

Coasts, typhoons and nature's
defences: lesson 2 of 3

Nature's shock absorbers

How reefs, seagrass and
mangroves protect the coast

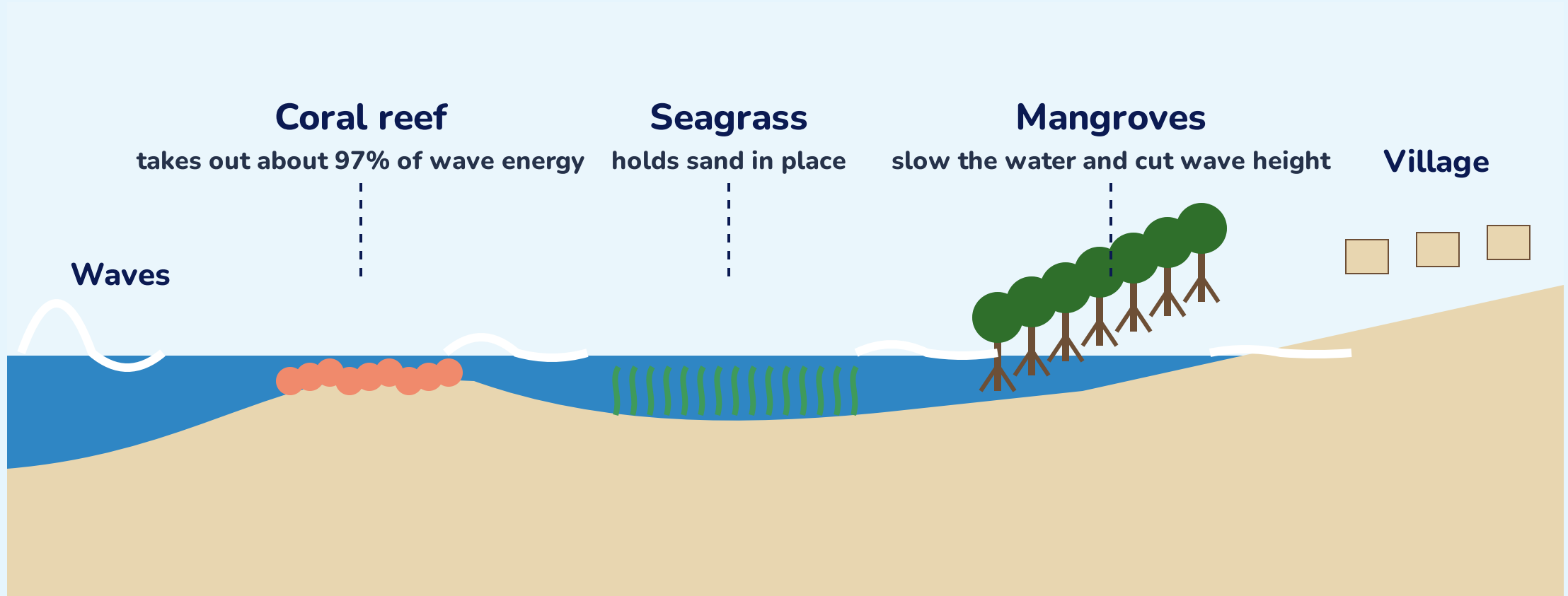


Mangroves in Negros Oriental. Photo: MCP



Three lines of defence

Waves lose energy as they cross each habitat before reaching the shore.



Coral reefs

97%

of wave energy removed by a whole reef, on average

86%

removed by the reef crest alone, where waves break

Reefs protect more than 100 million people around the world.

How we know: Ferrario and others, Nature Communications, 2014



Mangroves

13 to 66%

reduction in wave height over 100 m of mangrove forest

50 to 99%

over 500 m of forest

Dense roots and branches do most of the work. Wider forests protect more.

How we know: McIvor and others, The Nature Conservancy and Wetlands International, 2012



Experiment: the wave tank

1. Build a sloping sand beach at one end of a long plastic box. Mark lines 1 to 5 on the sand.
2. Add water. Make 20 waves with a paddle at the same speed and height each time.
3. Record how far the waves reach and how much sand washes away.
4. Repeat with a barrier: a 'reef' of stones, a 'mangrove' of sticks in clay, or a 'seawall' block.

