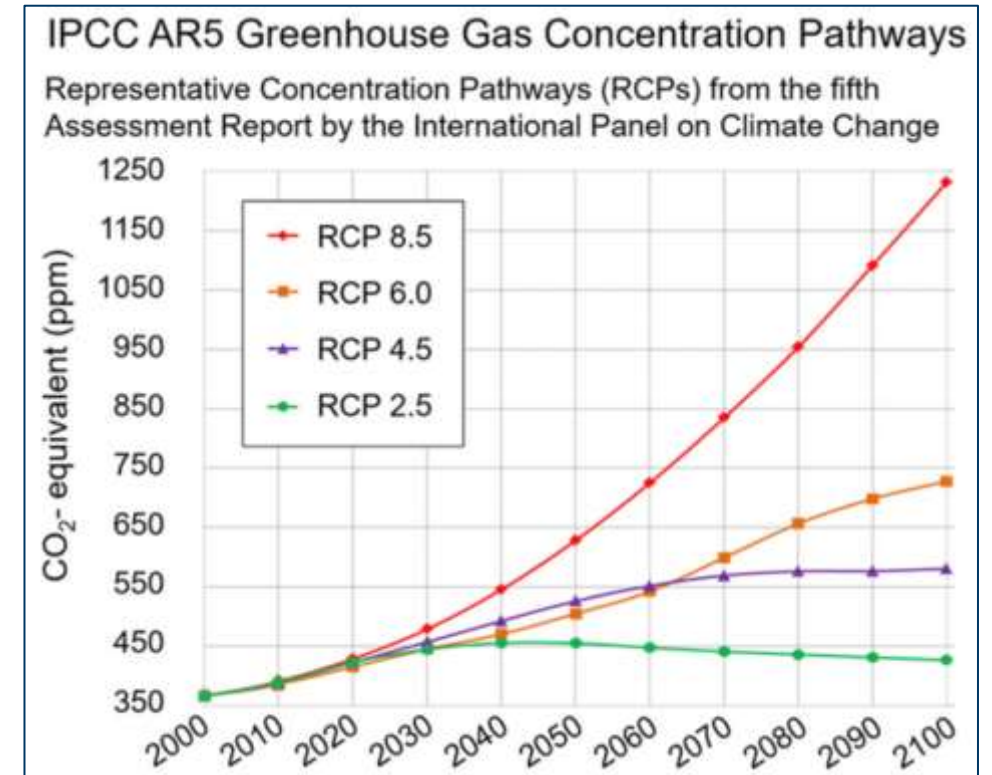


Climate change impact on Pacific Ports and Future Sustainability (Webinar)

