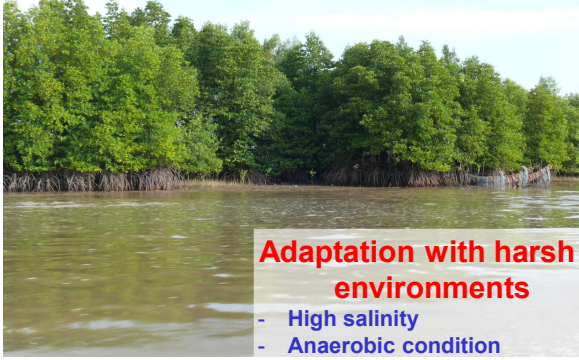


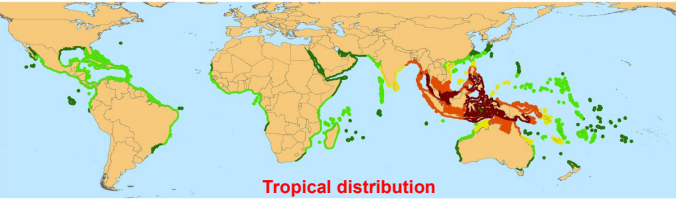
Mangrove ecosystem introduction

Mangroves are woody plants which grow at the sea-land boundary of (sub)tropical regions




Adaptation with harsh environments

- High salinity
- Anaerobic condition

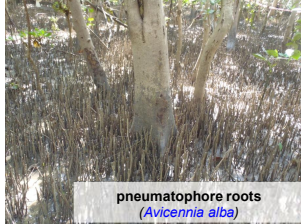


Tropical distribution


Native distributions of mangrove species^[1] ■ 1 - 3 ■ 4 - 13 ■ 14 - 25 ■ 26 - 35 ■ 36 - 46



knee roots
(Bruguiera gymnorhiza)

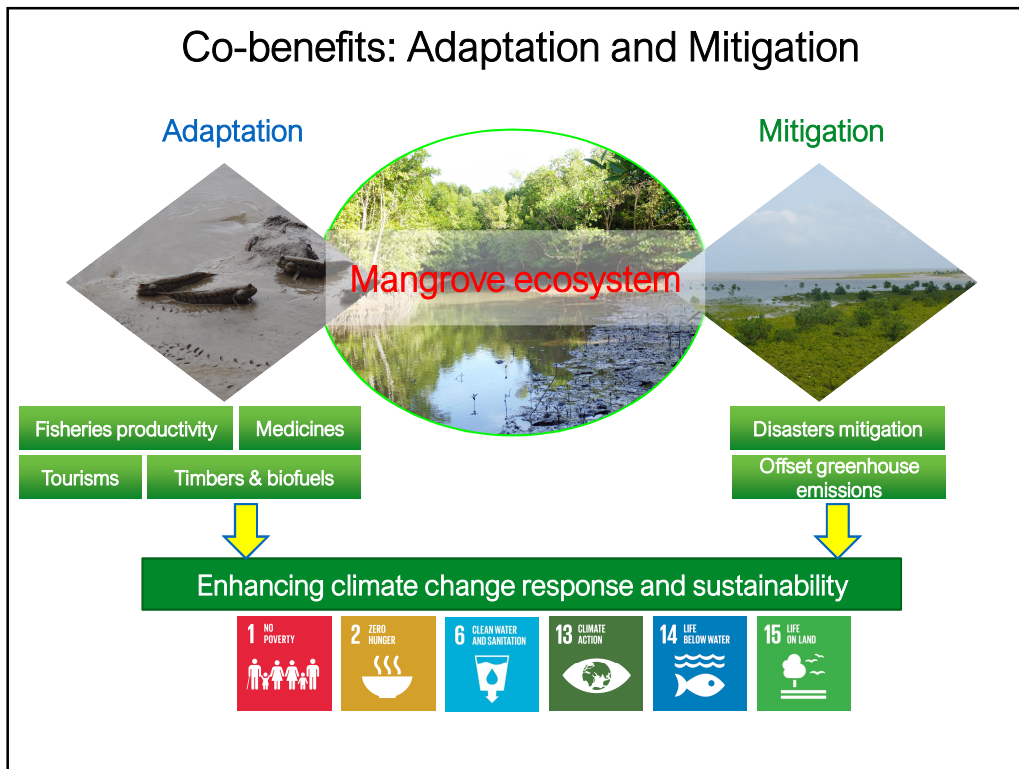


pneumatophore roots
(Avicennia alba)



