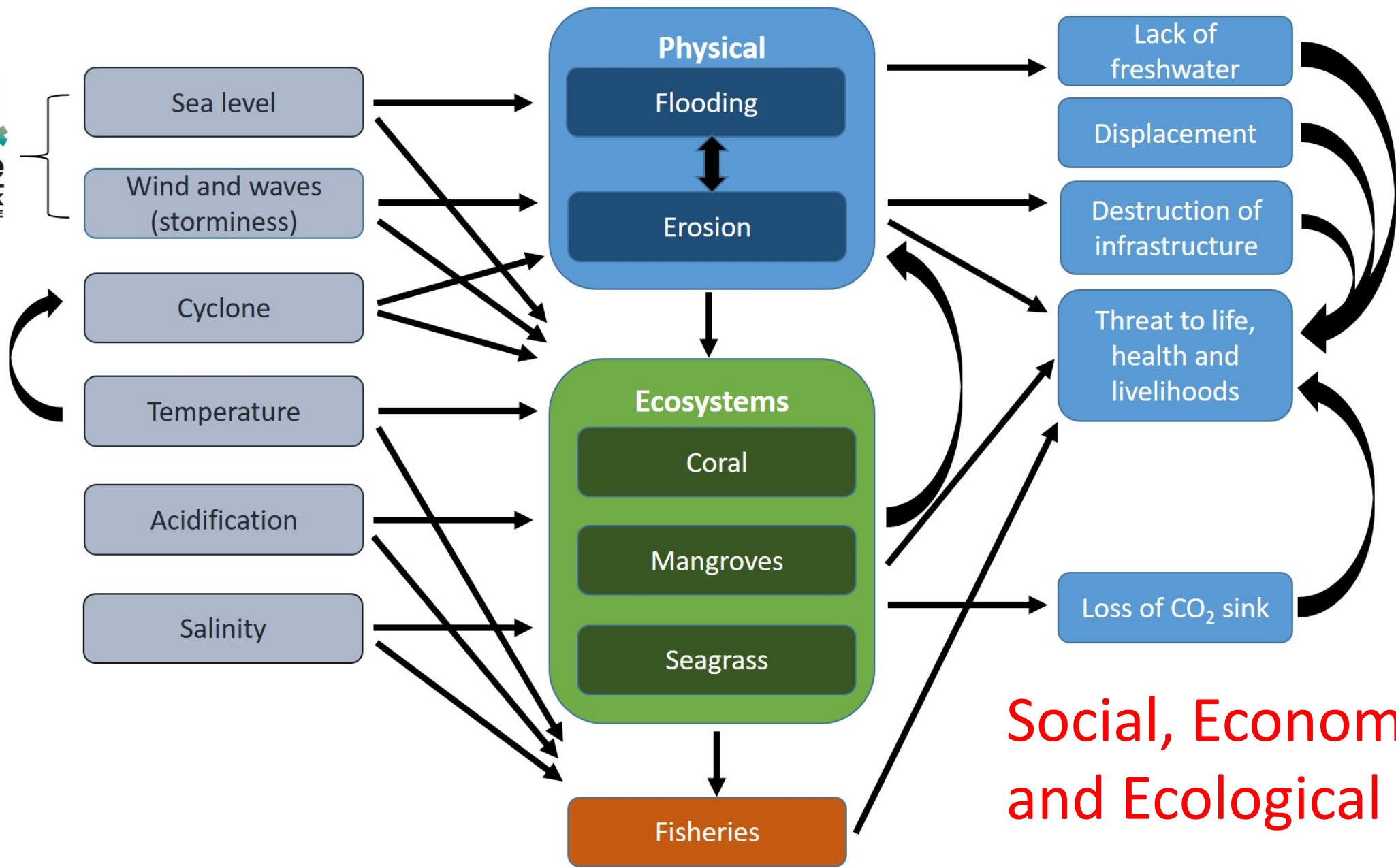


Impacts of climate change on the coastal and marine environment

Amani Becker

National Oceanography Centre

11th and 12th February 2020, Antananarivo, Madagascar



Observations & projections of marine climate change

- Sea level – Under high emission scenario 15mm/yr or 0.85m by 2100
- Wave height – likely to increase
- Cyclone – projected to increase in intensity with higher extreme sea levels
- SST - Tropical Indian Ocean SST has warmed by 1.4°C from 1950-2015
- Acidification
- Salinity

