

Hydrology of Mangrove Forests



特定非営利活動法人

海辺つくり研究会

tsunami
baroclinic flow

oscillation

wave break

circulation

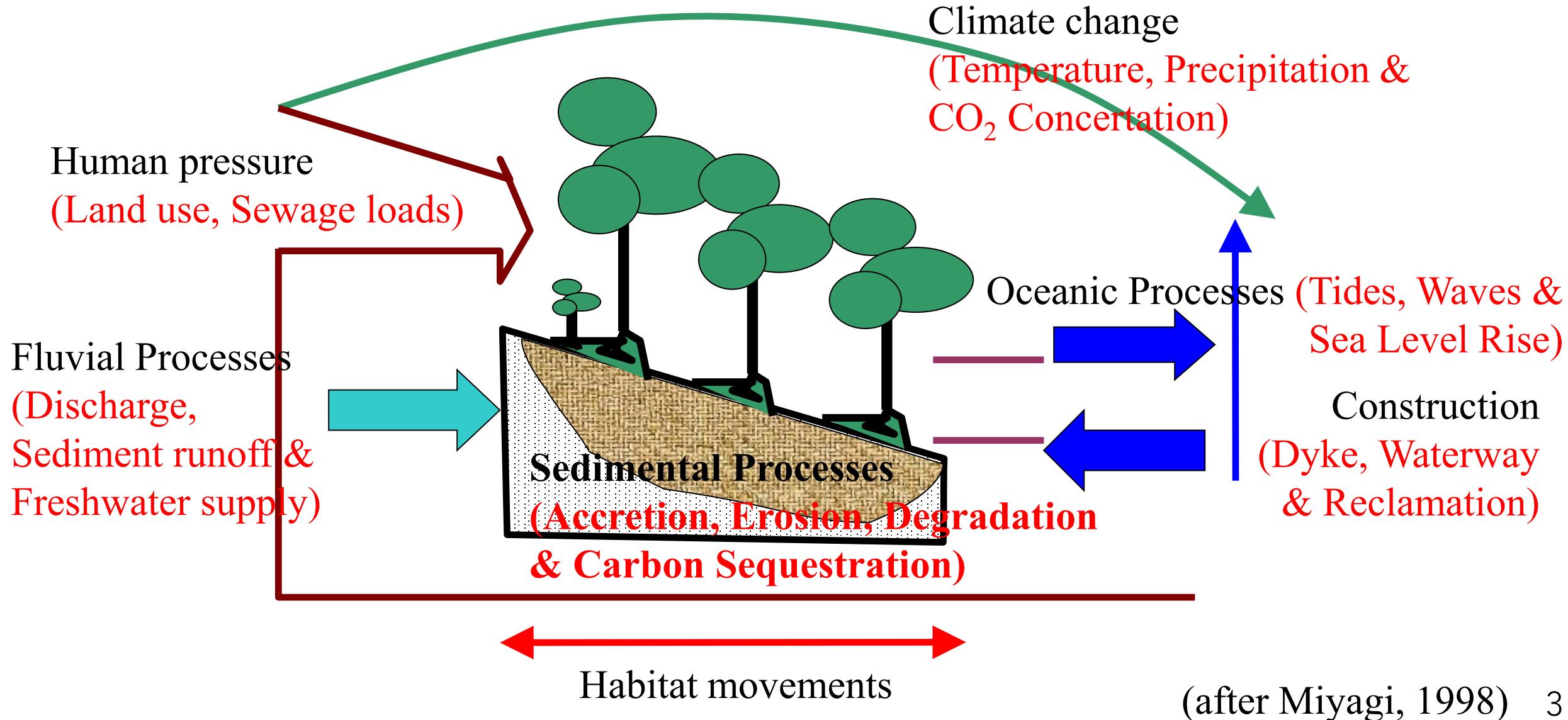
rotation
critical flow
river flow
stratification
tides
waves
barotropic flow
super flow
swells
gentle flow
mix
jump
flow
separation
macro tides
micro tides
high tides

