

APSE Coastal Erosion Research Report

Summary and Discussion

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Coastal Erosion

How local authorities are dealing with increased levels of coastal erosion linked to climate change



Why is there a need for the Report?

- Once again climate change rears its head.
- Natural processes which have occurred over millions of years are being speeded up by the impacts of climate change.
- Extreme weather events, particularly heavy rain and storms are increasing the rate at which the UK's and global coastlines are being eroded.
- Added to this are the world-wide increases in sea levels caused by glacial melting leading to increased flooding.
- This report aims raise awareness amongst local authorities about the causes of these problems, and importantly, identify how these challenges are being addressed in the UK by those councils and communities most affected.



What causes erosion?

Destructive waves, often generated by strong winds and long fetches, physically batter the coastline

- **Hydraulic action** - water forced into cracks
- **Abrasion** - rocks thrown against the coast
- **Attrition** - rocks wearing each other down

Solution or Corrosion – saltwater is a weak acid (carbonic acid) as it contains carbon dioxide and corrodes rocks such as chalk and limestone which are primarily made up of calcium carbonate.

This process turns the rock into soluble calcium carbonate leaving visible caves, notches, and eroded faces This dynamic process is responsible for the shape of iconic coastlines such as the White Cliffs of Dover and Durdle Door in the UK

- This process is increasing due to higher levels of carbon dioxide emissions worldwide.
- Since the Industrial Revolution, global ocean acidity has increased by roughly 30%



Why the sudden concern about coastal erosion and flooding?

- Global sea levels were relatively stable for roughly 6,000 years, However, this period of stability has ended. Since the late 19th century, sea levels have risen globally by about 21 to 24 cm
- The rate of this increase is driven by human-caused global warming.
- Melting ice and absorption of increased heat is causing sea levels to rise globally although the level of rise is not uniform as it is affected by land subsidence and regional gravitational effect e.g. isostatic adjustment.
- Roughly two-thirds of the entire UK sea level rise recorded over the last 125 years occurred in just the past three decades.
- 'State of the UK Climate' report (14th July 2025). highlights the UK sea level is rising faster than the global average
- Between 1993 and 2024, UK sea levels climbed by **13.4 cm**, significantly outstripping the global average increase of 10.6 cm over the same period
- The latest assessment of the UK's climate shows how baselines are shifting, records are becoming more frequent, and that temperature and rainfall extremes are **becoming the norm.**

Direct Human Impact on coastal erosion

- **Dam Construction & Catchment Barriers** Upstream dams trap river sediments, preventing sand from reaching the coast. This starves beaches of their natural replenishment, increasing the rate at which waves eat away the shoreline.
- **Hard Coastal Engineering:** Structures like groynes, breakwaters, and seawalls alter natural longshore drift. While they protect the immediate area, they block sand from moving further down the coast, triggering severe erosion elsewhere. They can also alter inland drainage capabilities leading to flooding behind these structures.
- **Sand and shingle mining:** Removing offshore sand or dredging material for construction and land reclamation severely depletes the shore's natural sediment resources leaving it open to stronger tide action and extreme wave action during storms.
- **Deeper Navigation Channels:** Dredging deep shipping lanes close to the coast allows larger, high-energy waves and faster ferry wakes to reach the shoreline without losing energy over shallow offshore bars.
- **Recreation:** Heavy foot traffic and off-road vehicles on beaches and sand dunes damage protective vegetation, leaving the underlying sand vulnerable to wind and wave action

The scale of the problem facing the UK

- UK has largest stretch of artificially protected coastline in Europe over 2,300 km against a total coastline of approximately 17,000 km.
- Highly vulnerable coastline with approximately 3,000 km of UK coastline facing erosion.
- In England roughly 45% of coastline artificially protected in some form.
- Over third of England's coastline has no protection or intervention.
- Increasing need for further intervention as coastal erosion is increasing – estimated between £18 - £30 billion needed to protect England's coastline alone.
- 17%-28% of England and Wales coastline facing severe coastal erosion threat increasing 3 – 9 times by 2080
- Holderness Coast in East Yorkshire is Europe's fastest eroding coastline. 61 km coastline eroding at 2 metres per year threatening homes and infrastructure.
- Estimated due to increasing sea levels and impacts of storms 20% of UK sea defences will be vulnerable.
- 520,000 properties (370,000 homes) at risk in England alone rising to 1.35 million properties by 2100.
- 1,600 kms of road, 650 km of railway line, 92 railway stations, 55 historic landfill sites at risk of coastal flooding or erosion by 2100.