Erosion



- Waves
- Sea level
- Wind
- Sediment supply

- Loss of land
- Habitat loss
- Destruction of infrastructure
- Displacement

Flooding

Praia Nova, near Beira, Mozambique



- Waves
- Sea level
- Storm surge
- Erosion
- Loss of land
- Destruction of infrastructure
- Lack of potable water
- Displacement
- Loss of life
- Health (physical & mental)

Coral reefs

Important for:

- Flood protection
- Wave attenuation
- Habitat
- Food and livelihoods

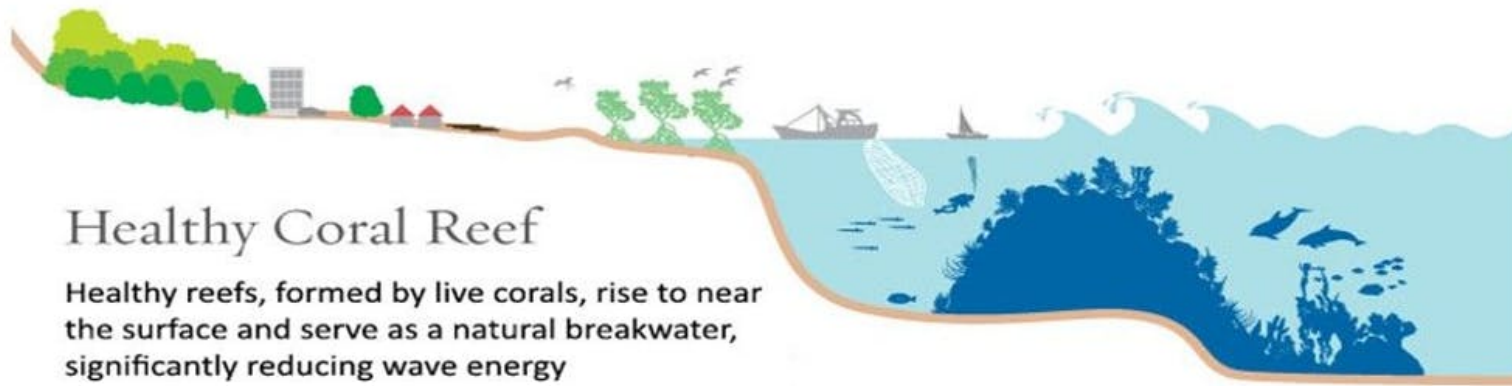
Climate change threats are:

- Temperature
- Sediment supply
- Acidification



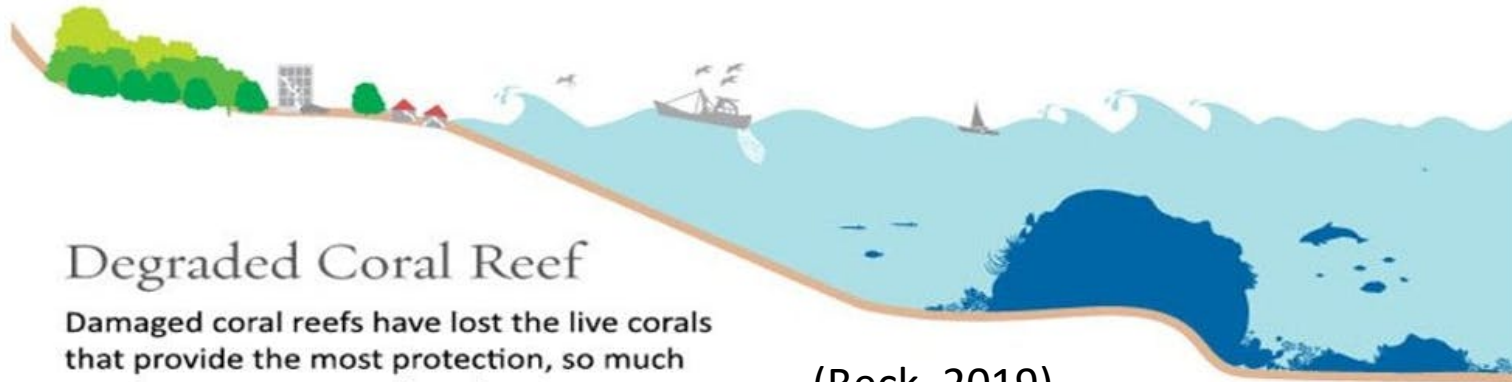
A before and after image of the bleaching in American Samoa. The first image was taken in December 2014. The second image was taken in February 2015