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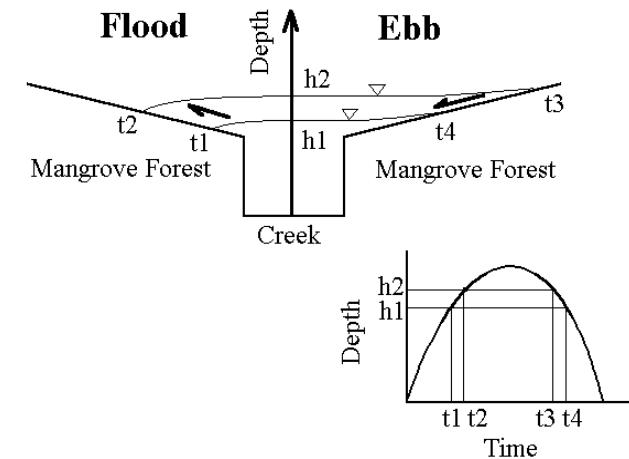
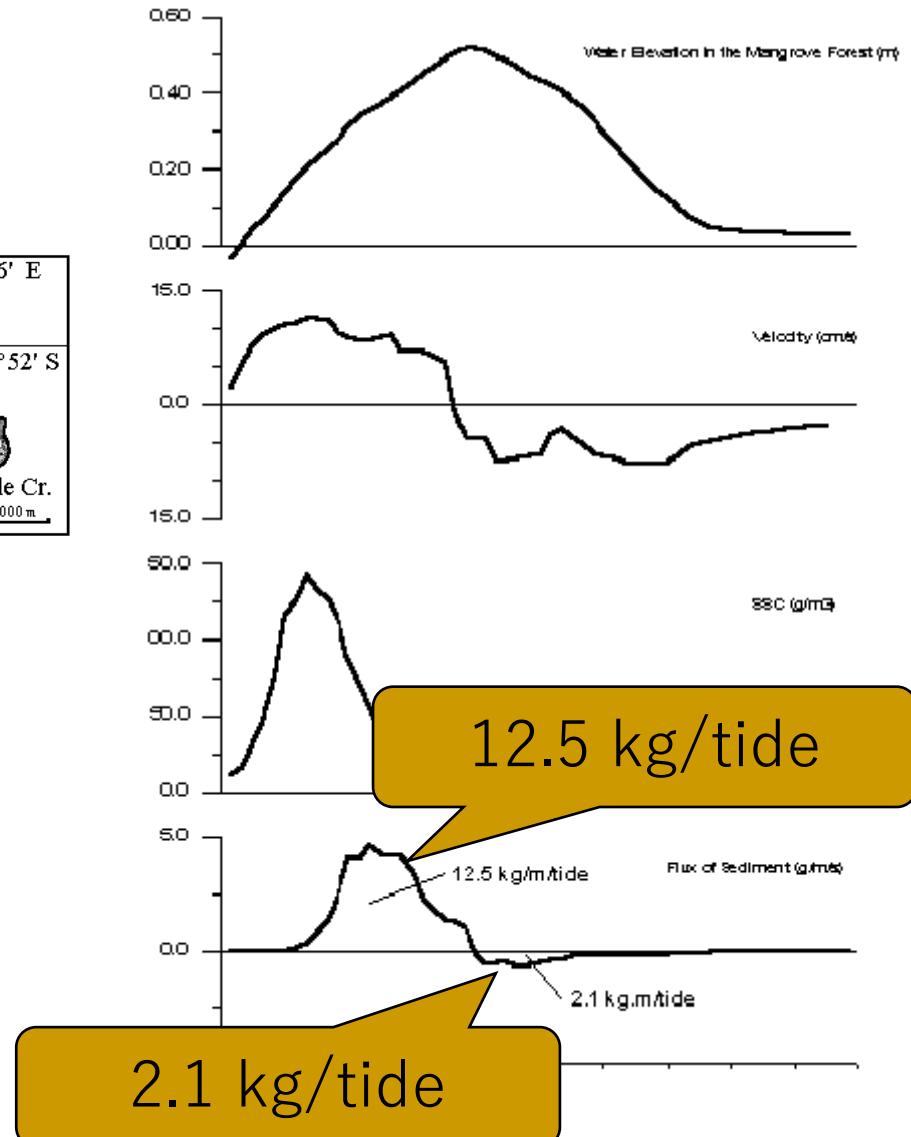
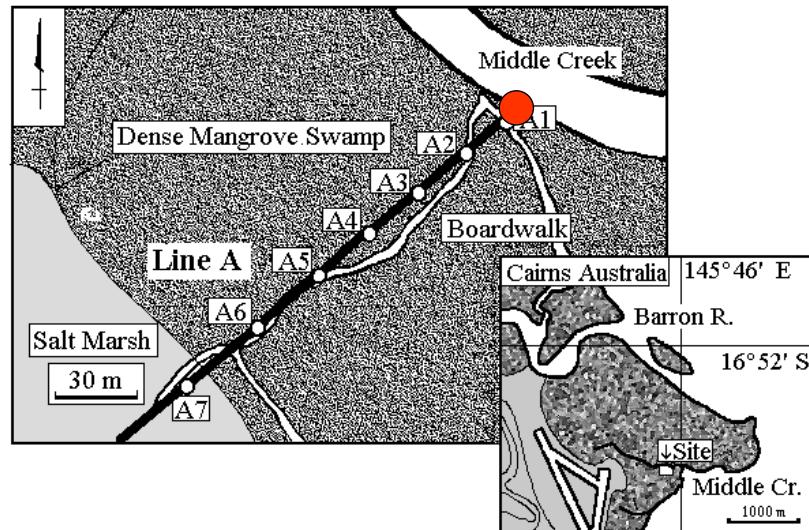
Contents: Hydrology of Mangrove Forests

- Sediment transport and Mangrove survival
- Current asymmetry and sediment trap at Swamp
- Sediment dynamics of Creek – Swamp system
- Wave attenuation and sediment export
- Mangrove forests as a part of Coastal Ecosystem