prop roots
(Rhizophora spp.)

1




2

Enhancing climate change response and sustainability

1
NO POVERTY

Support livelihood and animal protein sources for the coastal populations

Important renewable resources for fuels, construction, tannin, paper, dyes, and medicines




2
ZERO HUNGER

Maintain high productivities of the invertebrates and fish

6
CLEAN WATER AND SANITATION

Filters of pollutants from land to sea



13
CLIMATE ACTION

Protect village, city, agriculture, and aquaculture from tropical typhoons, floods and tsunami

Sequester carbon and offsetting greenhouse gases emissions

14
LIFE BELOW WATER

Refuges for invertebrates and fish


3

1
NO POVERTY


Support livelihoods and income for local community

Important renewable resources


mangrove timbers




Kiln at 900-1000 °C



Charcoal




Important building materials



➔

Construction



4

1 NO POVERTY

Support livelihoods and income for local community

Important medicine resources

Household items: Furniture, Wax

Textiles, leather: Tannins for leather preservation

Other products: Fish, shellfish and mangrove roots for aquarium trade

Medicines

Fertilizers

5

2 ZERO HUNGER

Maintain high productivities of the invertebrates and fish

Mangrove forests

local community benefits

Abundance of food resources

➔

high productivities of invertebrates and fish

➔

Fisheries productivities

Refuges for invertebrates and fish

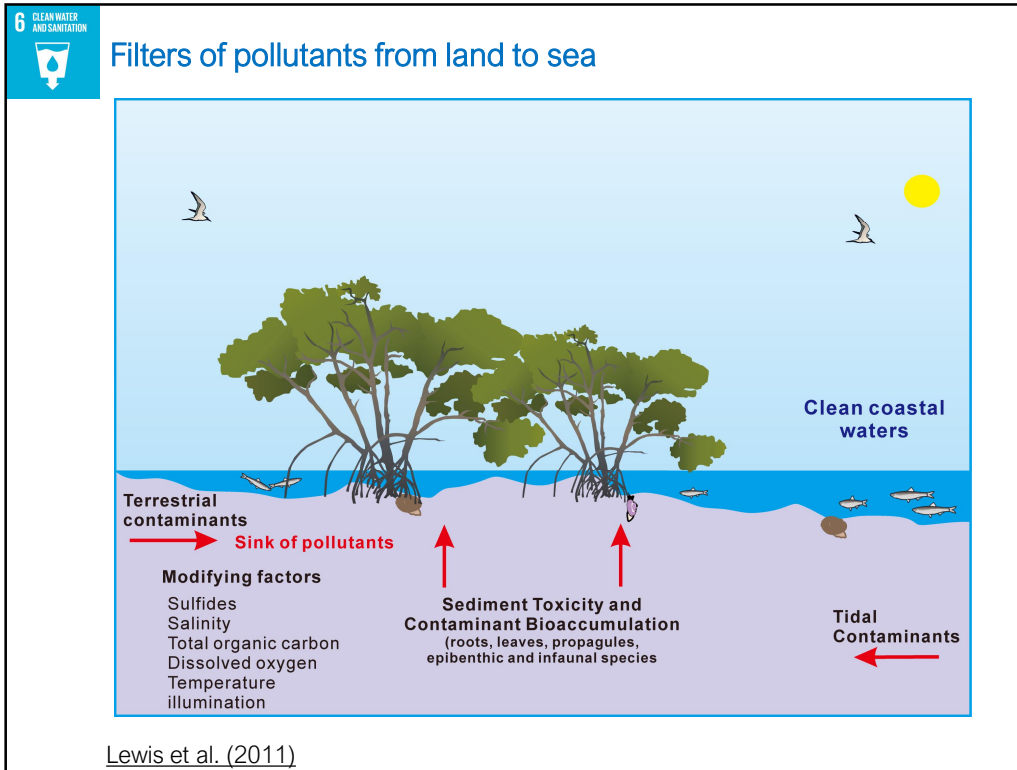
High protein food resources

1 ha mangrove forest supports 450 kg/year fish and invertebrates

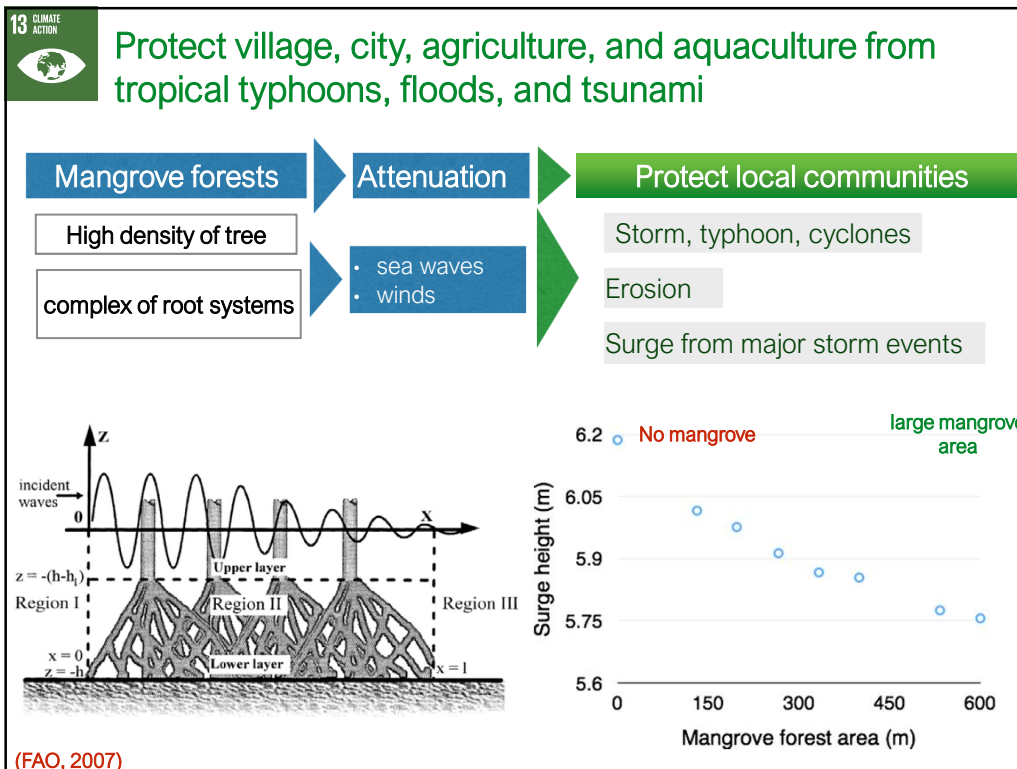
Year	Mangrove area (km²)	CPUE (t/HP/year)
1978	600	1.5
1980	750	2.5
1982	850	3.5
1984	900	3.8
1986	800	2.5
1988	700	1.5
1990	650	1.2
1992	600	1.0
1994	600	1.0

Correlation between mangrove forest area with fisheries productivities in Mekong Delta, Vietnam

