

**GREENHOUSE 2011, Cairns Convention Centre,
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**Forgotten Places:
Pacific Island deltas and sea-level rise**

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Vulnerability of Deltas

- IPCC ranks heavily-populated river deltas as among the most vulnerable of the world's natural systems to climate change.
- IPCC characterizes such deltas as “hotspots of social vulnerability”.
- Focus on mega-deltas is pragmatic but excludes smaller densely-populated deltas.
- All such deltas are uncommonly fertile and bioproductive.
- All such deltas are experiencing human impacts that are affecting natural flood regimes and sedimentary processes.

Vulnerability of Pacific Islands

- Many regard Pacific Islands as being on the “front line” of climate change.
- Atoll islands are the most iconic of vulnerable islands which has historically resulted in less attention being focused on vulnerable locations on higher islands.
- Many higher-island coastlines are as vulnerable to climate change as atoll islands.
- It is not widely known that there are densely-populated deltas on some larger islands in the Pacific.
- These deltas are important to national and local livelihood sustainability, typically because they host large towns and key infrastructure (particularly airports) or because they produce food surpluses.

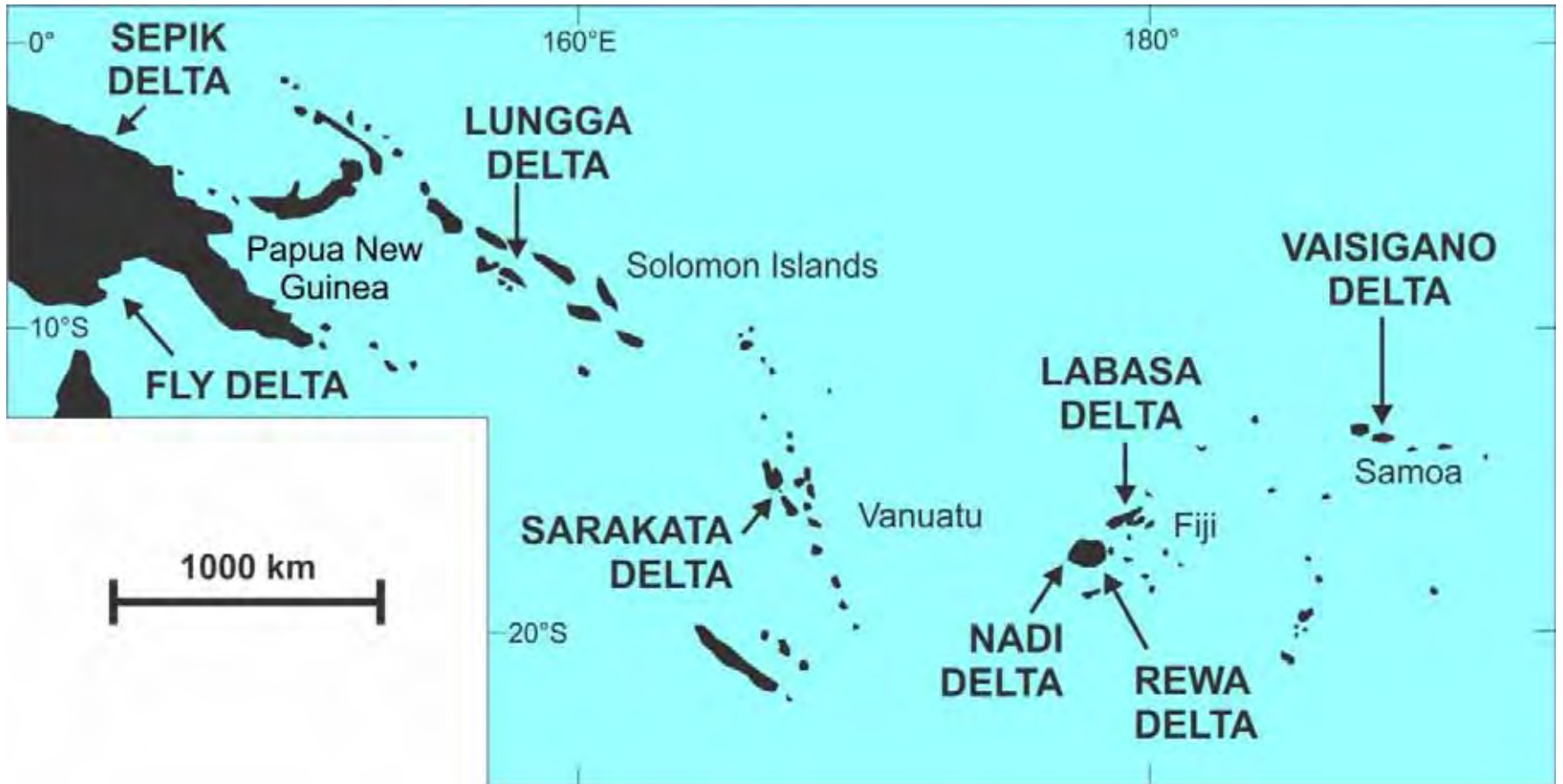
Organization of this Talk

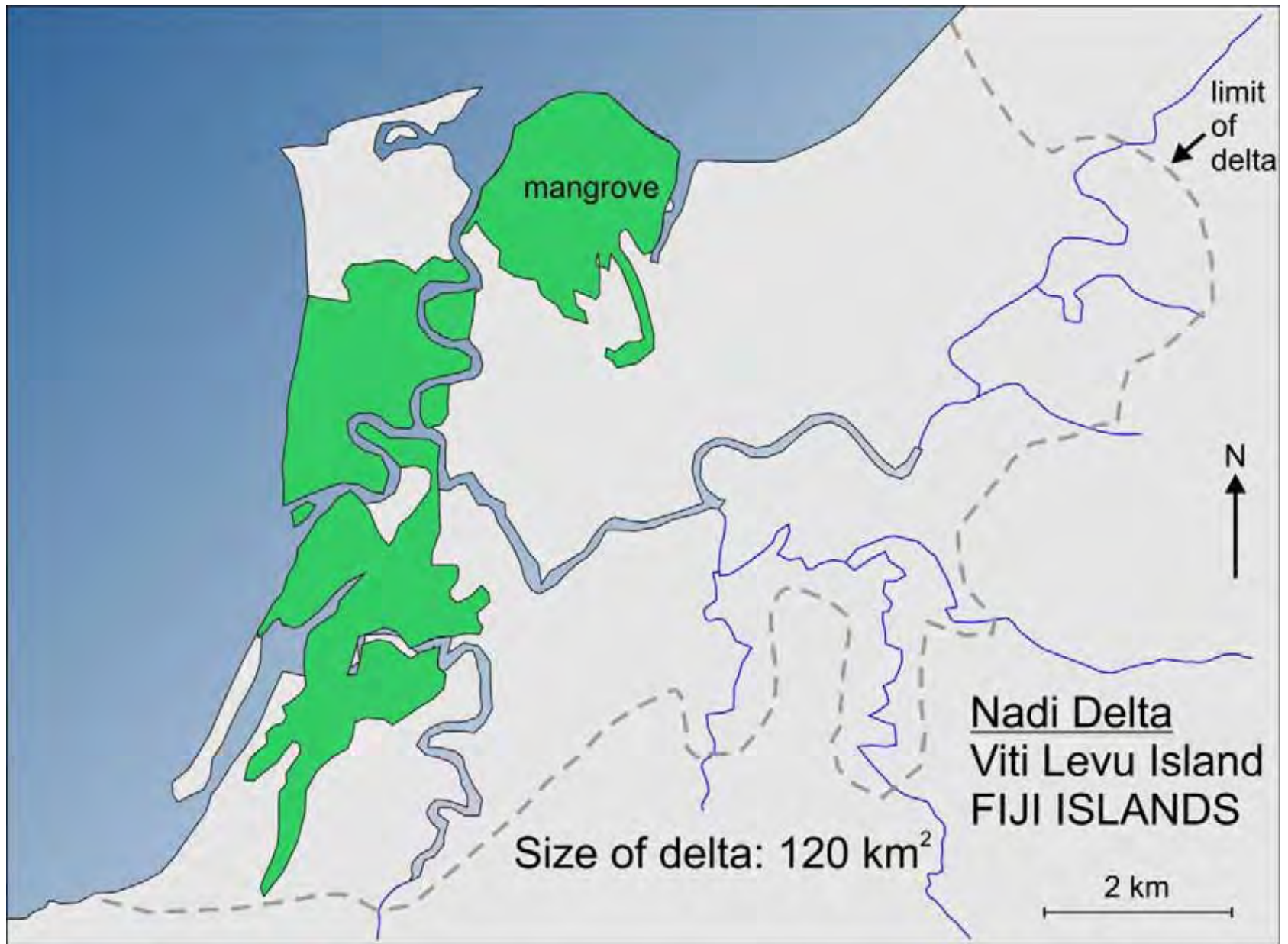
1. Pacific Island deltas: environment and population
2. Current issues for Pacific Island deltas
3. Future of Pacific Island deltas

