National SCIENCE Challenges

SUSTAINABLE SEAS

Ko ngā moana whakauka

Tipping Points

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VICTORIA

Tipping Points Team

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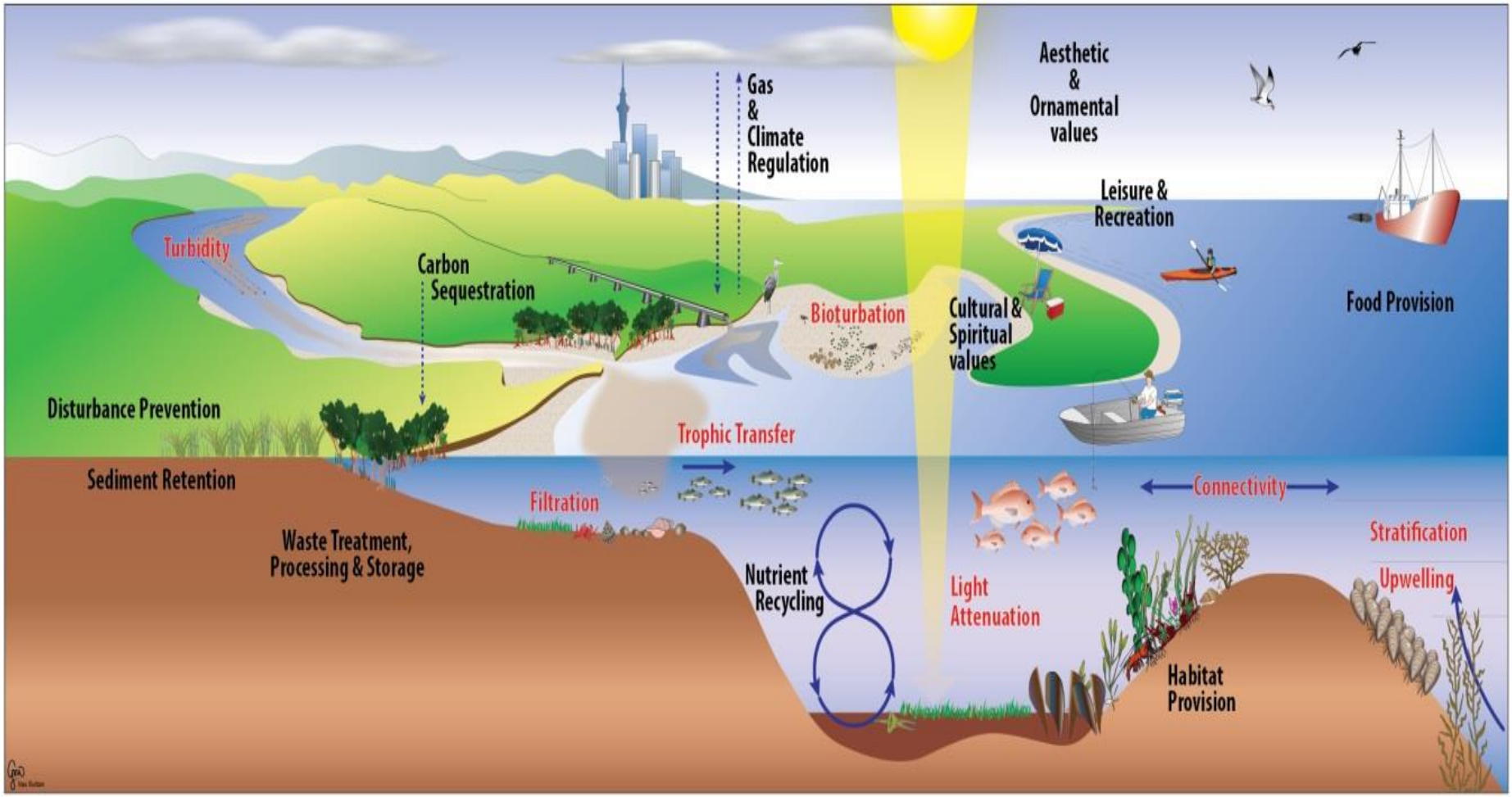
The hidden infrastructure



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Multiple stressors & cumulative effects

