

Coasts

	Key questions and ideas	Key facts
Lesson 1: Coasts: not just a day at the seaside	<p>What is a coast?</p> <p>What do different coastal features look like?</p> <p>Why might coastal features change over time?</p> <p>How might coastal features change over time?</p>	<p>The point where the land meets the sea or ocean</p> <p>The <i>Coastal Features</i> resource sheet for lesson 1 shows images of different coastal features. These features are: 1. Tombolo; 2. Beach; 3. Salt marsh; 4. Cave, Arch, Stack; 5. Bay; 6. Headland; 7. Cliff; 8. Spit; 9. Peninsula.</p> <p>Tombolos, beaches, salt marshes and spits are formed as a result of deposition. Caves, arches and stacks, bays, headlands, cliffs and peninsulas are formed as a result of erosion. http://thebritishgeographer.weebly.com/coasts-of-erosion-and-coasts-of-deposition.html gives details and diagrams of how each of these features are formed.</p> <p>Coasts are dynamic systems which result in changes over time. Continuous erosion and/or deposition will lead to coastal features changing over time.</p> <p>Erosion over time of a headland, for example, can lead to the development of a cave which can develop into an arch and eventually a stack and stump. http://thebritishgeographer.weebly.com/coasts-of-erosion-and-coasts-of-deposition.html provides further information on these changes along with an overview of how other coastal features change over time.</p>
Lesson 2: Coastal features and processes: the what and how of coasts	<p>Coastal processes</p> <p>What is longshore drift?</p> <p>How are arches, caves, stacks and stumps formed?</p>	<p>This lesson focuses on two coastal processes: longshore drift as an example of transportation and erosion. Students will need to know about the process of longshore drift in order to apply their knowledge to a case study on Ghana in lesson 4.</p> <p>Longshore drift is the process of sediment transportation across a beach. It is dependent on the prevailing wind which affects the waves and as a result the swash (waves up the beach). Sediment is transported with swash at a 45 degree angle up the beach and 90 degree angle back to the sea with backwash. As the waves move across the beach, sand and sediment is transported in the direction of the wave movement. See http://geothecoast.blogspot.pt/2013_05_01_archive.html for diagram.</p> <p>Weaknesses in rock are exposed to erosion through the process of abrasion, solution and hydraulic action. These processes widen these weaknesses into cracks which slowly become larger and develop into small caves. As the cave continues to erode, the back wall becomes thinner until eventually it is completely eroded away leaving an arch. Subsequent erosion under the arch eventually leads to a</p>

	<p>What is solution?</p> <p>What is abrasion?</p> <p>What is attrition?</p> <p>What is hydraulic action?</p>	<p>weakening of the structure until the roof of the arch collapses and leaves a feature called a stack. Over time the stack will continue to erode and finally collapse into a stump. Watch http://www.bbc.co.uk/learningzone/clips/coastlines-caves-arches-and-stacks/8432.html to see this process in action.</p> <p>Weak acids in salt water create chemical reactions which dissolve and erode rock such as limestone and chalk.</p> <p>Pebbles and sediment being transported by waves scrape like sandpaper against rocks causing the rock to breakdown.</p> <p>Rocks and pebbles being transported in the water collide and break into smaller fragments. This process causes transported rocks to become smaller and rounder.</p> <p>Water is forced into cracks in rock. Air becomes compressed and the increased pressure causes cracks to widen and deepen.</p>
<p>Lesson 3: "London-on-Sea"</p>	<p>How can coasts be physically different?</p> <p>How are coasts used differently?</p> <p>How can people benefit from living on a coast?</p> <p>How can people be disadvantaged from living on</p>	<p>Every coast has its own characteristics. Coasts can be dominated by fine sand or shingle, salt or mud flats, large boulders, cliffs, sheltered bays. These physical differences will often dictate how different coasts are used. In relation to the PowerPoint <i>Different coasts and their uses</i> the following coasts are used for the following activities: Khezr Beach Iran – tourism; Southend-on sea – tourism, fishing, residential; Finland Gulf, Russia – recreation and leisure; Kyrkbacken, Sweeden – marina; Valdivostok, Russia – port, residential; Santorini, Greece – tourism and residential; Shanghai, China – urban development, port, residential.</p> <p>Economic benefits – development of ports increase opportunity for trade and employment; development of tourist industry; provide jobs in fishing industry which will often attract other businesses for example restaurants.</p> <p>Social benefits - areas for leisure and recreation, often aesthetically pleasing sea front residential areas.</p> <p>Economic disadvantages – price of houses can be too much for local people, money generated from tourist industry is seasonal and often affected by the weather; some coastal industries are in decline in</p>