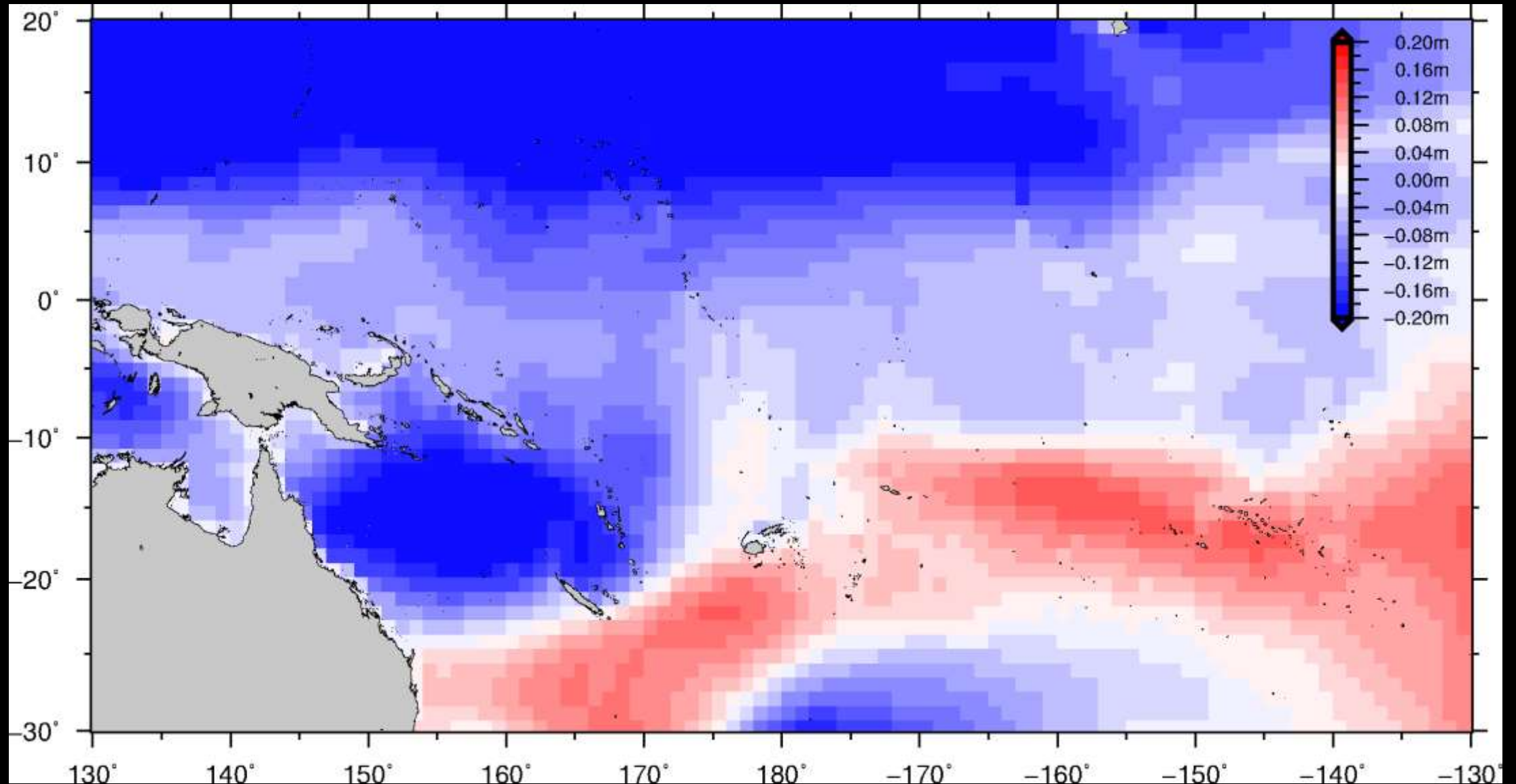
- Richard Hill (Executive Advisor, GHD Advisory)**
- 26th August**