Sediment transport and Mangrove survival

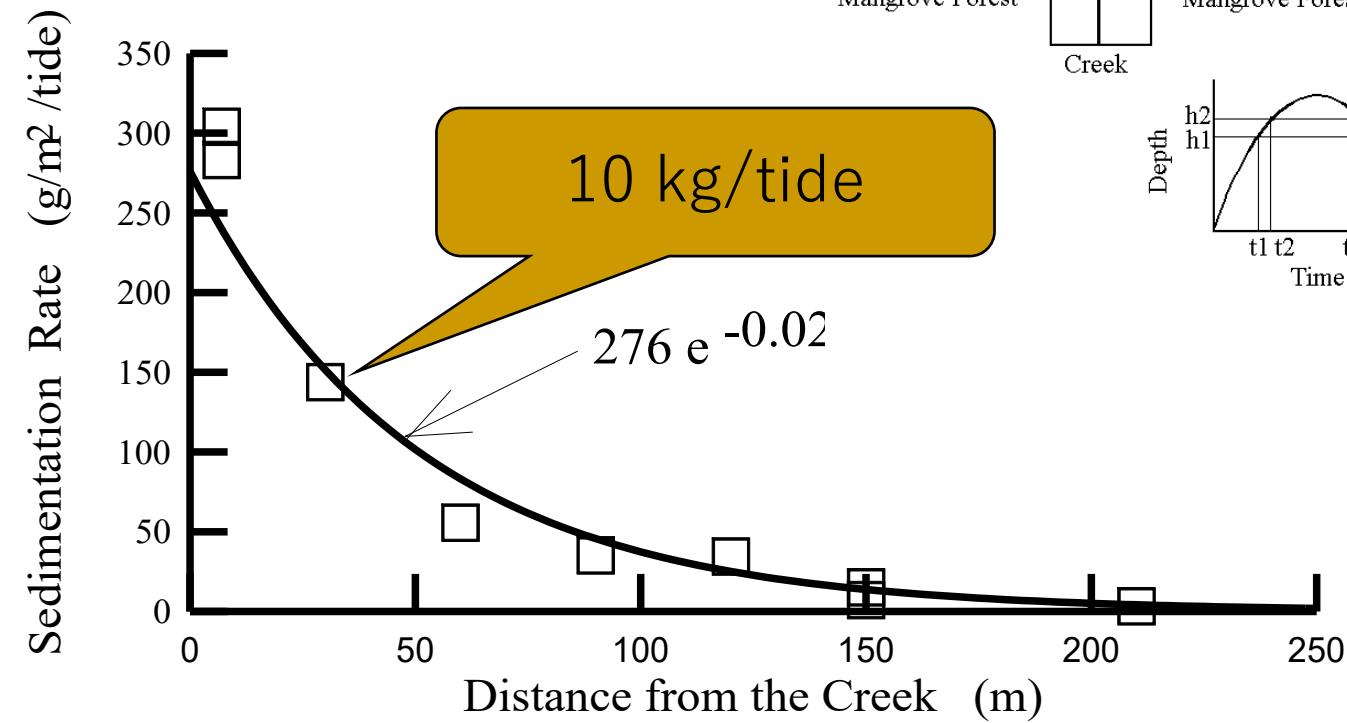
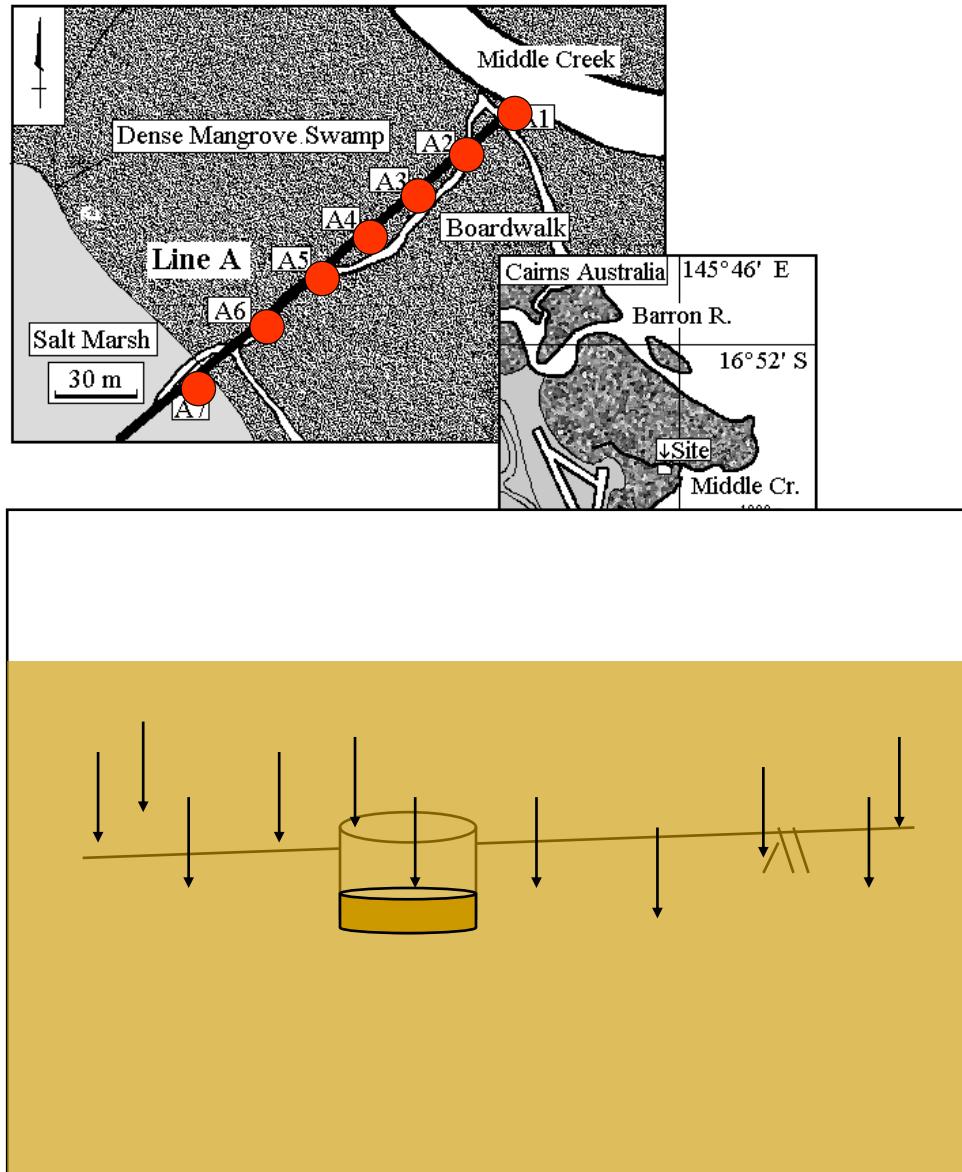