	<p>a coast?</p> <p>How would London benefit from being located on a coast?</p> <p>What problems might London face if it was located on a coast?</p>	<p>some areas for example fishing.</p> <p>Social disadvantages – overcrowding in high tourist season putting increased pressure on infrastructure and local shops and services; coastal flooding can disrupt everyday lives; coastal erosion can lead to the destruction of houses and or settlements.</p> <p>Students should be free to develop their own ideas but most answers will probably focus around development of the tourist industry if London was located adjacent to sandy beaches. Consideration should also be made of the expansion of London’s port and how this would be easier to have a port with direct access out to sea rather than ships having to navigate the River Thames.</p> <p>Problems are likely to address the threat of coastal flooding and the potential this would have to disrupt people’s lives and industry. Students should also consider the issue of overcrowding and the pressure this would put on infrastructure and services if more tourists were attracted to the city if it had a coastal location.</p>
<p>Lesson 4: Man vs coast</p>	<p>Physical Geography of Ghana</p> <p>Longshore drift in Ghana</p> <p>What impact is human activity having on Ghana’s coastline?</p>	<p>Ghana is located in West Africa and is boarded by Côte d’Ivoire to the west, Burkina Faso to the north and Togo to the east. The eastern edge of the country is dominated by the River Volta which flows into the Atlantic Ocean. Ghana’s coastline is 540km and makes up approximately 7% of the country’s land mass. 25% of Ghana’s population live on the coast and 70% of the country’s industries and businesses are located there.</p> <p>Due to the strong prevailing wind from the South West over the Atlantic Ocean and the power of large waves which reach the coast of Ghana, there is significant and sustained longshore drift. As a result a massive amount of sand is transported by the process of longshore drift from Ghana to the coast of Togo to the east. Prior to the construction of the Akosombo Dam, the River Volta deposited huge amounts of sediment at the mouth of the river at the delta. Although this sediment was transported by longshore drift, the regular and constant deposition from the River Volta protected the coastline even with significant longshore drift in action.</p> <p>The construction of the Akosombo Dam in 1965, 60KM north of the mouth of the River Volta regulates the flow of the River Volta and subsequently the transportation of sediment into the Volta Delta. Very little sediment now reaches the delta, because it is held in Lake Volta behind the dam, but the strength of longshore drift remains the same. As a result, not enough sand is being deposited to replace the sand transported by longshore drift leading to coastal erosion and coastal retreat.</p>