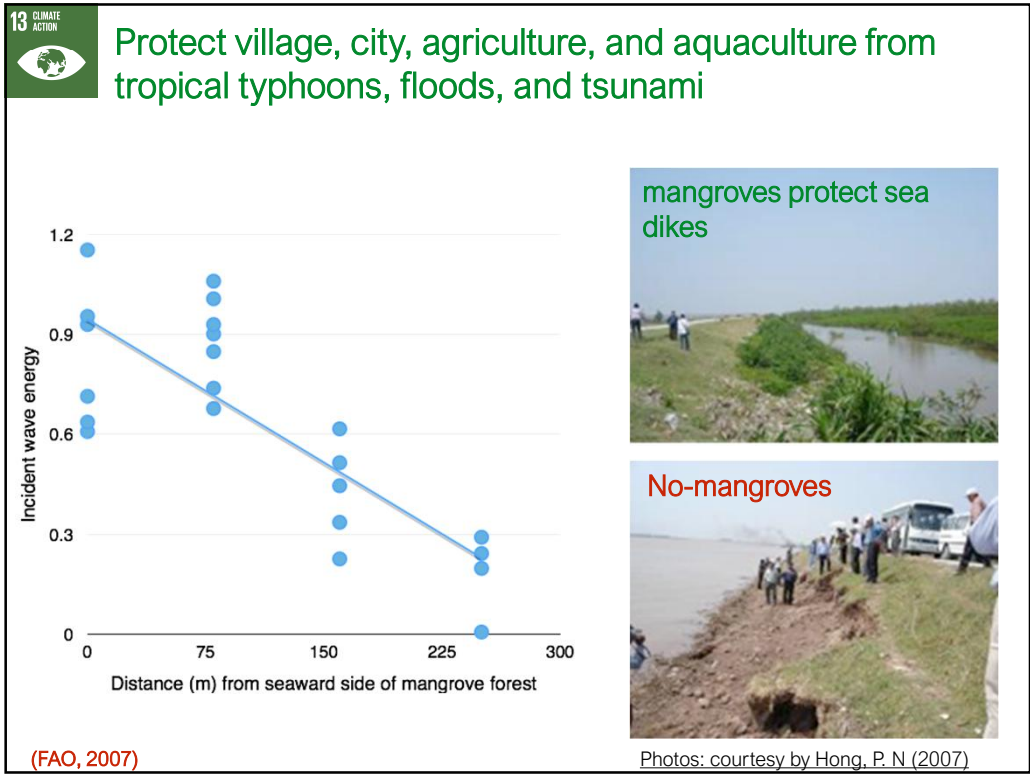
6



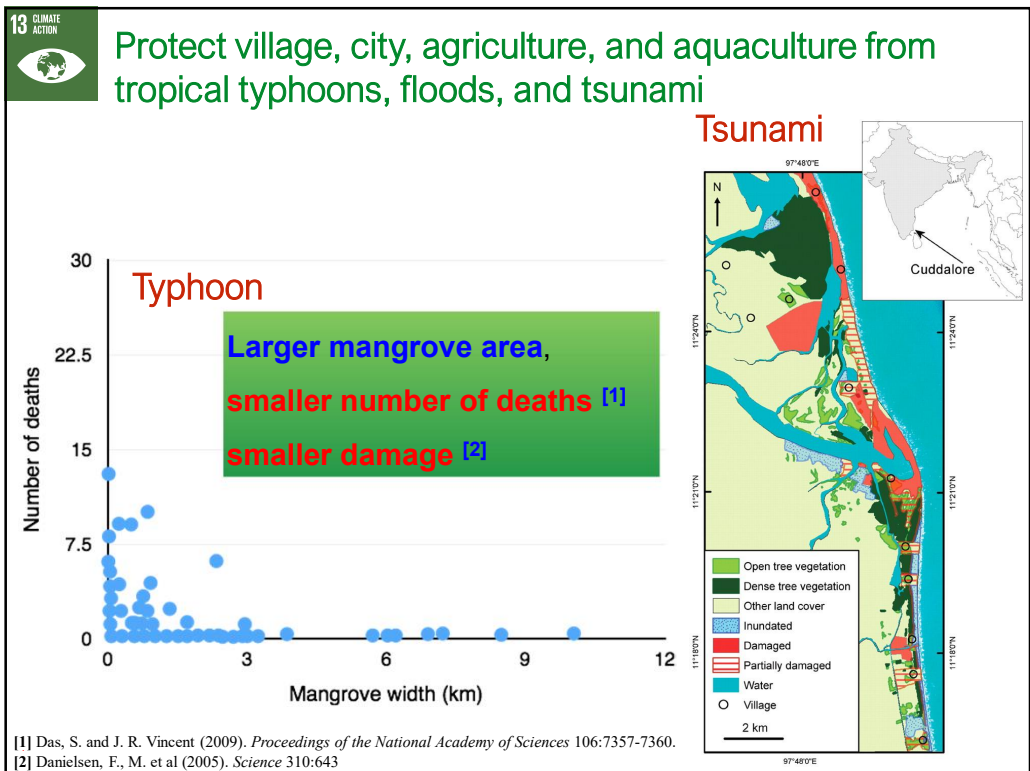
7



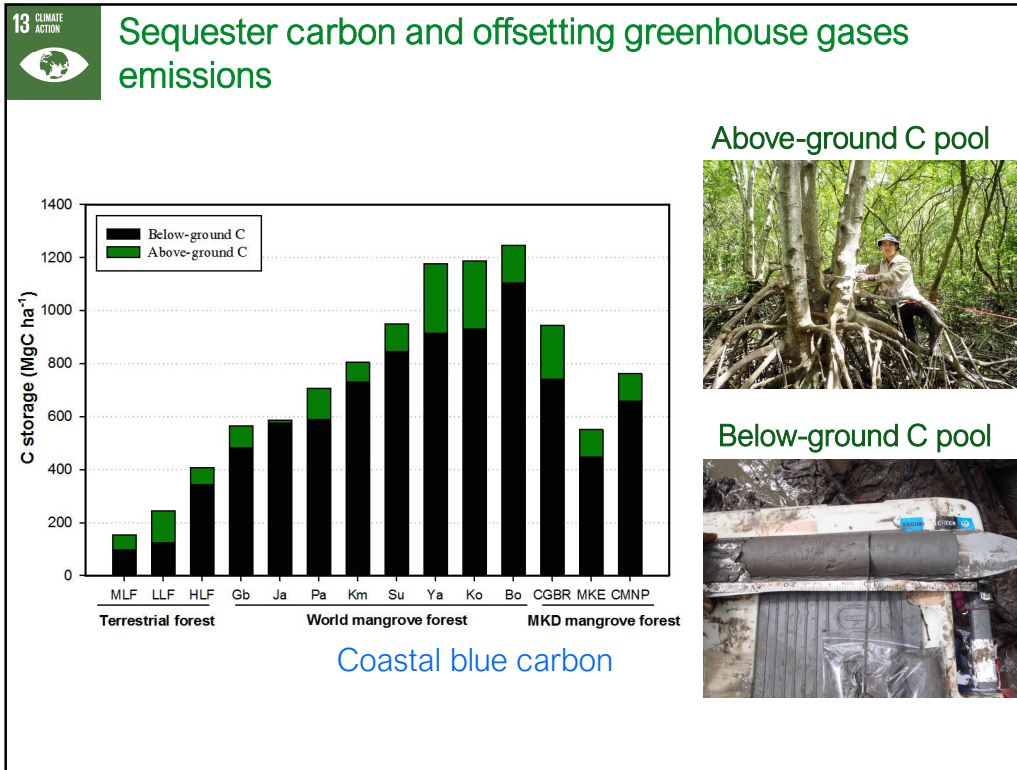
8