Coral reefs as flood & erosion protection



Healthy Coral Reef

Healthy reefs, formed by live corals, rise to near the surface and serve as a natural breakwater, significantly reducing wave energy



Degraded Coral Reef

Damaged coral reefs have lost the live corals that provide the most protection, so much more wave energy reaches the coast

(Beck, 2019)

Coral reefs can reduce wave energy by 97% (Ferrario et al 2013)

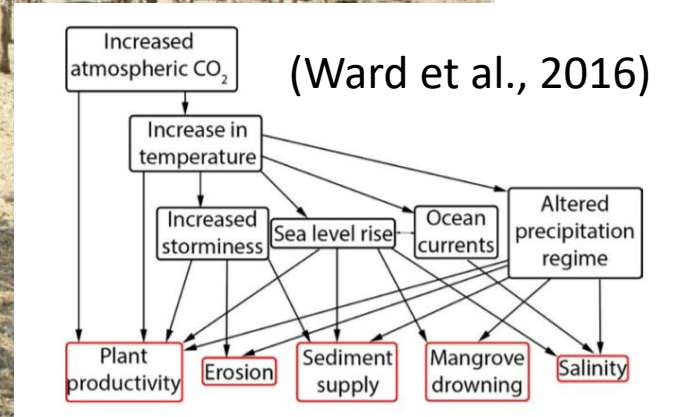
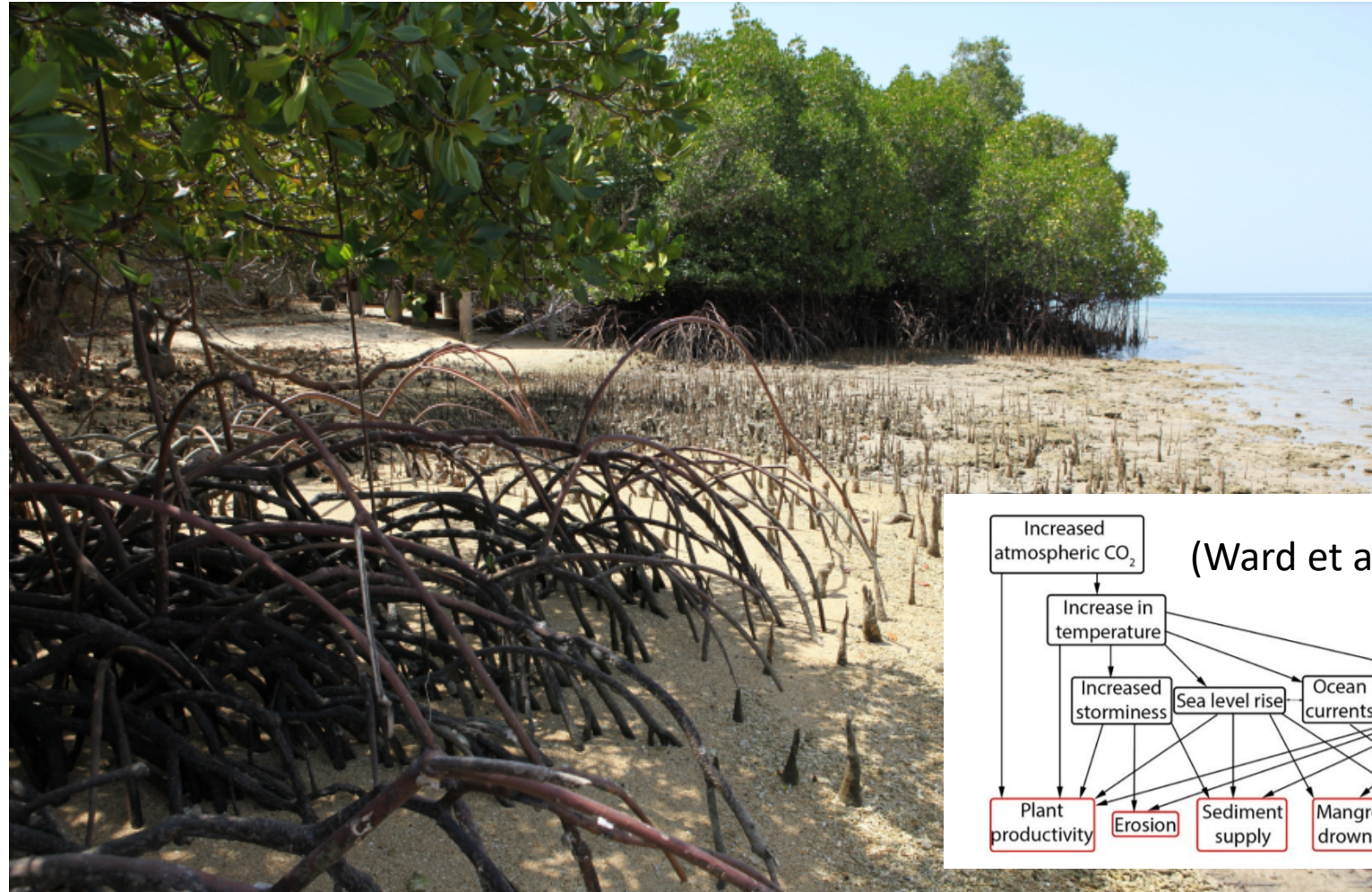
Great Barrier Reef has been shown to have sustained growth rates of 0.3 to 0.9 m/100 years (Perry and Smithers, 2011)

