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Coastal Erosion is the wearing away of the land near the coastline. It removes sediments from beaches, dunes, cliffs, and coastal wetlands, mainly due to wind, waves, high tides, and storms. Coastal erosion is a natural process that shapes the world’s coastline but is also a significant environmental issue. This article will focus on the causes, types, impacts, case studies, management studies, and some interesting facts related to coastal erosion. Let's explore!Coastal ErosionCoastal Erosion- OverviewAspectDescriptionDefinitionCoastal erosion is the gradual wearing away and removal of land and sediment along the coastline by the action of waves, currents, tides, and wind.Causes1. Wave Action: Wave energy directly impacts the coastline, eroding and transporting sediment. 2. Sea Level Rise: Rising sea levels increase coastal erosion rates by encroaching on land. 3. Storms and Extreme Weather: Storm surges and high winds can accelerate erosion. 4. Human Activities: Coastal development, sand mining, and infrastructure can exacerbate erosion.Processes1. Hydraulic Action: The force of breaking waves dislodges and removes sediment from the coastline. 2. Abrasion: Waves carrying sediment scrape and wear down coastal features. 3. Attrition: Sediment particles collide, break, and become smoother over time. 4. Solution: Dissolution of soluble rock materials (e.g., limestone) by seawater.Impacts1. Loss of Land: Coastal erosion leads to the loss of valuable land, property, and infrastructure. 2. Habitat Destruction: Erosion can degrade and destroy coastal habitats, affecting biodiversity. 3. Economic Costs: Damage to coastal properties, tourism sites, and infrastructure results in economic losses. 4. Storm Surge Vulnerability: Eroded coastlines are more susceptible to storm surges and flooding.Management Strategies1. Hard Engineering: Structures such as seawalls, groynes, and breakwaters to protect the coastline.2. Soft Engineering: Beach nourishment, dune restoration, and vegetation planting to stabilize coastlines. 3. Managed Retreat: Relocation of vulnerable coastal communities away from eroding areas. 4. Regulatory Measures: Zoning laws, building codes, and setback requirements to regulate coastal development.Meaning of Coastal ErosionCoastal erosion is the wearing away of the land by the action of natural processes such as waves, tides, currents, and weathering. It leads to the loss of soil, sediments, and rocks from the shoreline which impacts the natural coastline. The study of erosion and sediment redistribution in coastal areas is referred to as coastal morphodynamics. Causes of Coastal Erosion NATURAL CAUSES ARTIFICIAL CAUSESWave Action Deforestation Effect of Severe Cyclone Excessive Sea Mining Rise in Sea level Construction of Ports and Harbours Hide Tides Daming of Rivers Natural Factors Wave Action – High wave energy leads to the gradual removal of the land near the coastline through littoral drift. Coastal erosion caused due to wave action can never be rebuilt through natural processes. Wave action erodes the coastline over time. Currents – Currents erode the coastline by carrying away sand and other sediments. Tides - Tides are caused by the gravitational pull of the sun and moon. When the tidal energy is less, the level of coastal erosion is less whereas, when the tidal energy is more, the rate of coastal erosion is more. Human Activities Deforestation – It is one of the major causes of soil erosion. Tress and other vegetation help to bind the soil together. Sand mining – It is the process through which the primary soil is extracted from beneath the sea. It not only lowers the groundwater level of the coast but also serves as a threat to the marine fisheries and aquatic ecosystem. Construction of ports and harbors – The construction of jetties, breakwaters, groins, and reclamation bunds, disturbs the natural flow of the sea which in turn blocks the coastal sedimentary transport. It alters the dune topography and coastal forest growth. Climate Change Rising sea level – The rise in sea level, increases the rate of frequency of the storm, due to which the wave energy moves further inshore and erodes the coastal cliffs. Storms can further uproot and destroy the coastal vegetation which destabilizes the coastlines and increases the erosion Increased Rainfall – Climatic change leads to a change in the precipitation pattern. Heavy rainfall leads to increased runoff which causes coastal erosion. Effects of Coastal ErosionThe effects of coastal erosion can be wide-ranging and significant, impacting both natural environments and human communities. Here are some of the key effects:Loss of Land: Coastal erosion results in the gradual retreat of the shoreline, leading to the loss of valuable land. This can threaten coastal infrastructure, properties, and agricultural land, as well as cultural and historical sites located along the coast.Habitat Degradation: Erosion can degrade and destroy coastal habitats such as beaches, dunes, wetlands, and mangroves. These habitats provide important ecosystems services, including biodiversity support, storm protection, and carbon sequestration. Loss of these