

Mangroves : contributions to CCA and DRR

**Asia-Pacific Climate Change Adaptation Forum
2014, 1-3 Oct 2014, Kuala Lumpur, Malaysia**

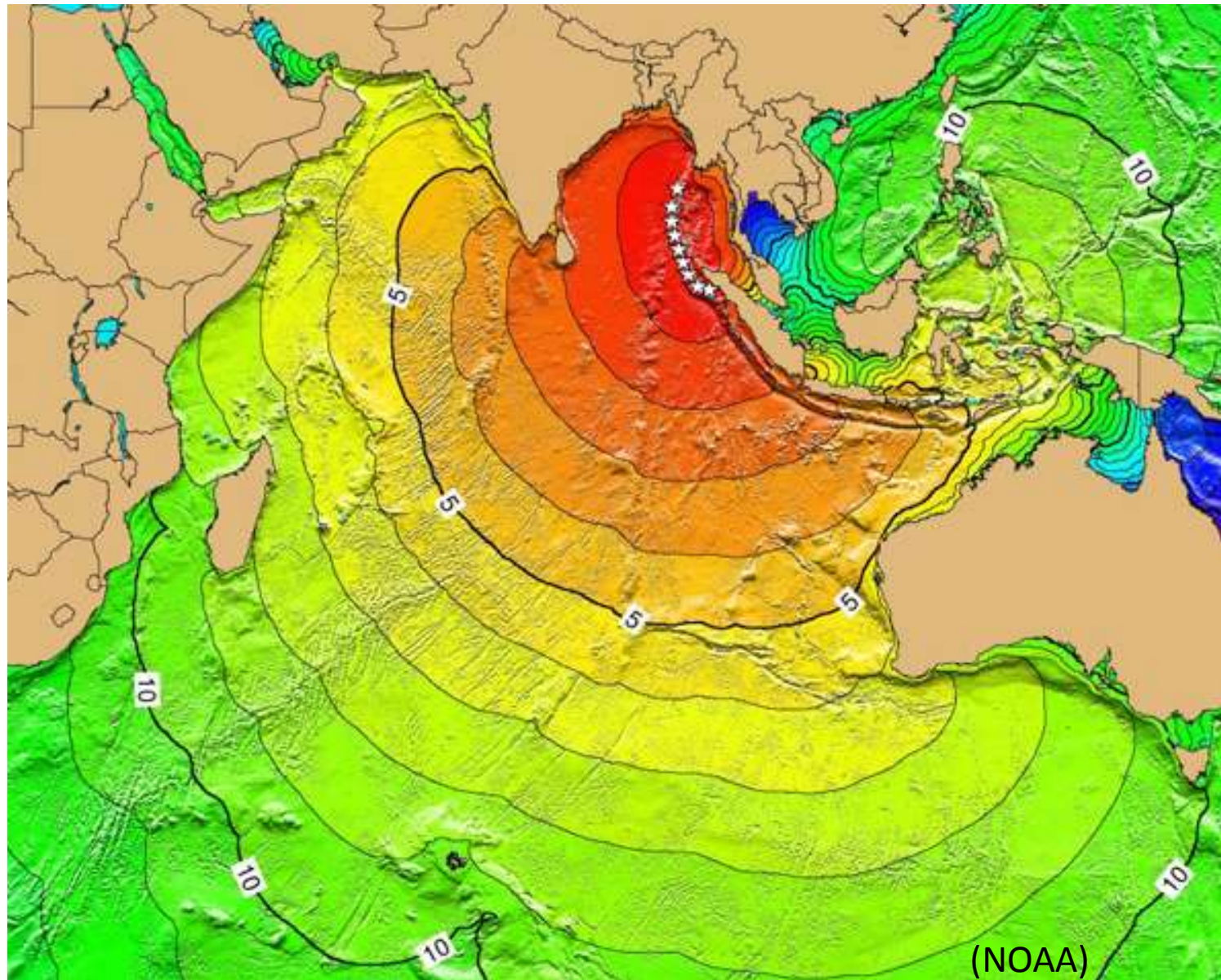
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Asia : climate change