Provides a sediment source - beaches and islands created from sediments derived directly from coral reefs

Mangroves


Important for:

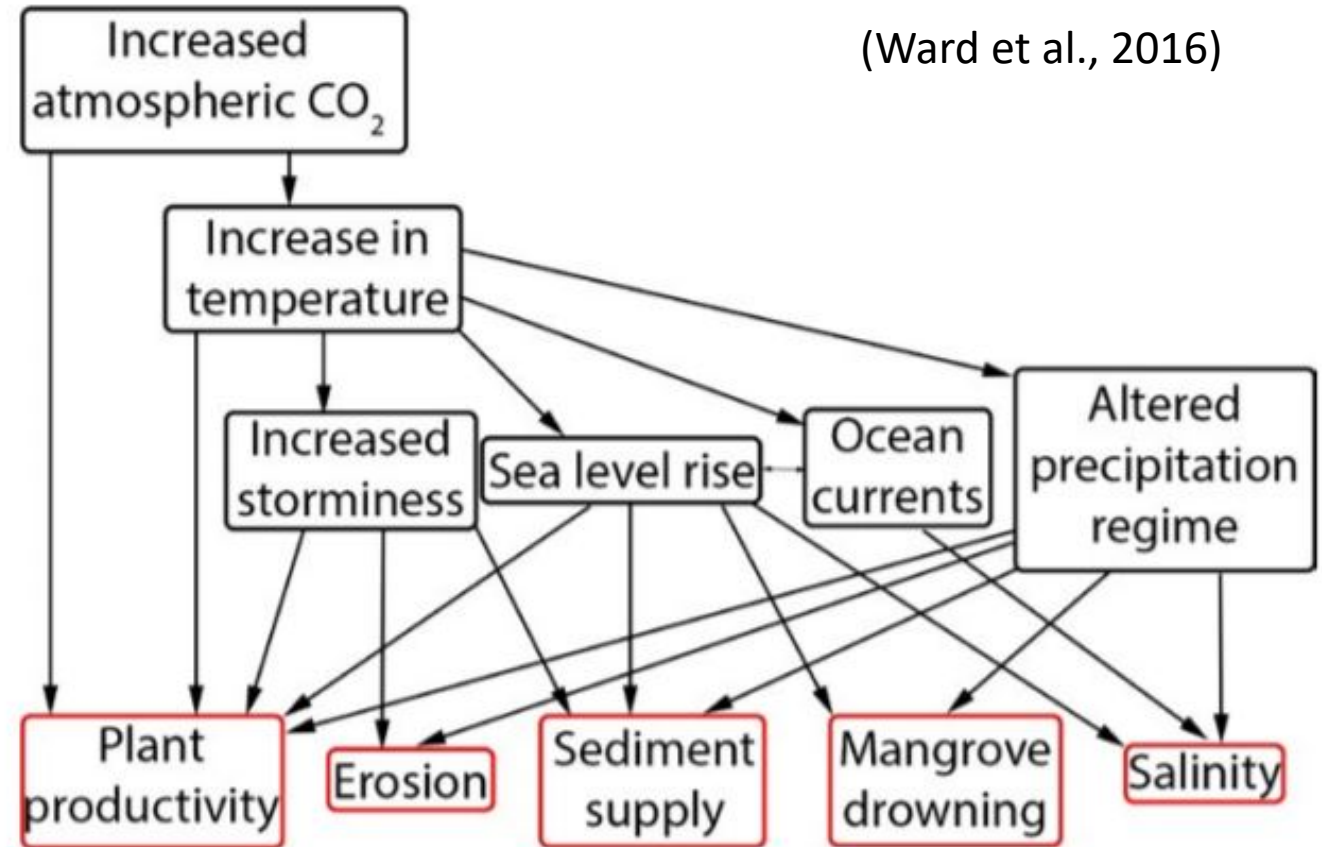
- Flood protection
- Wave attenuation
- Habitat
- Sediment stabilisation
- Building materials
- Fish nurseries (food and livelihoods)
- CO₂ sequestration
- Climate change threats are:



Mangroves


Important for:

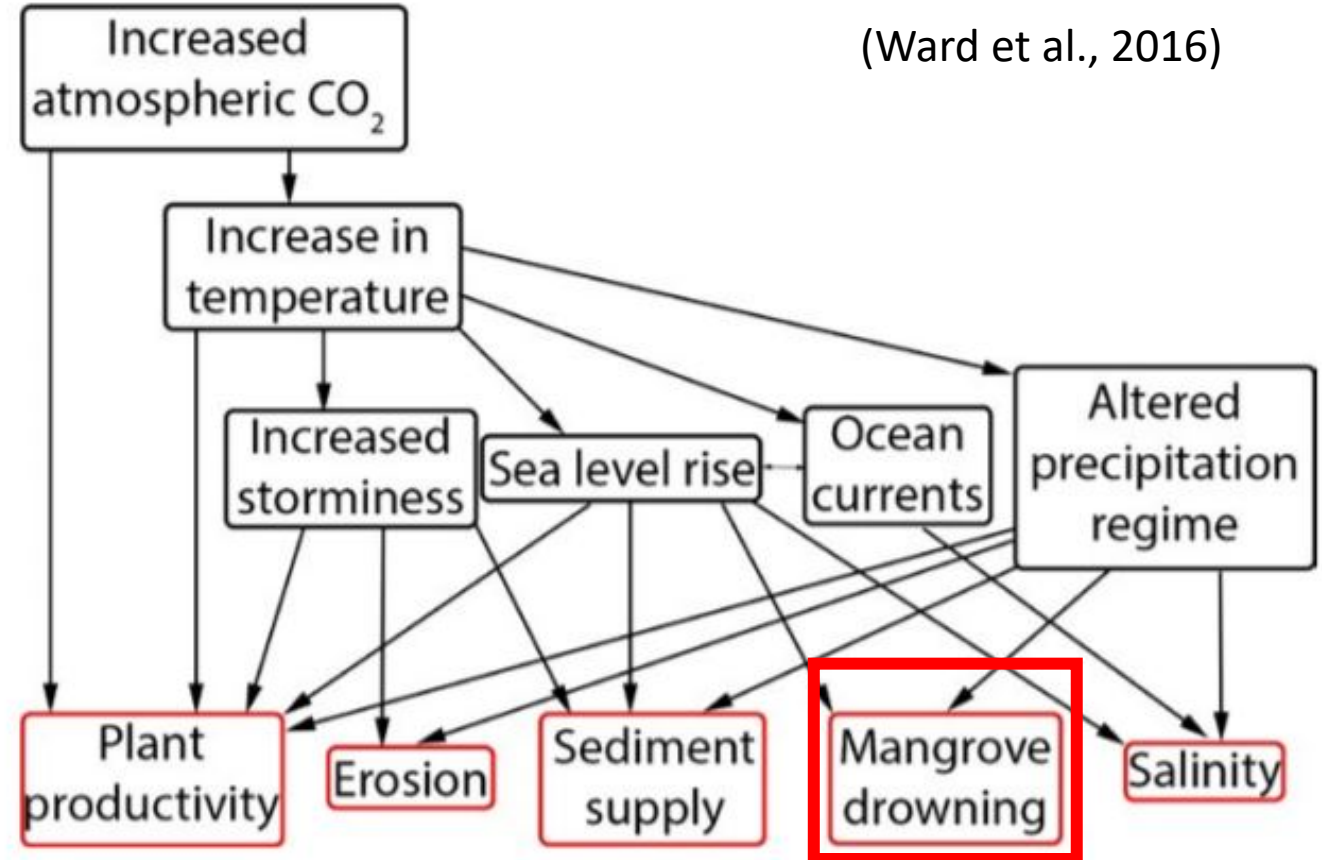
- Flood protection
 - Wave attenuation
 - Habitat
 - Sediment stabilisation
 - Building materials
 - Fish nurseries (food and livelihoods)
 - CO₂ sequestration
- Climate change threats are: 