habitats can lead to declines in biodiversity, loss of habitat for wildlife, and disruptions to coastal ecosystems.Economic Impacts: Coastal erosion can have significant economic costs, including damage to coastal properties, infrastructure, and tourism facilities. It can also lead to loss of revenue from tourism and fisheries, as well as increased costs for coastal protection measures and shoreline stabilization efforts.Storm Vulnerability: Erosion can weaken the natural protection provided by coastal features such as beaches, dunes, and barrier islands, making coastal communities more vulnerable to storm surges, flooding, and other extreme weather events. This can increase the risk of property damage, loss of life, and displacement of populations.Saltwater Intrusion: As coastlines erode, saltwater from the ocean can intrude into coastal aquifers and groundwater systems, contaminating freshwater resources. This can have negative impacts on drinking water supplies, agricultural irrigation, and ecosystems dependent on freshwater habitats.Cultural and Social Impacts: Coastal erosion can also have cultural and social impacts, including loss of cultural heritage sites, displacement of coastal communities, and disruption of traditional livelihoods such as fishing and agriculture. It can also lead to social conflicts over land use, property rights, and access to resources.Coastal Erosion ExamplesHere are some examples of coastal erosion from around the world:Louisiana, USA: The coastline of Louisiana is experiencing rapid erosion due to a combination of factors, including subsidence, sea level rise, and human activities such as oil and gas extraction and the construction of levees. This erosion has led to the loss of thousands of acres of land, including valuable wetlands and barrier islands.The Sundarbans, Bangladesh and India: The Sundarbans, the largest mangrove forest in the world, is facing significant erosion due to rising sea levels, sedimentation, and human activities such as deforestation and shrimp farming. Coastal communities in the Sundarbans are experiencing increased vulnerability to flooding and storm surges as a result of erosion.Happisburgh, United Kingdom: The coastline of Happisburgh in Norfolk, England, is eroding at an alarming rate, with cliffs receding by several meters each year. This erosion has led to the loss of homes, roads, and historic landmarks, including the 12th-century church of St. Mary's.The Maldives: The low-lying islands of the Maldives are highly vulnerable to coastal erosion and sea level rise. Erosion is exacerbated by factors such as coral reef degradation, sand mining, and coastal development. The Maldives government has implemented measures such as beach nourishment and the construction of seawalls to mitigate erosion.Great Ocean Road, Australia: The coastline along the Great Ocean Road in Victoria, Australia, is experiencing erosion due to wave action, storms, and sea level rise. This erosion has resulted in the loss of coastal cliffs and rock formations, including the famous Twelve Apostles.Coastal Erosion ProcessesCoastal erosion is a complex process influenced by various natural and human factors. The primary processes contributing to coastal erosion include:Wave Action: Waves generated by wind and other factors exert significant force on coastal landforms, eroding and transporting sediment along the shoreline. The intensity and direction of wave action depend on factors such as wind speed, wave height, and the angle of wave approach.Hydraulic Action: The force of breaking waves dislodges and removes sediment from the coastline, contributing to erosion. This process is particularly active during storms and high-energy wave events.Abrasion: Also known as "corrasion," abrasion occurs when waves carrying sediment scrape and wear down coastal features such as cliffs, headlands, and beaches. The abrasive action of sediment particles can lead to the gradual erosion of coastal landforms over time.Attrition: In this process, sediment particles carried by waves collide with each other and with coastal landforms, resulting in the breaking down and smoothing of sediment grains. Attrition contributes to the process of sediment transport along the coastline.Solution: Dissolution of soluble rock materials (e.g., limestone) by seawater contributes to coastal erosion in areas with limestone or other soluble rock formations. Over time, the gradual dissolution of these rocks can lead to the formation of coastal caves, arches, and other erosional features.Longshore Drift: Waves breaking at an angle to the shoreline can generate a current known as longshore drift, which transports sediment along the coast. Longshore drift can lead to the gradual erosion of sediment from one area of the coastline and deposition in another, resulting in changes to coastal landforms and erosion patterns.Sea Level Rise: Rising sea levels associated with climate change can exacerbate coastal erosion by increasing wave energy and inundating low-lying coastal areas. Sea level rise contributes to the erosion of beaches, dunes, and coastal marshes, leading to land loss and coastal retreat.Types of Coastal ErosionThere are five different types