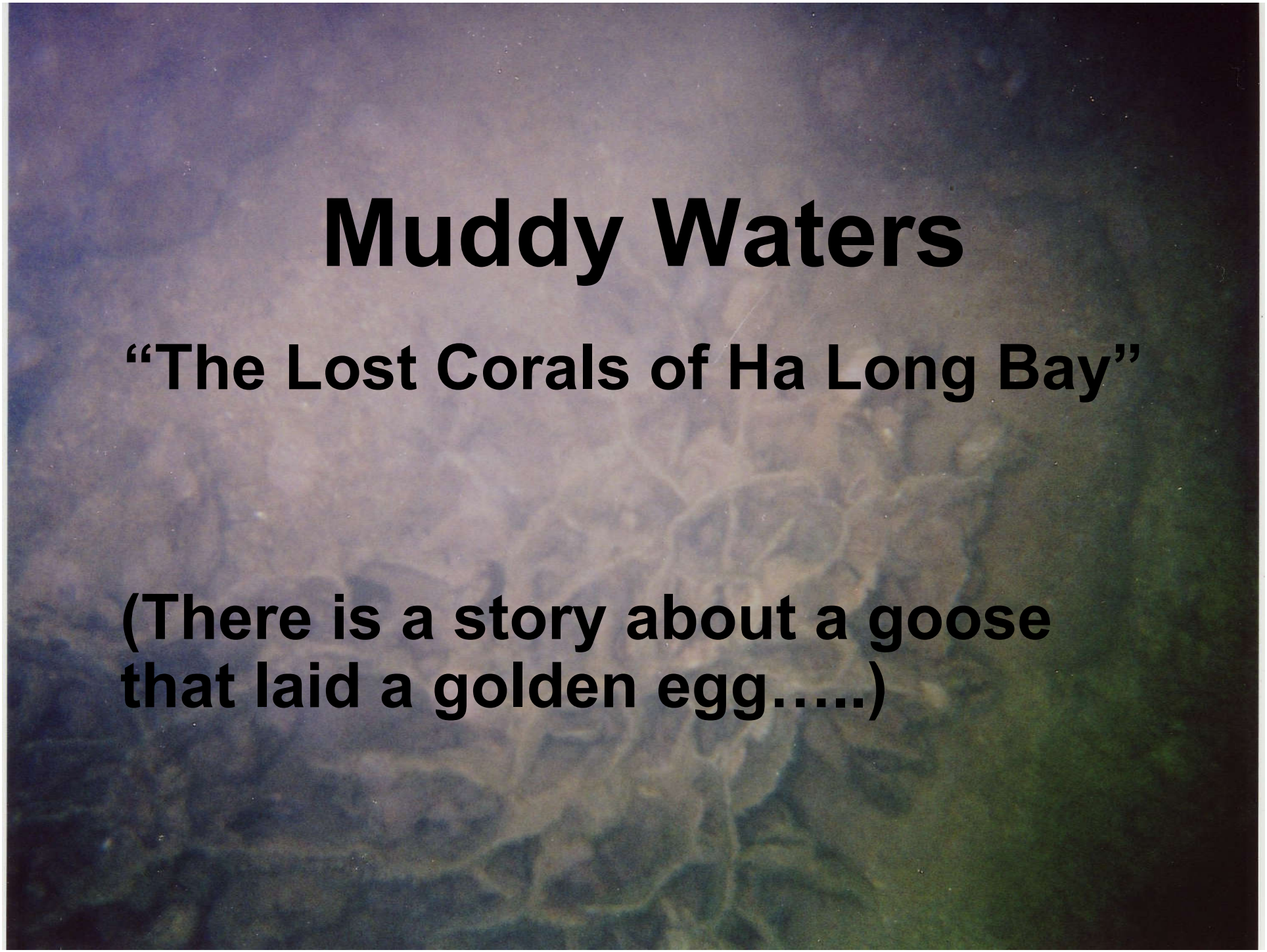
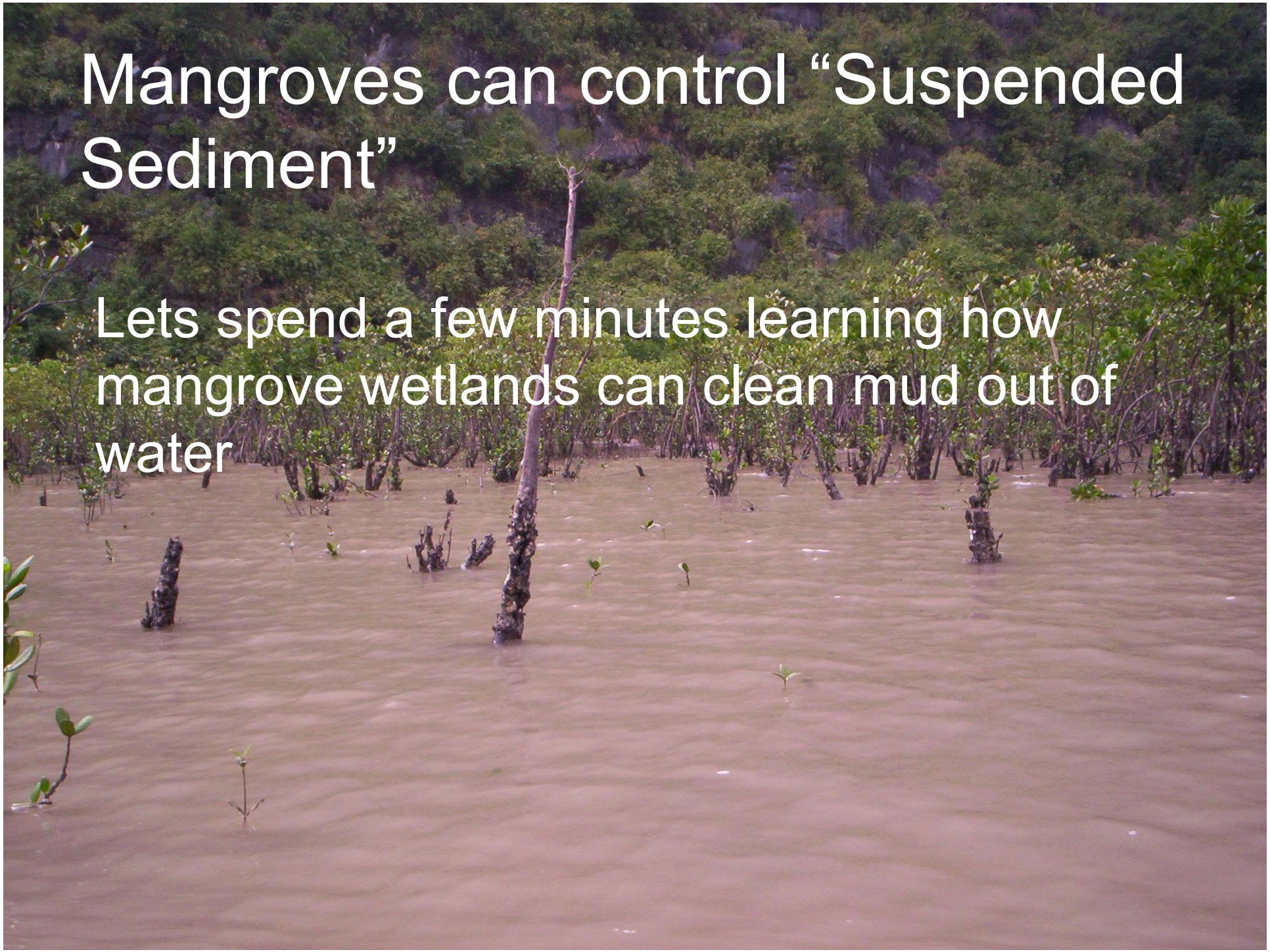