How is climate change affecting Pacific Ports

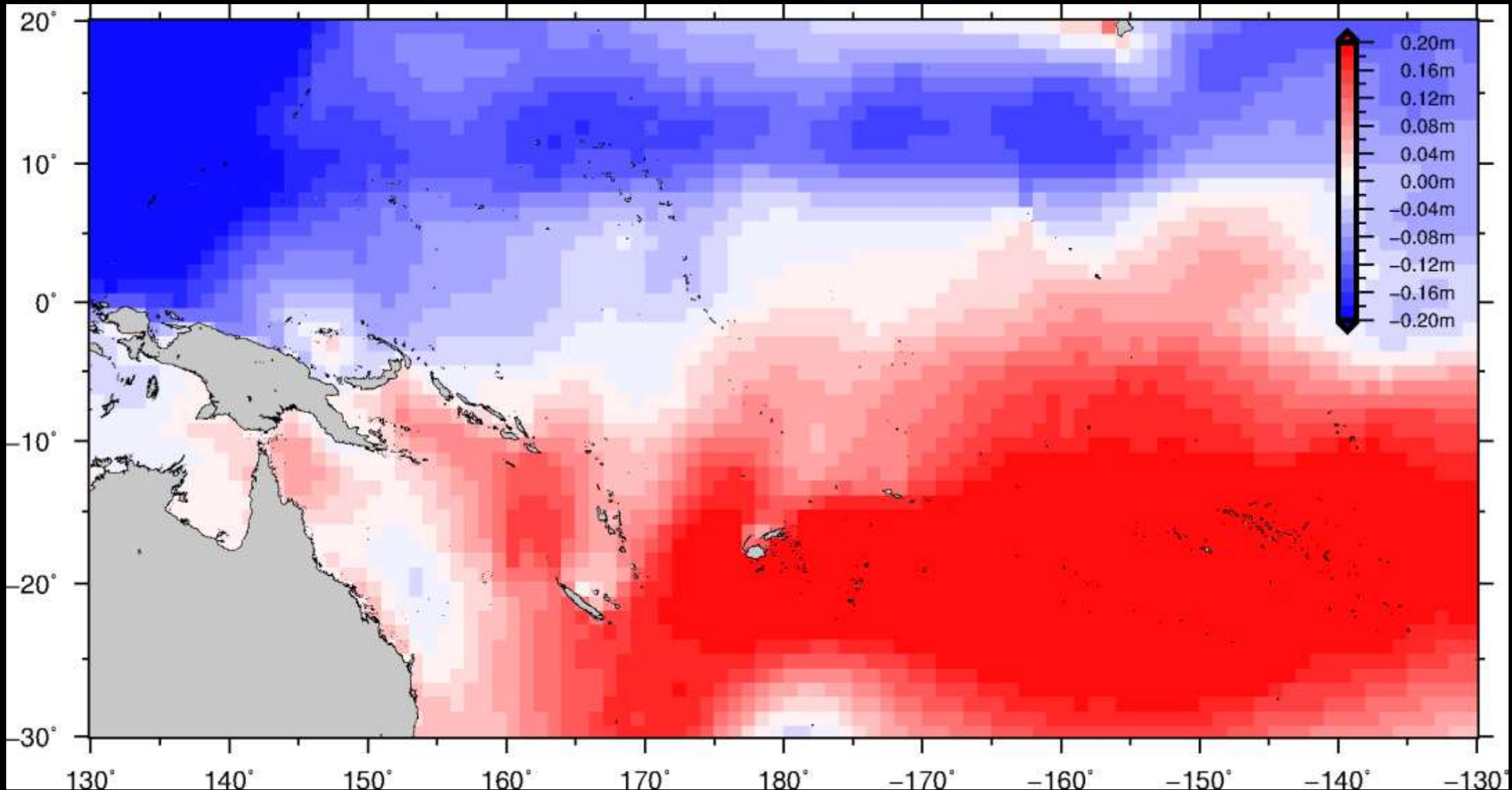
1. Increasing scale and frequency of weather / disaster events
2. Cumulative combinations of extreme design loads / effects
3. Increases to the vulnerability and suitability of current port infrastructure settings