of coastal erosion:- Hydraulic Action It takes place due to the forces of the waves hitting the coastline. The air gets trapped in the cracks of the cliff face. In due course of time, the cracks will become larger which will cause the cliff to splinter away. Abrasion It is a process through which the sand and small pebbles wash away from the shorelines. It is also known as the sandpaper effect. It mostly takes place during the stormy conditions. Corrosion It is a process where the waves wash, away the sediments, rocks, or any other material over the bottom of the sea and wear away at the surface. The process of corrosion directly leads to the process of abrasion. Attrition It is the process in which the already rocks from the coastline knock into each other and break apart. It causes the rocks to become smaller pebbles which eventually leads to the formation of sand. Solution It is the process in which the weak acidic chemicals in the seawater react with the chemicals in the rock, causing the rock to erode. Chalks and limestone cliffs are particularly vulnerable to such kind of erosion. because they contain calcium carbonate. How to prevent Coastal Erosion?Preventing coastal erosion requires a combination of natural and engineered solutions. Here are some strategies commonly used to mitigate coastal erosion:Beach Nourishment: This involves adding sand or sediment to beaches to replenish eroded areas and restore natural coastal features. Beach nourishment can help absorb wave energy, reduce erosion, and maintain recreational and ecological values of beaches.Vegetation Planting: Planting native vegetation such as grasses, shrubs, and trees along the coastline can help stabilize soil, reduce wave impact, and promote sediment deposition. Coastal vegetation also provides habitat for wildlife and enhances biodiversity.Living Shorelines: Living shorelines are nature-based solutions that use natural materials such as plants, oyster reefs, and marsh vegetation to stabilize the shoreline and reduce erosion. Living shorelines can provide effective erosion control while enhancing habitat and water quality.Breakwaters and Groynes: These structures are built offshore or along the coast to dissipate wave energy and protect the shoreline from erosion. Breakwaters are submerged or partially submerged barriers that reduce wave height and intensity, while groynes are structures that extend perpendicular to the shore to trap sediment and prevent longshore drift.Seawalls and Revetments: Seawalls are hard structures built parallel to the shoreline to protect coastal properties from wave action and erosion. Revetments are sloping structures made of concrete, rock, or other materials that absorb wave energy and prevent erosion along the shoreline.People Also View Displacement of land along the coastline This article needs additional citations for verification. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed.Find sources: "Coastal erosion" – news · newspapers · books · scholar · JSTOR (January 2013) (Learn how and when to remove this message) Heavy marine erosion: cliff fall at Hunstanton in the east of England Sea erosion at Valiyathura Kerala, India Tunnel-like structures formed by erosion in Jinshitan Coastal National Geopark, Dalian, Liaoning Province, China Coastal erosion is the loss or displacement of land, or the long-term removal of sediment and rocks along the coastline due to the action of waves, currents, tides, wind-driven water, waterborne ice, or other impacts of storms.[1][2] The landward retreat of the shoreline can be measured and described over a temporal scale of tides, seasons, and other short-term cyclic processes.[3] Coastal erosion may be caused by hydraulic action, abrasion, impact and corrosion by wind and water, and other forces, natural or unnatural.[3] On non-rocky coasts, coastal erosion results in rock formations in areas where the coastline contains rock layers or fracture zones with varying resistance to erosion. Softer areas become eroded much faster than harder ones, which typically result in landforms such as tunnels, bridges, columns, and pillars. Over time the coast generally evens out. The softer areas fill up with sediment eroded from hard areas, and rock formations are eroded away.[4] Also erosion commonly happens in areas where there are strong winds, loose sand, and soft rocks. The blowing of millions of sharp sand grains creates a sandblasting effect. This effect helps to erode, smooth and polish rocks. The definition of erosion is grinding and wearing away of rock surfaces through the mechanical action of other rock or sand particles. According to the IPCC, sea level rise caused by climate change will increase coastal erosion worldwide, significantly changing the coasts and low-lying coastal areas.[5] Hydraulic action occurs due to the physical weathering and mechanical response when waves strike a cliff face thus compressing air in cracks on the cliff face.