

Beach management strategies protecting the Gold Coast's beaches

Lesson Map: <http://esriaustralia.com.au/education/SpatialActivity67>

Engage

A history of erosion and our contribution to the problem

- Click on the URL above to open the lesson's Story Map, *Beach management strategies: Protecting the Gold Coast's iconic beaches from erosion*. Scroll down to get started.
- The lesson outline below may best be suited to completion over 2 lessons. Completing the **Engage** and **Explore** sections of this lesson would be a good place to reach by the end of the first lesson. The second lesson could then focus on completing the **Explain** and **Extend** sections.
- Read the section titled *A history of erosion*. Take notes if required and stop to discuss as necessary.
- ? Consider the two images of erosion – one from 1954 and the other in 2009. What is the most notable feature of the beach after it has been affected by erosion? *[The most notable feature of the beach after it has been affected by erosion are the steep sand bluffs that have been created by the force of strong winds and waves.]*
- ? What are some immediate social concerns you can identify for people that may use the beaches following erosion like this? *[Answers will vary but may include: access to the beach is obstructed and dangerous, infrastructure at risk of collapse, debris poses safety issues, beaches are unappealing for recreational use.]*
- Scroll down and read the section titled *How has human activity on the Gold Coast contributed to the problem?* Take notes if required and stop to discuss as necessary. As you make your way through this section, answer the questions below.
- ? What role does vegetation provide in the protection of dunes? In your response, identify the areas of the beach and dune system that are less stable. *[Vegetation is important to the protection of dunes as they stabilise the dunes. The roots of grasses, creepers, shrubs and trees hold sand and dunes in place, even when confronted with severe weather. On the other hand, the beach itself (beach berm)*

Download student worksheet [here](#).

Time

100 minutes (2 x 50 minute lessons)

Activity

Investigate the effects of erosion on the Gold Coast.

Investigate beach management strategies in place to combat erosion on the Gold Coast's beaches.

Learning Outcome

Students will be able to:

- Understand the Gold Coast's history of erosion
- Identify environmental, economic and social threats that erosion poses to the Gold Coast
- Investigate the pros/cons of beach management strategies employed to protect against erosion
- Explore data through visual, spatial and textual means

ACARA Curriculum Link

[Year 8 Geography: Landforms and landscapes](#)

[ACHGK051](#) | [ACHGK052](#) |
[ACHGK053](#) | [ACHGS059](#) |
[ACHGS061](#)

[Year 10 Geography: Environmental change and management](#)

[ACHGK070](#) | [ACHGK073](#) |
[ACHGK075](#) | [ACHGS076](#) |
[ACHGS079](#)

[Connections with Senior Geography syllabuses](#)

- Environmental change
- Natural hazards

and incipient dune are less stable areas as little to no vegetation covers these areas. As a result, waves and winds are able to wash sand away from its original resting place.]

? Upon reaching the first map slider – *The Gold Coast from 1955 to 1997* – respond to the following statement. Describe the urbanisation that has occurred between 1955 and 1997. *[In 1955, the beachfront, the dune systems, and the area further back from the dune systems, were completely untouched by urbanisation; instead, urbanisation had only occurred on the left side of the Nerang River. By 1997, urbanisation had begun on the right side of the river too, although it had not undergone the extensive urbanisation that is present today.]*

? Upon reaching the second map slider – *The Gold Coast from 1997 to 2020* – respond to the following statement. Describe the urbanisation that has occurred between 1955 and 1997. *[Urbanisation on the Gold Coast in 2020 is extensive and is characterized by tightly packed low, medium and high-density housing. In 1997, housing is of a lower density and this is evident in the green spaces that represent parks, nature corridors and backyards.]*

Explore

Erosion: an environmental, economic and social threat

- Scroll down and read the section titled *Erosion: an environmental, economic and social threat*. Take notes if required and stop to discuss as necessary. As you make your way through this section, answer the questions below.
- ? After watching the video on Longshore drift on the Gold Coast, describe the process in five or less steps? *[1. Prevailing wind and current conditions from the Coral Sea and Tasman Sea push waves and swell conditions from a south-easterly direction along the Gold Coast's beaches. 2. As the waves roll in, they carry sand and sediment onto the beach at one angle, and as they roll out, they carry sand off the beach at another angle. 3. This sand is swept and pulled along the coastline from the southern beaches to the northern beaches of the Gold Coast. 4. Longshore drift is purely a function of the wave energy and the direction of wave energy and is therefore, subject to storms and changes in prevailing conditions.]*
- ? Read through the sub-section titled *Erosion as an economic threat* and consider the image of erosion at Surfers Paradise beach in 2013. Explain how erosion threatens the economic security of the Learn to Surf instructors. *[The economic security of the Learn to Surf instructors may be jeopardized as their employment largely depends on lesson bookings from tourists. If the business does not receive enough bookings, then there will be no need for as many instructors. Further to this, the business may reduce the amount of lessons on offer, which in turn will affect the work hours and*

Teacher Feedback:

To share your feedback on this, or any Spatial Activity, please contact education@esriaustralia.com.au

income of the instructors.]