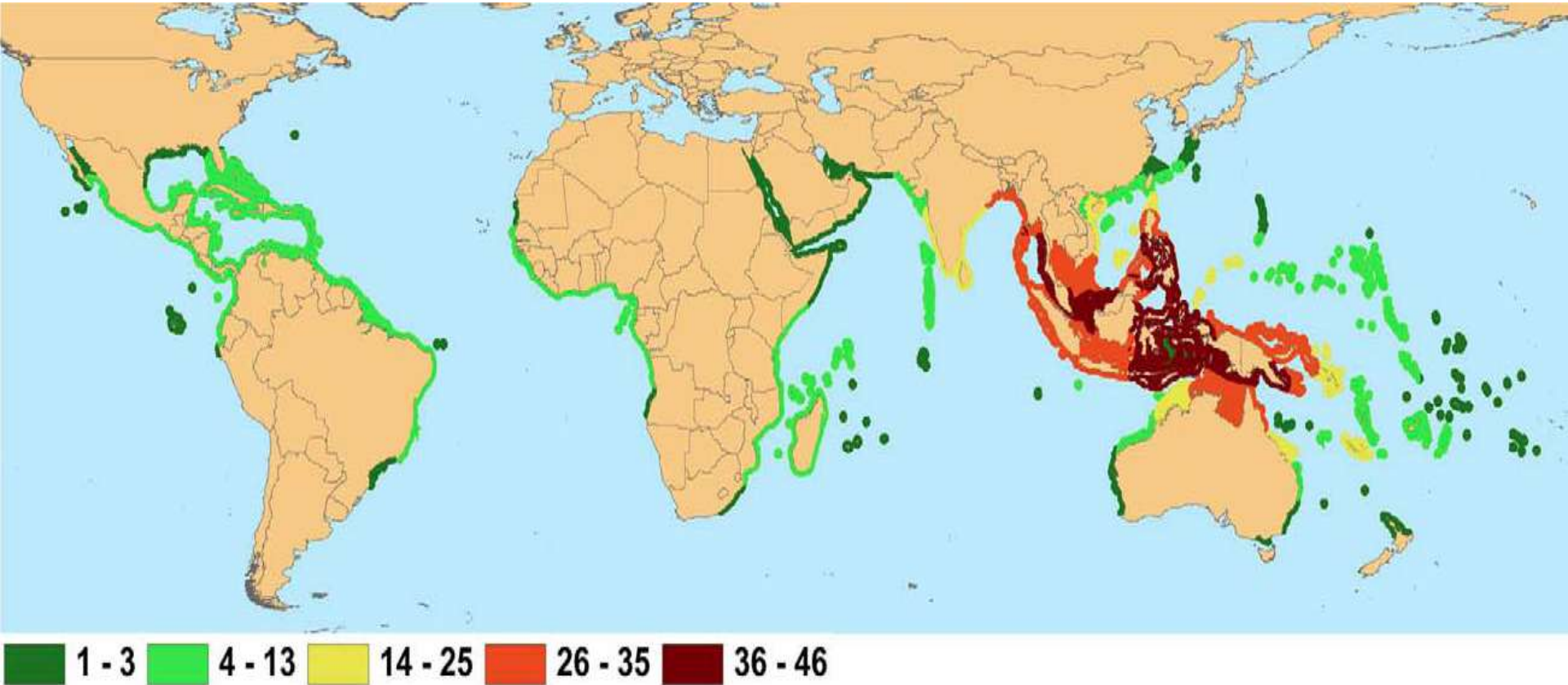


(Maplecroft 2012)

