

Article

A History of Shoreline Management Planning: Lessons for Governing the Shoreface

Tim Stojanovic 

Marine and Coastal Environment Team, School of Geography and Sustainable Development (and Scottish Ocean Institute), University of St Andrews, St Andrews KY16 9AL, UK; tas21@st-andrews.ac.uk

Abstract

Coastal areas face unique challenges, with climate change impacts such as sea level rise exacerbating coastal hazards that put people, infrastructure, and habitats at risk. This study evaluates three generations of Shoreline Management Plans (SMPs) in the UK (1993–2024). The study considers whether the system of governance is encouraging sustainable solutions. Policy analysis identifies a range of sustainability principles which have become dominant for SMPs. Findings show that shoreline management planning has evolved considerably over the last 30 years. It has transformed governance from a reactive, engineering-focused, administratively based approach to a risk-based, geostrategic, technically informed approach. SMPs have slowed the increase of coastal vulnerability. In the most recent phase, they have increased consideration of adaptation to the impacts of climatic change. However, strategic goals are not always translated into locally implemented action, because of problems with criteria, collaboration, costs, cultural attitudes, competing priorities for coastal landuse, and contentious decisions, especially those which set public interest against individual interests. So, governing the shoreface will need to evolve further to deal with the tensions between ‘working with nature’, ‘working in partnership with people’, and ‘adapting to future climates’.

Keywords: planning; governance; climate change adaptation; coasts; coastal management; sea level rise; shoreline management plans; UK



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1. Introduction

This study considers whether Shoreline Management Planning (SMP) over the last 30 years has led to more sustainable outcomes, by reviewing the principles, policies, and approaches that have been implemented for the UK coast, and their effect on how the governance system operates.

The term ‘shoreline’ requires definition in this context. In the English language, the terms ‘shore(line)’, ‘coast(line)’, ‘coastal zone’, and ‘coastal area’ refer in subtly different ways to a place. The choice of the term ‘Shoreline Management’ developed in contradistinction to the term (Integrated) Coastal (Zone) Management, which became commonplace from the time of the US 1972 CZM Act. The term ‘shoreline’ aimed to denote the narrower focus of SMPs on the issues of flooding and erosion. SMPs thus distinguish themselves from multi-sectoral coastal and estuary management plans. In the conclusion, this study re-visits this issue of terminology to consider how the choice of the term shoreline has influenced approaches to managing coastal hazards.

1.1. Coastal Hazards

A combination of high-profile damaging storms, tsunamis, and hurricanes, plus the significance of sea level rise as a climate change impact, are raising the issue of coastal vulnerability as a matter of international importance [1,2]. Current planning systems are failing to deal with these challenges [3,4]. Coastal vulnerability is likely to intensify. Costs to manage coastal flooding were estimated to increase to USD 12–71 billion annually by 2100 due to growing human settlements and projected relative sea level rise [5]; and Expected Annual Damages from coastal flooding are likely to increase nearly fivefold by 2080 under a four degrees, high population growth scenario (RCP 6.0) [6]. It is not just flooding which is an issue, but a range of coastal hazards threaten society. Relevant hazards experienced in a place depend on the combination of sources and the character of the receiving area (Figure 1). Typically in the UK, on a soft sedimentary coast, the shore may be subject to rapid erosion; on unstable coasts, there is a risk of landslides, and on low-lying coasts, there is a risk of inundation from flooding. Other kinds of more human-induced hazard are also relevant, such as the re-entrainment of waste from coastal waste landfills [7].



Figure 1. Conceptualisation of UK Coastal Geo-hazards. Draws on Pettit and Potts [8], data on flooding [9,10], erosion [11], landslides [12], storm surge [13], and coastal pollution [7]. Interactions between hazards are also relevant [14].