Current asymmetry and sediment trap at Swamp



(after Furukawa *et.al.*, 1997)

Current asymmetry and sediment trap at Swamp

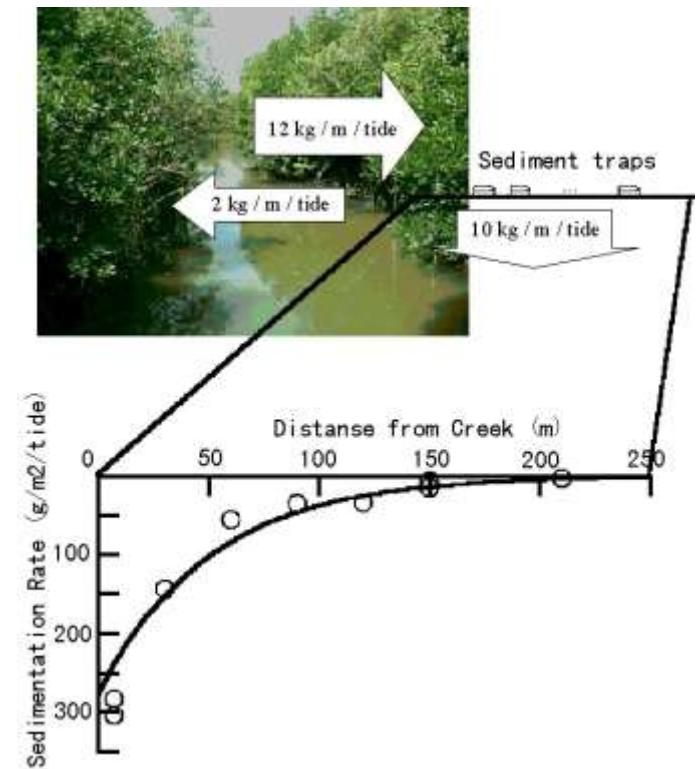


(after Furukawa *et.al.*, 1997)

Sediment dynamics of Creek – Swamp system

- Sediment trapping at swamp by tidal asymmetry due to mangroves' drag
- Sediment accretion in the forest floor

Future change		Dense Forest	Sparse Forest
External	Internal		
High Tides / High Sediment supply	High Trapping	Medium Trapping	
Low Tides / Low Sediment supply	Medium Trapping	Low Trapping	