'Some coastal communities and infrastructure are likely to be unviable in their current form'

Committee on Climate Change

Planning for Coastal Erosion - Management Strategies

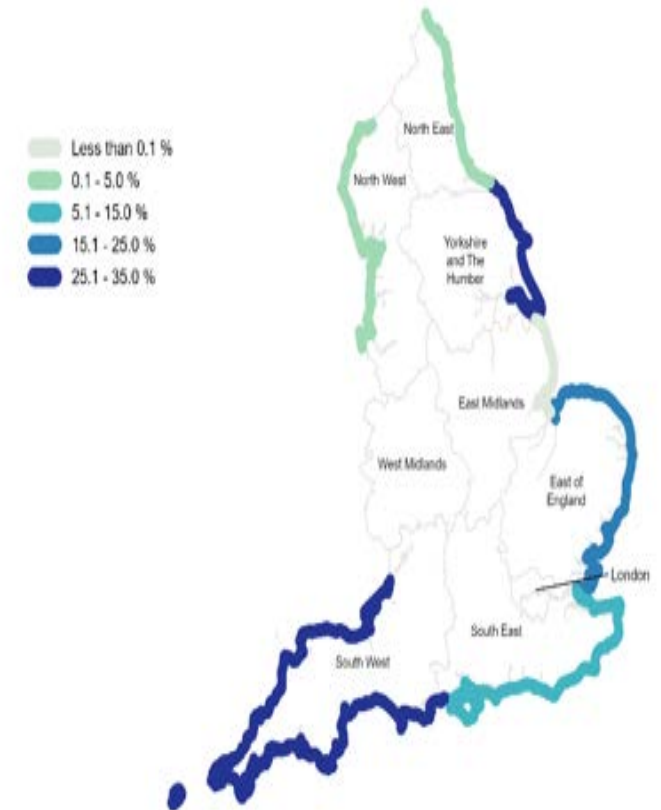
- The Environment Agency has a strategic overview role for the management of all sources of flooding and coastal change in England, including coastal erosion.
- Scottish Environmental Protection Agency (SEPA), Natural Resources Wales (NRW) hold a similar responsibility and in Northern Ireland the Department for Infrastructure holds overall responsibility for flood policy, though at the moment no single department possesses statutory oversight for coastal erosion.
- The UK's approach to coastal erosion and flooding relies on **the National Flood and Coastal Erosion Risk Management (FCERM) Strategy** and local **Shoreline Management Plans**.
- The strategy operates on a risk-based framework rather than providing an automatic guarantee of protection for all properties.

Flood and Coastal Erosion Risk Management Strategy

- The Environment Agency maintains a strategic overview and guides local authorities on where and how to invest resources.
- The strategy's long-term vision is for: a nation ready for, and resilient to, flooding and coastal change –up to 2100.
- It has 3 long-term ambitions, underpinned by evidence about future risk and investment needs. They are:
- **climate resilient places:** working with partners to bolster resilience to flooding and coastal change across the nation, both now and in the face of climate change
- **today's growth and infrastructure resilient in tomorrow's climate:** making the right investment and planning decisions to secure sustainable growth and environmental improvements, as well as infrastructure resilient to flooding and coastal change
- **a nation ready to respond and adapt to flooding and coastal change:** ensuring local people understand their risk to flooding and coastal change, and know their responsibilities and how to take action

Making the strategy happen – supporting evidence

- The Environment Agency has been transforming how they understand current and future risk by improving two key evidence tools:
- **The National Flood Risk Assessment (NaFRA)** which provides a single picture of current and future flood risk from rivers, the sea and surface water for England.
- **The National Coastal Erosion Risk Map (NCERM)** [National assessment of flood and coastal erosion risk in England 2024 - GOV.UK](#) provides the most up to date national picture of current and future coastal erosion risk for England. The NCERM also accounts for the latest Shoreline Management Plans which set out a long-term approach to managing flood and coastal erosion risk around the coast.
- Based on the data, the report describes how the assessment of flood and coastal erosion risk is changing due to a combination of changes to physical factors such as
 - climate change projections,
 - a greater understanding and assessment of risk and
 - improved modelling and new data.