Climatic change will give rise to changes in storm frequencies and tracks, and a higher baseline of mean sea level from which inundation would occur [15], but prediction of future impacts is complicated by uncertainties. In the UK, successive Climate Change Risk Assessments (2012, 2017, 2022) have led to the issue of flooding and coastal erosion being highlighted as one of 18 priority topics in 2022 for 'more action needed.' This prioritisa-

tion stemmed from research which used a source-pathway-receptor analysis to identify that expected annual damages from coastal flooding would increase from GBP 60 m to GBP 280 m assuming continued current levels of adaptation [16], with implications for 120,000–160,000 residential and non-residential properties. The level of risk varies spatially, and there are significant differences by nation, with Northern Ireland and Scotland having relatively less properties at risk both because of the lower density of population and less relative sea level rise, though such generalisations should not obscure that there are locations with high vulnerability in each nation.

1.2. Need for Management

In response to natural hazards, planning and management systems aim to understand the spatial distribution of risks and develop adaptive strategies to reduce exposure (by actions which reduce the susceptibility of the receptor to hazards) and support recovery (by reactions to hazards which restore, rebuild, or potentially re-shape the receptor) [17].

Even without increasing future risks, coastal management has long been necessitated by the needs of humans to respond to events, because hazards such as inundation from the sea or collapse of sea cliffs may cause harm to human interests, giving rise to economic losses, damage to property, injury, or even fatalities [18]. Whether or not people are present, there is still concern about how infrastructure and landuse at the coast such as farms, golf courses, railways, or energy installations will be affected by natural cycles of erosion along dynamic coasts, or flooding from extreme tides or storms on susceptible low-lying land. In this way, harm from hazards to coastal systems may affect food, energy, transport, or leisure systems. This concern extends to natural habitats—for example, beaches which have high recreational value, or saltmarshes which in the UK have been declining in extent until recent implementation of restoration programmes. The loss of those habitats due to the building of defence infrastructure, or the ability to recreate habitats as part of nature-based solutions—makes shoreline management a topic of concern for biodiversity conservation as well as climate adaptation. Paradoxically, one of the challenges for SMP has been the failure to integrate with broader issues of landuse planning and nature conservation. This is required because the coast is a multi-functional space [19].

1.3. Diverse Types of Coast and Responsive Planning Systems

Coasts worldwide are immensely diverse [20,21], from high to low energy, remote to urban. Such diversity defies simplistic lesson drawing: it is unrealistic to expect one policy could be applied to all parts of a nation's coast. But many nations have implemented some form of national planning system specifically for the coast in response to the issues detailed above. This study considers the long-term implementation of such a system in one nation. By focusing on how the governance principles structure the relationships between humans and coastal environments, the analysis has relevance for shoreline management planning efforts in other nations, including where similar goals have been pursued under different terminology such as 'Beach Management Planning' where long stretches of that landform dominate, or as one part of wider 'Integrated Coastal and Ocean Management' initiatives—for example, in the USA with the 'Rhode Island Shoreline Change Special Area Management Plan' [22]; 'Regional Coastal Plans' in New Zealand, part of the local authority landuse planning system [23]; and in Portugal the 'Coastal Plans' of Decree-Law No. 309/93 [24,25].

1.4. Introducing Shoreline Management Planning

Shoreline Management Plans are non-statutory documents which assess risk and set long-term policies for sections of the coast based on natural physical units. On this basis, the UK coast is divided up into 29 cells/sub cells (units of discrete sediment circulation—see

the figure in Section 3.2.3), and over 2500 smaller policy units such as embayments. These units have an average length of 3 km (ranging from ~0.01 to 10 km). The SMPs take a long-term view of change up to a 100-year timeframe, drawing on climate change projections and understanding of coastal processes. For each policy unit, the SMPs evaluate four policy options and prioritise one which is most justified based on environmental, social, technical/engineering, and economic considerations. The four policy options are as follows, and Figure 2 illustrates their implementation in select parts of the UK coast:



Figure 2. Implementation of SMP policy options. (A) ‘No Active Intervention’ West of Wales SMP unit PU3.1 Dinas Fach to Pen Anglas, Colin Smith CC BY-SA 2.0; (B) ‘Managed Realignment’ Essex and South Suffolk SMP unit F5a Tollesbury Wick Marshes, James D CC BY-SA 2.0; (C) ‘Hold the Line’ North Wales and North West SMP unit 11a PY2.3 Traeth Pensarn; Mat Fascione CC BY-SA 2.0; (D) ‘Advance the Line’ Ayrshire SMP unit 6b2.1 Hunterston, Thomas Nugent. CC BY-SA 2.0 Note: hold the line policies do not always imply hard engineering.