Muddy Waters
"The Lost Corals of Ha Long Bay"
(There is a story about a goose
that laid a golden egg…..)

Mangrove Wetlands

- Why do we think of mangroves when we discuss sustainable tourism in Ha Long Bay?

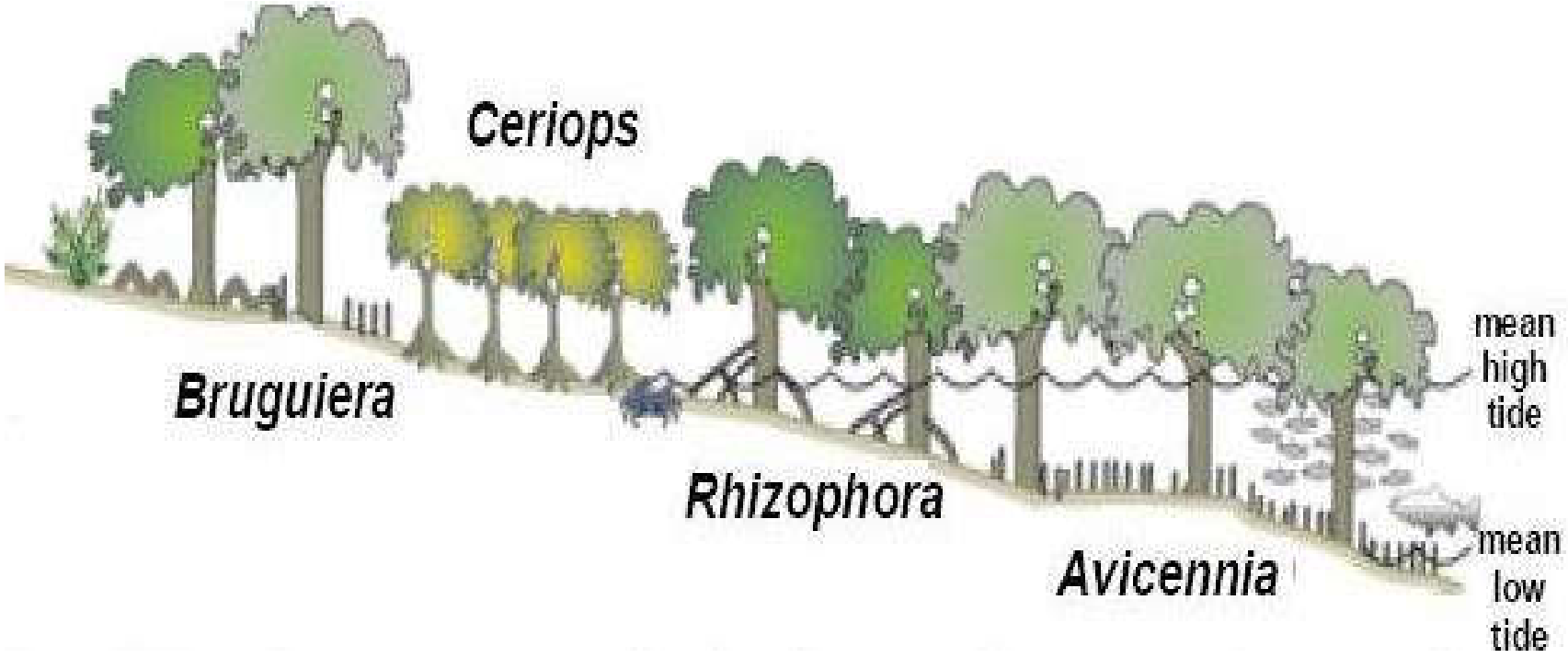


Mangroves can control “Suspended Sediment”

Lets spend a few minutes learning how mangrove wetlands can clean mud out of water