[6] This exerts pressure on the surrounding rock, and can progressively splinter and remove pieces. Over time, the cracks can grow, sometimes forming a cave. The splinters fall to the sea bed where they are subjected to further wave action. Attrition occurs when waves cause loose pieces of rock debris (scree) to collide with each other, grinding and chipping each other, progressively becoming smaller, smoother and rounder. Scree also collides with the base of the cliff face, chipping small pieces of rock from the cliff or have a corrasion (abrasion) effect, similar to sandpapering. Solution is the process in which acids contained in sea water will dissolve some types of rock such as chalk or limestone.[7] Abrasion, also known as corrasion, occurs when waves break on cliff faces and slowly erode it. As the sea pounds cliff faces it also uses the scree from other wave actions to batter and break off pieces of rock from higher up the cliff face which can be used for this same wave action and attrition. Corrosion or solution/chemical weathering occurs when the sea's pH (anything below pH 7.0) corrodes rocks on a cliff face. Limestone cliff faces, which have a moderately high pH, are particularly affected in this way. Wave action also increases the rate of reaction by removing the reacted material. Sea-dune Erosion at Talace beach, Wales The ability of waves to cause erosion of the cliff face depends on many factors. The hardness (or inversely, the erodibility) of sea-facing rocks is controlled by the rock strength and the presence of fissures, fractures, and beds of non-cohesive materials such as silt and fine sand. The rate at which cliff fall debris is removed from the foreshore depends on the power of the waves crossing the beach. This energy must reach a critical level to remove material from the debris lobe. Debris lobes can be very persistent and can take many years to completely disappear. Beaches dissipate wave energy on the foreshore and provide a measure of protection to the adjoining land. The stability of the foreshore, or its resistance to lowering. Once stable, the foreshore should widen and become more effective at dissipating the wave energy, so that fewer and less powerful waves reach beyond it. The provision of updrift material coming onto the foreshore beneath the cliff helps to ensure a stable beach. The adjacent bathymetry, or configuration of the seafloor, controls the wave energy arriving at the coast, and can have an important influence on the rate of cliff erosion. Shoals and bars offer protection from wave erosion by causing storm waves to break and dissipate their energy before reaching the shore. Given the dynamic nature of the seafloor, changes in the location of shoals and bars may cause the locus of beach or cliff erosion to change position along the shore.[8] Coastal erosion has been greatly affected by the rising sea levels globally. There has been great measures of increased coastal erosion on the Eastern seaboard of the United States and in areas of coastal Guyana.[9] Locations such as Florida have noticed increased coastal erosion. In reaction to these increases Florida and its individual counties have increased budgets to replenish the eroded sands that attract visitors to Florida and help support its multibillion-dollar tourism industries. Coastal erosion Pacifica, California coast after major storms in 1997 (resulting from the strongest El Niño on record) destroyed the houses shown above. Beach erosion at Cabrillo National Monument, California. Large-scale coastal erosion at Torrey Pines State Natural Reserve, California. Coastal erosion at Torrey Pines State Natural Reserve, California, resulted in the necessary relocation of a scenic overlook. Coastal erosion during a king tide, Dania Beach, Florida Erosion of cliffs on the Norfolk coast near Cromer. The coastline along East Anglia's North Sea coast is particularly prone to erosion, and has led to many instances of properties being relocated or destroyed over the course of history. Weathering and transport slope processes Slope hydrology Vegetation Cliff foot erosion Cliff foot sediment accumulation Resistance of cliff foot sediment to attrition and transport Human Activities Resource extraction Coastal management There are three common forms of coastal erosion control methods. These three include: soft-erosion controls, hard-erosion controls, and relocation. This image represents a typical seawall that is used for preventing and controlling coastal erosion. Hard-erosion control methods provide a more permanent solution than soft-erosion control methods. Seawalls and groynes serve as semi-permanent infrastructure. These structures are not immune from normal wear-and-tear and will have to be refurbished or rebuilt. It is estimated the average life span of a seawall is 50–100 years and the average for a groyne is 30–40 years.[10] Because of their relative permanence, it is assumed that these structures can be a final solution to erosion. Seawalls can also deprive public access to the beach and drastically alter the natural state of the beach. Groynes also drastically alter the natural state of the beach. Some claim that groynes could reduce the interval between beach nourishment projects though they are not seen as a solution to beach nourishment.[11] Other criticisms of seawalls are that they can be expensive, difficult to maintain, and can sometimes cause further damage to the beach if built improperly.