RCP 4.5 Wave Height Change for October 2100



RCP 8.5 Wave Height Change for October 2100

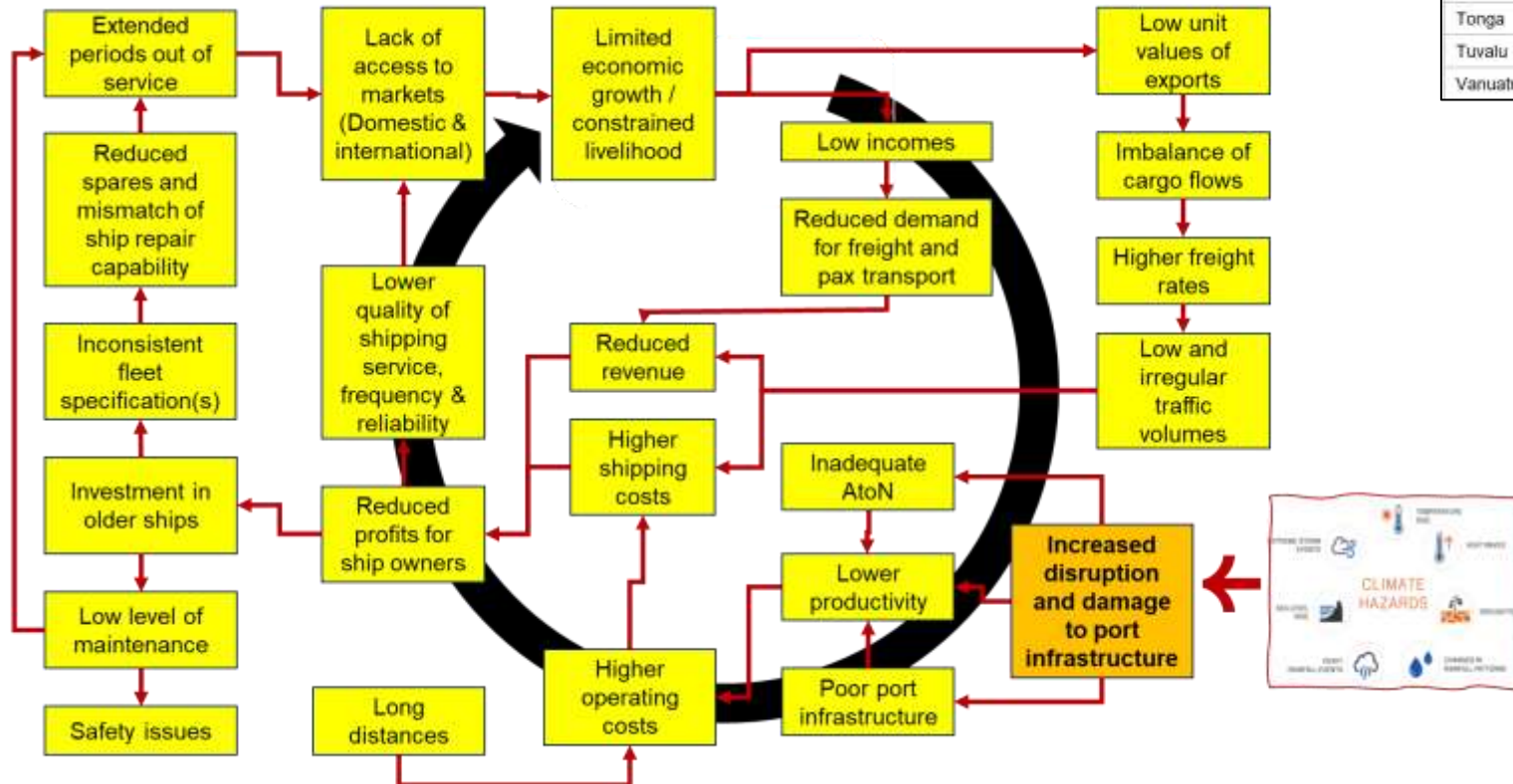


How will this impact Pacific Ports / Countries?

Pacific Region characteristics:

- Vast spread of many Pacific Island Countries (small islands, EEZ, remote communities)
- Many low lying areas and urban centres
- Sea transport is arguably more critical for PIC connectivity than for any other society
- Tourism stalled, debt rising, revenues are down
- The ability to recover is linked with sea transport connectivity

Country	Number of islands	Total area of islands (km ²)	Average island area (km ²)	Area of 200-mile ocean zone (km ²)	Average island maximum elevation (m)
Federated States of Micronesia	127	799	6	2,978,000	45
Fiji	211	20,857	99	1,290,000	134
Kiribati	33	995	30 ^a	3,550,000	6
Marshall Islands	34	286	8	2,131,000	3
Nauru	1	23	23	320,000	71
Palau	33	495	15	629,000	58
Papua New Guinea ^b	349	67,757	154	3,120,000	134
Samoa	7	3046	435	120,000	504
Solomon Islands	413	29,672	72	1,340,000	88
Tonga	124	847	7	700,000	56
Tuvalu	10	44	4 ^a	900,000	4
Vanuatu	81	13,526	167	680,000	330