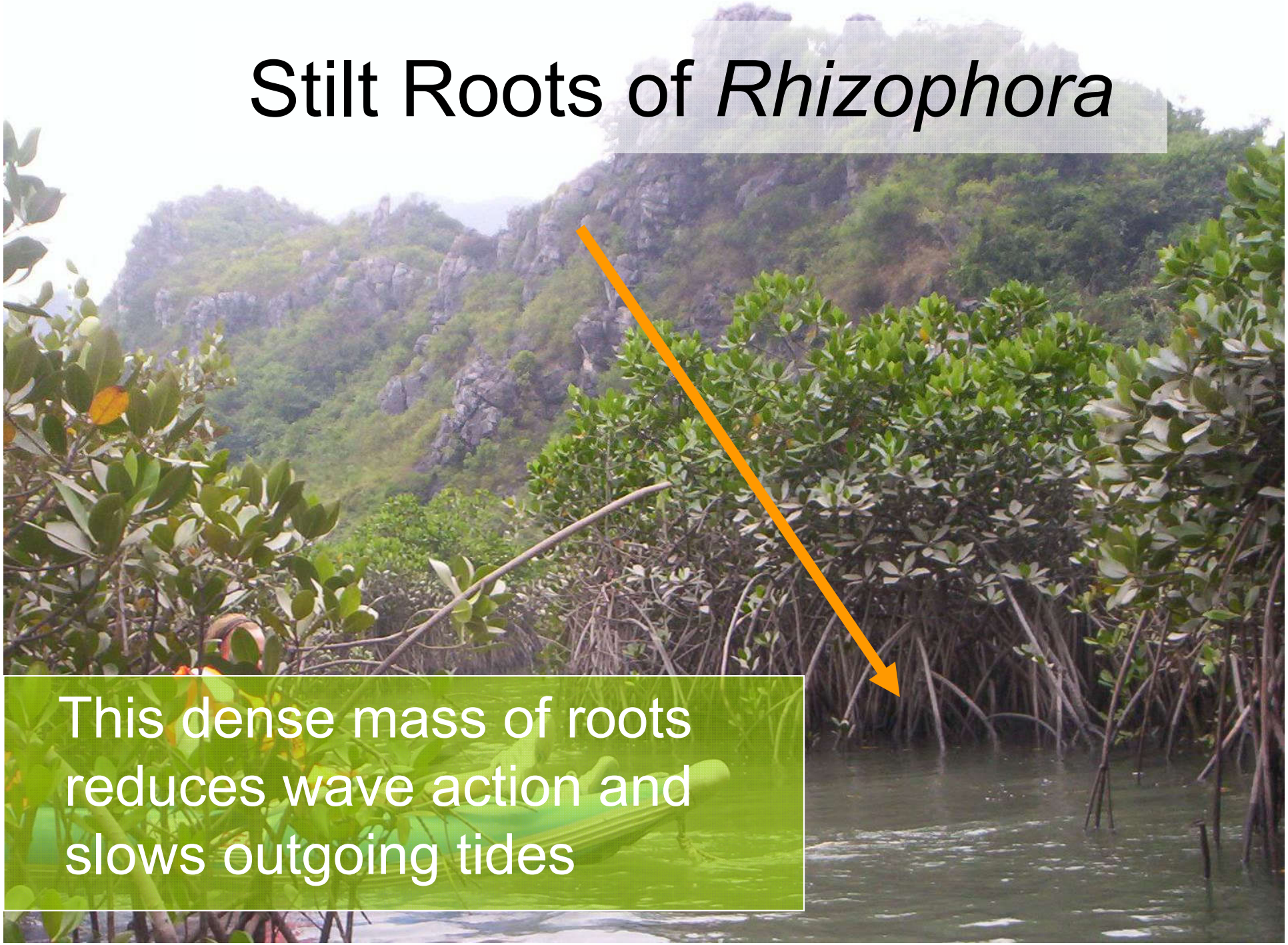

Mangrove wetlands are great sediment traps
The suspended red mud in this Indonesian river is being caught and held by the mangroves on each side.

How do Mangrove Wetlands trap sediment?