Local stressors

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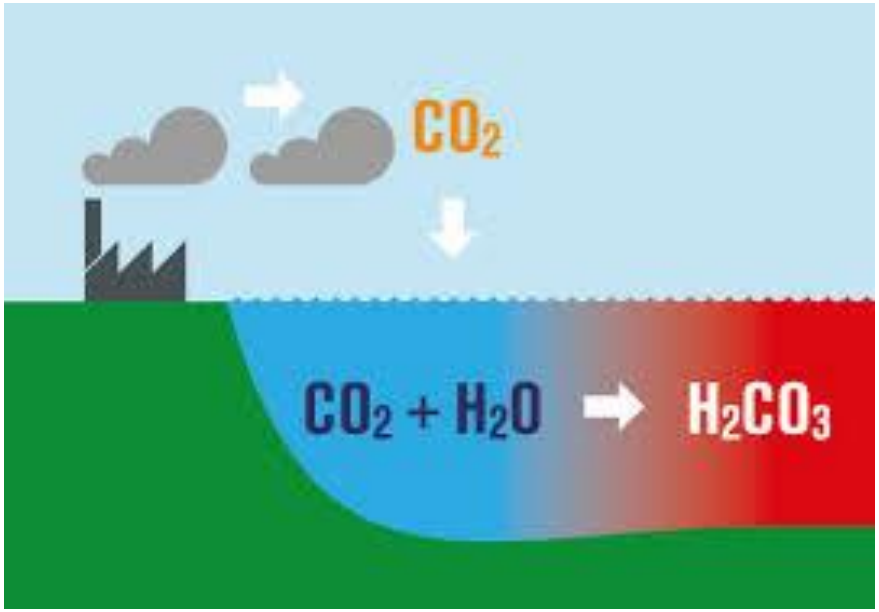
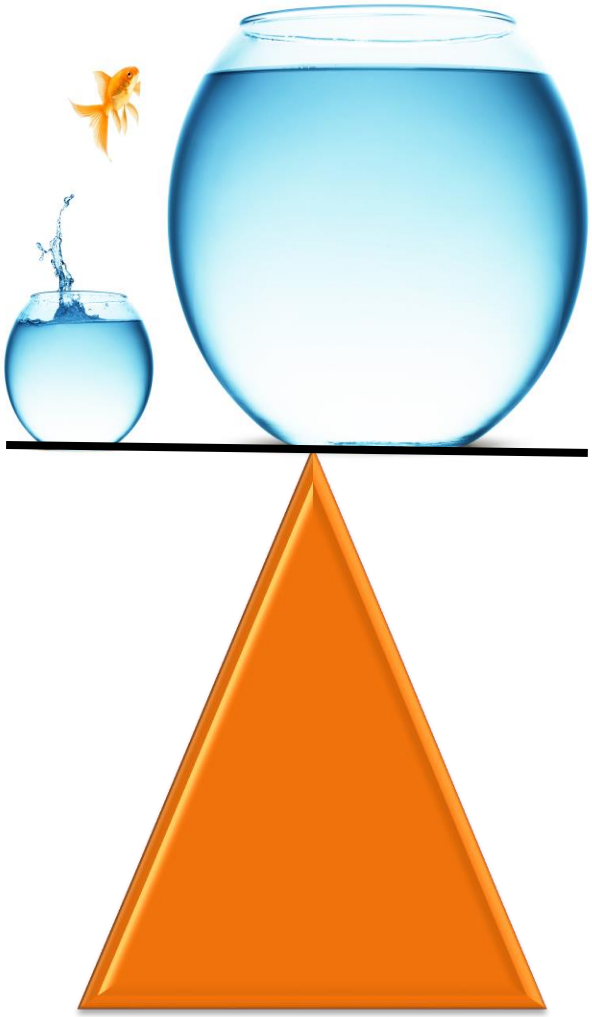
Multiple stressors & cumulative effects