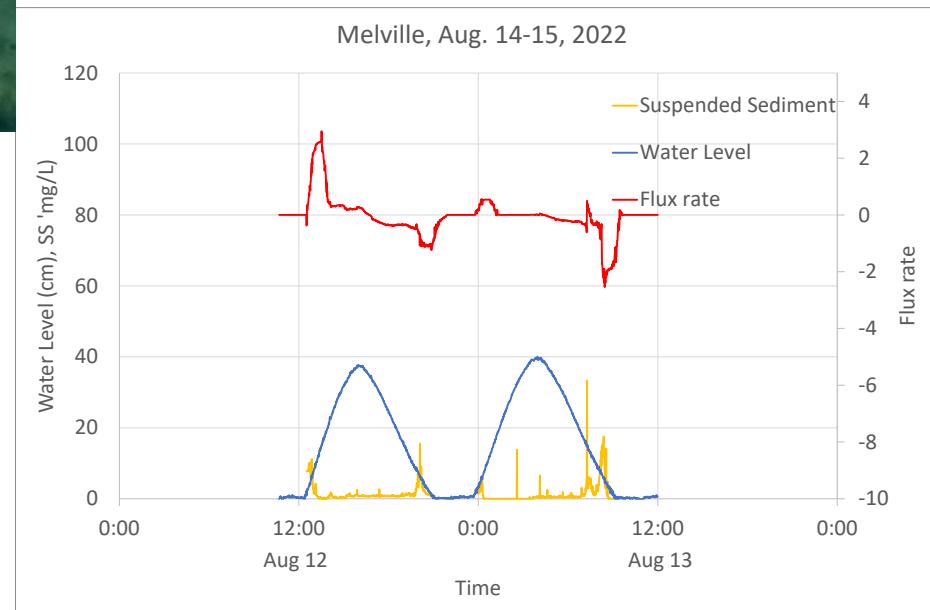
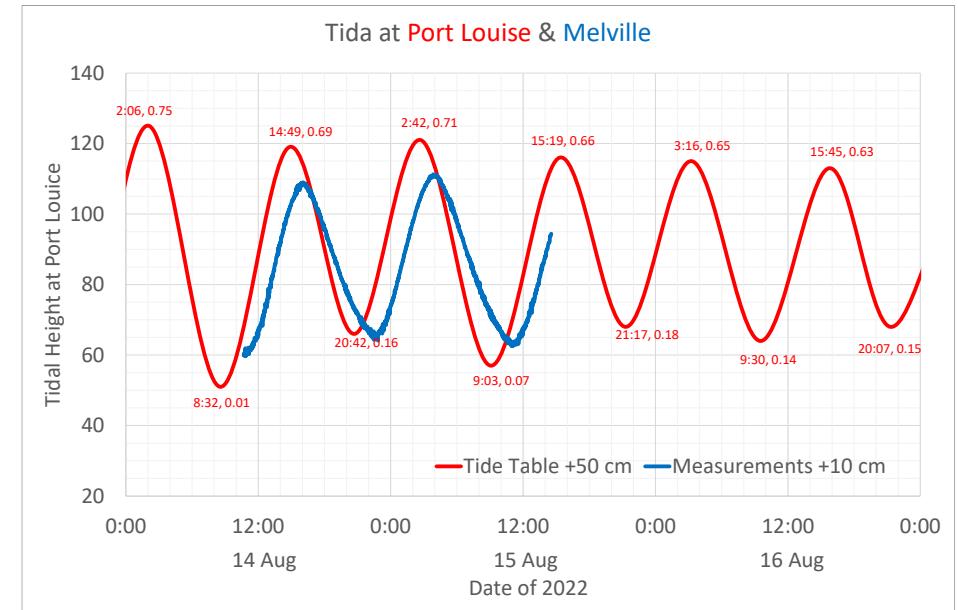
(after Furukawa *et.al.*, 1997)



Future change

	Internal	Dense Forest	Sparse Forest
External	High Tides / High Sediment supply	High Trapping	Medium Trapping
	Low Tides / Low Sediment supply	Medium Trapping	Low Trapping