Mangrove plants live in tidal zones where they affect water movement

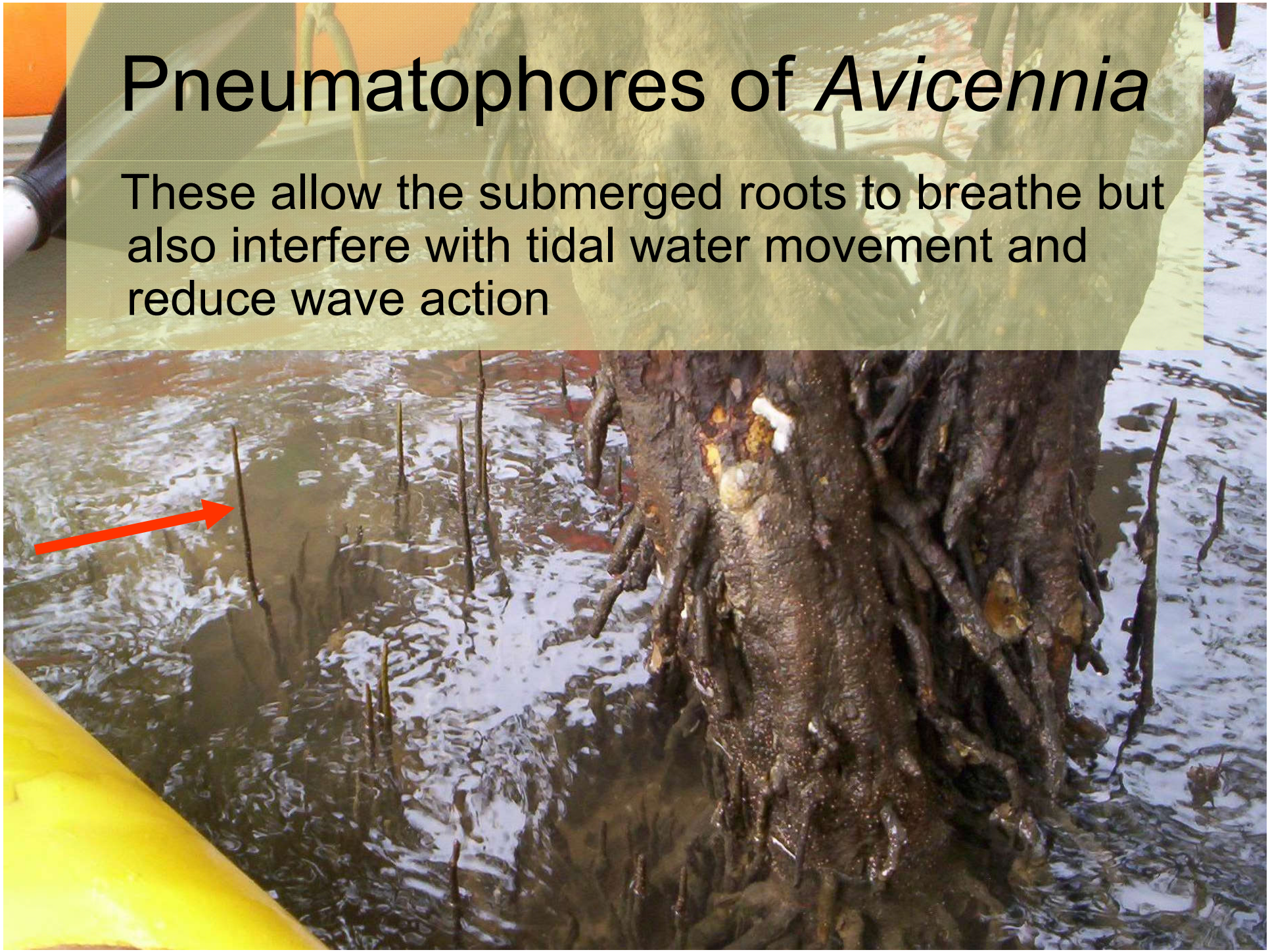
Stilt Roots of *Rhizophora*



This dense mass of roots reduces wave action and slows outgoing tides

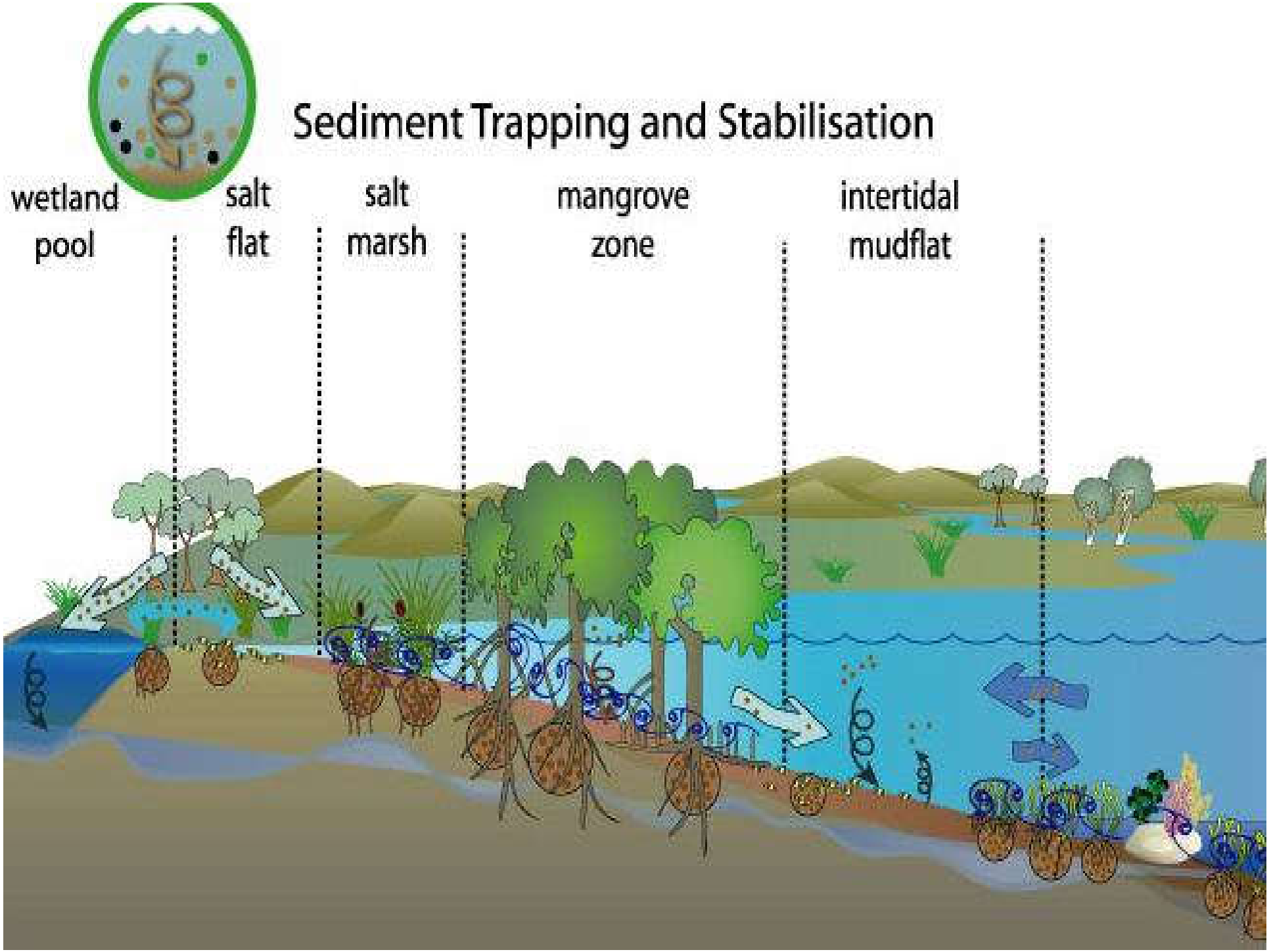
Pneumatophores of *Avicennia*

These allow the submerged roots to breathe but also interfere with tidal water movement and reduce wave action