Explain

Beach management strategies on the Gold Coast: groynes, walls, dredging and bulldozing

- Continue through the StoryMap to begin a guided tour of the beach management strategies being used on the Gold Coast.
- As you read through each strategy, you will be presented with both textual information and visual information, in the form of images, videos and maps. You can engage with the maps by zooming in and out and by clicking and dragging your cursor to pan the map extent.
- Read the section titled *Rock Groynes*. Take notes if required and stop to discuss as necessary.
- ? Interact with the map to locate more rock groynes. Pan the map south along Palm Beach. What do you find? Continue south. What about Kirra Beach? [Aside from the 2 groynes already pictured in the default map extent, two more groynes exist south along Palm Beach, one of which protects the mouth of Currumbin Creek. After panning south to Kirra Beach, one can see that a rock groyne exists at the point [adjacent to R T Peak Memorial Park]. This groyne serves to trap sand on Coolangatta and Greenmount Beach.]
- Read the section titled *Rock walls*. Take notes if required and stop to discuss as necessary.
- ? Consider Burleigh Heads – the headland on the southern end of Burleigh Beach – and what you know about Longshore drift. What problem likely exists for the southern end of the Burleigh Beach? NOTE: you can pan and zoom the map to gain further insights. [The headland at Burleigh Heads is likely to trap high volumes of sand on the southern side of the headland. This is evident by looking at the sand deposits that have built up at the mouth of the Tallebudgera Creek. This provides a problem for the southern end of Burleigh Beach as natural processes – like Longshore drift – will not be able to replenish the beach with sand; this is also evident at the southern-most part of the beach where the width of the beach is noticeably smaller.]
- Read the section titled *Dredging*. Take notes if required and stop to discuss as necessary.
- ? Consider the large expenses and project times associated with large-scale dredging.

At what stage of the year would it be most suitable for large-scale dredging projects to be carried out on the Gold Coast? Why? [Large-scale dredging projects would be best undertaken in late Autumn and Winter. These seasons are more suitable because the dredging can then take place in the off-peak tourist season so as to limit the economic impacts it may have on the Gold Coast. Furthermore, activity on the beaches are likely to be diminished in colder months, allowing for dredging and the moving of sand by machinery to be carried out more easily.]

- Read the section titled *Dumping and Bulldozing*. Take notes if required and stop to discuss as necessary.

Extend

Beach management strategies on the Gold Coast: artificial reefs and sand pumping

- Scroll down and read the section titled *The construction of artificial reefs*. Take notes if required and stop to discuss as necessary.
- Scroll down and read the section titled *Sand pumping / Bypass system*. Take notes if required and stop to discuss as necessary.
- ? In your own words, describe the importance of either the artificial reef at Narrownneck or the sand pumping jetty at the Spit. [Answers will vary]
- ? List the pros and cons for each beach management strategy in the table below. You may wish to revisit the relevant sections of the StoryMap to assist you.

Beach management strategy	Pros	Cons
Rock Groynes	- cheap to build/maintain - don't affect beach access - simple & effective for keeping sand in place	- unattractive / unaesthetic - starves the beach on the other side of the groyne of sand
Rock walls	- cheap to construct - provides defense against high-energy waves - waves break on rock instead of dune	- unattractive - can block public access to beach
Dredging	- Once process is complete, beaches look attractive - Restores natural	Offshore dredging can increase erosion if not planned appropriately

	- appearance of beach - Sand placed in wave-breaking zones (bars) protects beach from damaging waves and storms	Can affect and disrupt ecosystems
Dumping and bulldozing	- Beach looks attractive - Natural appearance maintained - Protects tourism industry	- Heavy machinery present on beach - Visual / noise pollution - Safety hazards
Artificial reefs	- Effective at controlling / limiting erosion - Improves surfing conditions - Creates new ecosystems for marine life - Geo-textile bags are environmentally friendly	- Very expensive to design and construct - Requires ongoing maintenance and renewal to remain effective
Sand pumping / Bypass system	- Pipelines deliver large volumes of sand to affected areas of beach - Protects river mouths from sediment build-up - Facilitates navigable seaways for vessels - Maintains natural coastal processes - Sand is treated, debris is removed	- Very expensive to design and construct - Continued maintenance and costs - Pumping needs to be suspended during marine breeding times

→ Scroll down and read the section titled *The future of the Gold Coast*. Take notes if required and stop to discuss as necessary.

Next Steps:

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