993
• dredged 1,000 m³
• 1994 Environmental Impact Assessment found that had little to no effect on lagoon environment
• filled borrow pit north of PWD
• that borrow pit now thrives

What about today?
Some assumptions

**HYPOTHETICAL PRESENT DAY DREDGE**

- Capacity: **23 000 m³/year**
- **Suction** dredge
- **25-year** life cycle

**HOW DO YOU SELL THE AGGREGATE?**

- **Two stockpiles**: (1) local construction demand, (2) borrow pit filling
- Lagoon aggregate sold at the **current Kaupule price for bags of aggregate**
Financial analysis: preliminary results

Profits are positive.

But.

These profits depend on the government’s commitment to using the aggregate to fill the borrow pits.
Profits **with** and **without** infilling (25 yrs)
Economic analysis: preliminary results

For a project that fills the borrow pits and fulfils construction demand, the economic rate of return is 12%.

Benefits include: lower expenditures on seawalls, lower expenditures on imports
Total economic benefits (25 yrs)

Year

AUD

infilling + demand
So how did economics help?

• We helped the Government of Tuvalu identify which were the main **issues which would impede or facilitate** the success of a lagoon dredge

• We alerted the Government of Tuvalu to **expected costs** associated with establishing a lagoon dredge (not just financial; i.e. “how much does a dredge cost?”)

• We noted the ways in which a lagoon dredge would **affect the market, and vice versa**
Fakafetai lasi!
Thank you!