The scene below water

- A labyrinth of roots to stop water movement
- A nursery for marine species


Sediment Trapping and Stabilisation
wetland pool
salt flat
salt marsh
mangrove zone
intertidal mudflat

Mangrove Research Results

- Cairns, Australia – 80% of suspended sediment brought in by tides is trapped
- Palau, Micronesia – 30% of river sediment is trapped and the coral reef is protected from excessive sedimentation
- Fly River, PNG – up to 4cm sediment accumulation per year

Ha Long Bay's Coral

- Studies show that only a few soft corals survive in Ha Long Bay
- Virtually all hard corals have died
- Research indicates that high turbidity (high sediment loads) is the main cause of coral death in Ha Long Bay - *Nguyen Dang Ngai*


Soft corals are able to remove some sediment and so survive longer in a turbid sea than hard corals

Suspended Sediment in Ha Long Bay

Questions to ask:

- Where does it come from?
- Why is there so much?
- Has tourism worsened the problem?

Earthworks

- An access road to the new bridge


Rain happens (*Forrest Gump 1993)*


Rain creates mud

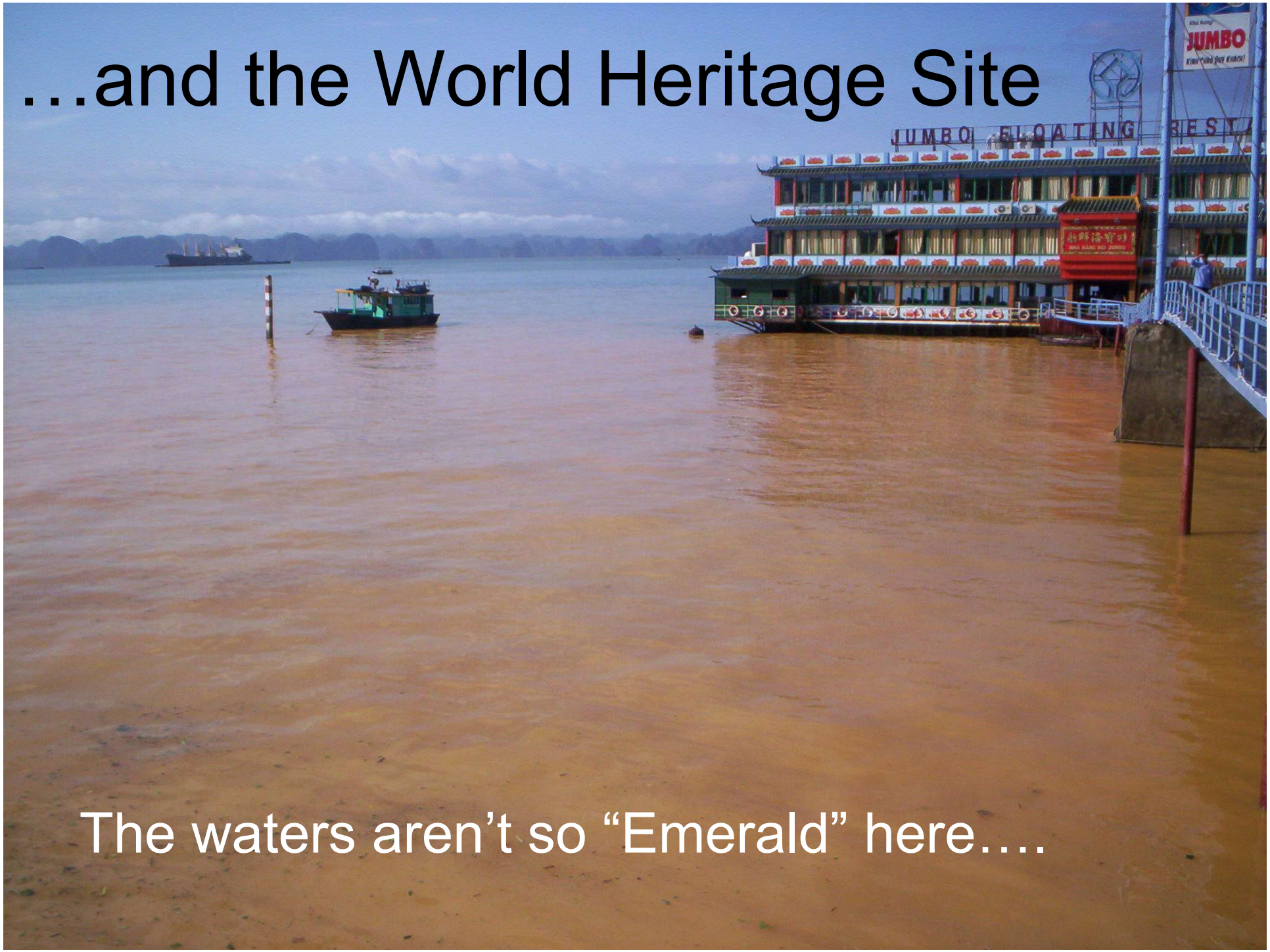

and without control measures….


…the sediment just flows on


….and on….


…until it reaches the sea..

…and the World Heritage Site



The waters aren’t so “Emerald” here….