Asia : tsunamis



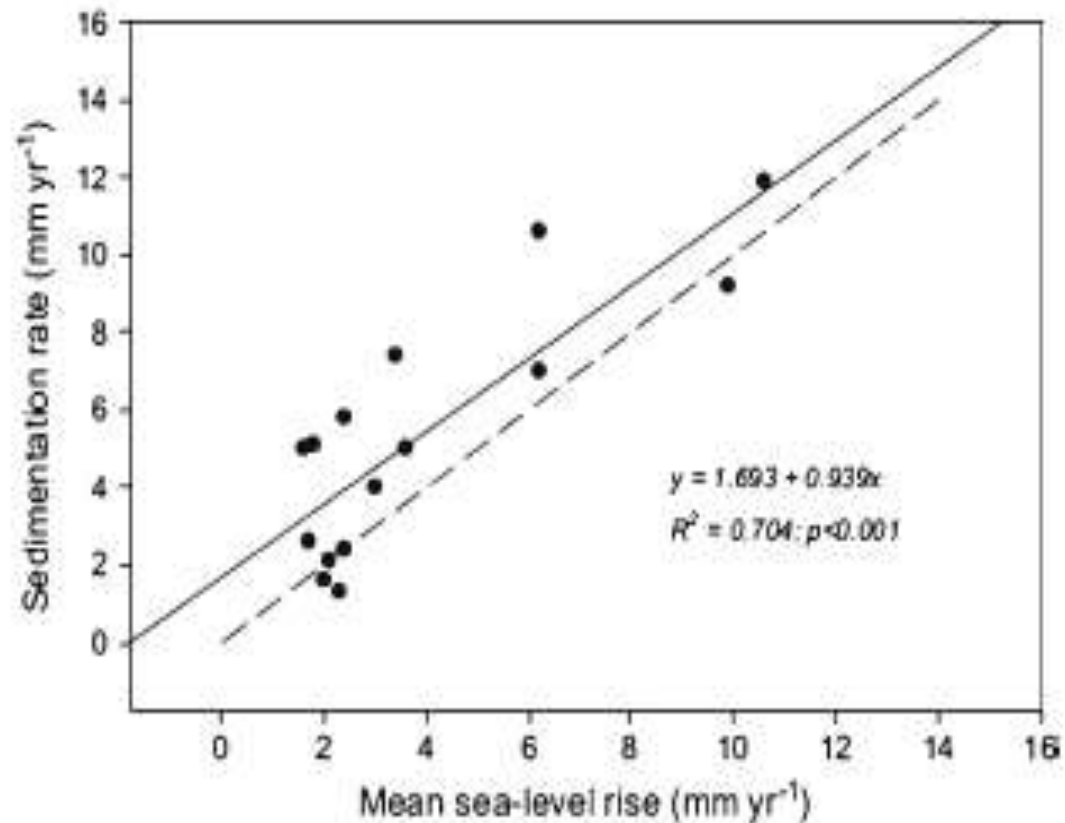
Mangroves



(Polidoro et al 2011)

Mangroves : sea level rise

- Keeps up with SLR – 1 mm/annum.
- “Intact and healthy mangrove systems can adapt to sea level rise; their growth **can accommodate to increases of 3.8 up to 9 millimetres per year** depending on local circumstances..” (Wetlands International).



(Alongi 2008)

Mangroves and waves

- Publications on **experiments and field studies done on effectiveness of mangroves** (Mazda et al 2007).
- Review by **Cochard et al (2008)** summed up and put controversy to rest to some extent.
- In Nov 2013, mangroves shielded villages of Sagay islets from effects of typhoon Haiyan (Yolanda).

| Ecosystem type | Dominant ecosystem processes | Dominant buffer composition | Approximate wave buffer effectiveness range | | | | Expected tsunami energy exposure |
|----------------------|------------------------------|-----------------------------|---|--------------------|-------------------|-------------------|----------------------------------|
| | | | Normal waves | Storm waves | <4 m high tsunami | >8 m high tsunami | |
| (c) Mangrove forests | Biotic/physical | Biotic | ▼~▼ ¹ | ▼~▼ ^{1,2} | ▼~▼ ² | ▲~▼ ² | ■—■ |