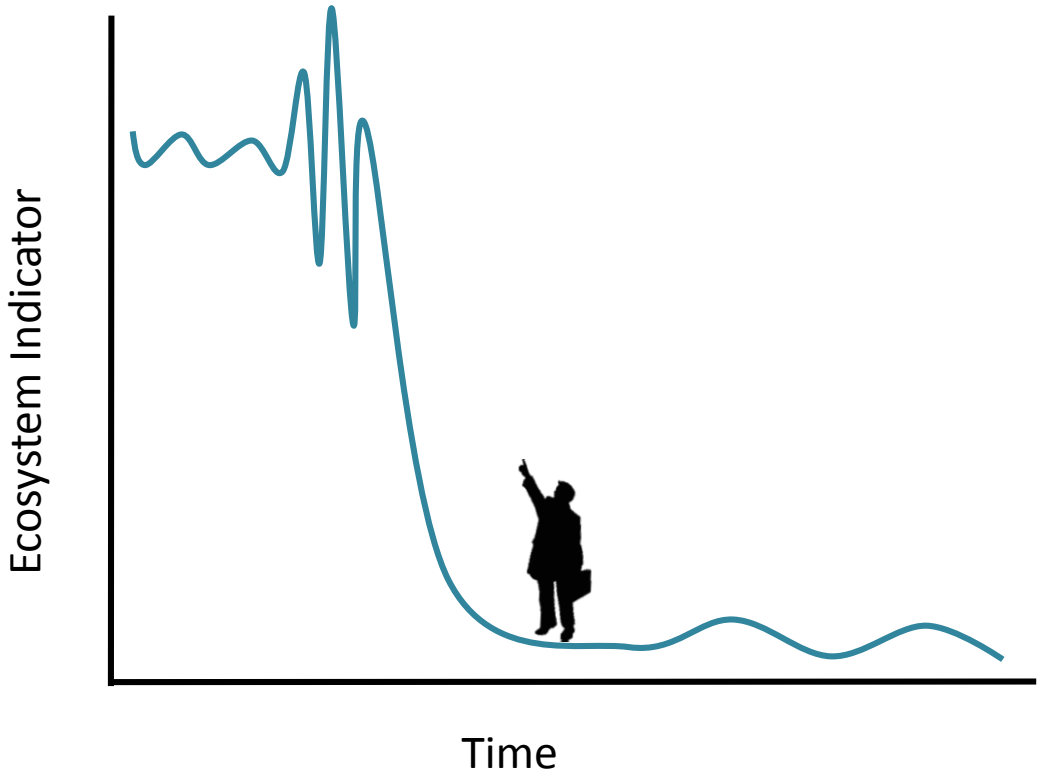
Global context



Small changes . . . large effects

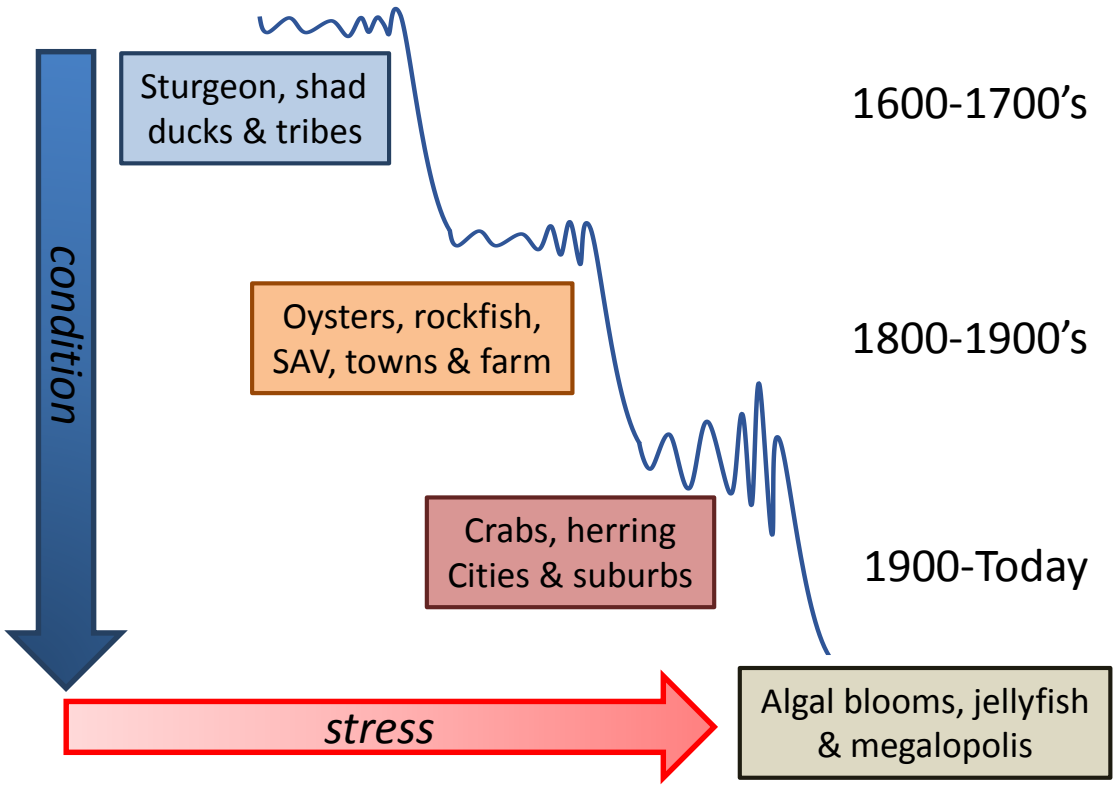


Tipping Points



Tipping Points

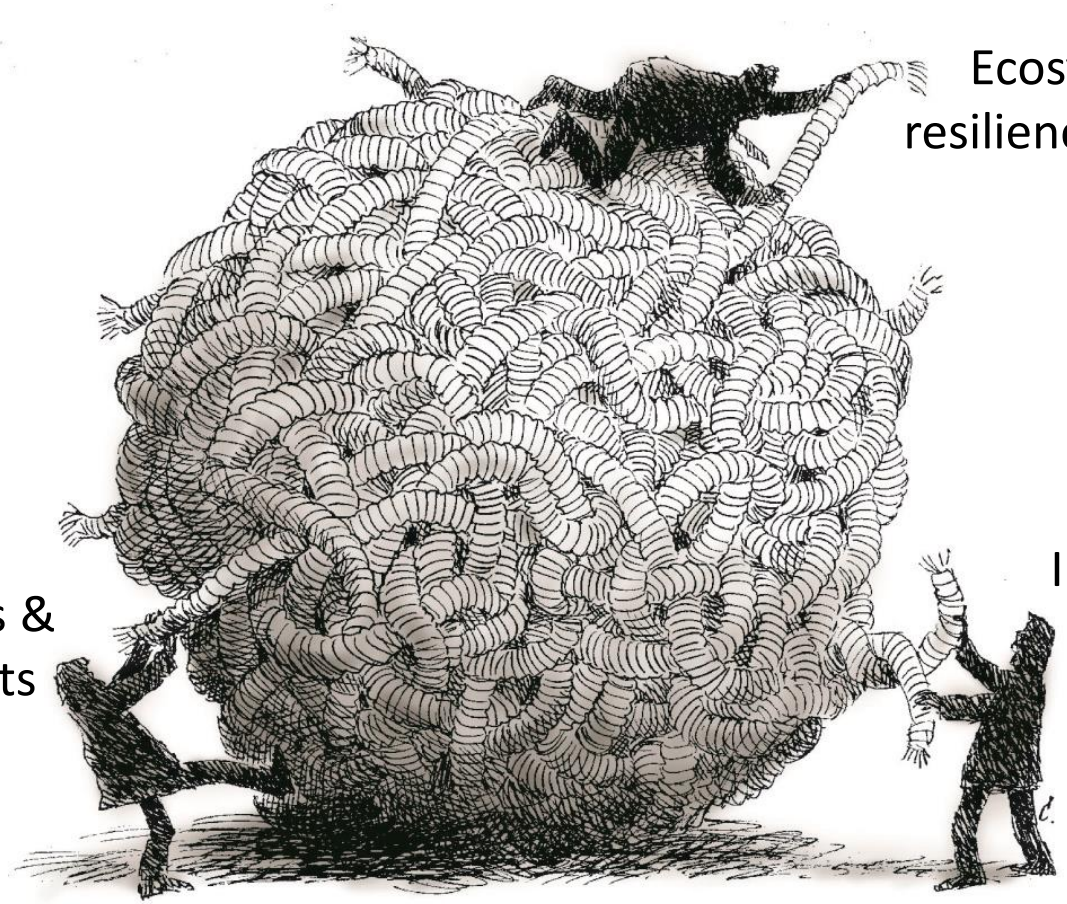
Chesapeake Bay



Management & tipping points

Our challenge

Ecosystem function, resilience & tipping points