[12] As we learn more about hard erosion controls it can be said for certain that these structural solutions cause more problems than they solve. They interfere with the natural water currents and prevent sand from shifting along coasts, along with the high costs to install and maintain them, their tendency to cause erosion in adjacent beaches and dunes, and the unintended diversion of stormwater and into other properties.[13] Natural forms of hard-erosion control include planting or maintaining native vegetation, such as mangrove forests and coral reefs. Sandbagged beach at the site of Hurricane Sandy. Soft erosion strategies refer to temporary options of slowing the effects of erosion. These options, including Sandbag and beach nourishment, are not intended to be long-term solutions or permanent solutions.[10] Another method, beach scraping or beach bulldozing allows for the creation of an artificial dune in front of a building or as means of preserving a building foundation. However, there is a U.S. federal moratorium on beach bulldozing during turtle nesting season, 1 May – 15 November.[14] One of the most common methods of soft erosion control is beach nourishment projects. These projects involve dredging sand and moving it to the beaches as a means of reestablishing the sand lost due to erosion.[10] In some situations, beach nourishment is not a suitable measure to take for erosion control, such as in areas with sand sinks or frequent and large storms.[12] Dynamic revetment, which uses loose cobble to mimic the function of a natural storm beach, may be a soft-erosion control alternative in high energy environments such as open coastlines.[15] Over the years beach nourishment has become a very controversial shore protection measure: It has the potential to negatively impact several of the natural resources. Some large issues with these beach nourishment projects are that they must follow a wide range of complex laws and regulations, as well as the high expenses it takes to complete these projects. Just because sand is added to a beach does not mean it will stay there. Some communities will bring in large volumes of sand repeatedly only for it to be washed away with the next big storm. Despite these factors, beach nourishment is still used often in many communities. Lately, the U.S. Army Corps of Engineers emphasized the need to consider a whole new range of solutions to coastal erosion, not just structural solutions. Solutions that have potential include native vegetation, wetland protection and restoration, and relocation or removal of structures and debris.[13] The solutions to coastal erosion that include vegetation are called "living shorelines". Living shorelines use plants and other natural elements. Living shorelines are found to be more resilient against storms, improve water quality, increase biodiversity, and provide fishery habitats. Marshes and oyster reefs are examples of vegetation that can be used for living shorelines; they act as natural barriers to waves. Fifteen feet of marsh can absorb fifty percent of the energy of incoming waves.[13] Further information: Managed retreat Relocation of infrastructure any housing farther away from the coast is also an option. The natural processes of both absolute and relative sea level rise and erosion are considered in rebuilding. Depending on factors such as the severity of the erosion, as well as the natural landscape of the property, relocation could simply mean moving inland by a short distance or relocation can be to completely remove improvements from an area.[12] A coproduction[16] approach combined with managed retreat has been proposed as a solution that keeps in mind environmental justice. Typically, there has been low public support for "retreating".[17] However, if a community does decide to relocate their buildings along the coast it is common that they will then turn the land into public open space or transfer it into land trusts in order to protect it. These relocation practices are very cost-efficient, can buffer storm surges, safeguard coastal homes and businesses, lower carbon and other pollutants, create nursery habitats for important fish species, restore open space and wildlife, and bring back the culture of these coastal communities.[13] Storms can cause erosion hundreds of times faster than normal weather. Before-and-after comparisons can be made using data gathered by manual surveying, laser altimeter, or a GPS unit mounted on an ATV.[18] Remote sensing data such as Landsat scenes can be used for large scale and multi year assessments of coastal erosion.[19][20][21] Moreover, geostatistical models can be applied to quantify erosion effects and the natural temporal and spatial evolution of tracked coastal coastal profiles. The results can be used to determine the required temporal and spatial distances between the measured profiles for ecomic tracking.[22] Small-scale erosion destroys abandoned railroad tracks A place where erosion of a cliffed coast has occurred is at Wamberal in the Central Coast region of New South Wales where houses built on top of the cliffs began to collapse into the sea. This is due to waves causing erosion of the primarily sedimentary material on which the buildings foundations sit.