



Nature's shock absorbers

Lesson plan: how coral reefs, seagrass and mangroves reduce wave energy, tested in a wave tank, and the evidence from Yolanda



Ages	14 to 18 (grades 9 to 12)
Time	60 to 75 minutes
Group	Groups of four
Where	Science lab or outside, where water can spill
You need	Per group: a long plastic box, sand, water, a flat paddle, stones, sticks or skewers, modelling clay, a brick or block, a ruler

What students learn

- How each coastal habitat reduces wave energy, with real measurements.
- How to design a fair test with repeats.
- How to evaluate a physical model against the real world.
- What the Yolanda experience shows about the limits of natural defences.

Before the lesson

1. Per group: a long plastic storage box (60 cm or more), enough sand to make a sloping beach at one end, a flat paddle or ruler, stones, sticks in clay, and a brick.
2. Print one **record sheet** per group.

The lesson

- 1 Three lines of defence **10 minutes, slides 1 to 4**. Share the measurements for reefs and mangroves.
- 2 Wave tank **35 minutes, slides 5 and 6**. Groups test at least three barriers, three times each.
- 3 Evidence and limits **10 minutes, slide 7**. Discuss the Yolanda stories.
- 4 Wrap up **5 minutes, slide 8**. Discuss one or two questions.

Answers and what to listen for

What usually happens: the seawall stops wave run-up but water often scours the sand in front of it and at its ends. The stone reef breaks waves early and reduces run-up. Dense sticks reduce run-up gradually, and more sticks work better. Results vary, so repeats matter.

Making it easier or harder

- **Younger groups:** run it as a class demonstration with two barriers.

- **Older groups:** film the waves and measure wave height before and after the barrier from the video, then calculate the percentage reduction.

Safety and good practice

- Mop up spills straight away to avoid slips. Keep water away from electrical sockets.

Curriculum links

- **Science:** energy transfer, waves, ecosystems, fair testing.
- **Geography:** coastal processes and management.
- **Philippine senior high school:** General Science and research skills.
- **Ocean Literacy Principle 6:** the ocean and humans are inextricably interconnected.

The teacher reading has the science behind every slide, with links to the sources.

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