Strategic and Spatial Planning

- Local authorities working with Environment Agency in England (Similarly in Scotland and Wales) are working together to manage coastal erosion and flood risk.

Shoreline Management Plans (SMPs):

- These are large-scale assessments (covering 50 to 100 years) that dictate how specific stretches of coastline are managed. They consider sediment movements, coastal processes, and climate change.

SMPs assign one of four strategic policies to each specific coastal unit:

- **Hold the Line:** Maintain or upgrade existing defences (e.g., seawalls).
- **Advance the Line:** Build new defences seaward of the original line to reclaim land.
- **Managed Realignment:** Allow the shoreline to move and control the flooding, often creating natural habitats like salt marshes.
- **No Active Intervention:** Allow nature to take its course with no planned investment in defences.

The aim of Shoreline Management Plans and linkages

- SMPs are non-statutory, high-level documents that assess risks to people, property, and the environment, informing local development planning. The plans are reviewed, updated, and managed as "living documents" to manage coastal erosion and flooding risks over short, medium, and long-term horizons.
- It should be noted that SMPs are long-term plans each covering large areas of coast, so they focus on setting the direction of management rather than the full detail of how that direction will be implemented. Specific investment options are developed locally, sometimes using a focussed coastal strategy for a particular stretch of coast.
- Management approaches can change if new evidence shows a different approach would be more sustainable
- **Coastal Change Management Areas (CCMAs)** are designated planning zones where shorelines are highly vulnerable to erosion, flooding, or landslips over the next 100 years. Local Planning Authorities use CCMAs to restrict inappropriate development and safely manage risks along unstable coastal margins
- Councils must establish a CCMA where the Shoreline Management Plan (SMP) recommends "No Active Intervention" or "Managed Realignment". It is rarely used where the policy is to "Hold the Line" with heavy physical defences.

Physical Methodology to preventing or managing coastal erosion

Hard engineering

- **Sea Walls** – expensive ultimate protection often used to protect settlements and base of cliffs
- **Rock armour/rock revetments** large durable angular hard-wearing rocks, absorb and dissipate waves, sometimes sloped and used together. Can lead to build up of sand which further reduces erosion and creates habitats. Expensive and need maintenance.
- **Gabions** wire mesh filled cages containing stones, rock or concrete often used at base of cliffs. Relatively eco-friendly (as opposed to concrete) but can be prone to rusting.
- **Groynes** placed perpendicular to shore they trap sand and shingle lengthening beach and protecting land behind from flooding and erosion. But can starve areas further down beach from sediment build up increasing impact of erosion in those areas.
- None of these can guarantee protection from growing number of storms.



Soft Engineering

- Natural sustainable options
- **Beach Nourishing** adding imported sediment or recycling sand/gravel to a beach then this creates wider, and more gradually sloping beaches causing the destructive impact of waves to break earlier and consequently lose much of their energy before they reach sea defences and cliffs.

Natural Solutions

- **Saltmarshes and mudflats** act as a buffer to absorb tidal energy and protect coastal land from erosion.
- **Sand dunes and planting native vegetation** helps stabilizes sand, creating a natural barrier that grows with sea levels.
- **Reef Restoration (Coral/Oyster) helps** create underwater structures that act as breakwaters, reducing wave height and energy.
- **Living shorelines** is an approach that combines vegetation, sand, and organic materials to stabilize shorelines while maintaining natural habitats.