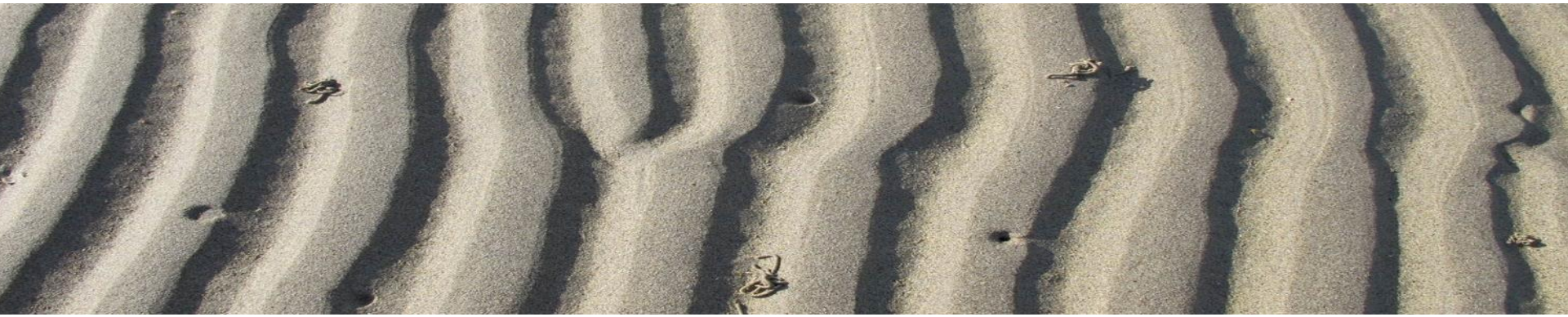


Implications for management

Multiple stressors & cumulative effects

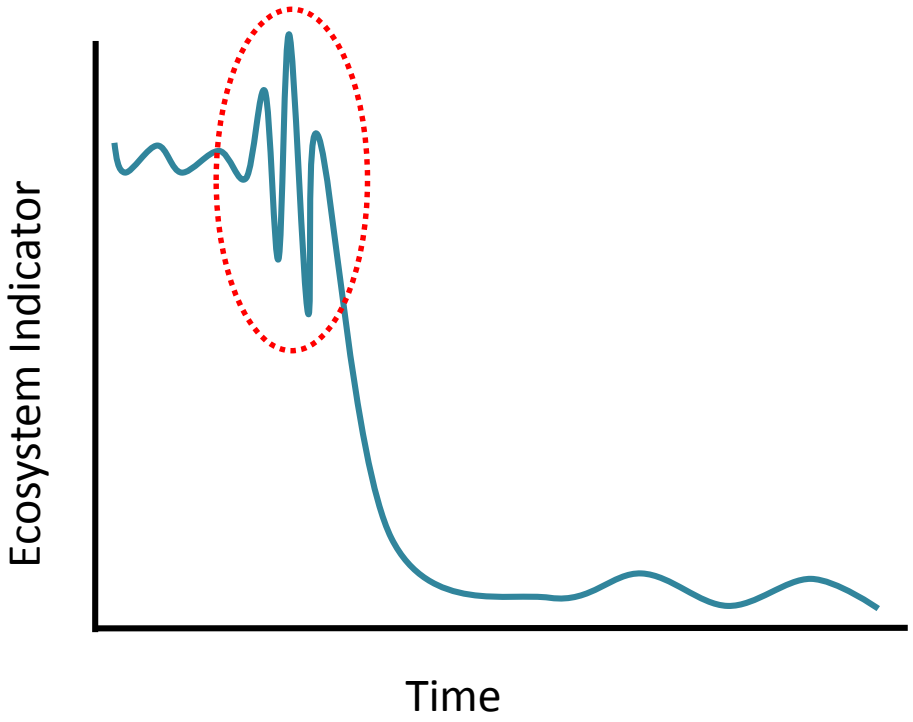
Project Structure

1. Insights from historical data
2. Experiments in the real world
3. Complex systems models
4. Validation of models/experiments – linkages to management limits