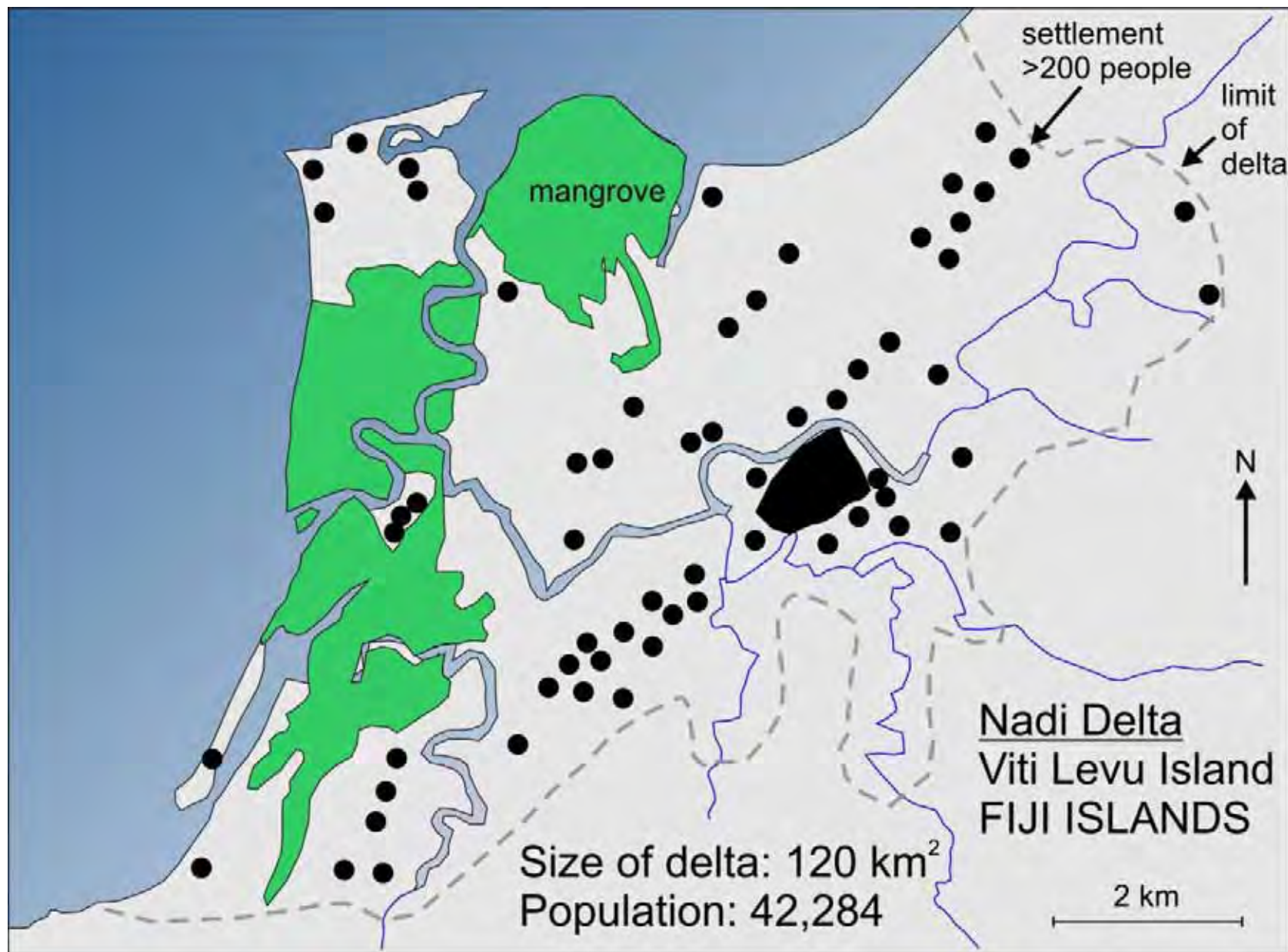


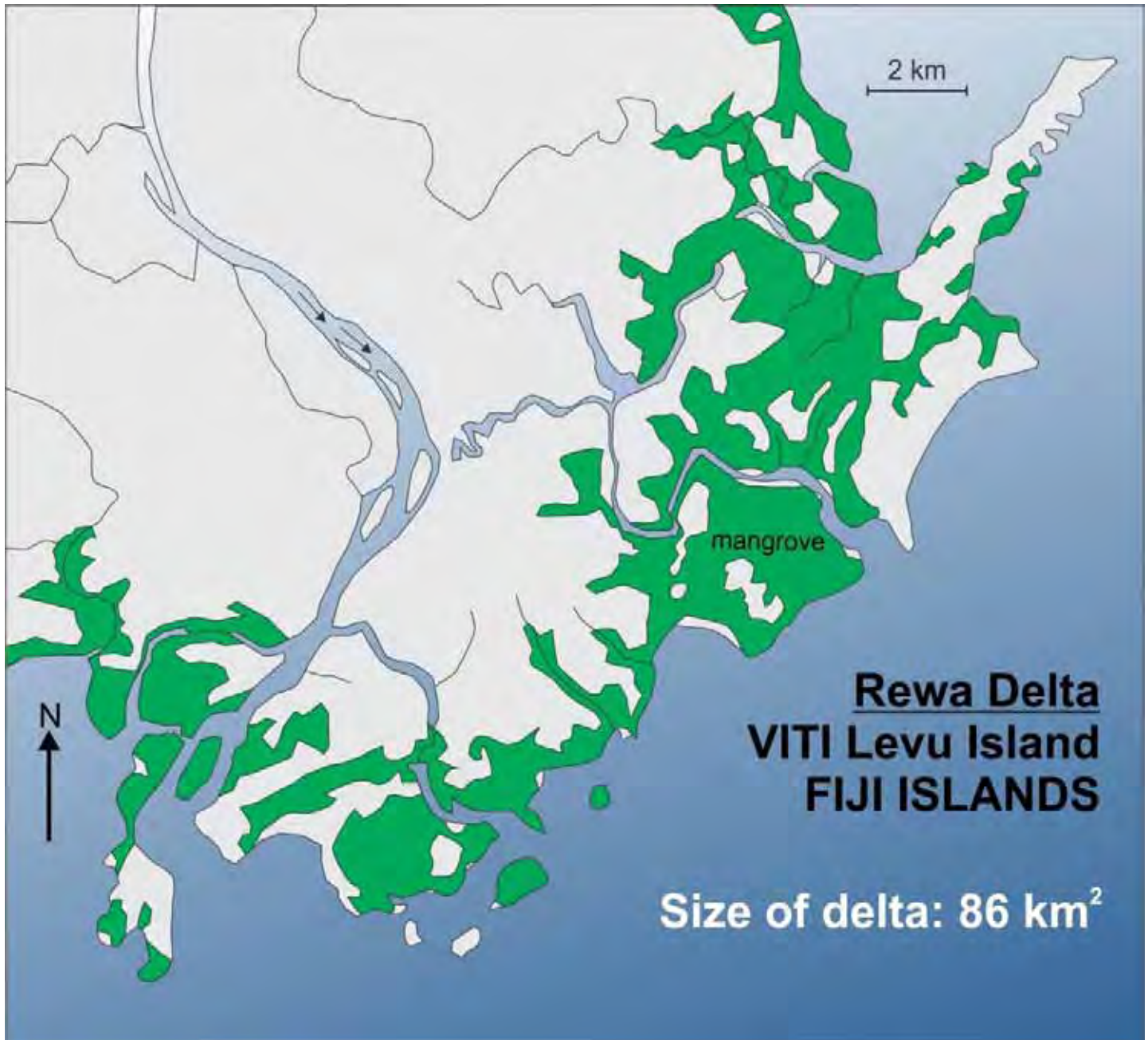
Part 1

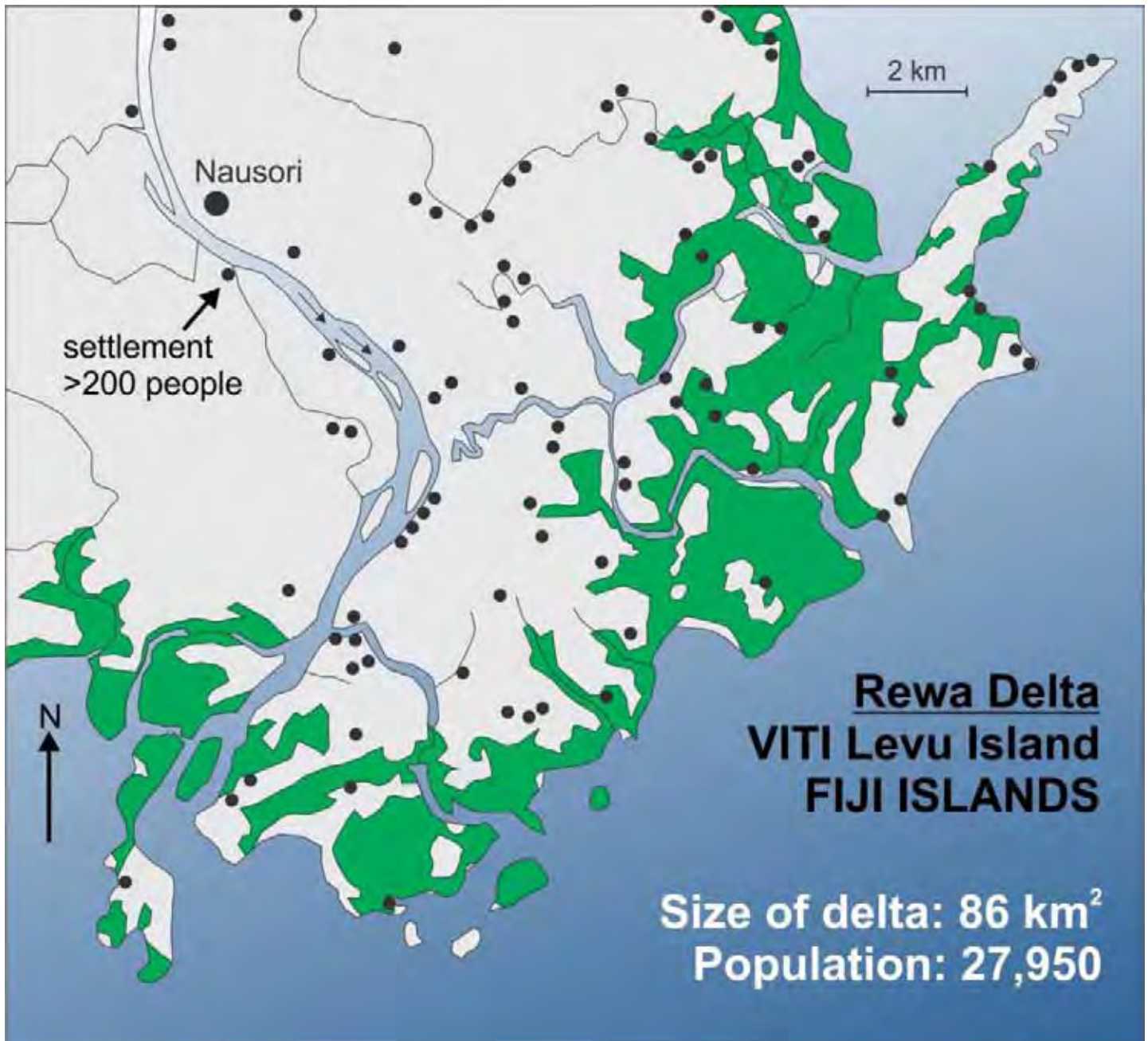
**PACIFIC ISLAND DELTAS:
ENVIRONMENT AND POPULATION**

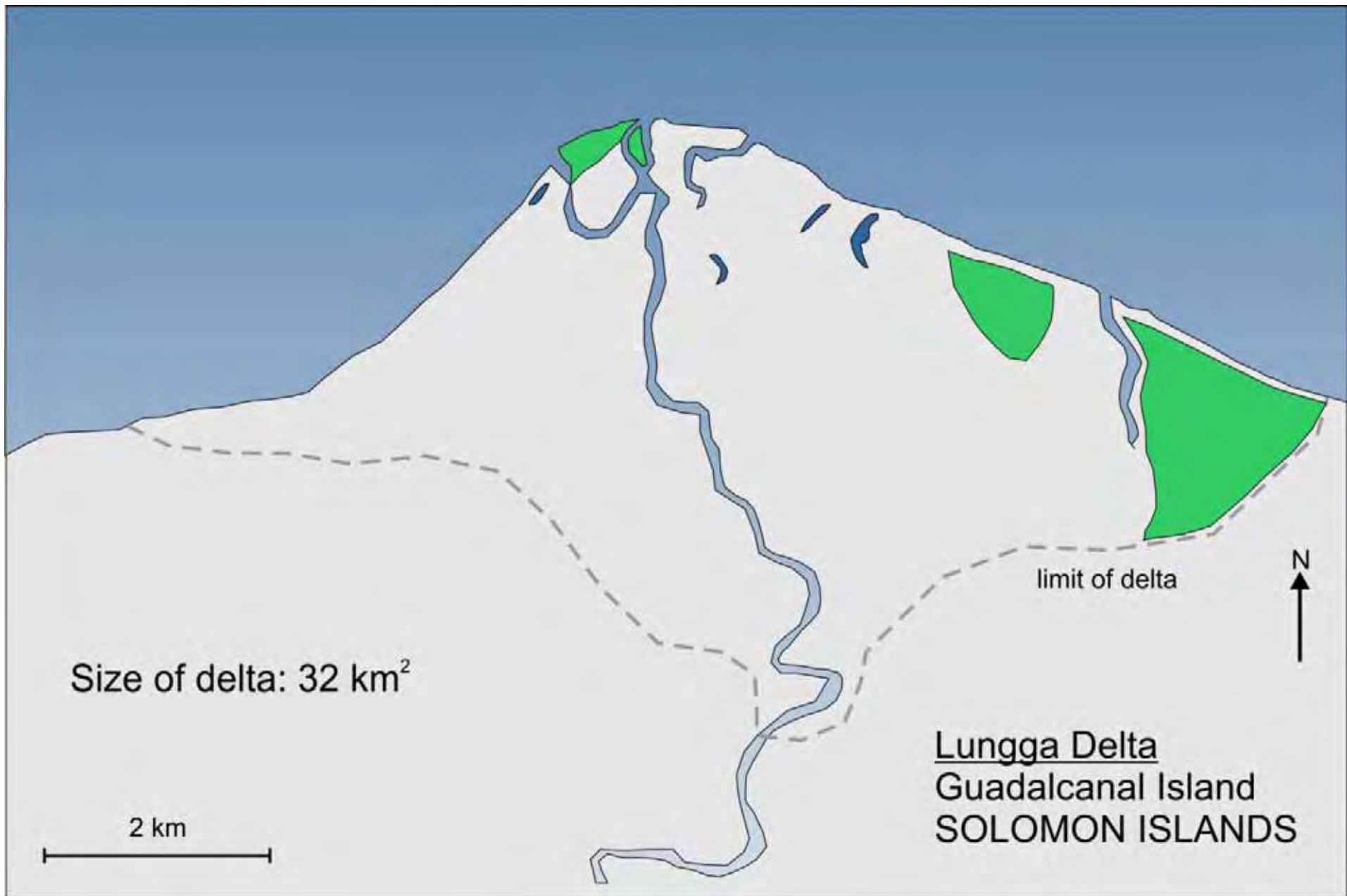


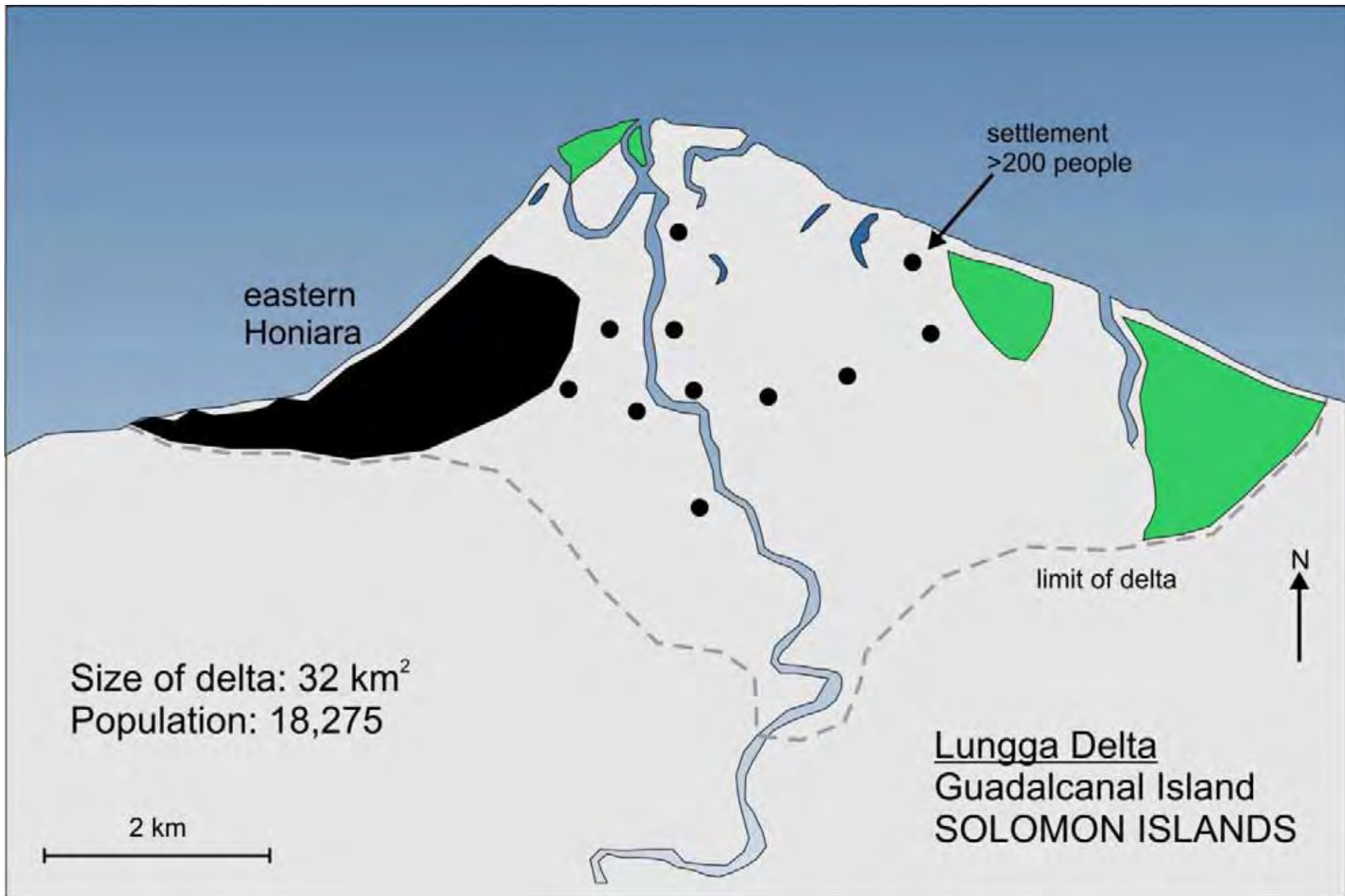








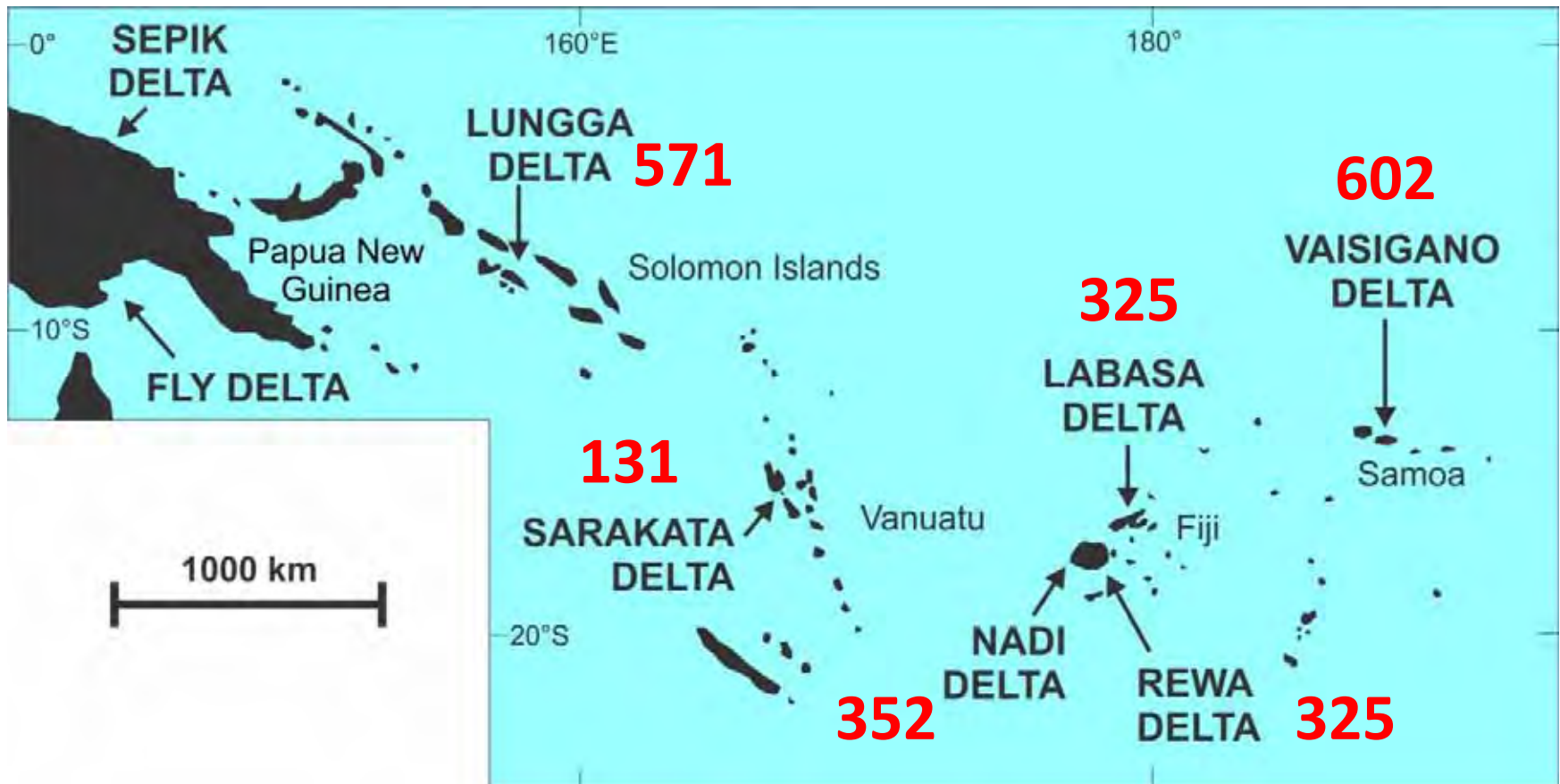