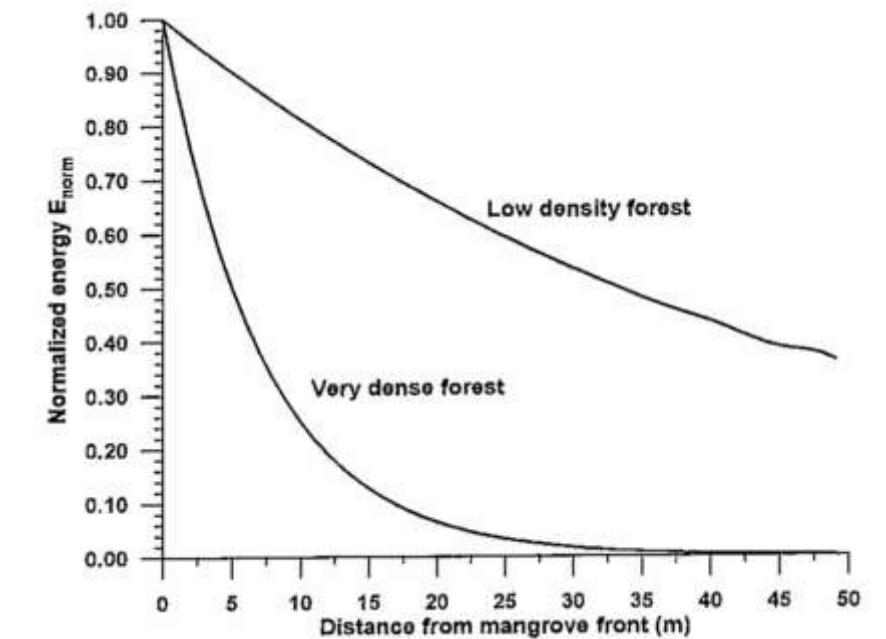
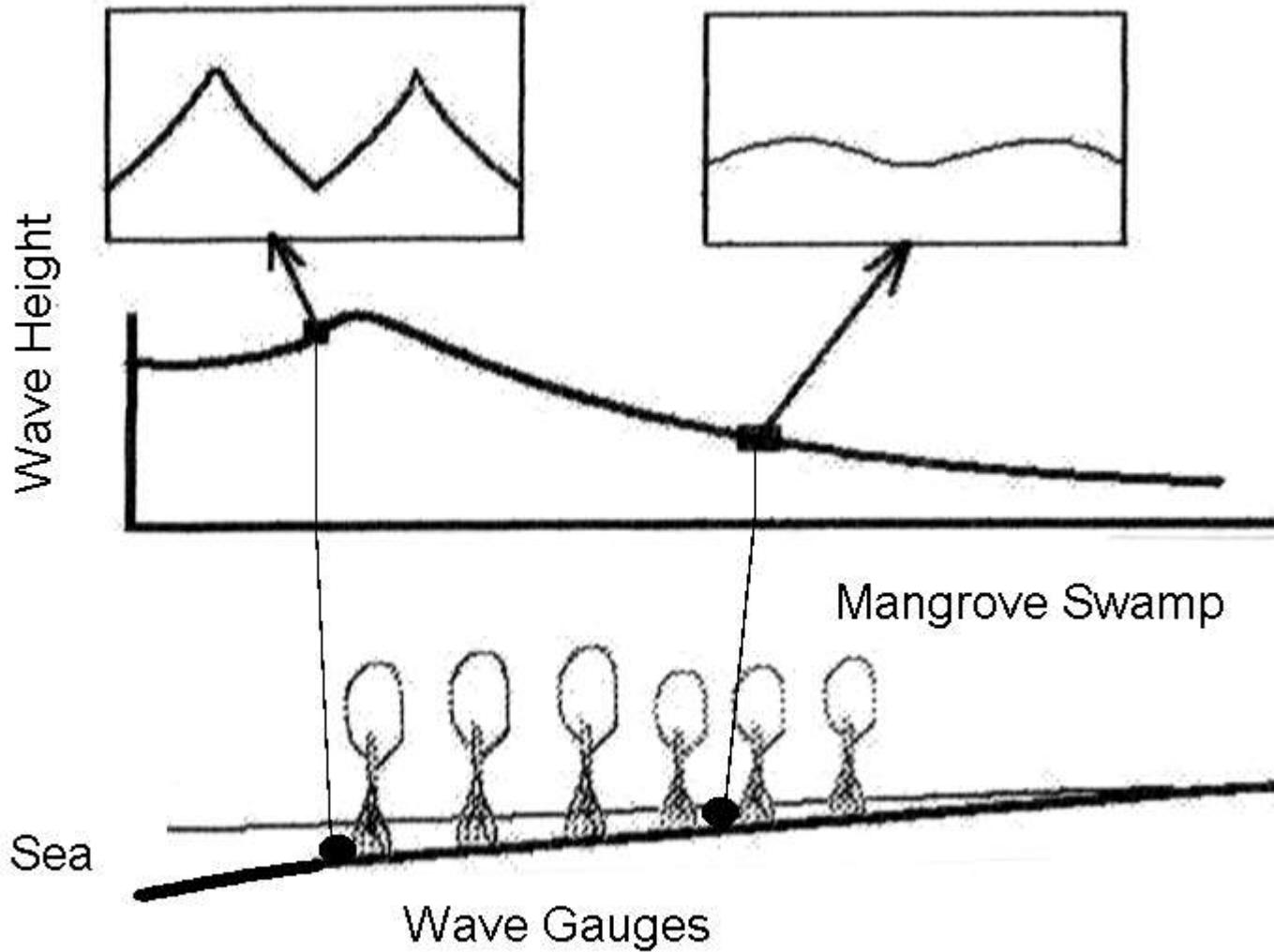
Observation at Melville