Benefits in adopting a nature-based solution approach

- **Long-Term Resilience:** Unlike concrete seawalls that may fail or exacerbate erosion elsewhere, natural systems can adapt to environmental changes.
- **Biodiversity Boost:** These solutions restore habitats, supporting coastal wildlife and fisheries.
- **Carbon Sequestration:** Coastal habitats like salt marshes act as carbon sinks, helping to combat climate change.
- **Cost-Effectiveness:** Often cheaper over the long term compared to building and repairing artificial, hard-engineered structures



When the only option is to accept what nature wants.

Managed Realignment

Managed realignment, or "managed retreat", is a soft engineering strategy where sea defences are intentionally breached or moved inland to let the sea flood low-lying land.

The aim of this approach is to create protective intertidal habitats like saltmarshes, which absorb wave energy, reduce erosion, and are much cheaper to maintain than traditional concrete seawalls.

Medmerry, West Sussex: The UK's largest managed realignment cost roughly £28 million but successfully reduced local flood risks, saved millions in future maintenance, and created 183 hectares of new intertidal habitat.



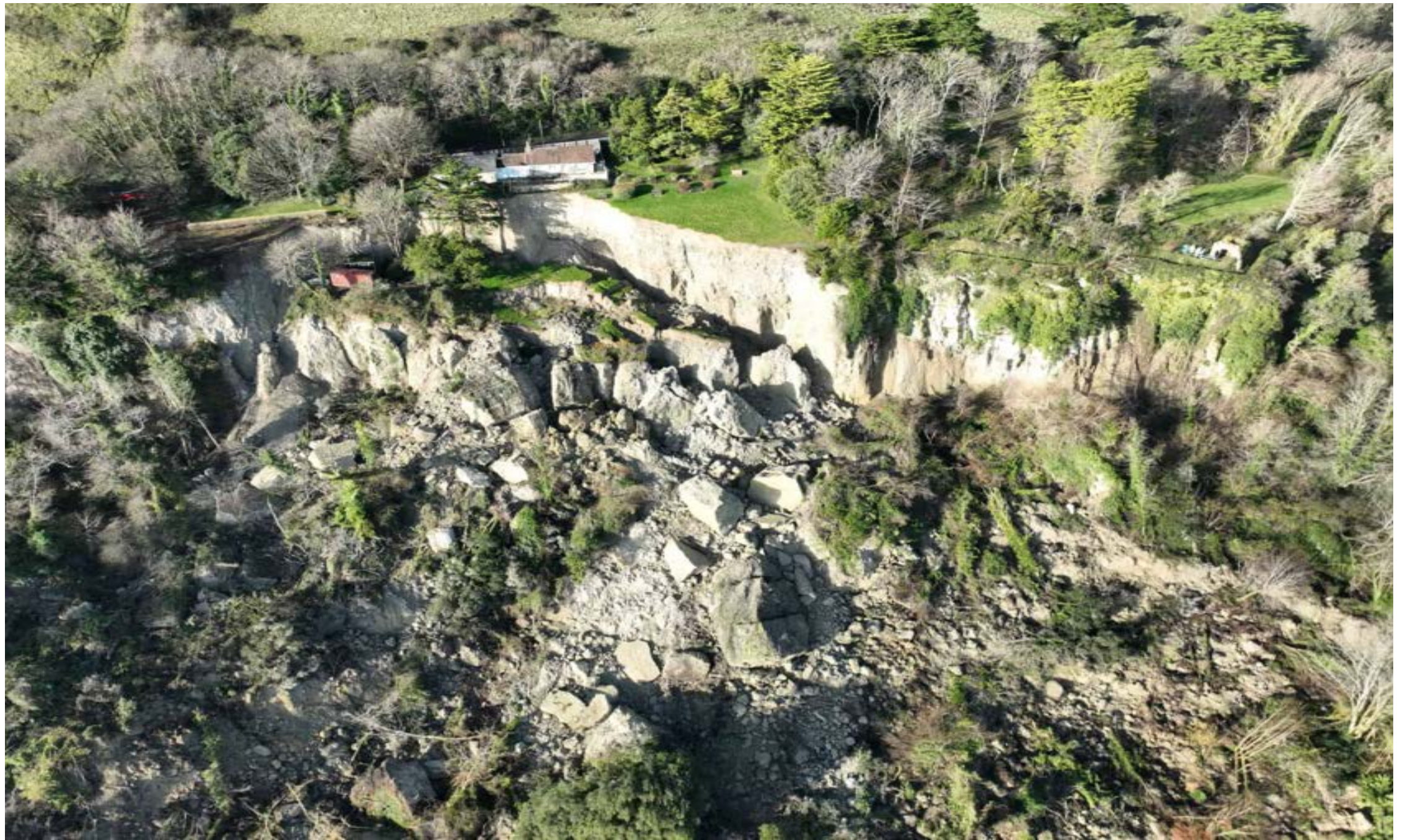
No Active Intervention

- **No Active Intervention (NAI)** is a coastal management policy where no funds are invested to build or maintain sea defences.
- The shoreline is allowed to evolve naturally. This strategy is typically applied to undeveloped areas or places where protecting the coastline is technically impossible or economically unviable.
- **Fairbourne, Gwynedd (Wales):** Located on a low-lying floodplain, this village is the most notable example of a managed retreat and NAI policy. Because the area faces severe risks from sea-level rise, the local Shoreline Management Plan (SMP) determined it is unsustainable to protect. Authorities plan to gradually decommission the village, making it one of the UK's first planned climate refugee sites



Planning for the future – A case study

- As well as the gradual wearing away of our coastlines by wind and wave action, there is another natural phenomenon which causes significant damage to our coasts and the communities and infrastructure lying close by – landslips or alternatively, landslides.
- Triggered by winter storms, heavy rain, and wave action undermining cliff bases, these mass movements result in significant property loss, infrastructure damage, and danger to the public.
- Landslips, or landslides, driven by coastal erosion are a critical threat across the UK, affecting over 1.3 million people in 98 coastal areas.
- The Isle of Wight has complex, long-term landslip systems, Due to a combination of weak, complex geology (clays, sands, and chalk), Intense coastal erosion at the cliff base, and recent high, concentrated winter rainfall, means landslides have become a more common occurrence.