Keep it fair

Same water depth

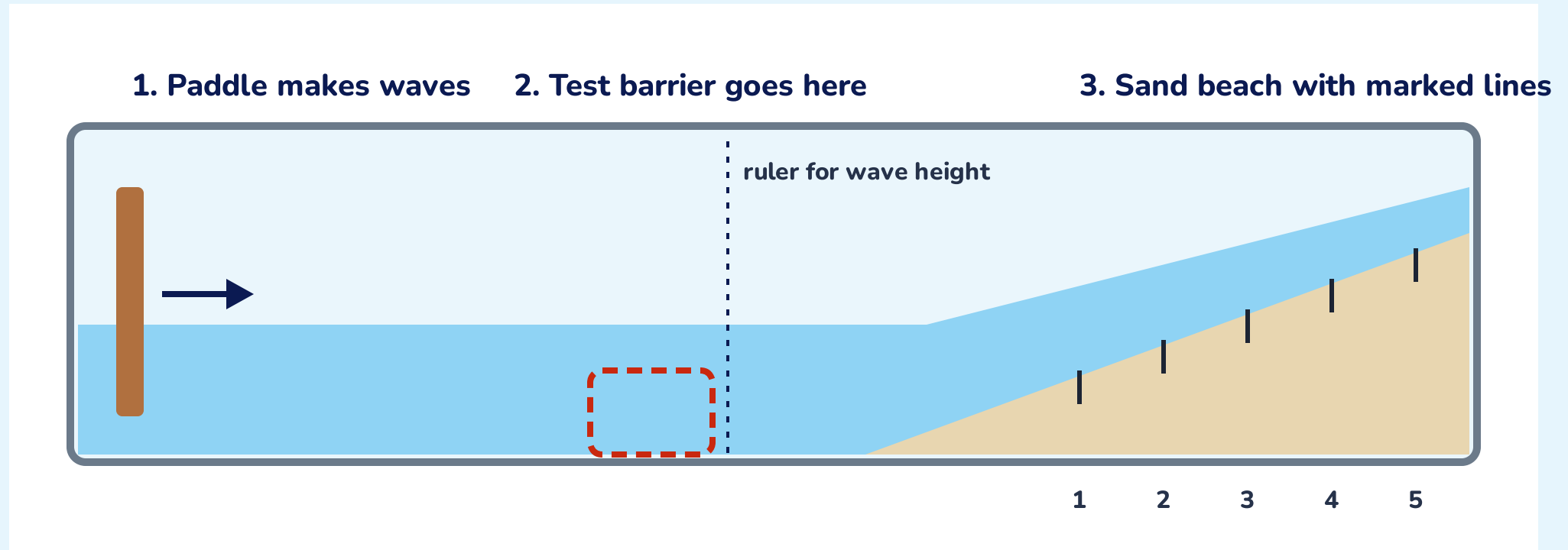
Same number of waves

Rebuild the beach each time



The tank set-up

Test each barrier three times and take the average.



Real-world evidence: Yolanda

In Eastern Samar and elsewhere, communities sheltered by thick mangroves reported less damage from Yolanda's surge than similar places without them.

But on one mangrove-lined island in Negros Occidental, the village chief said it was early evacuation that saved lives. Mangroves reduce the damage; they are not a guarantee.



Mangroves from above. Photo: MCP



Talk about it

Which barrier worked best in your tank? Was that what you predicted?

What can't a tank model show about a real typhoon?

Why might a forest of mangroves work differently from a solid wall?

Next time: grey or green? Choosing coastal defences



Photos and sources

Photos: mangroves by MCP. Drawings made for this lesson. All illustrations drawn for this lesson by Marine Conservation Philippines.

Sources:

- Ferrario, F. and others (2014). Nature Communications.
- Inquirer (2014). Mangroves can serve as protective wall.
- McIvor, A. and others (2012). Reduction of wind and swell waves by mangroves.
- Eco-Business. Mangroves shielded Sagay islets' residents.

Full links are in the teacher reading. Free to use and share for education. Made by Marine Conservation Philippines. More free lessons: marineconservationphilippines.org/resources/teachers-resources/

