Geographical investigation: Coastal change and conflict

**Conclusion:**

How has coastal management influenced the beach morphology of Bridlington?

The groynes and sea wall have had a positive influence on the beach morphology, increasing the steepness of the beach. This is proven by the beach profile being steeper at sites 4-5 (ranging from 10-30°) where defences have been built, compared to site 1 where there are no coastal defences (ranging from 0-7°). However, the groynes are no longer effectively trapping the sand (sites 1 and 5 showed no drop-in sediment), so further maintenance is required.

What are the social and economic impacts of the coastal management strategies in Bridlington?

The sea wall has a positive social and economic impact on Bridlington. Implications to local people/tourists was scored on average at +2, as the sea wall has multiple access points to the beach via stairs and a promenade. The sea wall is also effectively preventing erosion and flooding where the wall is built. However, a sea wall is very expensive to build and requires maintenance. The groynes are having a negative social and economic impact, they reduce access along the coastline for tourists and need immediate repair.

**Evaluation:**

Limitations of methods:

* Groyne measurements – we used a ruler rather than a tape measure or metre ruler, we only measured 5 groynes in total, we only took measurements on one day.
* Photographs – didn’t take photographs of each defence, didn’t collect data for everywhere in Bridlington.
* Bi-polar analysis – only compared results to one other person, didn’t take an average score.

Ways we improved the reliability of our data:

* Collected data in groups to reduce human error
* Collected data at multiple sites along the coastline so we had a more representative data set
* Took photographs at each site to provide qualitative data to back up quantitative data

**Results:**

The sediment was moving in a northern direction along 3/5 groynes, with the largest drop in sediment being 10cm along groyne 3. Groyne 1 and 5 showed no drop-in sediment.

Site 1 (area of no coastal defences) had a very shallow beach profile, only ranging by 7°. Sites 4-5 showed the steepest beach profile, ranging from 10-30°.

The bi-polar analysis on the groynes suggested that they are in-effective, with an average score of -1. Whereas, the bi-polar analysis for the sea wall averaged at +1, suggesting it is effective.

**Secondary data:**

News article from the BBC about coastal erosion and management along the Holderness Coastline – suggest why the area needs coastal management. We also analysed historical photographs.

**Geographical theory:**

Bridlington is susceptible to coastal erosion as the geology consists of sedimentary rock, which is vulnerable to erosion and mass movement.

Bridlington has built groynes to trap the movement of sediment from longshore drift. This enables the beach profile to become steeper, creating a natural defence against destructive waves. If groynes are working effectively, there will be a large build up of sediment along one side.

Bridlington have also built a sea wall to reflect wave energy, reduce the rate of erosion in front of the coastal town and protect it from coastal flooding. If it is working effectively, destructive waves will be unable to topple the wall, and erosion rates will cease behind the sea wall.

Social impacts of sea defences built = restricting people’s access on the beach.

Economic impacts of sea defences built = expensive defences

**Sampling used to select data collection sites:**

Stratified sampling to select the area of beach to collect data Sites were pre-chosen using an OS map to ensure there is a mixture of hard engineering methods. Random sampling wouldn’t be appropriate as I needed to collect data between areas that have been managed and areas that haven’t to make a clear judgement on the impact of coastal management on coastal processes at Bridlington.

**Hypotheses:**

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| **Key question** | **Geographical theory** |
| 1. Why does Bridlington need coastal management? | This area of coastline is mainly sedimentary rock. This will make the area vulnerable to coastal erosion and mass movement. |
| 2. What types of coastal management are implemented at Bridlington? | Sea wall and groynes – hard engineering. |
| 3. How has coastal management influenced the beach morphology of Bridlington? | A groyne prevents sand moving along the shore. Sand is trapped against the updrift side of the structure, resulting in a wider beach and steeper beach profile. |
| 4. What are the social and economic impacts of the coastal management strategies in Bridlington? | Social impacts = restricting people’s access on the beach.  Economic impacts = expensive defences. |

**Site selection - Bridlington:**

Bridlington’s north coastline was chosen for this investigation as it has a range of hard engineering coastal management methods (groynes and sea wall), it is within a 2-hour drive of TDA so we can collect sufficient data, accessible via the A165 and the beach is easily accessible.

**Methods of data collection:**

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| **Method** | **Description** | **Equipment** | **Sampling** | **Justification** | **Data presentation** |
| Groynes measurements | I will approach the southward side of the groynes first. I will measure 10m down the groyne, from the back of the beach and place the tape measure at the top of the groyne (highest horizontal plank of wood). I will measure in cm down to the first pebble/piece of sand. I will record this in my data table. I will then walk around the groyne to the northward side and repeat this method. I will repeat this method on x5 pre-selected groynes on the beach. | Tape measure/ruler, pencil, paper, clipboard | Systematic – 10m down the groyne each time. I will do this along 5 groynes to ensure I have a representative data set. | This method will help me determine how coastal management strategies are affecting the beach morphology. If the hard engineering method of groynes is effective there will be a large difference between the two measurements (north vs south). | Located bar chart - A located bar chart shows the difference in sediment drop along each of the groynes measured.  Justification – Good visual representation of where the largest build-up of sediment is along each groyne. |
| Measuring beach profile | Measure 10m from the nearest groyne (south side). Follow a straight transect line from the edge of the sea to the back of the beach. Split the transect line into segments where the slope angle visually changes. Each reading is taken by following these instructions:   1. Person A stands at a safe distance from the edge of the sea holding a ranging pole​, upright 2. Person B stands holding a second ranging pole further up the beach where there is a break (change) of slope​ angle, upright. 3. The distance between the two ranging poles is measured using a tape measure​ 4. The angle between matching markers on each ranging pole is measured using a clinometer​ and recorded in a table. Repeat this process at each break of slope until the top of the beach is reached​. | X2 ranging poles, x1 clinometer, x1 tape measure | Systematic, 10m away from each groyne. Measurements taken based on visual changes in the slope | This method will help me determine how coastal management strategies are affecting the beach morphology. If the beach profile is steeper near to the groynes, than it is where there are no coastal management strategies then there is a clear correlation. If the hard engineering methods are effective there will be a large difference between the beach morphology on the managed coastline compared to the un-managed coastline. | Line graph - A line graph to show how the beach profile (morphology) changes from the sea front to the back of the beach.  Justification – Good visual representation of how the beach profile changes shape. |
| Bi-polar analysis of sea defences | I will complete one bi-polar survey for each coastal management strategy implemented in Bridlington. The categories will be designed to investigate the social and economic impacts of the coastal management strategies in Bridlington. The data I collect will range from -2 to 2, with -2 being the least effective and 2 being the most effective. I will then calculate a total score based on each sub-score I give. | Copy of bi-polar survey x3 | Stratified – one completed for each type of coastal management. | This method will allow me to determine the social and economic impacts of the coastal management in Bridlington. If the sea defences mainly score 0 or lower I can determine that they are having a negative social and economic impact. | Radar graph - A radar graph shows how positive or negative each defence is. If the shape is smaller, the defence is negative and therefore has a greater social and economic impact.  Justification – Good visual representation of how effective each defence is. |

**Enquiry question:**

To investigate the impact of coastal management on coastal processes and communities.