No Active Intervention, where natural processes are left to operate (previously called ‘Do Nothing’ in first-generation SMPs). This option acts as a baseline comparison for other options. It can entail minimal action, including dismantling defences, limited works, or transfer of responsibility to other parties [26].

Managed Realignment, where the line of defence is set back to a more sustainable location, commonly higher ground which usually reduces the length and height of the defence and therefore cost, plus allows for environmental benefits through recreation of habitats. Previously called ‘Managed Retreat’ in first-generation SMPs [27,28]. (I would argue that the commonplace terminology ‘managed retreat’ is too metaphorical and fuzzy a concept for practical planning, and should be replaced by more specific terms e.g., managed realignment or planned relocation, to assist with precision of communication).

Hold the line, where a variety of schemes from engineered structures to beach nourishment and natural habitats are used to stabilise the shoreline at its current position.

Advance the line, where defence structures are established seaward of the present shoreline.

Since 2020, guidance for new SMPs has provided greater clarity by stipulating a detailed ‘sub-category’ effectively providing 20 permutations of policy options (for example, managed realignment could involve permutations of new defences, setback defences, or using natural features). The policies for a unit may be set to evolve over time—for example, a managed realignment policy for the coming 20 years, followed by a hold the line policy for the following 30 years. In practice, an ‘advance the line policy’ has been little used in the UK and is dependent on a big urban area or major infrastructure to justify this approach.

The production of SMPs involves a significant planning process. In England and Wales, there is regional coordination whereby local authorities and government agencies collaborate together in ‘Coastal Groups’ to produce SMPs for a natural unit across administrative boundaries. Guidance documents outline six major phases of work divided into 25 tasks. There is a considerable data collation, collection, and analysis phase. SMPs are meant to draw upon an evidence base including modelling of coastal processes, monitoring of the shoreline, scientific projections of future shorelines, and technical reviews of the condition of coastal infrastructure. Increasingly, SMP has espoused greater consultation with stakeholders and public participation—though many evaluations have been negative about the scope of what has been achieved [29–31]. An important part of the plan making process is to identify trade-offs, address conflicts, and agree on goals or compromises. The ‘preferred’ options are reviewed when SMPs are presented to local government committees for validation, where local politicians provide oversight.

It is also important understand what SMPs do not aim to do. Notably, because the SMPs are strategic plans, they do not deliver the funding nor decide the detail for how a policy will be implemented—e.g., the actual form of a scheme such as a seawall that might implement a ‘hold the line’ policy.

1.5. The Governance System: SMPs and More

These SMPs are one key component of a wider regime for governing risks of flooding, erosion, and long-term change at the coast (the policy terminology in the UK is ‘Flood and Coastal Erosion Risk Management’). This includes national policies for England, Scotland, Wales, and to a limited extent Northern Ireland, and within those nations, varying levels of guidance and research. Nested below SMPs might be individual beach or estuary management plans. Extensive additional planning is required for individual schemes, including simulation modelling, engineering design and construction, landscaping, public consultation, licences from regulators, cost–benefit analysis, and environmental impact assessments. Also, beyond the scope of SMPs are issues such as flood warning, building improvements, and emergency planning. These respectively help to manage risk, reduce harm, or support recovery. They are undertaken as part of parallel processes. Flooding legislation has encouraged consideration of in-combination effects of flooding from rain (pluvial), runoff, rivers (fluvial), and the sea (coastal), and for this reason flood risk assessment for the coast is considered as part of broader catchment-focused, statutory, ‘flood risk management plans’. However, the focus in those is on the risk of flooding (rather than combined geohazards per Figure 1), making the coast a relatively minor consideration in flood policy, compared to SMPs where the coast is the central concern.