Alofi Wharf, Niue (Jan 2020)

Potential responses for Pacific Island Countries

1. Structured transition to low carbon freight and operational solutions

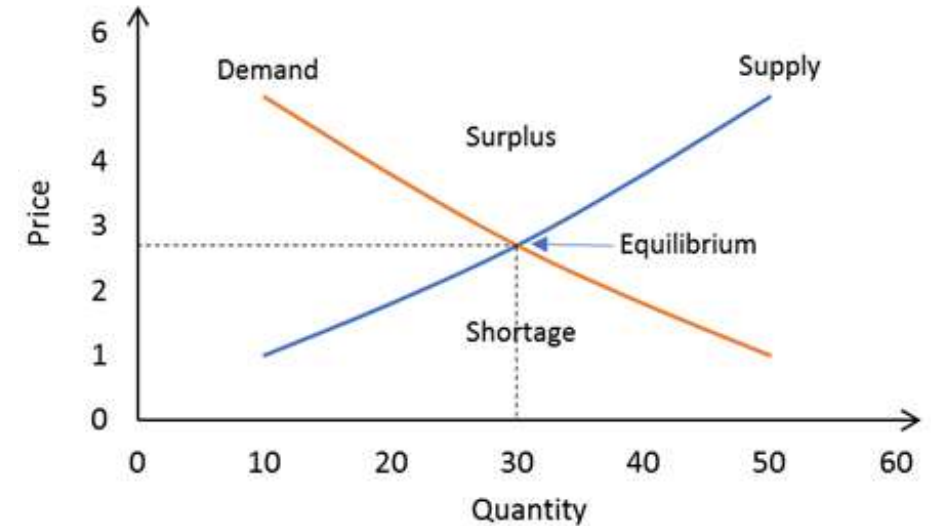
- PICS and transport are heavily reliant on fossil fuels – cost exposure – need to facilitate switch to alternative fuels / renewable power systems
- Renewable initiatives (LED lights, renewable mini-grids)
- Targets for maritime transport performance – e.g incentives linked to financing and objectives linked to global priorities need to be considered

2. Optimised and resilient infrastructure - Do we need to do things differently?

- Optimise the shipping solution to match the trade task – is this an opportunity to descale port infrastructure needs across the region?
- Selected deep-water hubs that facilitate enhanced international shipping connectivity with inter-regional / PIC nodes supporting (competitive) shipping services – smaller scale, more frequent, more routes to market.
- Could we then change the location of ports and/or have multiple (smaller) port options at country level to improve resilience?

3. Regional solutions - not country specific?

- Having standardised infrastructure regionally – operators, vessel types, vessel maintenance to create consistent functional needs and offer redundancy
- Integration of supply chain factors into regional and domestic connectivity plans - routes and/or services that would offer opportunity to improve the balance of freight flows between domestic ports / islands.
- Standardised asset management plans / systems – for port infrastructure and ships (matched to ship repair capabilities / technologies etc).

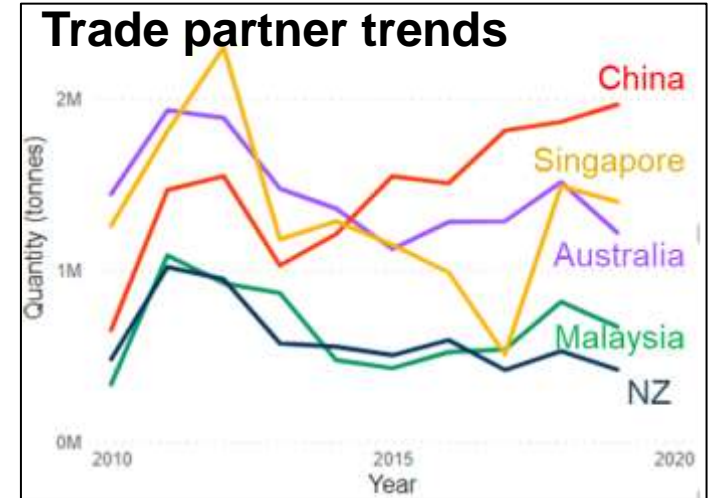


Potential impacts that climate change could have on trade in the pacific?



