## Demonstration time series

- The coastline was eroding 10 meters per year
- The earthen dyke was washed away in 2006, 2007, 2008
- Houses damaged, crops, mango trees and fish were killed by the sea water





### The demonstration was set up in 2009









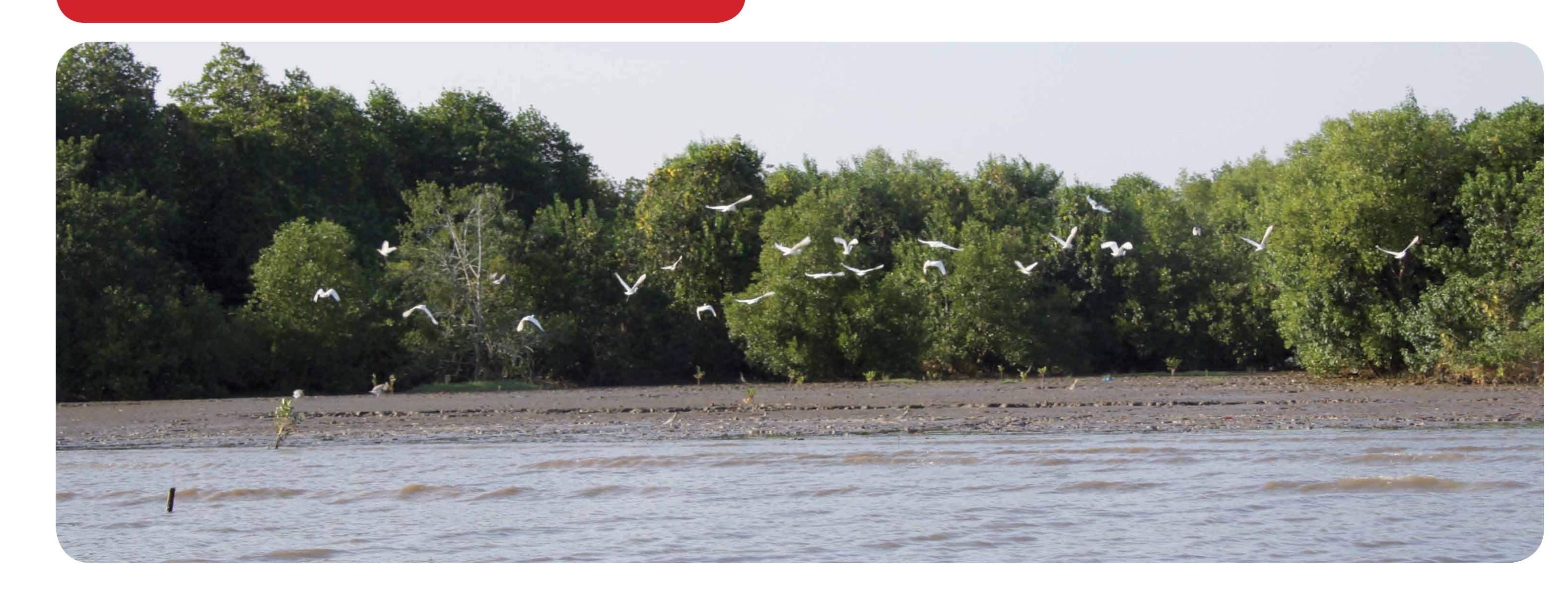




## Reducing wave energy

Natural mangrove forests

Reduce wave energy by 50 - 67%



Wave break fences
Reduce wave energy by 65%

#### The fences:

- Reverse erosion –allows deposition of silt
- Promote natural regeneration
- Increase biodiversity
- Reduce wave energy
- Stop silt and rubbish from smothering seedlings
- Stop silt from retreating to sea









## Protection fences increase biodiversity

















## Avicennia is an excellent colonizing species

Naturally regenerated seedlings grow faster than planted ones!

In open areas the root system develops to cover double the area of the crown.



#### After 3 years Avicennia is:

- Over 3 m high
- Has crown diameter of 1.5 m
- Root system occupies 1 3 m diameter
- Stem is flexible and not damaged by waves

#### After 3 years Rhizophera is:

- 1 m high
- Has crown diameter of 50 cm
- Root system occupies 5 10 cm
- Stem is not flexible and is damaged by waves







# Measured change due to mangrove protection fences

## EROSION IS REVERSED!

	Treatment 5 Control	Treatment 1	Treatment 2	Treatment 3	Treatment 4
	DARD Fence	Wave break fence	Wave break + silt trap fence	Mangrove + 1 side fences	Mangrove + 2 side fences
Annual silt gain (cm)		0	4	10	9
Survival planted mangroves (%)	None	30%	90%	100%	100%
Recruitment	None	After 2 years low number.  Now (3 years)  1 – 5 seedlings m <sup>2</sup>	After 1 year medium number. Now 20 – 500 m <sup>2</sup> .	Immediate, medium numbers. Now outgrowing planted seedlings	Immediate – large numbers. Now outcompeting planted seedlings
Benthos – Species richness (Can Tho Uni)	4	3	7	5	5
Benthos – species abundance (Molluscs & Crustacea) (Can Tho Uni)	6	51	57	86	45







## Fences allow change to mud structure

#### Mud collected at low tide on the same day