[23] Dunwich, the capital of the English medieval wool trade, disappeared over the period of a few centuries due to redistribution of sediment by waves. Human interference can also increase coastal erosion: Hallsands in Devon, England, was a coastal village washed away over the course of a year, 1917, directly due to earlier dredging of shingle in the bay in front of it. The California coast, which has soft cliffs of sedimentary rock and is heavily populated, regularly has incidents of house damage as cliffs erodes.[24] Devil's Slide, Santa Barbara, the coast just north of Ensenada, and Malibu are regularly affected. A man looking out over the beach from a building destroyed by high tides in Chorkor, a suburb of Accra. Sunny day flooding caused by sea level rise, increases coastal erosion that destroys housing, infrastructure and natural ecosystems. A number of communities in Coastal Ghana are already experiencing the changing tides. The Holderness coastline on the east coast of England, just north of the Humber Estuary, is one of the fastest eroding coastlines in Europe due to its soft clay cliffs and powerful waves. Groynes and other artificial measures to keep it under control has only accelerated the process further down the coast, because longshore drift starves the beaches of sand, leaving them more exposed. The white cliffs of Dover have also been affected. The coastline of North Cove, Washington has been eroding at a rate of over 100 feet per year, earning the area the nickname "Washaway Beach". Much of the original town has collapsed into the ocean. The area is said to be the fastest-eroding shore of the United States' West Coast. Measures were finally taken to slow the erosion, with substantial slowing of the process noted in 2018.[25] Fort Ricasoli in Kalkara, Malta already showing signs of damage where the land is being eroded Fort Ricasoli, a historic 17th century fortress in Malta is being threatened by coastal erosion, as it was built on a fault in the headland which is prone to erosion. A small part of one of the bastion walls has already collapsed since the land under it has eroded, and there are cracks in other walls as well. In El Campello, Spain, the erosion and failure of a Roman fish farm excavated from rock during the first century B.C. was exacerbated by the construction of a close sport harbour.[26] Hampton-on-Sea is suffering from this problem as well. Hampton-on-Sea is located in Kent, England. It was at one time very popular for its oyster fishing and was very reliant on the sea. Hampton-on-Sea has undergone the effects of coastal erosion since before the 1800s. Hampton-on-Sea's coastal erosion worsened with the increase in global warming and climate change. Global warming is causing a rise in sea level, more intense and frequent storms, and an increase in ocean temperature and precipitation levels. Another reason Hampton-on-Sea had such a horrific case of coastal erosion is due to an increase in the frequency and the intensity of storms it experienced.[13] These natural events had destroyed the Hampton Pier, Hernecliffe Gardens, a set of villas, several roads, and many other structures that once lay on Hampton-On-Sea. After this destruction, in 1899 they started building a sea wall to protect the rest of the remaining land and buildings. However, the sea wall did not offer much help: buildings continued to be affected by the erosion. Then a storm came and broke the sea wall, it then flooded the land behind it. These events cause many land investors to back out. Eventually, Hampton-on-Sea had to be abandoned because the erosion overtook so much of the land. By 1916 Hampton-on-Sea had been completely abandoned. By the 1920s only a couple of structures still stood. It was at that point that Hampton-on-Sea was said to have been finally drowned. Today only three landmarks have survived the tragedy that Hampton-on-Sea had faced. These landmarks include The Hampton Inn, The Hampton Pier, and a few roads. Although The Hampton Pier is not the same size as the original it is still available for people to fish from. A study published in Earth's Future, a journal by the American Geophysical Union in 2025 shows that coastal areas in arid regions, for example, in the Mediterranean, are severely affected by erosion. In 2025, for example, more than 7,000 buildings in the harbor city of Alexandria are at risk of collapsing due to erosion processes and groundwater changes.[27] In South America, the Chilean coast has experienced erosion on certain beaches due to an increased frequency in severe storms during warm phases of the El Niño-Southern Oscillation phenomenon.[28] Beach erosion and accretion Beach evolution Beach morphodynamics Beach nourishment Raised beach Modern recession of beaches Paleoshoreline Integrated coastal zone management Coastal management, to prevent coastal erosion and creation of beach Coastal and oceanic landforms Coastal development hazards Coastal geography Coastal engineering Coastal and Estuarine Research Federation (CERF) Erosion Bioerosion Blowhole Natural arch Wave-cut platform Longshore drift Deposition (sediment) Coastal sediment supply Sand dune stabilization Submersion ^ Ueberman, A.S.; O'Neill Jr, C.R. (1988). Vegetation use in coastal ecosystems (PDF). 