Insights from historical data

Theory



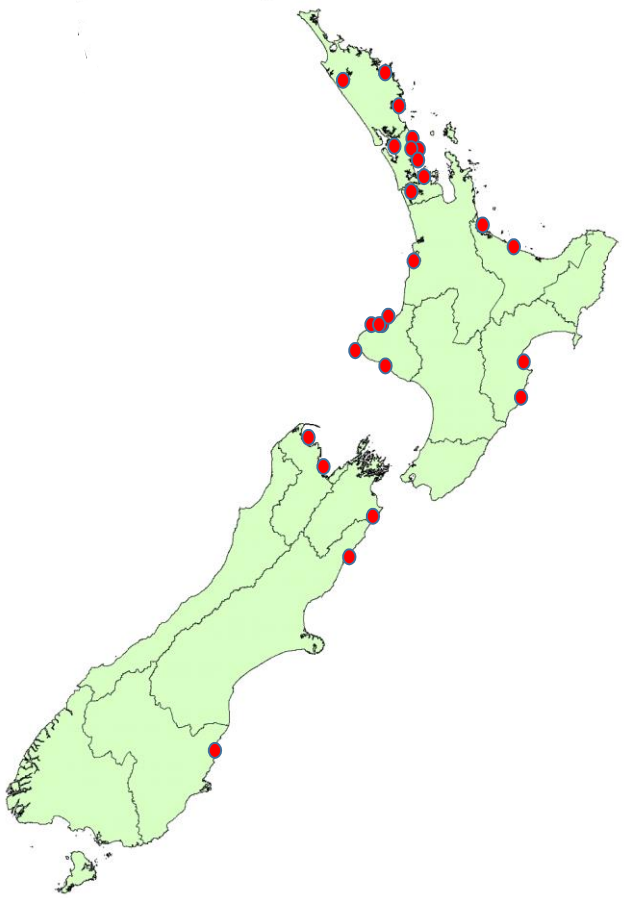
Empirical evidence

- Litzow et al 2008
- Lindegren et al 2012
- Hewitt & Thrush 2008

Insights from historical data

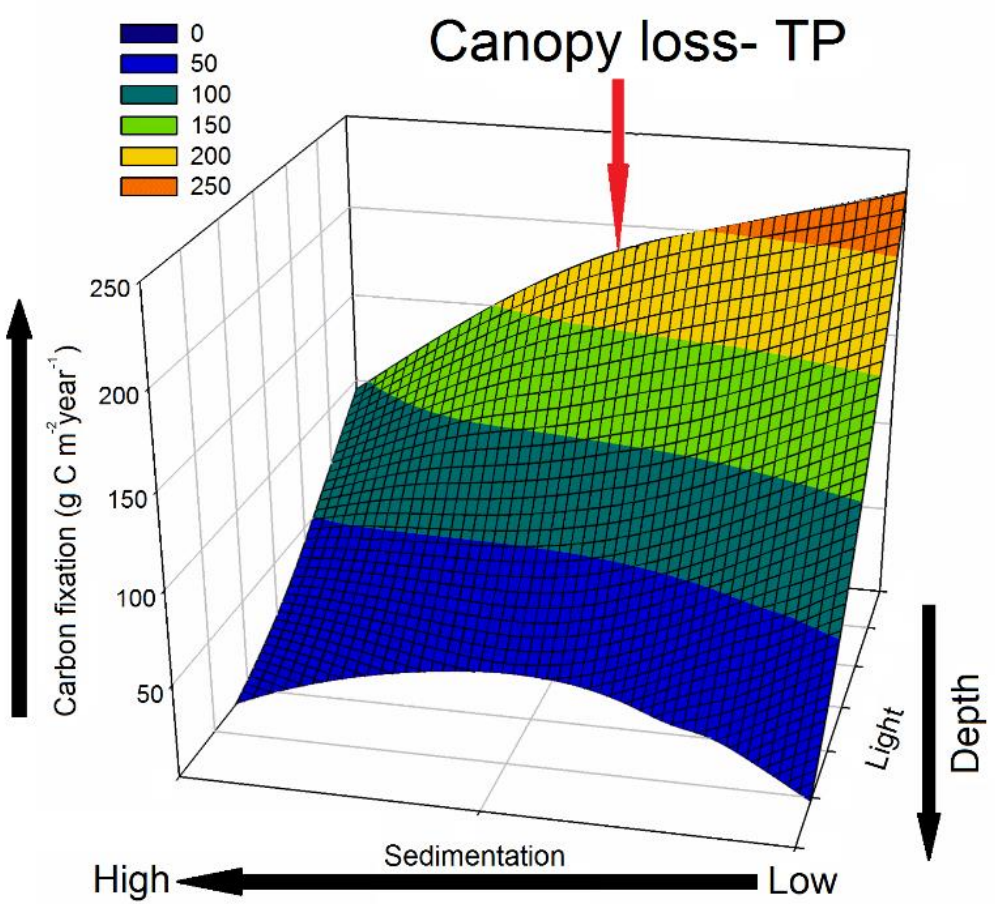
- Criteria for assessing suitability/quality of data established
  - Sampling frequency (time or space)
  - Stressor(s) data
  - Response variables
  - Knowledge

- Data sets identified (> 20)
  - Estuary sandflats
  - Inter- and subtidal reefs
  - Coastal soft sediments
  - Access negotiations underway