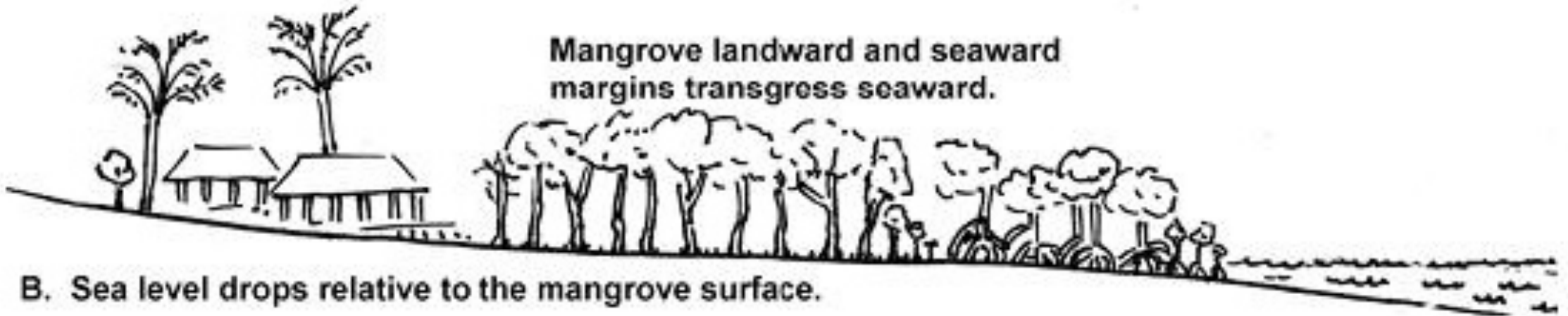
Mangroves

Important for:

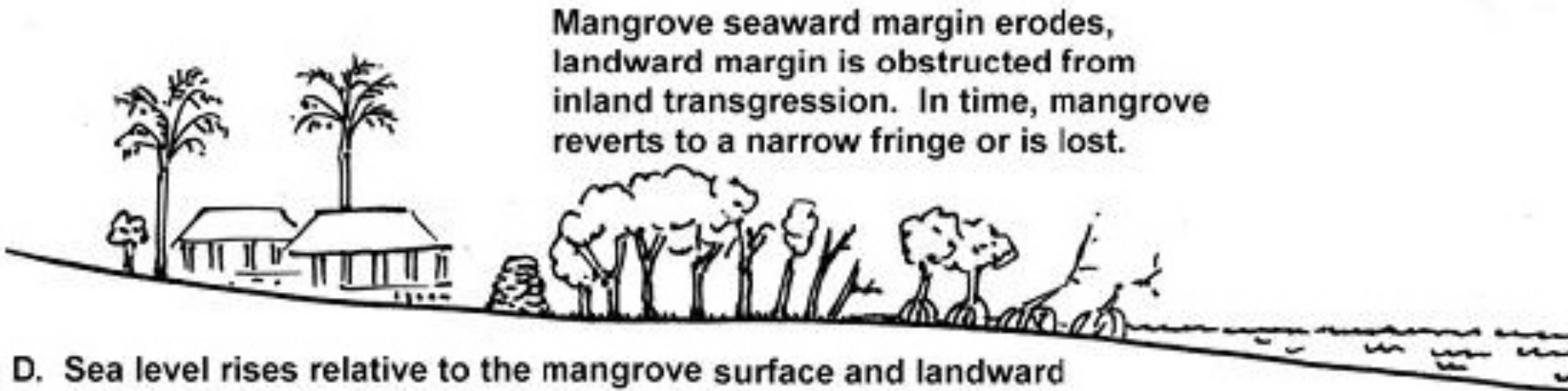
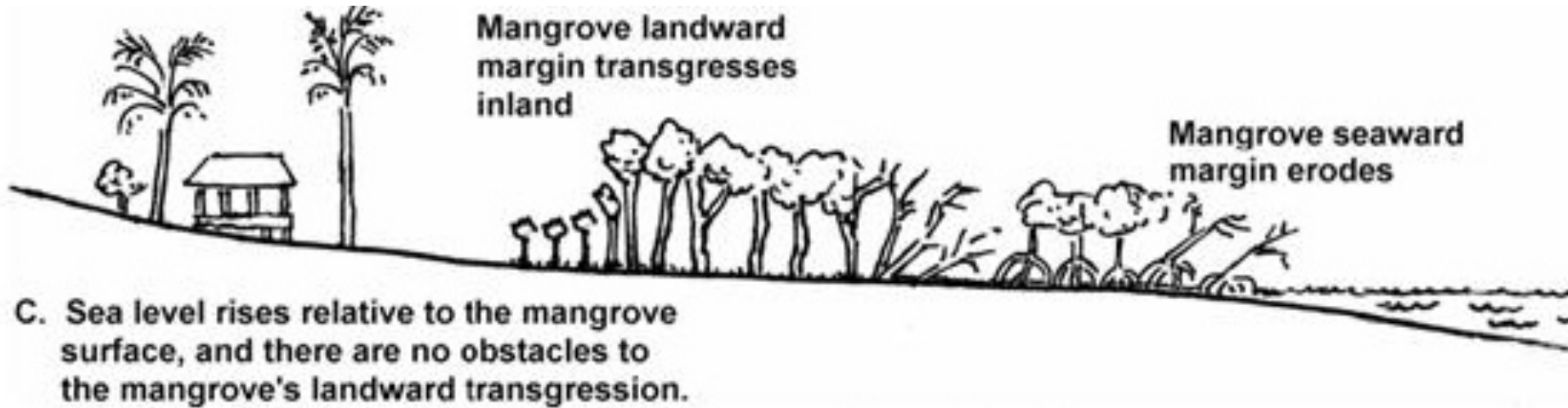
- Flood protection
 - Wave attenuation
 - Habitat
 - Sediment stabilisation
 - Building materials
 - Fish nurseries (food and livelihoods)
 - CO₂ sequestration
- Climate change threats are: 