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New England Federal Partners. Retrieved 29 November 2021. Shoreline retreat and beach nourishment are projected to increase in Southern California Images of Coastal features Retrieved from " We're currently performing scheduled maintenance. We apologize for any inconvenience and appreciate your patience. Please check back later. From Coastal Wiki Definition of Coastal erosion: Coastal erosion is the process of wearing away material from the coastal profile due to imbalance in the supply and export of material from a certain section of the coast. This is the common definition for Coastal erosion, other definitions can be discussed in the article Coastal erosion, England. Photo credit Sophie Day. Creative Commons Licence. Notes Erosion takes place on the shoreface and on the beach if the export is greater than the supply of material, meaning that the level of the seabed and the beach will decrease. The deficit can be due to both cross-shore processes and longshore processes. It manifests itself in the scouring in the foot of the cliffs or in the foot of the dunes. Coastal erosion occurs mainly during strong winds, high waves and high tides and storm surge conditions, and results in coastline retreat. Erosion due to cross-shore processes is a (partially) reversible process (see Dune erosion). The rate of erosion is correctly expressed in volume/length/time, e.g. in m3/m/year, but erosion rate is often used synonymously with coastline retreat, and thus expressed in m/year. The most important reason for long-term erosion is a deficit in the littoral drift budget, which is often caused by a deficit in supply of sand to the area in question (also referred to as structural erosion). Related articles Articles listed on the category page coastal protection and in particular articles on different causes of erosion: Natural causes of coastal erosion Human causes of coastal erosion and articles on the background of erosion: Dealing with coastal erosion Bruun rule for shoreface adaptation to sea-level rise Dune erosion Littoral drift and shoreline modelling Shoreface profile Active coastal zone Coastal Hydrodynamics And Transport Processes Coastal Erosion along the Changjiang Deltaic Shoreline An introduction to the interaction between ecology and geomorphology of a system is given in Biogeomorphology of coastal systems Further reading USACE, 2012. Coastal engineering manual. Report No 110-2-1100. Washington DC: US Army Corps of Engineers Mangor, K., Drønen, N. K., Kaergaard, K.H. and Kristensen, N.E. 2017. Shoreline management guidelines. 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Because nearly the entire state is edged in coast, there is a great chance of coastal erosion for all those who live on the coast. For residents of the Jacksonville, FL area or other cities situated close to the coast, this concern is especially high. Coastal erosion occurs when sand becomes trapped along structures such as jetties, sea walls, piers, etc. As the sand is trapped, the natural movement of the water along the shoreline continues, but there is no longer sand moving with the water since the sand was trapped. This results in the water eroding the shoreline instead of replenishing the sand as it moves along. There are a couple of different causes of coastal erosion in Florida cities. These causes are: Slow Rise of Sea-Level Hurricanes or Other Storms Poorly Planed Development Navigation Inlets and Construction Preventing Coastal Erosion in the Jacksonville, FL Area Foundation Professionals of Florida will help you repair sea walls that have started to fail. These seawalls help prevent erosion by locking the sand along the shore into place. The prevents it from being eroded by the ocean. With a proper seawall, you can keep the beach around your home from being eaten away by the current. However, is the seawall is not in good condition, it may start to fail. This can lead to more erosion and other problems. That is why the team at Foundation Professionals of Florida offers tieback solutions to keep your seawall in place and make sure that it stays secure. These tiebacks work like screws that are installed through the seawall and into the ground on the other side horizontally. As they are screwed into the ground, they pull the leaning and bowing wall straight and anchor it into place so that it can keep the beach from collapsing into the ocean and eroding away. Call the team at Foundation Professionals of Florida to determine the dangers of coastal erosion to your home and come up with seawall repair solutions to stop this problem. Coastal erosion (or shoreline retreat) is the loss of coastal lands due to the net removal of sediments or bedrock from the shoreline.Coastal erosion can be either a:rapid-onset hazard (occurs very quickly, a period of days to weeks)slow-onset hazard (occurring over many years, or decades to centuries).What causes coastal erosion?Coastal erosion is typically driven by the action of waves and currents, but can also result from mass wasting processes on slopes, and land