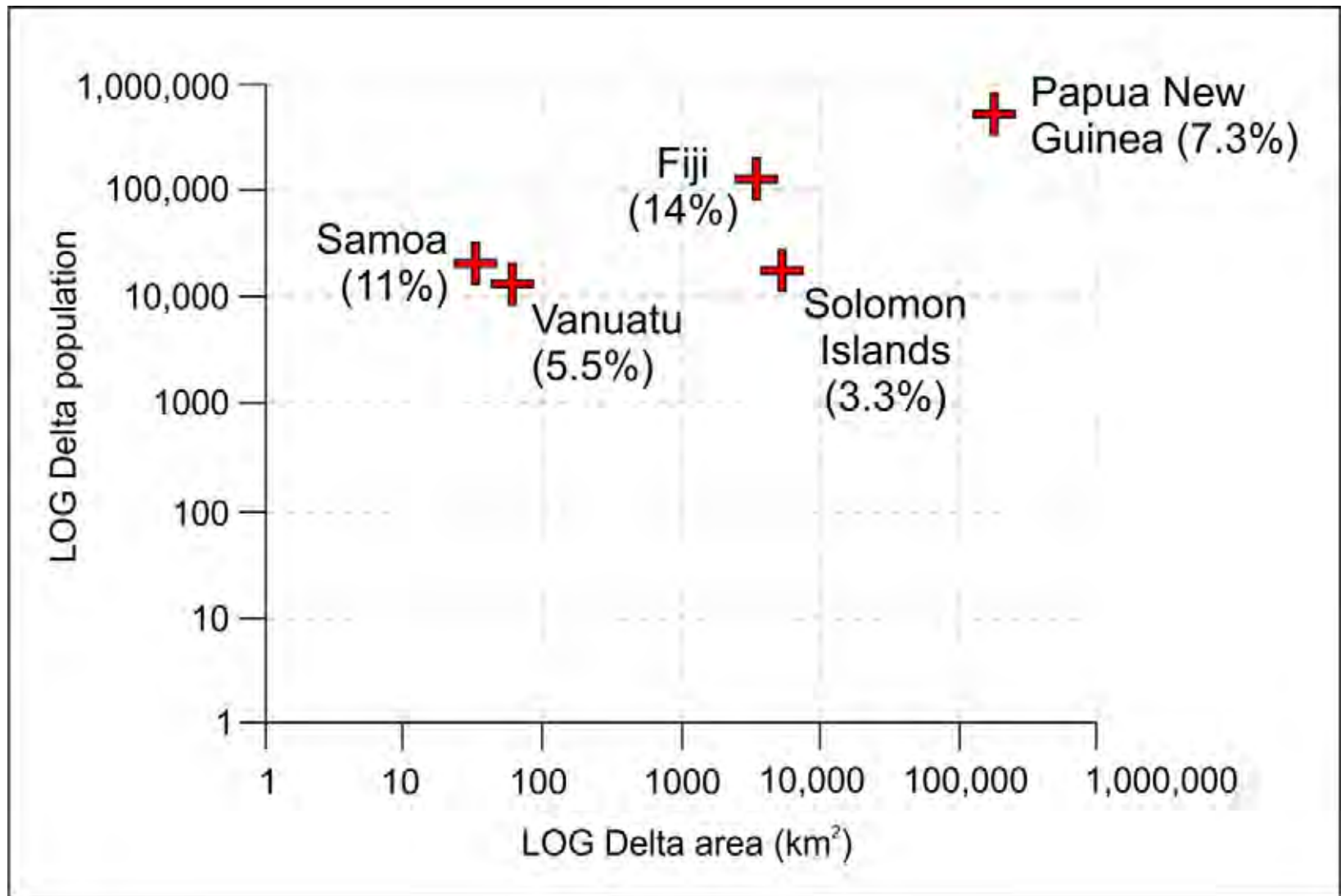
Population densities of Pacific Island deltas (persons/km²)

Global average mega-delta population density = **500**

(Ericson et al., 2006, Global and Planetary Change)



% national population that occupy Pacific Island deltas



Note: All figures are minima because not all deltas in these countries are included



Part 2

**CURRENT ISSUES FOR PACIFIC
ISLAND DELTAS**

Current issues for Pacific Island deltas

- Delta surfaces are subsiding because of crustal downbowing, sediment compaction, and slumping. These problems are exacerbated by groundwater extraction.



Laucala Village, Rewa Delta, built on an island that has lost around 40% of its land area in 20 years (Shalini Lata photo).

Current issues for Pacific Island deltas

- Mangrove forests are being cleared/thinned along many delta fronts.



Mangrove clearance along delta front, Fiji. Note the associated evidence for erosion (coconut palm roots exposed) and the vulnerability of Naicabecabe Village.

Current issues for Pacific Island deltas

- Upstream water and sediment inputs are being altered by human impact, including damming and forest clearance.



Tavua (Nasivi) Delta, Fiji – note upland soil erosion and cleared mangrove areas

Current issues for Pacific Island deltas

- Floods are generally becoming more frequent, more prolonged, and increasingly deep.