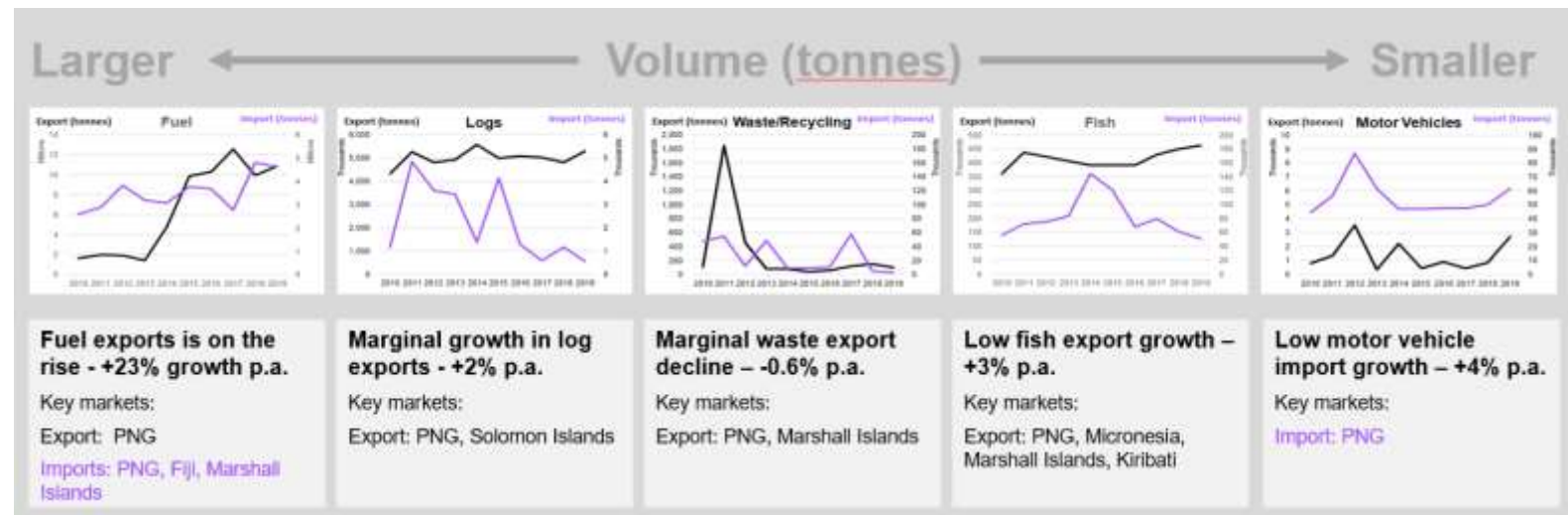
Commodities and trade trends:

- Further changes to the origin and destinations of products:- Product supply costs and demand characteristics
- Bulk fuel / energy products:
 - Expected decline in traditional products as renewables are adopted for power generation etc) > product volume and distribution cost impacts
 - Need to accommodate a transition to new fuel products (hydrogen carriers) such as Ammonia, Methanol, etc > product storage and distribution
 - Need to consider supply chain systems for renewable power systems > (ship) battery recharging at ports?, battery changeovers?, chilling products
- Commercial Fishing:- Undefined impact in quota volumes and movement patterns > economic impact and flexibility in export methods needed
- Agricultural and Forestry:- changes to the environment impacting agri produce



What can new initiatives in response to climate change actions could arise?

- Increase in waste material for recycling > export / shipping backload opportunities
- Reductions in packaging volumes being shipped
- Alignment of marine transport with aviation transport (to create efficiencies)
- New ship types and control systems
- There are more.....



*** Thank You**