subsidence. Significant episodes of coastal erosion are often associated with extreme weather events (coastal storms, surge and flooding) but also from tsunami, both because the waves and currents tend to have greater intensity and because the associated storm surge or tsunami inundation can allow waves and currents to attack landforms which are normally out of their reach. On coastal headlands, such processes can lead to undercutting of cliffs and steep slopes and contribute to mass wasting. In addition, heavy rainfall can enhance the saturation of soils, with high saturation leading to a reduction in the soil's shear strength, and a corresponding increase in the chance of slope failure (landslides).Coastal erosion is a natural process which occurs whenever the transport of material away from the shoreline is not balanced by new material being deposited onto the shoreline. Many coastal landforms naturally undergo quasi-periodic cycles of erosion and accretion on time-scales of days to years. This is especially evident on sandy landforms such as beaches, dunes, and intermittently closed and open lagoon entrances. However, human activities can also strongly influence the propensity of landforms to erode. For example, the construction of coastal structures (such as breakwaters, groynes and seawalls) can lead to changes in coastal sediment transport pathways, resulting in erosion in some areas and accretion in others. The removal of sediments from the coastal system (e.g., by dredging or sand mining), or a reduction in the supply of sediments (e.g., by the regulation of rivers) can also be associated with unintended erosion. At larger scales, natural and human-induced climate change can modulate the likelihood and rate of coastal erosion.Coastal erosion becomes a hazard when society does not adapt to its effects on people, the built environment and infrastructure.Where does coastal erosion occur in Australia?The most vulnerable coasts are those made up of unconsolidated sediments, such as beaches, dunes and sand cliffs, on open coasts that experience net longshore drift of sediment and on the shores of coastal lakes and lagoons. Geoscience Australia has developed an online mapping portal that allows for the identification of areas of the Australian coast that are experiencing erosion. The Digital Earth Australia (DEA) Coastlines product is a free, publicly available dataset that measures annual shorelines and rates of coastal change along the entire Australian coastline from 1988 to the present. It combines satellite data from Geoscience Australia’s Digital Earth Australia (DEA) program with tidal modelling to map the typical location of the entire 33,000-kilometre Australian coastline at mean sea level for each year. The tool enables historic trends of coastal erosion and progradation (growth) to be seen at both a local and continental scale. DEA Coastlines data is available to download and to explore on the interactive DEA Maps platform.The Smartline national dataset maps record the location of those coastal substrates and landforms that have greater or lesser sensitivity to potential coastal impacts of climate change and sea-level rise (IPCC 2013), such as accelerated erosion and shoreline recession, increased slumping or rock fall hazards, changing dune mobility, and other hazards.Rapid onset: The NSW coast has a long history of experiencing coastal erosion events dating back to 1857. Single storm events have caused coastal erosion, such as that associated with East Coast Low storms in 2015 and 2016 that damaged beachfront properties in Sydney. A series of large storm events in 1974 led to even more extensive damage to coastal properties and infrastructure in this region.Slow onset: The Twelve Apostles along the Great Ocean Road are a result of landscape change and coastal erosion over millenia. There were originally 12 limestone features with 8 now remaining. These structures remain vulnerable to further erosion from waves.Around the Australian coast, nearly 39 000 buildings are located within one hundred metres of 'soft' shorelines and are at risk from accelerated erosion due to sea-level rise and changing climate conditions (as at 2011).Our roleReducing risk to Australians from coastal erosionGeoscience Australia is committed to support Australia's capability to managing the impact of natural hazards, including coastal erosion. Our teams:develop an understanding of natural hazards and community exposure to support risk mitigation and community resilienceprovide authoritative, independent information and advice to the Australian Government and other stakeholders to support risk mitigation and community resiliencemaintain and improve systems for effective natural disaster preparedness, response and recoverycontribute to Australia's overseas development program.In particular, we:develops national-scale datasets as a fundamental input to coastal erosion hazard and risk assessmentsdevelops methods and tools that can support the development of coastal risk assessmentssupports national initiatives to manage the coastal environment.To learn more about our work, access our latest data or hazard assessment tools, visit the Community Safety page.