- This makes areas continuously evolving landscapes, forcing ongoing, large-scale engineering, monitoring, and, in some cases, the abandonment of homes and roads
- Recent updates to the Shoreline Management Plan (SMP) and the Draft Island Planning Strategy (DIPS) have reflected a growing recognition that traditional coastal defences alone are insufficient. Instead, a shift toward adaptive, long-term planning is required



Dynamic Adaptive Pathway Approach

- The planned approach is to shift toward adaptive, long-term planning
- This includes the identification and implementation of Coastal Change Management Areas (CCMAs), which will guide future development away from high-risk zones and support the relocation of vulnerable infrastructure and communities.
- The strategy will also promote the use of nature-based solutions, such as dune restoration and managed retreat, to enhance resilience while preserving the Island's unique coastal ecosystems.
- A **Dynamic Adaptive Pathway Approach** (DAPA), is being used which is a way of planning for coastal change that helps communities and decision-makers deal with uncertainty— especially around climate change, sea level rise, and erosion.
- The approach will:
 - *Plan ahead for different future scenarios (e.g. faster or slower sea level rise).*
 - *Stay flexible, so different actions can be taken if conditions change.*
 - *Avoid costly mistakes, by only committing to major changes when they're really needed.*
- The council has described this approach as a type of roadmap with multiple routes. Were the council start on one path, but if the situation changes—like flooding becomes more frequent—they can move to a different route that's better suited to the new conditions.
- In short, DAPA helps the council make flexible decisions about how to manage their coast over time, while keeping options open and preparing for change.

Funding Sources

- Funding for controlling coastal erosion primarily comes from a combination of central government grants, local authority budgets, and partnership funding from stakeholders who benefit from such works.
- UK coastal erosion projects are primarily funded through the government's **Flood and Coastal Erosion Risk Management (FCERM) Grant in Aid**, administered by the Environment Agency and Defra. Grants cover 100% of eligible costs up to £3 million, and 90% for costs exceeding that threshold.
- **Coastal Adaptation Pilots (CAPs)**
 - Targeted at areas where natural forces make long-term defences unsustainable, this scheme provides dedicated funding for community adaptation including home and business relocation.
- **Coastal Erosion Assistance Grant (CEAG)**
 - This grant is designed specifically to help property owners and local authorities in the most vulnerable zone
 - The government is acutely aware of the threat from coastal erosion and has put in place a £5.2 billion program for 2021-2027 to improve resilience against flooding and coastal erosion nationwide.