2. Materials and Methods

The characterisation of shoreline management planning in this study is based on a corpus of documents ($N = 72$), listed in Appendix A. These include national policies, strategic guidance, committee and inquiry transcripts and reports, and research and de-

velopment reports. Links to policy documents are available in a UK marine and coastal policy database (<https://mace.wp.st-andrews.ac.uk/uk-marine-coastal-policy-database/> accessed on 26 June 2025). The sample is an attempt to provide a comprehensive population of relevant documents between 1992 and 2024. Documents were uploaded into Qualtrics Nvivo 13 qualitative analysis software and subjected to content analysis [32]. The content analysis focuses on the key terms used in the policy texts to analyse their intended effects. From this, major themes are inferred that can be associated with the different phases of SMPs, thereby characterising the nature of the system. For example, the wording of MAFF guidance in 1995 states the aim of SMPs is to “provide the basis for sustainable coastal defence policies within a sediment cell and to set objectives for future management of the shoreline”, whereas the wording of guidance from the Department of Environment, Food and Rural Affairs in 2005 states the aim of SMPs is to make “a large-scale assessment of the risks associated with coastal processes and help to reduce these risks to people and the developed, historic and natural environment”. The change in terminology illustrates the transition from a ‘defence’ to a ‘risk management’ framing.

2.1. Policy Analysis

In its most basic conception, ‘Policy’ is a statement of intention or strategy. Policy analysis consists of a disparate set of methods to interrogate policies, their creation, contestation, and/or implementation. Bobrow and Dryzek argue [33] p.3 that policy analysis as a field “is marked by a variety of technical approaches. . . along with the variety of research traditions in contemporary social science”. A series of paradigms (influenced by broader competing paradigms in the social sciences) have seemingly overturned previous assumptions by reconceptualising the policy process, or argued that changes in the nature of institutions or the complexity of sustainability issues reframe what policy is or how it works. Rational systematic policy analysis reviews policy goals and their implementation. Policy theory seeks to undertake social analysis to formulate explanatory theories of the policy process [34]. Policy evaluation tends to make a narrower assessment against some pre-defined programme goals [35] to identify the impacts of policies—who is benefitting, or value for money. Interpretive policy analysis stresses the mapping of power relations, the social construction of facts, and the role of values and ideologies underlying the politics of policymaking [36]. Often this entails deconstructing the discourses behind the policies. Deliberative policy analysis attends to the negotiations and conflicts involved in coming to agreement in the policymaking process [37]. This attends to the diversity of interests involved in policymaking, what evidence gets to count, and how learning happens. Owens [38] argues that each approach has some merit and they may be viewed as complementary, providing answers to different aspects or questions, but that nevertheless too much analysis has relied on the rational systematic approach with its simplified linear model of decision-making, thereby missing out some more fundamental explanations for why policy has come to be as it is. Lejano [39] broadly agrees with this characterisation, stressing the need for policy analysis to maximise the dimensionality of analysis, and to consider the policy context in depth. Undoubtedly further scholarly research on the political ecology of coastal hazards in the UK is warranted [40,41]. Nevertheless, in this study, a key goal is to elucidate the content and ambition of SMPs, in order to assess what the conformity is between policy goals and outcomes. Therefore, a rational systematic approach is taken.

A weakness of this and many other forms of policy analysis is its reliance on the interpretation of one analyst. This can be mitigated to some extent by considering the characterisation of SMPs by other analysts, and the programme evaluations of SMPs which have been commissioned by government departments. Along with reviews provided by

public enquiries and parliamentary committees, these provide parallel summary evaluations which can be drawn upon for secondary analysis. However, a missing component is the experiences of those who have implemented shoreline management planning, and their interpretation of events—direct reports of how their intentions and worldviews informed SMPs. Even so, this reliance on policy analysis is justified, as despite various weaknesses of secondary analysis, reviewing the documentary evidence provides the best opportunity of understanding the evolution over longer timescales, especially given that role holders tend to move jobs and respondents are therefore not available nor able to provide the overview for this 30+ year retrospective.

2.2. Critical Evaluation

This study takes an evaluative approach and invokes 5 key criteria. The primary set of criteria are the 5 'Es' of Efficacy, Efficiency, Equity, Elegance, and Effectiveness, which are drawn from systems analysis [42].

Efficacy relates to the ability of the approach to achieve its stipulated outputs. This is a step towards overall effectiveness. It draws out consideration of potentially important pre-conditions—whether there is the finance, capacity, leadership, political mandate, co-operation, and other factors for institutions to work effectively. Given that implementation failure is an ongoing feature of planning and adaptation endeavors [4], it is helpful to focus attention on whether intentions have been translated into action.