Coastal field experiments: Reefs & estuaries

Rocky reefs



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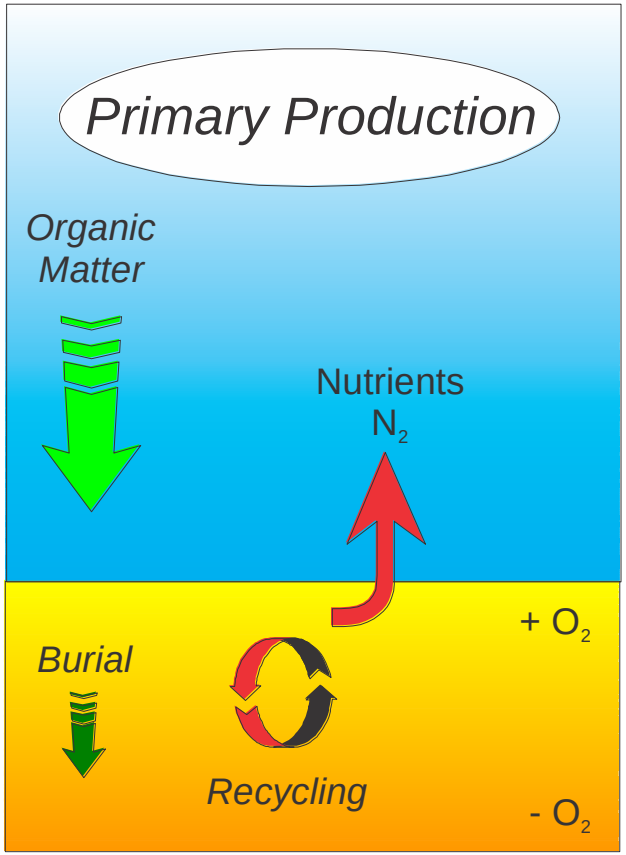
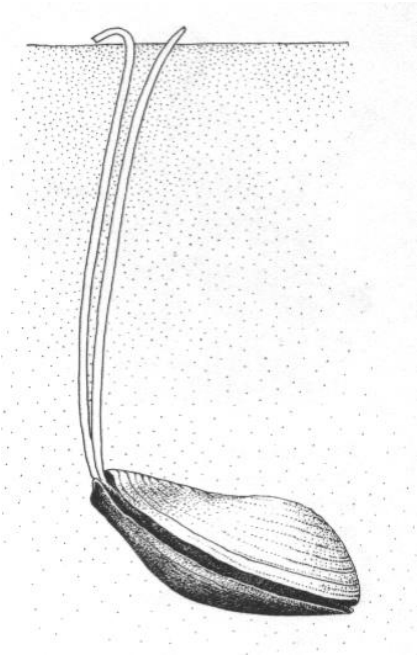
Muddying the waters & the hidden garden

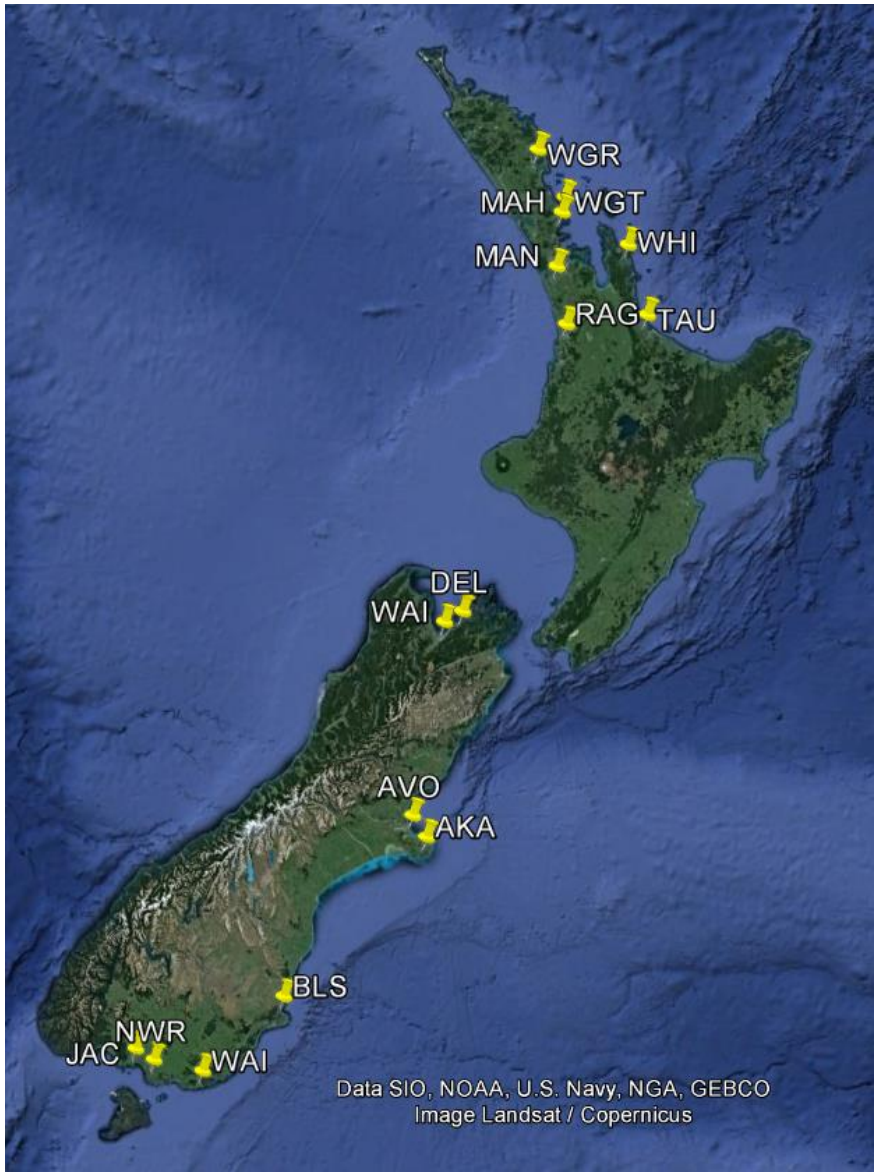
Coastal nutrient processing





Wedge shell (hanikura)