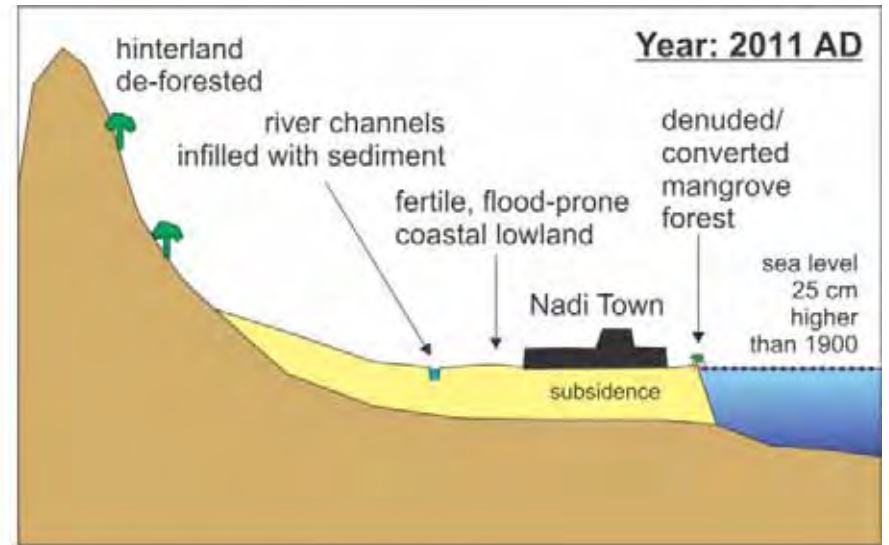
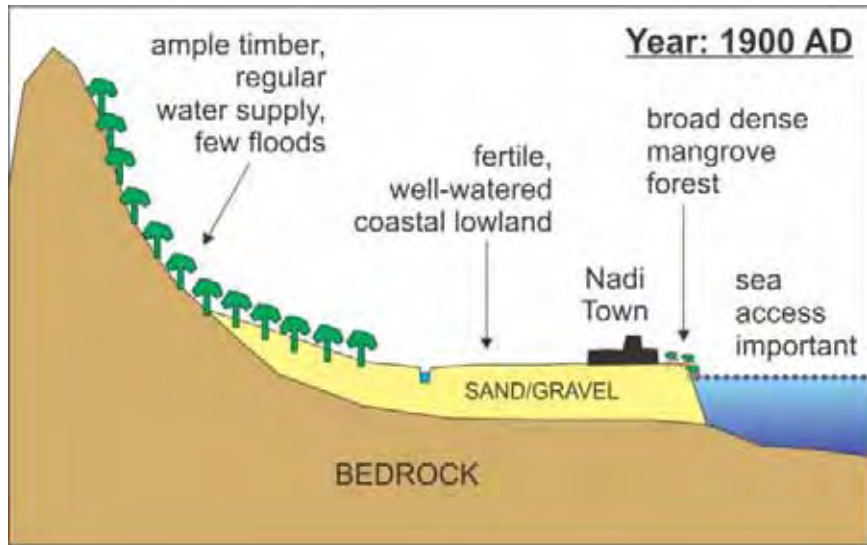
Nausori Town, Rewa Delta – January 2009 floods
(Shalini Lata photo)

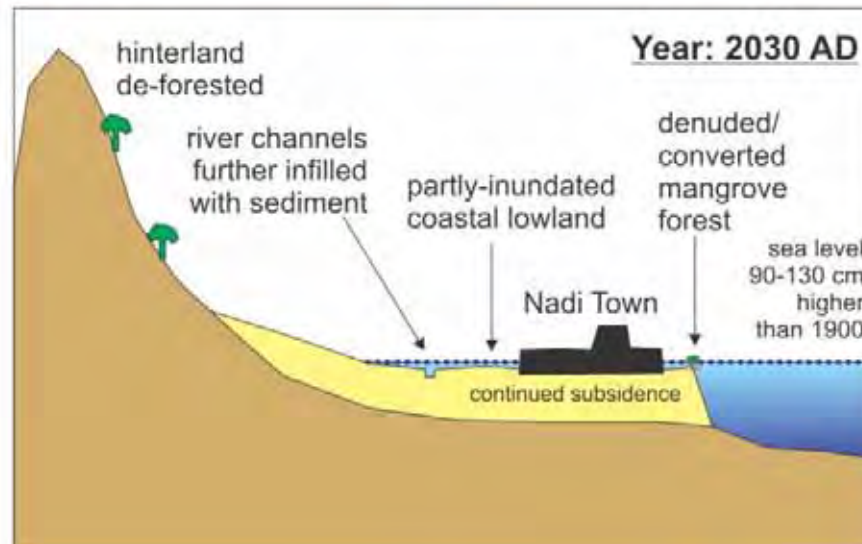
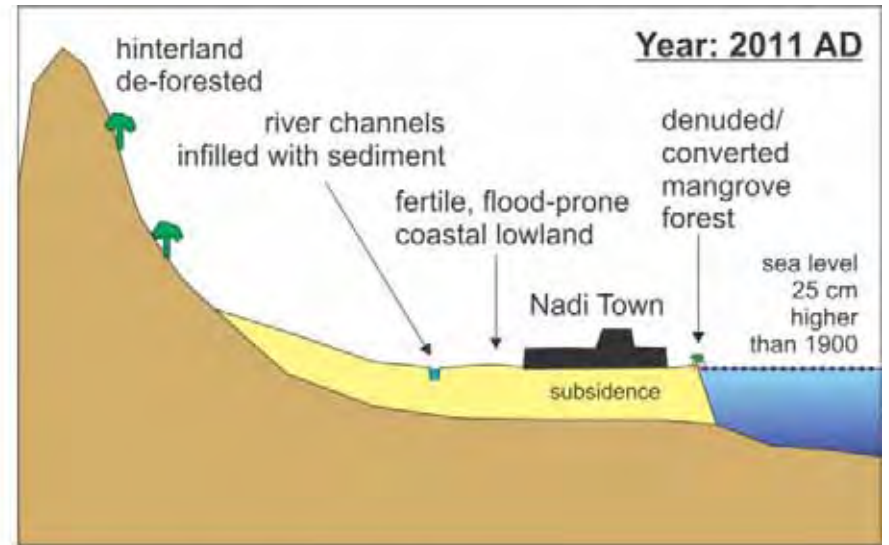
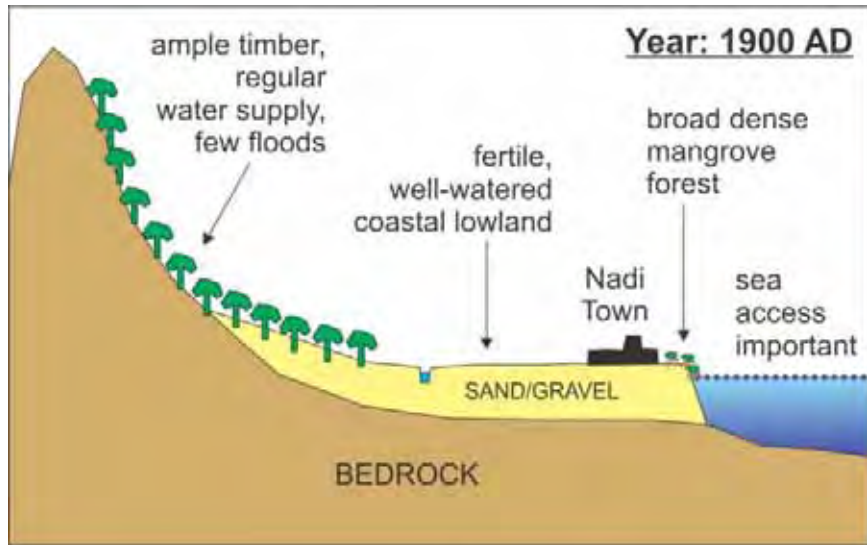
Current issues for Pacific Island deltas

- Human responses have been generally short-term and ineffective.