Efficiency relates to the total costs and efforts of operating the approach and value for investment in terms of benefits produced. A relevant consideration is the transaction costs which can be calculated via the time which people dedicate to working on a plan.

Equity considers the fairness of the approach in procedural and distributional terms, from who gets to decide and how funding is distributed, to which communities get schemes implemented, and who benefits.

Elegance in this case evaluates the political dimension of planning activity [42]. Whereas in other socio-political analyses, power is often the dominant medium for political analysis, the elegance framing considers the negotiations by which the policies come to be set, and if the policies have the functional effectiveness to satisfy multiple stakeholder groups. This criterion draws on notions of explanatory power from broader scientific theory.

Effectiveness relates to the ability of the approach to achieve outcomes. In common with other issues involving human–environment relations, sustainability is a guiding principle. The temporal dimension of the adjective 'sustainability'—carrying the sense of 'the rate at which something can be maintained'—is highly relevant to UK shoreline management, since some seafront structures in the UK are hundreds of years old, or coming to the end of their lifecycle, so it is urgent to consider what should be done, especially in light of sea level projections. Furthermore, the question of what is a natural baseline is complicated by the fact that much of the coast has been thoroughly modified through built infrastructure and settlements, land claim, aggregate dredging, dams, and building coastal protection structures themselves. Defence structures cover nearly two-thirds of the shoreline in England [43], about 32% Northern Ireland [44], and 3% in Scotland [44]. Artificial and hybrid shorelines, whilst often candidates for continued hold the line policies, have effects on morphological systems at broader scales, particularly as the system adjusts to interventions [45].

2.3. Defining Sustainable Options

One way in which the issue has been framed is the notion of "low-regret strategies". This recognizes that there are both advantages and disadvantages for every kind of option, and it is not possible to find options that please everybody. A low-regret solution is

one where benefits substantially outweigh disbenefits. There are many outcomes which might be the subject of regret and lead to the expression of sorrow or disappointment that loss or deprivation has occurred: regret that someone died from a coastal hazard; regret that damage was done to business or property; regret that a defence structure failed; regret that development was allowed in a floodplain, landslide prone or eroding coast; regret that defence structures give rise to further development, despite still being at risk and therefore increasing overall risk (develop–defend–develop cycle); regret that expenses to build and maintain defences are dramatically increasing; regret that interference with coastal processes is causing knock on effects in other parts of the coast, or that the shoreline is becoming predominantly artificial; regret that coastal habitats are being damaged or lost, with knock on impacts on amenity and global sustainability; regret that settlements at risk suffer from housing blight. The challenge is that there are often trade-offs between these dimensions, such that one person’s satisfaction is linked to another person’s disappointment. This is one reason why SMP remains a process of political negotiation, and cannot be simply solved by technical optimisation. The inherent trade-offs mean that low-regret strategies tend to be apparent only in contexts where one SMP policy option can perform positively for the majority of the outcomes.

A second approach is to appraise the performance of individual strategies against a bundle of sustainability outcomes which consider various objectives: risk management (e.g., number of increased protected properties), ecology (e.g., area of habitat creation), economy (e.g., value of avoided damages), and society (e.g., prioritised help for deprived communities, or, e.g., 2 increased amenity benefits). This kind of multi-criteria evaluation allows for relative prioritisation of options (ranking those which perform best), and demands evidence to justify those options. A planning system which included these kinds of appraisal could be considered more sustainable, but the actual indicators used (and their relative importance) need defining. In UK policy, outcome measures are used to appraise funding for coastal schemes. For example, Outcome Measure 3 in the 2011 version of defence funding assessment puts a premium on the protecting households from within the 20% most deprived areas.