National Science Challenge – National Experiment



- 15 estuaries
- 22 sites
- Gradient in turbidity

- Engagement

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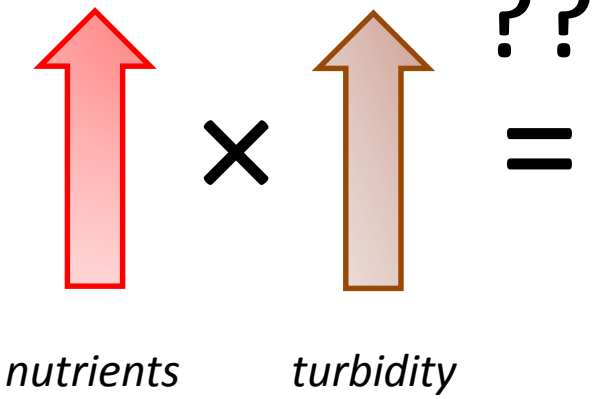
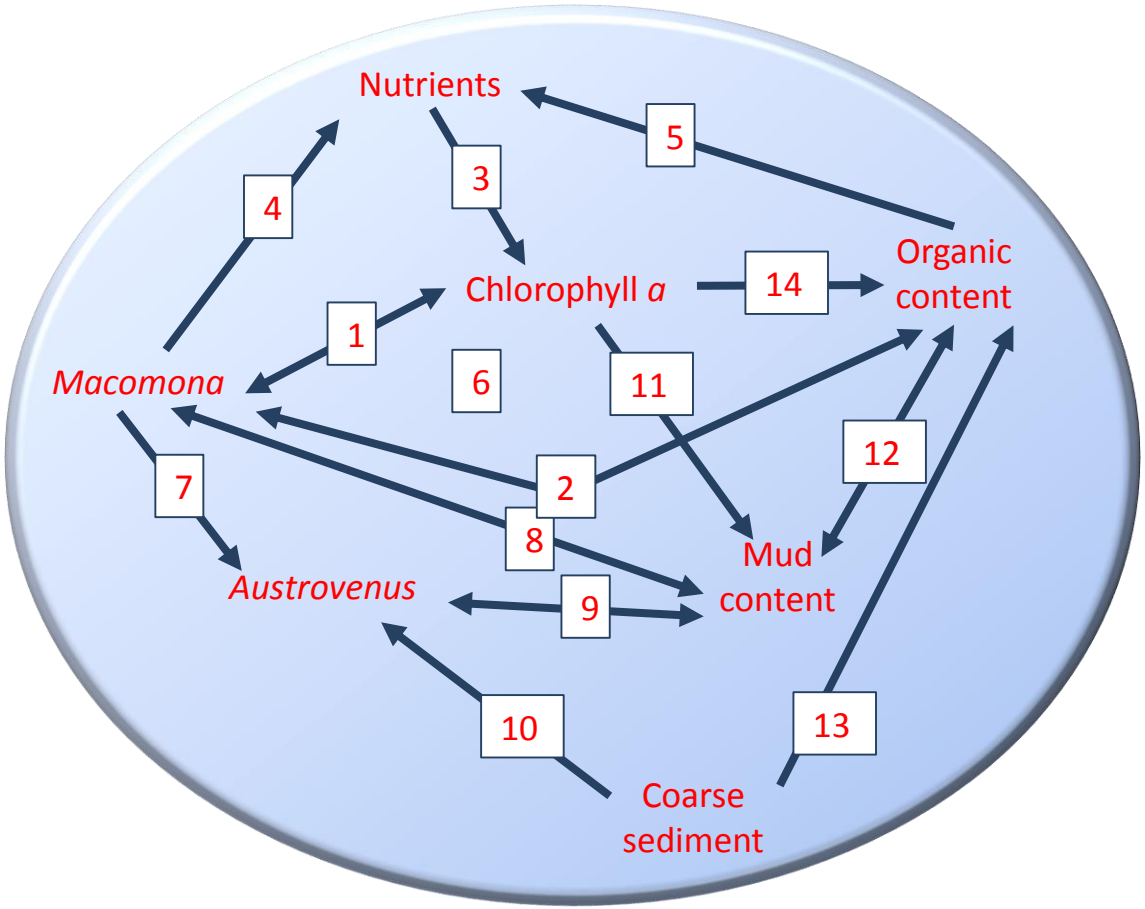
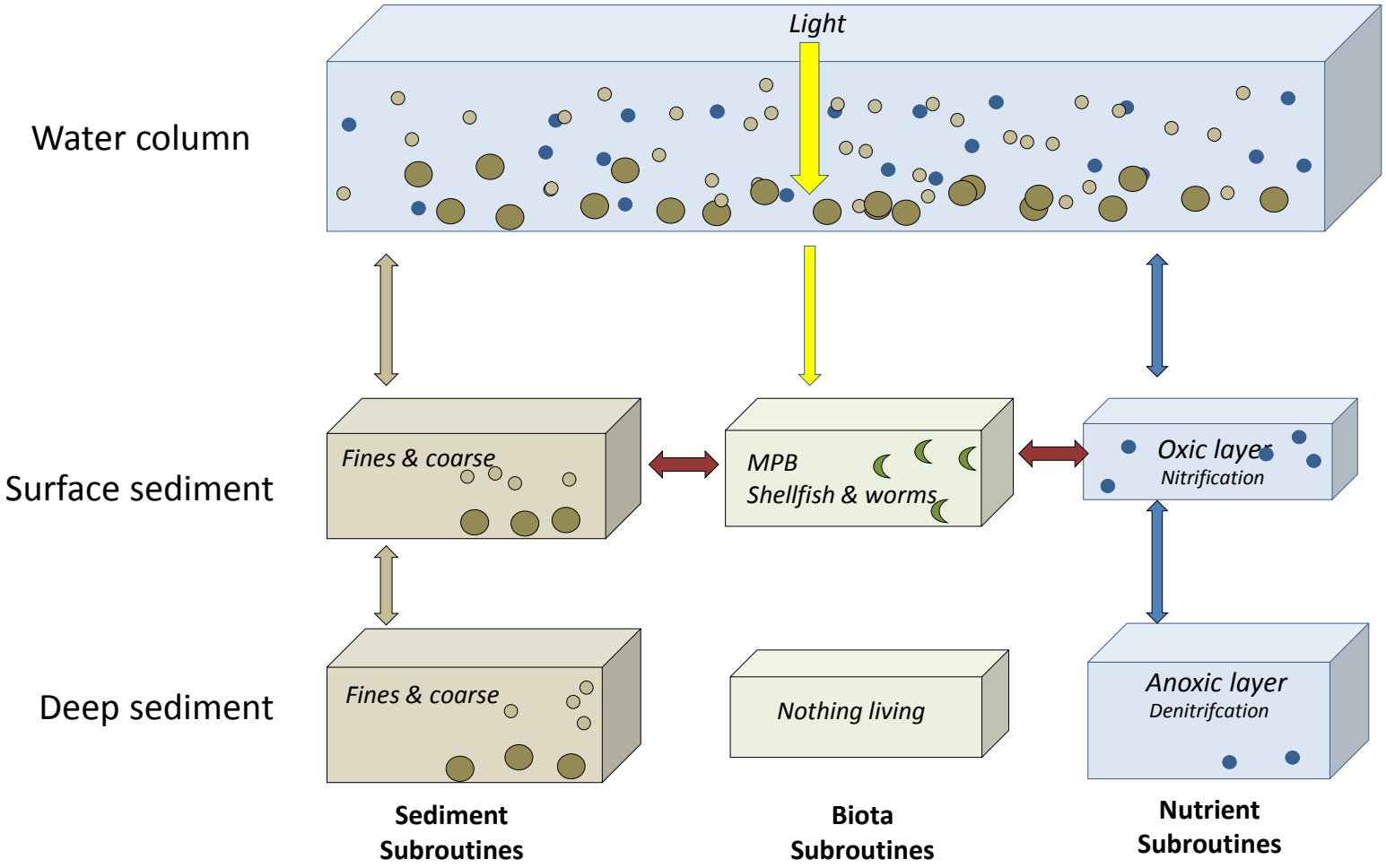
- Established 207, 9 m^2 plots across the study sites (total area = 1,188 m^2)
- Cored, by hand, 25,380 holes
- Elevated sediment nutrient levels
- Sampled after 6 & 12 months