Coastal Ecosystem Network at Melville

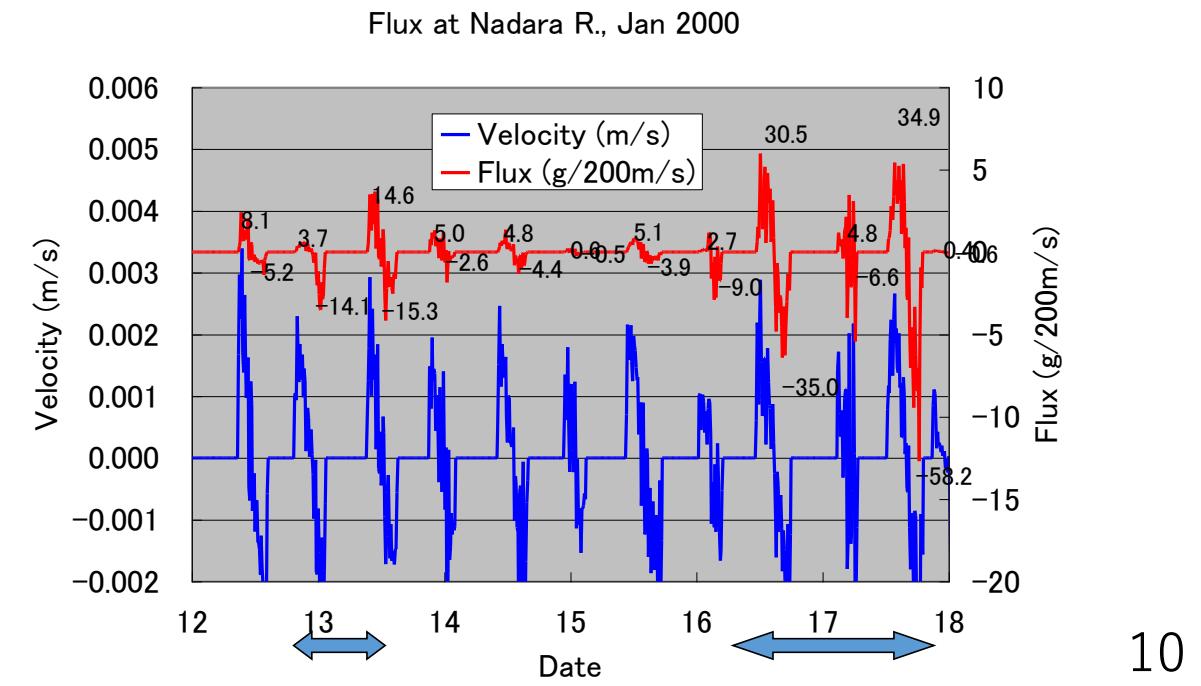
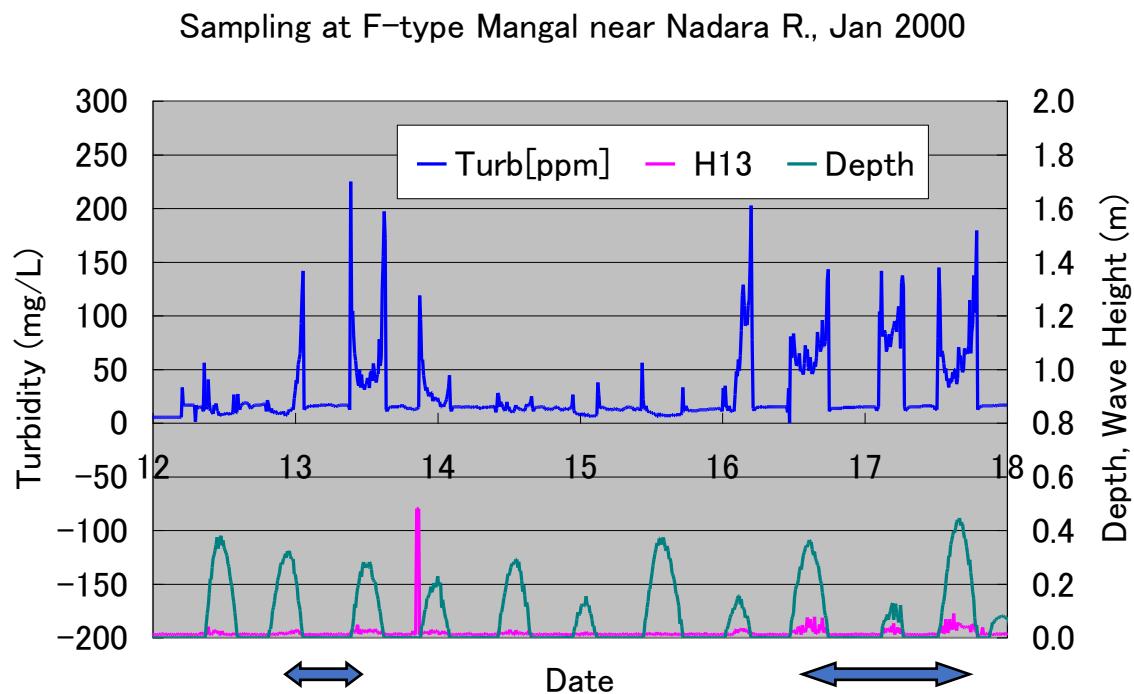


Wave attenuation and sediment export



Energy dissipation in densely ($16/m^2$) and sparsely ($1/m^2$) populated forests
(Massel et al. 1999).

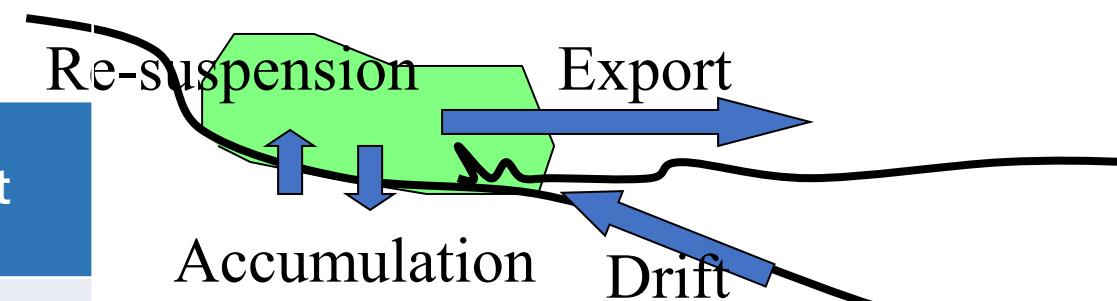
Wave attenuation and sediment export



Wave attenuation and sediment export

- Accumulation at normal condition
- Export with high re-suspension rate at high wave condition

Future change	Internal	Dense Forest	Sparse Forest
External			
High Waves	Erosion at front	Erosion at back	
Low Waves	Accumulation at back	Accumulation at front	