Legend:

| | | | | | |
|---|----------------------|----|---|---|--------|
| ▲ | Hazard amplification | ▼▲ | Slight effect (not evident, but measurable) | ■ | Small |
| ▼ | Hazard mitigation | ▼▼ | Moderate effect (evident, ~20-50% energy reduction) | ■ | Medium |
| X | No effect | ▼▼ | Considerable effect (~50-100% energy reduction) | ■ | High |

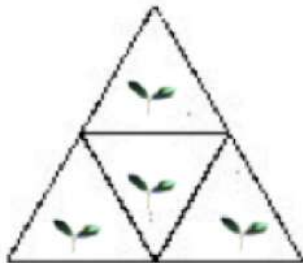
(Cochard et al 2008)

EBM

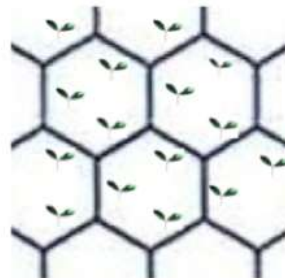
- **Emerging approach** using biodiversity and ecosystem services (supporting, provisioning, regulating, cultural) as part of overall strategy to adapt to adverse effects of climate change.
- Part of **broader portfolio of adaptation measures** – can be applied at different geographical scales and within various time frames.
- Is **cost-effective** to protect communities from climate change and extreme weather events.

Modular planting

- Ideally of **space-fitting shapes** (triangles, squares, rectangle, hexagons) containing sediments with mangroves grown to various heights or maturity.
- **Modules made of local materials or mixture of compressed sediments** that become self-destructive and formed part of sediments supporting mangroves.
- **Modular system of planting and deployment** is comparable to LEGO® set on large scale.
- **Nutrients and sediments added** to growing mangroves in field.
- Suitable for **variety of coasts** and not confined to muddy tidal flats.



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(IOC 2011)

Mangroves : benefits

- **Provides employment**; utilizes existing skills of coastal communities in mangrove planting.
- **Restores degraded coasts** caused by shrimp farming and other activities.
- **Improves biodiversity**; mangroves are nurseries for fish.
- **Low cost** protection measure compared to seawalls and dykes.
- Offers **coastal protection** from erosion, storm surges and buffer to tsunami waves.
- Important **carbon sink**.
- Supplementary/emergency **food supply**.
- **'No regrets' measure**; beneficial irrespective of future outcome of climate change.

(MAP)



| | |
|---|--|
| Sonneratia Wajit (Sticky Mangrove Apples)..... | |
| Sonneratia Lempok (Candied Mangrove Apples)..... | |
| Sonneratia Juice (Mangrove Apple Juice)..... | |
| Bolu Api-Api (Avicennia Spongecake)..... | |
| Bolu Agar-Agar Api-Api (Avicennia Agar-agar cake).. | |
| Onde-Onde Api-Api (Round Fried Avicennia cakes).. | |

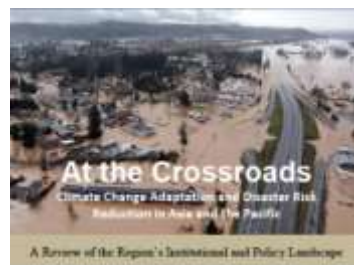
Avicennia marina

- **Widest latitudinal range**, ability to adapt to wide range of physical conditions, only mangrove to survive in arid areas.
- Present on both **seaward & landward margin of mangrove belt**.
- **'Opportunistic' colonization** due to ecological characteristics.
- Grows on **mud, sand, gravels, rocks, rock surfaces**.



Combining CCA & DRR

- CCA and DRR were treated **separately in the past**.
- DRR also find a niche to manage disaster risks associated with **extreme climate events** although it considers all hazards.
- Increasing recognition that **CCA and DRR share common focus** : reduce vulnerability of communities and contribute to sustainable development.
- Need to integrate recognized by **Hyogo Framework for Action** in 2005.
- **Practical integration.**




ISDR
UNISDR Asia and Pacific
(Berse et al 2011)



SOURCE
(Setiadi et al 2010)