A third approach is to focus on an overall characteristic which SMPs encourage, rather than what they prevent. Other terms—in contrast to sustainability—have been put forward as the ultimate goal of SMPs, including ‘defence’ or ‘protection’ [46]; ‘risk management’ [47]; ‘adaptation’ [48]; and ‘resilience’ [48,49]. Unfortunately, operationalisation of these terms has proven complicated and problematic. Despite their seeming straightforwardness, defining what they mean for the shoreline has proven to be a conundrum. Defence conceptualises water as a substance to be excluded but no defence measure guarantees total safety. Risk management focuses on calculus of uncertain futures but this leads to prioritisation of high-consequence threats. Adaptation, whilst being a well established term, can be conceptually imprecise when it fails to stipulate what is being adapted to and who does the adaptation by when [50]. Resilience also suffers from conceptual imprecision—is it a property of the system being managed (resilient coasts) or the system doing the managing (resilient organisations) or the people at risk (resilient communities)? Further explication is required to make meaningful outcome measures for SMPs from these concepts, though they remain stipulated goals in policy.

3. Results

3.1. Characterising Shoreline Management Planning

The SMPs produced are a portfolio of documents (see Figure 3), extending to 100s of pages and including sub-reports on coastal processes, economic, and environmental issues. From their inception, SMPs were envisaged as highly consultative documents, with

detailed procedures stipulated for engagement and envisaged to influence a wider range of other plans. In England and Wales, SMPs are part of a national programme with a timeline for delivery, whereas in Scotland, SMPs have been developed on a more *ad hoc* basis by individual local authorities. No SMPs have been developed in Northern Ireland as of 2025.



Figure 3. Components of a typical Shoreline Management Plan.

3.2. A Critical Narrative of Shoreline Management Plan Development

An historical analysis of SMP policy reveals four phases in development.

3.2.1. Phase 1 Pre-Shoreline Management Planning (Before 1993)

A key date for this analysis is the setting up of the Shoreline Management programme and the production of guidance from 1993. However, to evaluate whether SMP has led to improvement, it is necessary to consider how SMPs transformed the approach which came beforehand.

Roman and Medieval:

The UK shoreline has been altered by humans over a long time period. Evidence of land claims in the Roman period—generally the enclosure of marshes by building embankments made from nearby mud—has been found on the Severn Estuary, Somerset Levels, East Anglian Fens, and Solway Firth [51]. For example, the Elmore Wall runs for 800 m at Bridgemacote on the Gloucestershire coast [52]. Records of damage from flooding by the sea can be found as far back as the Anglo Saxon Chronicle, such as the great flood on St Michael’s Eve in 1014 (“This year, on the eve of St. Michael’s day, came the great sea-flood, which spread wide over this land, and ran so far up as it never did before, overwhelming many towns, and an innumerable multitude of people”: Anglo Saxon Chronicle entry of 1014). During the medieval period, the feudal landowning system of lords, bishops, and monasteries encouraged further land claims with a drive for more productive use of land. Strategies included the trapping of sediment by warping fences and the creation of drainage ditches on the landward side. Over 160 sq. km of the Wash was reclaimed from this time up to the present day, such that the River Nene was altered from having an estuary mouth into a drainage channel [53]. The extent of such works led to the creation of ‘Commissioners of Sewers’ to maintain such features in certain English counties under the Land Drainage Act of 1551.

Post Medieval and Industrial:

In the post-medieval period, another driver for the substantial alteration of the coast was the rising fashionability of seaside holidays. Resorts such as Scarborough, Brighton, and Weymouth developed from the 18th century. Over 18,000 visitors annually were recorded to Margate in the 1780s [54]. In the post-medieval era, there was more of an expectation that local landowners would co-operate together to co-ordinate defences, rather than the national government taking responsibility [55]. But by the time of the Victorian and Edwardian era, many coastal frontages were transformed by the expansion of