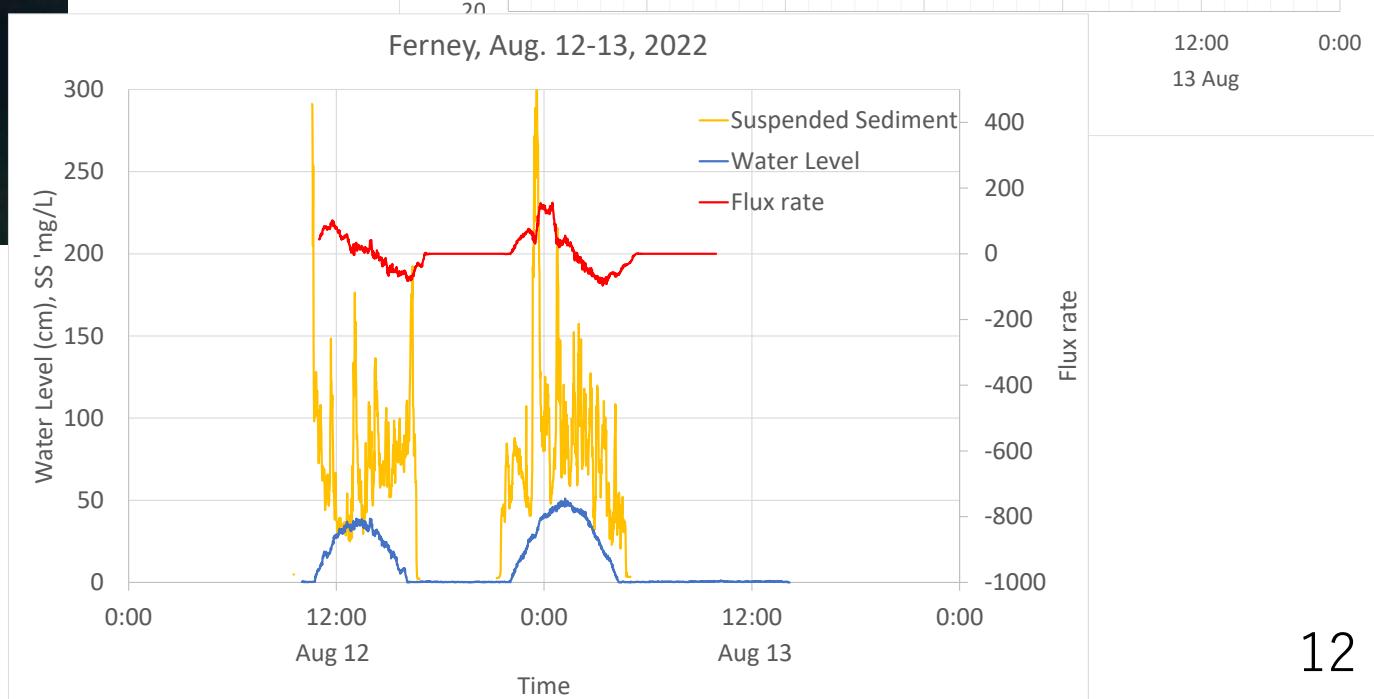
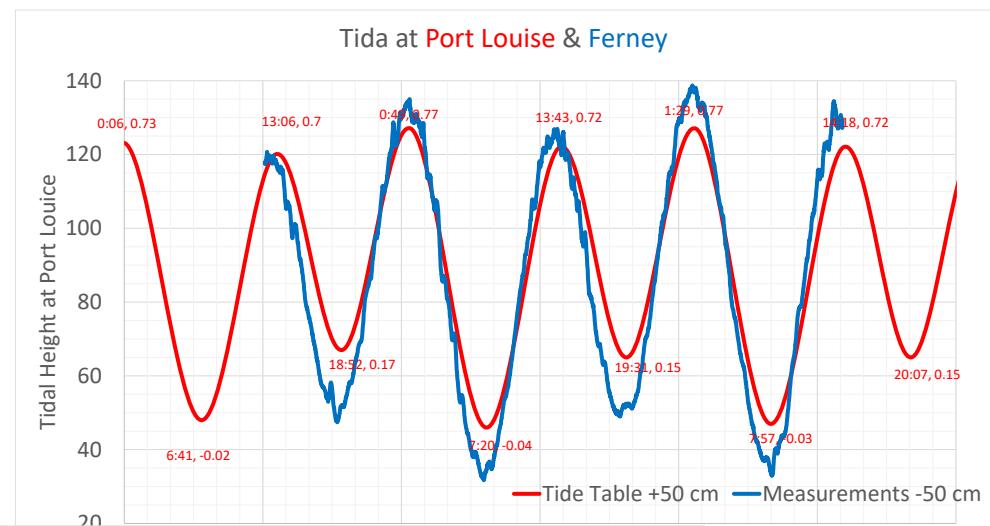




Future change

	Internal	Dense Forest	Sparse Forest
External	Erosion at front	Erosion at back	
High Waves			
Low Waves	Accumulation at back	Accumulation at front	

Observation at Ferney



Coastal Ecosystem Network at Ferney



Management of Mangrove Forests

- Sediment transport is a key for Mangrove survival
- Healthy (dense) mangrove forests trap sediments
- Wave attenuation as an Eco-DRR,
and needs of Integrated Management
- Mangrove forests as a part of the Coastal Ecosystem



ICM* and Community Engagements

* Integrated Coastal Management