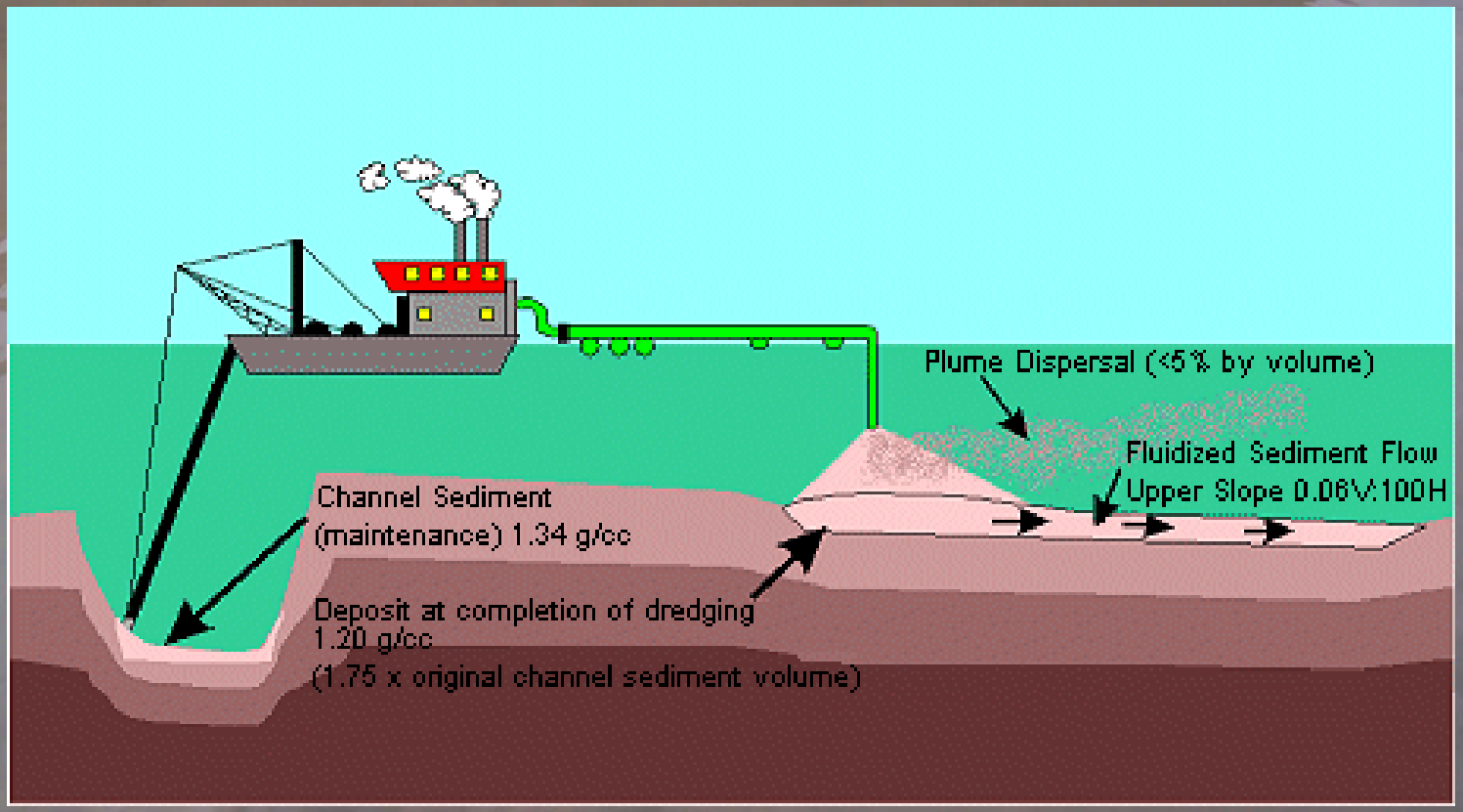
Ship Channel Dredging

"Hi. I am a great big suction dredge"

- To allow large ships to reach the new port of Cai Lan at Bai Chay, a channel has been dredged through the the World Heritage Protection Site.

Suction Dredging

This method mixes the sea floor sediments as they are sucked up, and allows a plume of suspended fine mud to drift away……



The problem is well known

This is from Vietnam Government Report VIE/91/G31 - Nov 1999

"Millions of tons of sand and mud due to the dredging activities at the sea-ports (Hai Phong dredges 3 – 5m tons per year) often cause the estuary and coastal sedimentation ……"

But things may improve….

- Quote from a 2006 Japanese Aid Report

"The Vietnamese authorities concerned are convinced the overall and long term advantages of large & high powered dredgers and hopper barges, compared with existing their own dredgers"

Then there is the Coal Mining

- Mining has been a major source of sediment, and other pollutants, for 100 years.

  but

- A German aid program is now cooperating with Vinacomin to control all pollution from its mines. This is a very positive move.

Tourism

- Just look at the water…….

In the wake of tourism….

- Ha Long Bay is shallow and each passing boat stirs up bottom sediments

Reclamation

- In heavy rain any bare soil will feed sediment to the waters of the bay

A progression

From mangroves to shrimp ponds -

from shrimp ponds to reclamation

from reclamation to hotels?

Tuan Chua Island

- The reclaimed land is within the buffer zone of the World Heritage Site and is VERY close to the actual WHS itself

Impact of Causeway

- These satellite photos show how the tidal flows around Tuan Chau have been changed by the causeway