	<p>What was Ghana's coastline like before the Akosombo dam was built?</p> <p>Why is the town of Keta under threat from coastal erosion?</p> <p>What has been done at Keta to protect the coast from coastal erosion and how might this help?</p> <p>The United Arab Emirates</p> <p>What are the main reasons</p>	<p>The coastline was dominated by wide deep sand beaches that were naturally replenished with sediment transported from the Volta Delta.</p> <p>The coastal town of Keta is under threat of coastal retreat due to the process of erosion. It has been estimated that 1 million cubic metres of sand per year is being removed. In the last 25 years, Keta, located 30km east of the Volta Delta, has experienced the removal of its protective beach which has left the town very vulnerable to coastal erosion. It is under threat due to the process of longshore drift which is transporting and removing sand from the town's beaches. One of the reasons for this is the decrease in fluvial sediment (from approximately 71m³/year to only 7m³/year) reaching the Volta Delta. This sediment was transported and deposited on beaches to the east of the delta creating protective beaches which helped limit coastal erosion.</p> <p>There has been some attempt to slow the process of coastal erosion at Keta with the introduction of groynes and a seawall in 2002. The construction of the Keta Sea Defence aims to intercept longshore drift between Keta and Hlorve in an attempt to interrupt sediment transportation, encourage deposition and limit coastal erosion. The Sea Defence (sea wall and 8KM road between Keta and Hlorve to re-establish the barrier link destroyed by erosion) together with an offshore breakwater and series of groynes has limited erosion by stabilising the coast. In addition, a feeder beach between the groynes is increasing the amount of sand for longshore drift to transport. It is worth noting however that while management strategies seem to be halting the effect of coastal erosion at Keta there is still a problem of sustained coastal erosion on the coast of Togo and Benin due to the disruption to longshore drift. More information about the Ghana case study can be found at: http://www.legos.obs-mip.fr/almar/ICS2014_LaibiBightofBenincoast_29_11_13_Revised.pdf?lang=en https://www.fig.net/pub/fig2009/papers/ts04e/ts04e_boating_3463.pdf</p> <p>The United Arab Emirates (UAE) borders Saudi Arabia to the south and Oman to the east. It has a coastline on the Persian Gulf and is located on the Arabian Peninsula. UAE is made up of seven emirates. The largest emirate is Abu Dhabi which as well as being the capital is also a centre for business and industry. The other large business centre is Dubai.</p> <p>Industry in Dubai had been based on oil but the government was aware that oil reserves would not last</p>
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	<p>for land reclamation in the United Arab Emirates?</p> <p>How is human activity changing the coastline of Abu Dhabi and Dubai?</p> <p>How were the new man-made islands created?</p> <p>What negative impacts have Abu Dhabi and Dubai experienced as a result of land reclamation to build new islands?</p>	<p>forever and they would have to diversify to sustain economic growth. One of the new industries was tourism. However with a limited coastline, the government decided to undergo a series of coastal land reclamation projects. Land reclamation usually involves dredging sand and sediment from the sea bed and using it to build new land in the sea.</p> <p>Land reclamation has dramatically changed the shape and length of the natural coastline. Abu Dhabi's coastline continues to expand as a result of land reclamation. Examples of areas which now exist due to land reclamation include the Al Raha Beach development and Lulu Island. Dubai only had 70KM of coastline so they decided to undergo huge land reclamation projects to expand the coastline and develop luxury residential areas as well as the development of leisure and recreational services. In 2005 Palm Jumeirah was completed. The man-made island consisted of an estimated 110million m₃ of dredged sand. Since then there have been a large number of other land reclamation projects including 'The World' which used 325 million m₃ of dredged sediment. Today there is approximately 1000KM of coastline; fourteen times as much as there was originally.</p> <p>The man-made islands were created by dredging sand from the sea bed and using it to fill in coastal salt flats called sabkhas. Examples of areas built on sabkha flats include The Mussafah Industrial Area and The Industrial City of Abu Dhabi.</p> <p>Land reclamation in the UAE has had a number of economic benefits (more land available for infrastructure and development, growth of tourist industry, development and sale of expensive real estate) but both Abu Dhabi and Dubai have experienced negative impacts of this large scale artificial coast creation.</p> <p>Marine ecosystems have been altered as a result of the dredging and land reclamation process which has buried coral reefs and oyster beds with sediment. These features were habitats to marine animals and as a result there has been a breakdown in the ecosystem and a decrease in commercial fishing. The coral reefs also acted as a natural barrier to the waves and helped limit coastal erosion.</p> <p>The location of the man-made islands has also led to the loss of many of the country's salt flats, which has removed natural habitats and had a negative impact on flora and fauna for example the loss of habitat for the Socotra cormorant, a rare sea bird.</p>
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<p>Lesson 5 & 6: Planning coastal fieldwork</p>	<p>Why is fieldwork important?</p> <p>How can I investigate that longshore drift is occurring? What evidence is there that longshore drift is occurring?</p> <p>How would I benefit from carrying out fieldwork?</p>	<p>Fieldwork makes the study of geography real! Students get an opportunity to apply their knowledge and understanding in a real life setting bringing concepts and theories to life. Fieldwork also enables students to develop new geographical skills ranging from collecting data to analysing results. Planning fieldwork also provides students with an opportunity to take responsibility for their own learning which often improves motivation for learning. More information about the importance of fieldwork can be found at the following link: http://www.rgs.org/NR/rdonlyres/5AE2EB69-4BD7-420D-A0A4-E691A88EB60D/0/Fieldw_VC1.pdf</p> <p>Measurements of the height of the sand either side of a groyne will indicate if longshore drift is occurring. If longshore drift is occurring there will be significantly more sand on one side of the groyne than the other. This pattern should be repeated at all the groynes along the beach. The method for this fieldwork is described on the following link http://www.rgs.org/OurWork/Schools/Fieldwork+and+local+learning/Planning+your+fieldtrip/Fieldwork+locations/Jurassic+Coast+of+Dorset+and+East+Devon/Longshore+drift+investigation.htm</p> <p>The response to this question should be personal to the individual student but answers are most likely to include: kinaesthetic approach is a powerful learning tool, makes geography real, opportunity to learn new skills, opportunity to experience a new area, opportunity to work with others.</p>