Shifts in ecosystem wiring





Empirical data to complex system models



Cross-program linkages

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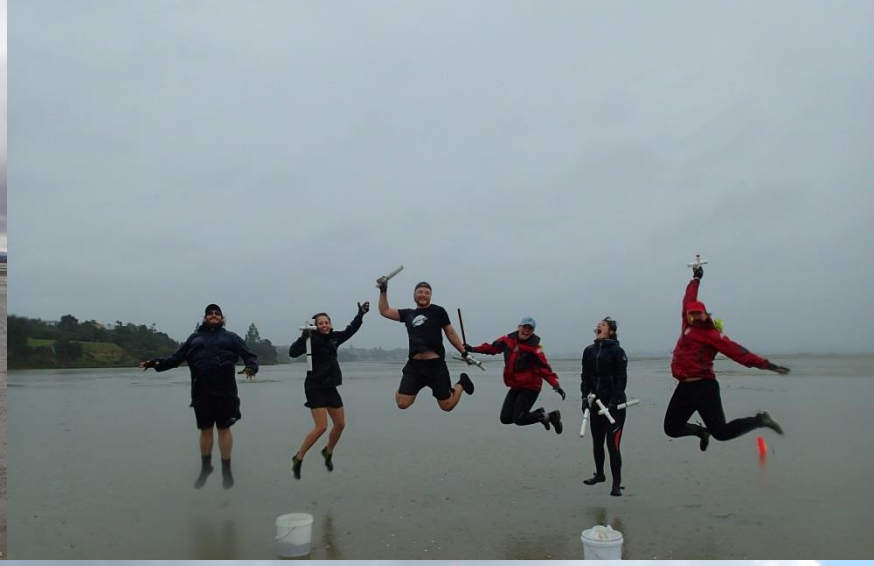

Dynamic Seas

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