coastal towns and ports; increasing demand for seaside recreation serviced by the railway network; and advances in engineering such that frontages took on more perpendicular form via engineering advancements including concrete groynes, large recurved and stepped seawalls and embankments [56]. Pressure grew and local authorities struggled to meet the costs of works, even more so landowners. Key local authorities (especially municipal authorities Aberystwyth, Bexhill on Sea, Bognor, Bridlington, Clacton, Cleethorpes, Deal, Eastbourne, Herne Bay, Llandudno, Lowestoft, Mablethorpe, New Romney, Pevensey, Ramsgate, Rhyl, Sandgate, Shanklin, Sheerness, Southwold, Teignmouth, Torquay, Ventnor, Whitstable, and Withernsea) formed a National Sea Defence Association and called a series of national conferences in London from 1906 which resolved to lobby the national government for financial assistance to develop and maintain protective works for sea defence. A Royal Commission on Coastal Erosion (and Afforestation) 1906–1911 was established to explore the issues. Forty-six meetings were held and 54 witnesses examined, with 11367 questions and answers. For the final reports, the Commission calculated that both erosion and accretion were occurring around the coast and concluded that over the previous 25 years, there had actually been a net gain in land (partly due to a significant amount of land-claim, but based on a somewhat flawed comparison of high and low water lines in Ordnance Survey 6-inch maps at dates varying by county between 1842 and 1906). It recognized that erosion and accretion are natural processes, albeit occurring at different rates in different places, highlighting the vulnerability of soft, sedimentary eastern and southern English coasts. It took the view that the state should not have a duty to protect the coast, but there could be better co-ordination of efforts. Nevertheless, suggestions to establish a ‘central sea-defence authority’ were not acted upon.

Post World War 2:

The rate of urbanisation and visitor numbers to the coast continued to expand in the post-World War 2 period. National landuse mapping and surveys of the coastline in England, Wales, and Scotland provided evidence of the pressures which led in turn to new efforts for coastal conservation and landscape management, reflected in national parks and heritage coasts [57]. The Coastal Protection Act of 1949 (CPA1949) gave permissive powers (rather than a duty) for local authorities to develop protection schemes, with opportunities for financial support from the central government, following up on what the government response Royal Commission (1911) had failed to implement. Ricketts [58] p.197 critiques the approach of the CPA1949 as “biased towards engineering responses” because it encouraged starting with ‘engineering analysis’ to the solution of an ‘erosion problem’ and lacked funding for amenity or environmental improvements as a component of any scheme. Piecemeal solutions to coastal hazards continued, although the landuse planning system provided greater control of development landward of mean low water. Carter [58] p.45 summarised that “far too much management seems to take place in a vacuum i.e., without any supporting policy, science or monitoring, often merely as a reaction to some perceived problem”.

A key juncture was the 1991–92 House of Commons Select Committee on the Environment Inquiry on the Coastal Zone. This raised trenchant criticisms about the failings of the institutional arrangements for coastal and flood protection. These were criticised as fragmented and disjointed, with a reactive approach to dealing with coastal hazards and development that did not sufficiently consider the functioning of natural coastal systems. One of the inconsistencies arising from the CPA1949 was that it divided responsibility between national government agencies for defence from flooding, and local government for responsibility for protection from erosion, leading to piecemeal treatment of issues along the shore and no strategic coastal policy. The scene was thus set for shoreline man-

agement planning, taking a proactive rather than reactive approach. National guidance was prepared for SMPs.

3.2.2. Phase 2 (1993–2005) First Generation of Shoreline Management Plans (SMP1)

The first 44 SMPs (39 in England and Wales, 5 Scotland) were produced between 1995 and 2005 (see Appendix B.1.). In England and Wales, Coastal Groups were constituted around sediment cells. In these groups, engineers from local authorities and environmental agencies worked together to commission and develop plans. This brought about a transition from administratively based, to strategic, geographically based planning. Some Coastal Groups (e.g., SCOPAC) formed as early as 1986 to support local authority collaboration. The SMPs undertook long-term planning to set policies over three epochs, spanning 20, 50, and in some cases 100 years from present. Considerable technical information was collated, including about future evolution of the coast. It has taken time for the quality of supporting scientific information to be evenly provided across SMPs to an acceptable quality [59,60] and to improve the accuracy of downscaled global climate projections [61] and risk mapping.

SMP has been characterised as a ‘collaborative’ form of governance [62], where government plays a lead role but other agents have a significant role. Responsibility for national policy lies with government, but roles are shared between local governments, government agencies, and departments working in collaborative groups. Energy, transport, and water resources companies are major infrastructure owners at the coast and have a right to attend groups, though their involvement has been patchy [63]. Landowners have legal rights to undertake works subject to approval, and therefore have a role in the implementation of policies. Significant voluntary sector coastal landowners such as the National Trust, and eNGOs such as the Wildlife Trusts and RSPB have been key agents in implementing management realignment in the UK in line with their nature conservation and heritage goals. In practice, consultancies have played a major role in the technical development of SMPs, so the approach can be characterised as a form of ‘new public management’, with much of the work and expertise out-sourced from government.