Conclusions

- The UK has some of the fastest eroding coastlines in Europe with around 17% of its coastlines affected by erosion.
- Coastal erosion in the UK cannot be entirely stopped, as it is a natural process which now appears to be accelerated by climate change (sea-level rise and storms).
- Sea defences may only slow coastal erosion rather than stop it entirely and many are now becoming ineffective because of sea level rises and the increasing frequency and severity of extreme weather and storms.
- Evidence indicates that it is not possible or prudent to stop or delay coastal erosion in some places, in fact it may even be advantageous to allow it to happen.
- Rather than trying to hold back the sea, perhaps we need to look at how we can manage or learn to live with the effects of coastal erosion by understanding how to adapt with the constantly changing coastline.
- This view is now widely accepted with the adoption of coastline strategies such as SMP's which consider managed realignment as a key approach.

SMP's are highly effective for strategic, long-term planning, but they are not statutory documents and therefore, not legally binding and consequently not legally enforceable, SMPs are strategic guidance documents which can complicate their integration into local council planning.

Decisions within SMP's such as areas designated for "Managed Realignment" or "No Active Intervention" often face opposition from local communities and homeowners whose properties may be left without protection.

Recent refreshes have updated action plans to ensure they are actionable, with better tracking and auditing of measures and that the policies within the plan are designed to be technically sustainable, environmentally acceptable, and economically viable

Funding

Government bodies (like the Environment Agency) have finite funding. The gap between what is planned and what can be funded locally sometimes results in inconsistencies in on the-ground execution.

Lack of Community Awareness

Despite knowing that your home may be at risk, there is currently no compensation for residents who lose their homes to coastal erosion, apart from a grant of £6,000 for home demolition, which suggests there is an urgent need for enhanced, long-term support for affected residents and local authorities through better communication, relocation packages and close working with those communities most at risk.

January 2026 APPG Coastal Communities meeting

- **SMP's to be made a statutory document.** This would mean that statutory Shoreline Management Plans (SMPs) would compel local authorities and agencies to implement long-term coastal erosion and flood risk strategies, moving them from advisory to mandatory.
- A statutory plan would also offer better certainty for developers, businesses, and residents, clearly outlining which areas will be defended and which will not, allowing for informed, long-term decision-making.
- Creation of a dedicated **Minister for Coasts and Rivers** is essential because these areas face unique, complex, and rapidly increasing threats that require centralized, strategic management. A focused ministerial portfolio would help ensure that coastal communities, river systems, and the marine environment receive specialized attention rather than being fragmented across different departments
- The status and legislative value of SMP's also needs to be addressed if they are to be of real worth in ensuring coastal erosion is to be addressed with equal vigour across the UK. Indeed, the proposals regarding a coastal erosion 'tsar' in the form of a Minister for Coasts and Rivers could be one way in which a more co-ordinated and national legislative approach could be achieved and would be popular with many, especially communities who would feel they had someone to look after them.

Final thoughts.

- It is clear, there is still a great deal of work to be done in raising the issue of coastal erosion to allow a more co-ordinated, realistic and evenly spread funding regime and importantly, a better community focused approach.
- It is accepted however, that great strides have been made in trying to combat coastal erosion particularly in those areas most at risk, through hard and soft engineering approaches.
- The reality is that coastal erosion is not going away, and climate change and its effects will only make it worse.
- We can perhaps slow the speed of coastal erosion in many places, although not everywhere.
- We will have to accept the fact that 'Holding the Line' is not an option for the whole of the UK coastlines, and some cases communities and associated infrastructure may have to be moved both now and, in the future, to avoid falling into the sea.
- Helping coastal communities to adapt is the first step but the real goal is to continue to tackle the root cause of the problem, that of achieving net zero and over time reducing the amount of carbon dioxide in the Earth's atmosphere, for if we fail to.....