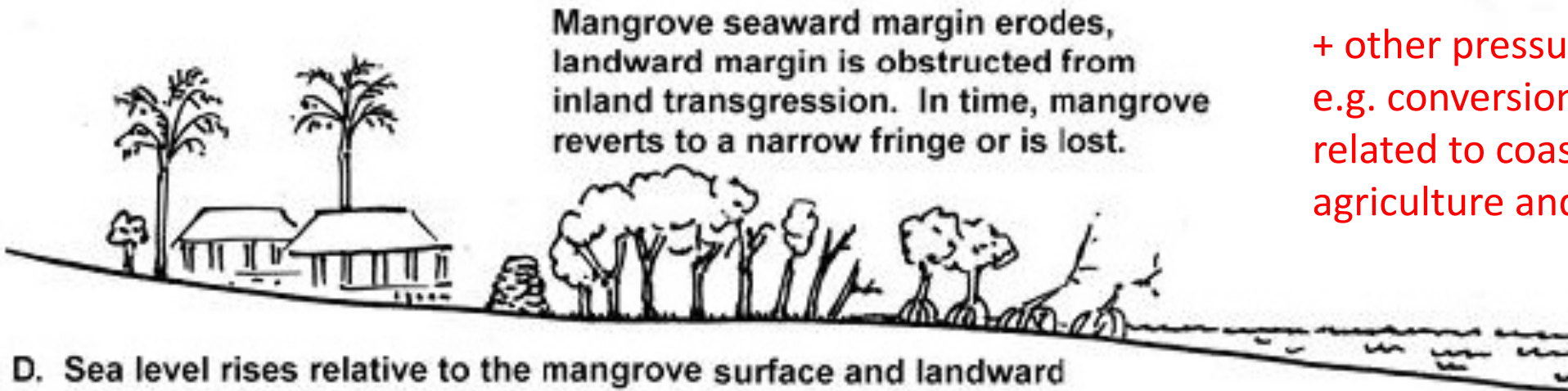
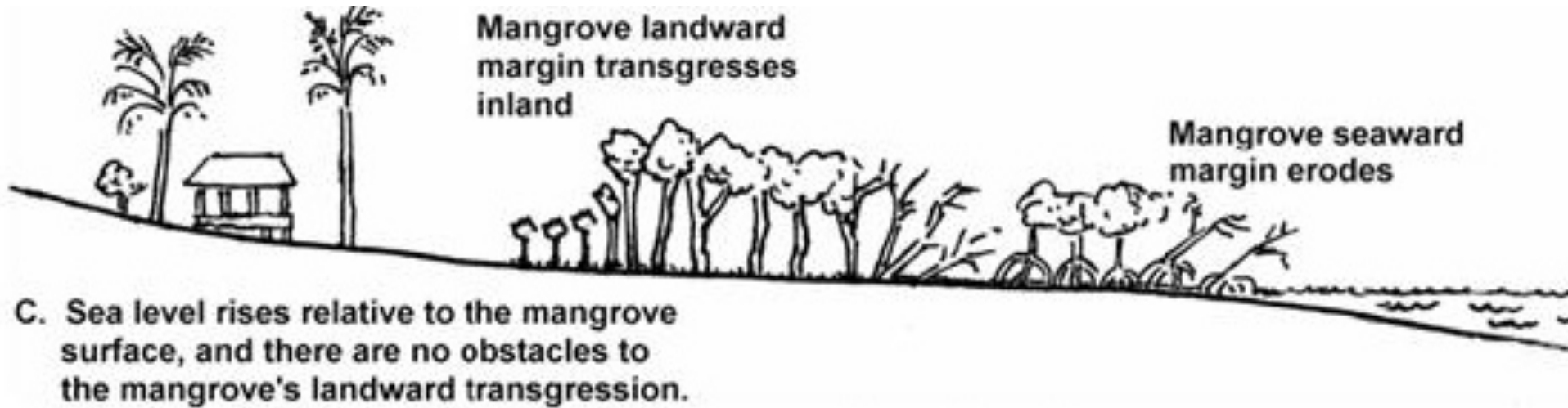
Sea level and Mangroves



Sea level and Mangroves



Sea level and Mangroves



+ other pressures.
e.g. conversion and degradation
related to coastal development,
agriculture and aquaculture

Seagrass

Important for:

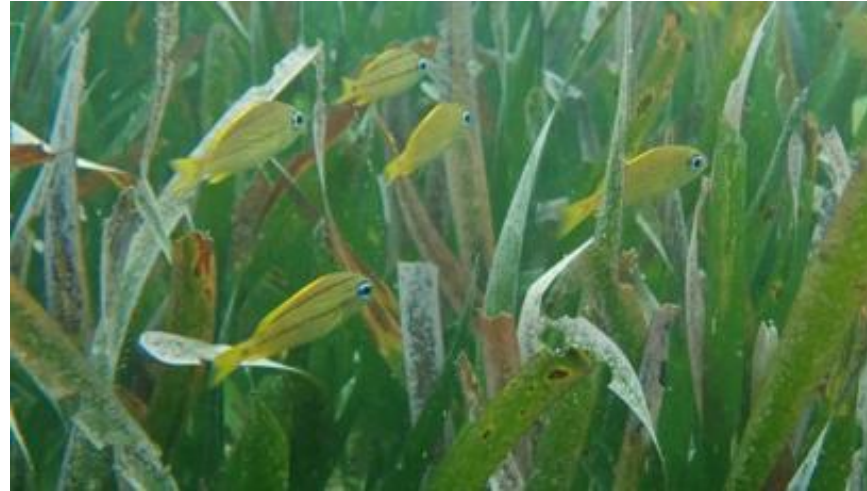
- Habitat
- Sediment stabilisation
- Fish nurseries (food and livelihoods)
- CO₂ sequestration – **35 times more efficient than rainforest!**

Climate change threats are:

- Temperature
- Salinity
- Water depth
- Waves
- Currents

Also lost due to:

- pollutant and nutrient runoff
- dredging and trawling



Carbon sequestration in coastal wetlands