The loss of mangrove wetlands has been huge

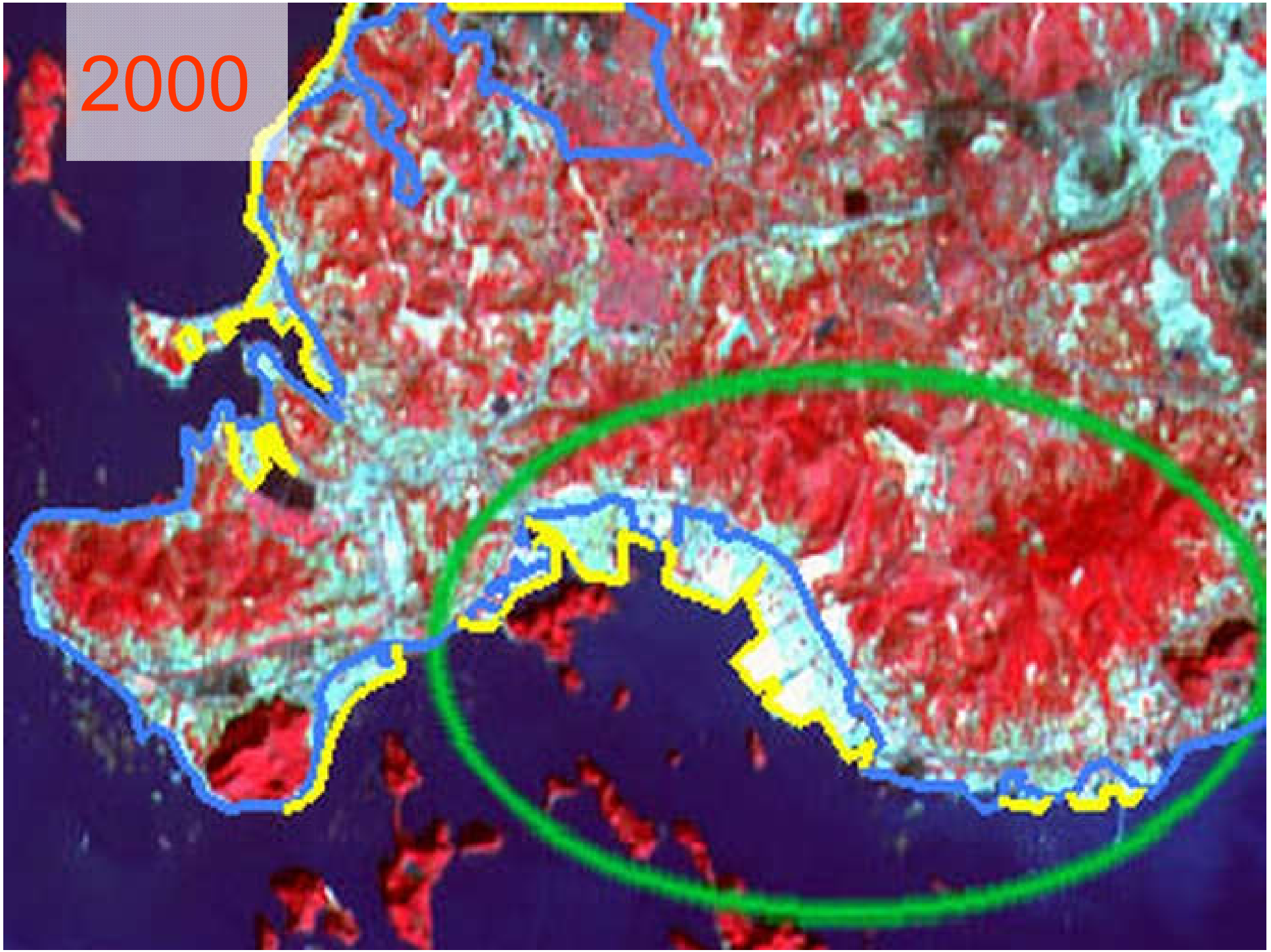
- in1989: 25.000 ha

- in 2001: 8.946,4 ha

That is a annual loss of 1,330 ha

While the rate of loss may have decreased recently, there will probably be less than 8,000 ha remaining by now