Muanicake Village, Rewa Delta – fence of wooden stakes backfilled with rubbish (Shalini Lata photo)







Part 3

FUTURE OF PACIFIC ISLAND DELTAS

Future of Pacific Island deltas

- Flood frequency and magnitude is likely to continue to increase.



Nadi Town, Nadi Delta, Fiji – January 2009 floods were linked to slow-moving depression (not tropical cyclone) and lasted two weeks.

Future of Pacific Island deltas

- Frustrations may increase.
- Owing to their higher population densities, deltas are more likely than atoll islands to become flashpoints.



Honiara, Solomon Islands – 2000 riots

Future of Pacific Island deltas

- Current responses will be gradually revealed as ineffective.



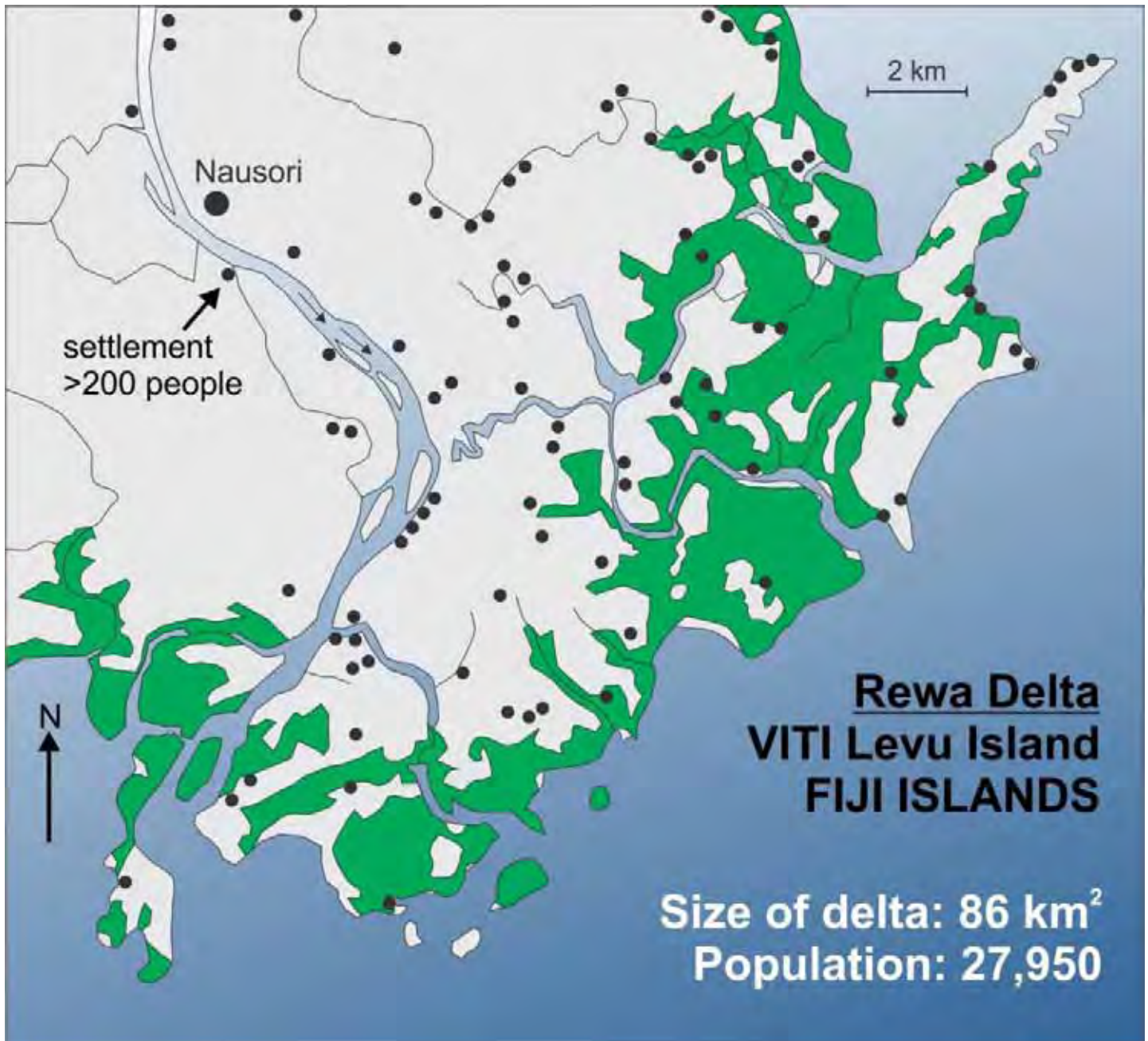
Muanaira Village, Rewa Delta, Fiji. 1990s adaptation to floods involved raising house on piles (Shalini Lata photo)

Future of Pacific Island deltas

- Communities will be forced to re-locate from the most vulnerable locations.



Lungga Delta, Guadalcanal Island, Solomon Islands. Part of Honiara, the nation's capital, occupies the delta.



Future Vulnerability



Year: 2030
Sea Level: + 0.4 m



Year: 2060
Sea Level: + 0.8 m



Year: 2100
Sea Level: + 1.2 m

Future of Pacific Island deltas

- Social impacts can be minimized by effective anticipatory adaptation, but this is not being contemplated.



River dredging, Fiji. Dredging is comparatively expensive and comparatively ineffective.

Future of Pacific Island deltas

- Costs could be underwritten by donor funding.
- Once one community moves successfully, others may be encouraged to follow suit.



Traditional attachment to delta lands among Pacific Island peoples is a significant barrier to re-location.

More in

Lata, S and Nunn, P.D. 2011. Misperceptions of climate-change risk as barriers to climate-change adaptation: a case study from the Rewa Delta, Fiji. *Climatic Change*. In press (Online First next week!**)**

Thank you