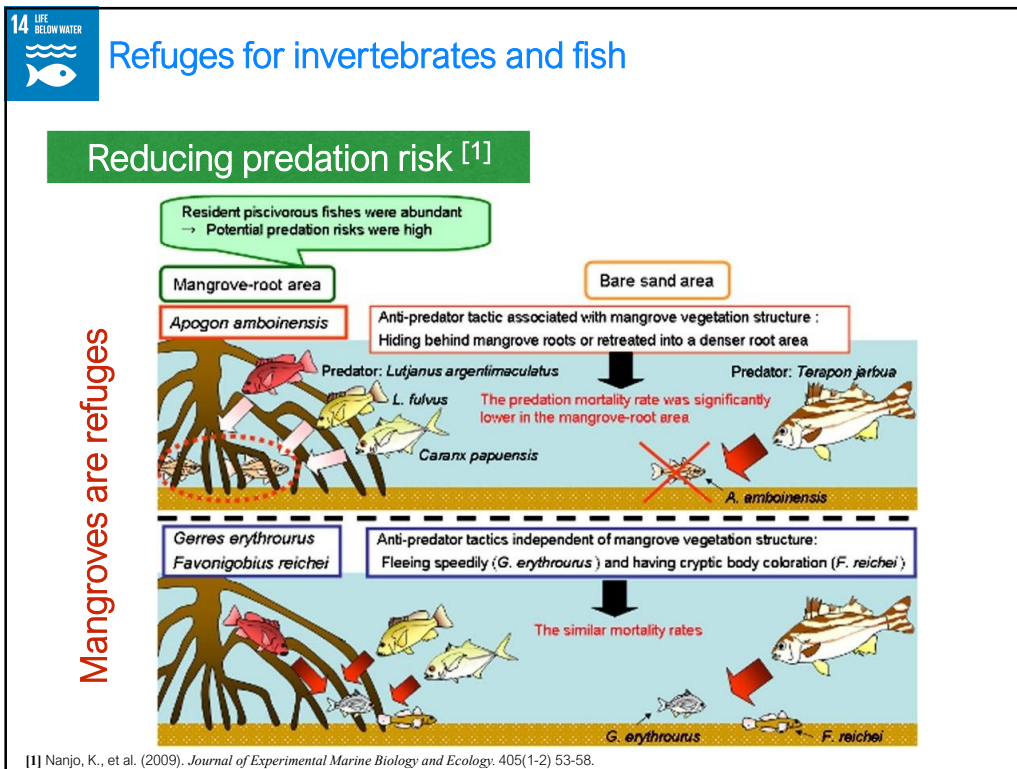
9



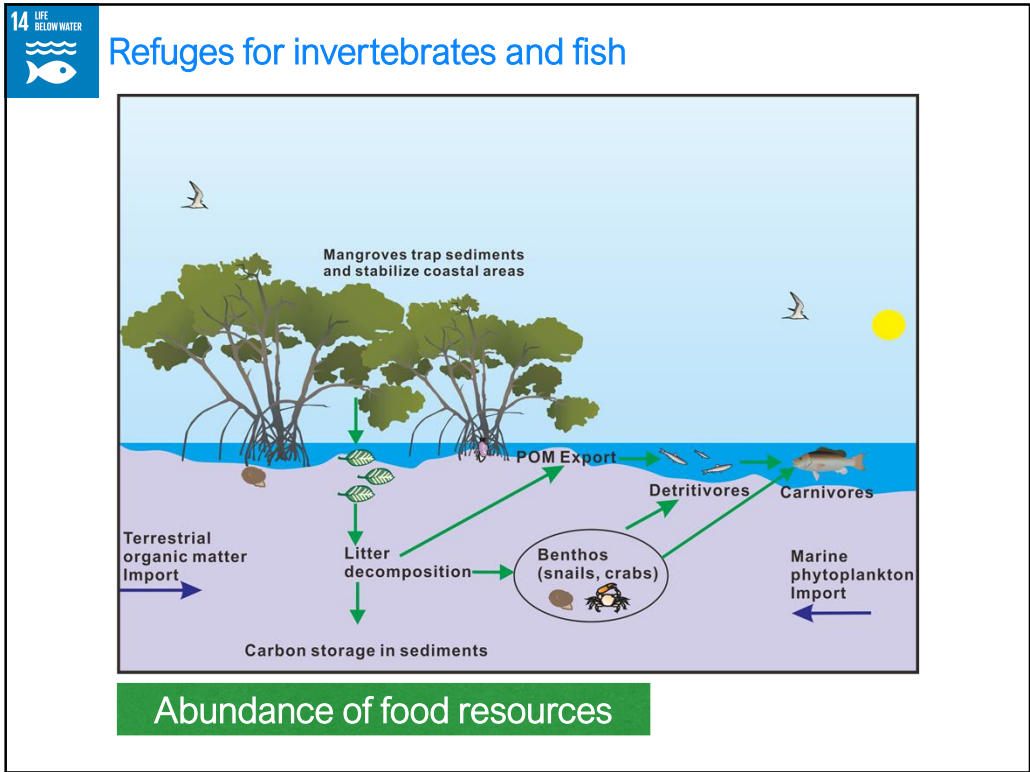
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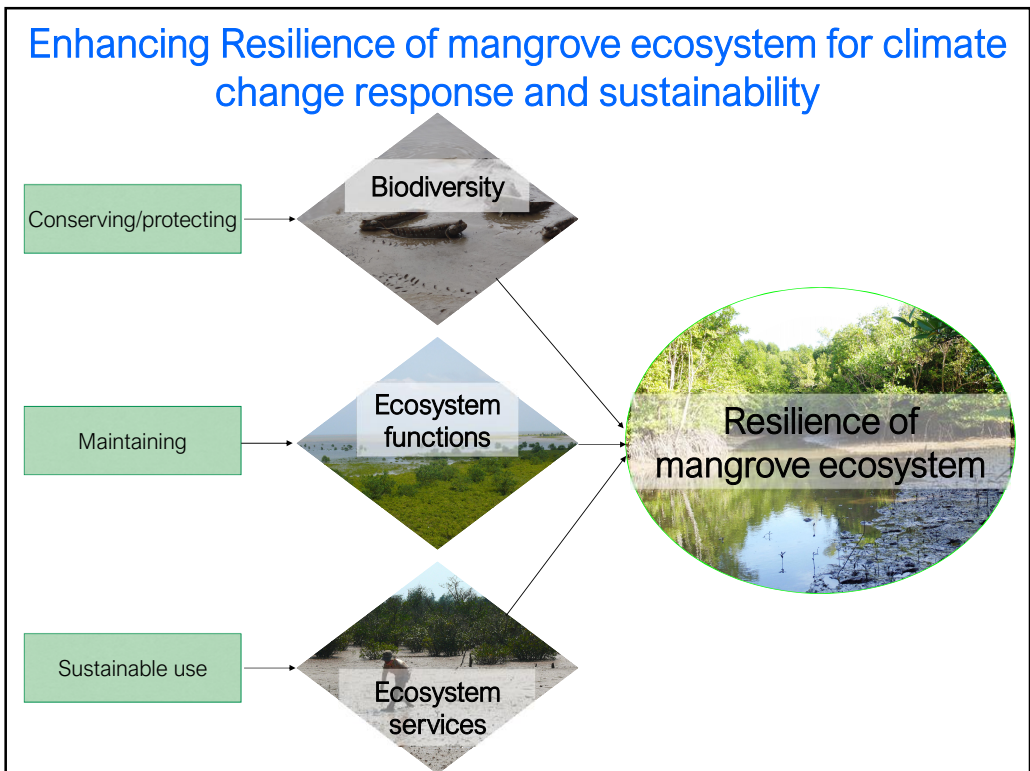
11



12



13



14

Homework

Read the paper for next lecture discussion?

[Claudia Kuenzer and Vo Quoc Tuan \(2013\). Assessing the ecosystem services value of Can Gio Mangrove Biosphere Reserve: Combining earth observation- and household-survey-based analyses. Applied Geography 45: 167-184](#)