Hong Gai - Mangroves 1950s
18
Khu 4
Hồng
Khu 3
H. Dầm Mát
H. Bằng
Vung Chua

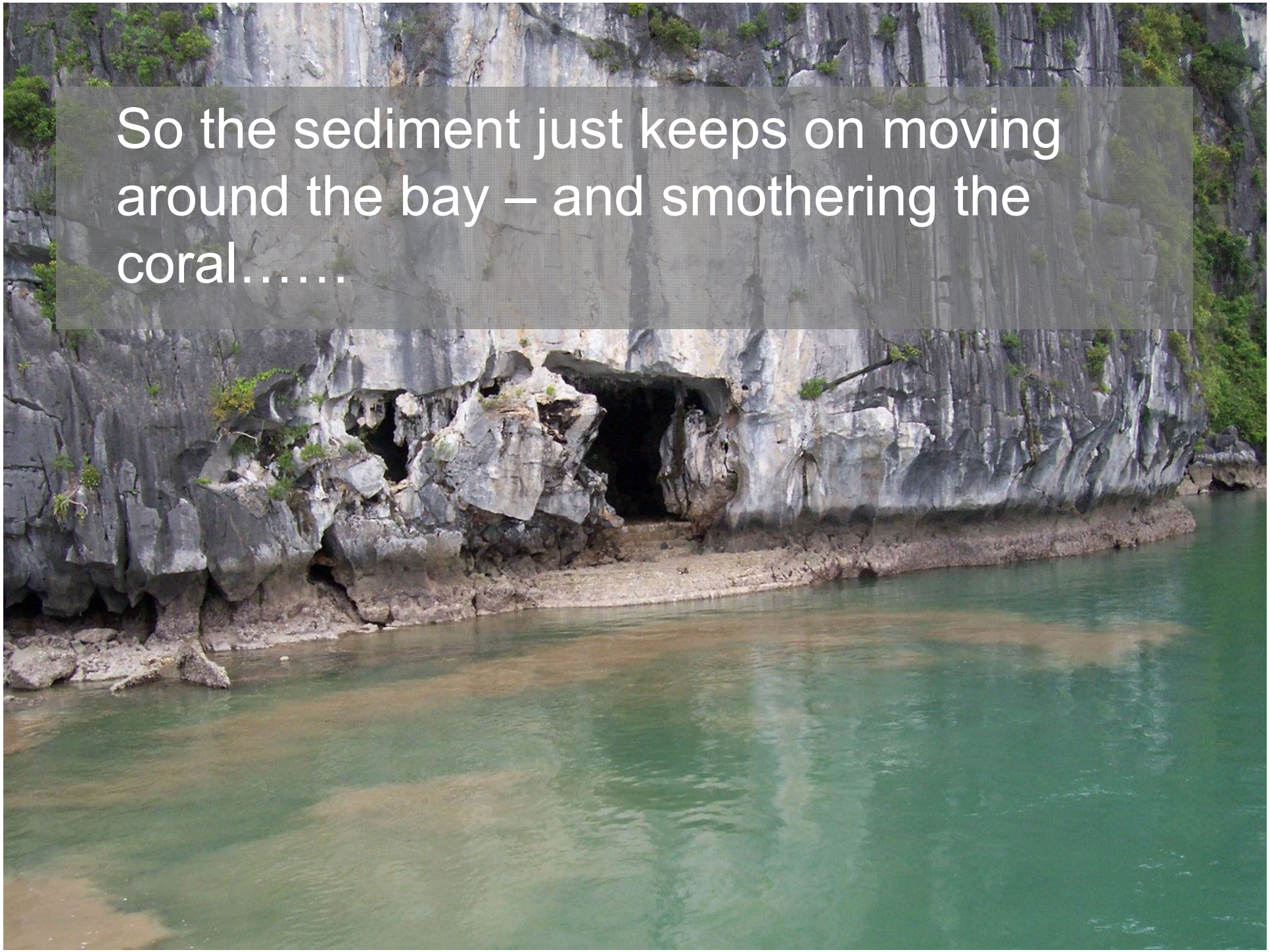

2000

Not many mangroves here now


Hong Gai's new coastal road
• The wetlands on the right will be reclaimed

Remember the mangroves

- They are the key to sediment removal
- and they have mostly been removed !


So the sediment just keeps on moving around the bay – and smothering the coral……

Who Suffers?

- The coral?

That has happened already!

- The Fishermen?

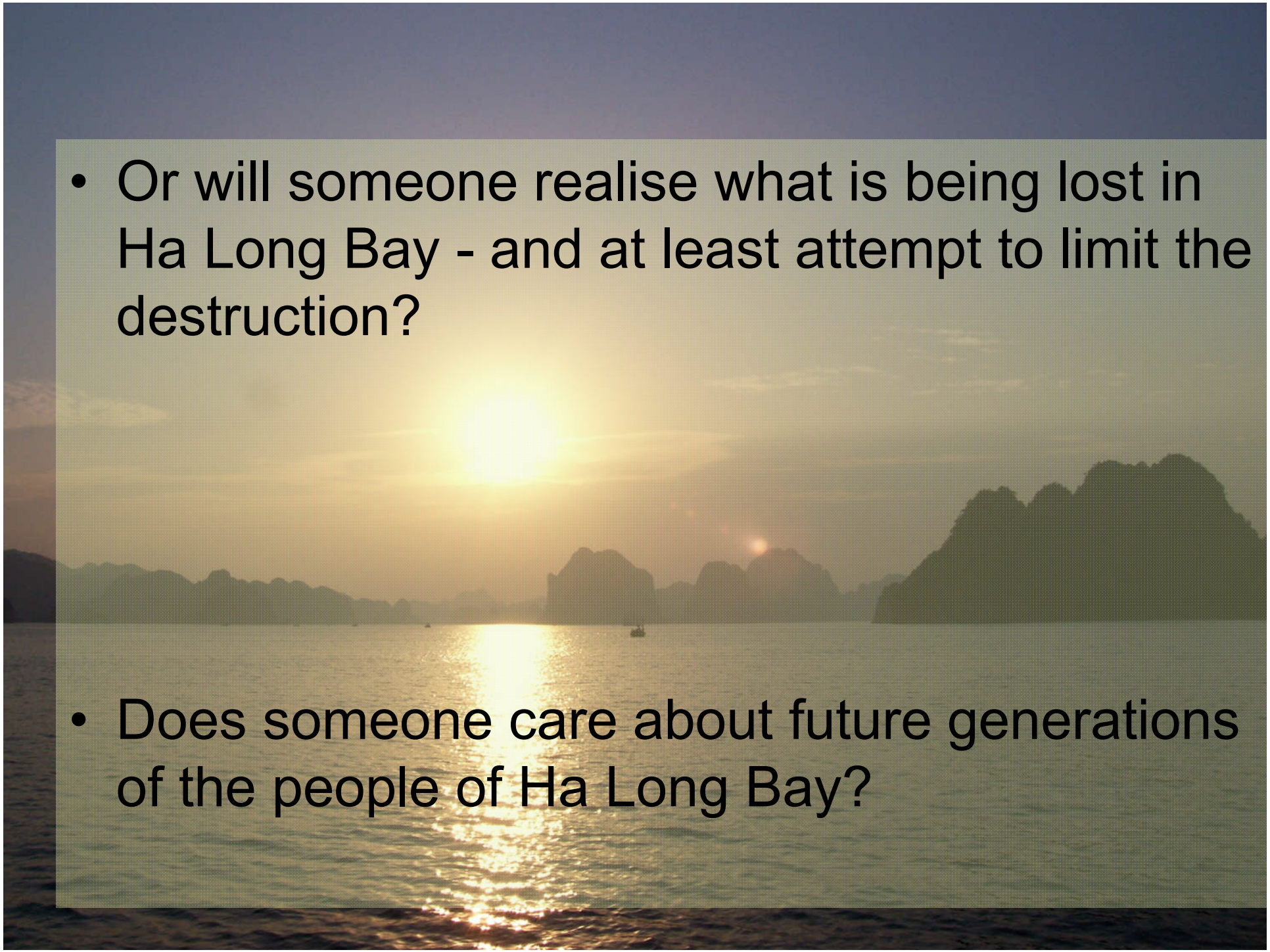
That is happening now.

Will Tourism Suffer Too?

- How long will the myth of sparkling emerald waters last…. and the tales of beautiful coral reefs….

- How many international tourists will come back for a second visit?

- **Its all a bit sobering to consider…..**



- Or will someone realise what is being lost in Ha Long Bay - and at least attempt to limit the destruction?

- Does someone care about future generations of the people of Ha Long Bay?