A review of SMPs in 2001 [64] criticised policymaking for relying too much on ‘hold the line’ options for developed coasts. In some cases, other policies were proposed but not signed off by political representatives on the review committee. This led to recommendations for stronger guidance on how to appraise the policy options, and evaluate sensitivity, sustainability, and cost-effectiveness to select and present preferred options.

3.2.3. Phase 3 (2005–2019) Second Generation of Shoreline Management Plans (SMP2)

A second tranche of Shoreline Management Plans were produced under new guidance (2005–2019). In England and Wales, the system was streamlined and 22 SMPs were produced (Figure 4), focused around coastal behavioural systems. In Scotland, the approach continued to be for individual local authorities to commission SMPs.

Guidance provided by DEFRA in 2006 clearly signaled a fundamental transition in terminology from ‘coastal defence’ to ‘flood and coastal erosion risk management’ (FCERM) to reflect a change in mindset towards what is perceived as a more sustainable goal. This was subsequently re-enforced by the national FCERM strategies in England and Wales which highlighted the need to “consider probability. . . and target resources to those areas where they have the greatest effect”. However, a 2018 report by the Committee on Climate Change [65] p.10 highlighted continued challenges with 185 km of England’s coastline where the cost of the schemes is greater than the value of what is protected, “which includes ~56 km for which the SMP Policy is ‘hold the line’ . . . and 1460 km of ‘hold the line’ frontages have a Benefit Cost Ratio of <2” (which makes them unlikely to receive

national funding). Yet SMPs are increasingly considering alternative strategies to hold the line (Table 1) and the use of soft-engineering measures to implement such policies is becoming better established. Further, Sayers [65] estimates the present value of avoided flood and erosion losses provided by English SMP2 policies to be GBP 13.3 bn.



Figure 4. Second-Generation Shoreline Management Plans and major sediment cells in the UK. Source: original. For titles of numbered SMPs, see Appendix B.2.

Table 1. Summary of SMP policy evolution for SMP2s.

SMP2s	NAI			MRL			HTL			ATL		
	Epoch 1	Change in Epoch 2	Change in Epoch 3	Epoch 1	Change in Epoch 2	Change in Epoch 3	Epoch 1	Change in Epoch 2	Change in Epoch 3	Epoch 1	Change in Epoch 2	Change in Epoch 3
England (20)	655	+21	+39	210	+111	−19	908	−134	−20	2	0	0
Wales (4)	178	+16	+21	72	+38	+17	223	−54	−38	0	0	0
Scotland (4)	64	0	+1	8	0	+7	77	−1	−6	1	0	0

Source: based on Sayers [66], and original analysis. Number of units with policy. NAI = no active intervention; MRL = managed realignment; HTL = hold the line; ATL = advance the line. Scottish SMPs (Angus, Ayrshire [North and South]), Dumfries & Galloway, Fife). English and Welsh SMPs listed in Appendix B.2.

Another aspect highlighted from the SMP1 review was the need for more effective stakeholder engagement and consultation, including with other professionals who play an important role in the outcome, such as local authority planners who regulate development. Rates of development in flood risk zones continue to be a concern. According to insurers, in 2024, 7116 dwellings were given planning permission in the floodplain in areas of flood risk greater than 1% [67]. Reductions in local authority personnel, capacity, and budget have affected the ability to generate engagement between SMPs and the planning system. Other kinds of tools have a potential role to play. ‘Coastal Change Management Areas’ have been established as a zoning tool which allows controls on coastal development, but Kirby et al. [68] identify that only 5.7% of the English coast has been designated as a coastal change management area, and argue that guidance is unclear on how to delineate CCMAAs.

More time and resources were provided for public engagement in SMP2 than SMP1, but in areas where policies have been perceived by homeowners to prioritise environmental issues over people, there have been strong objections and the formation of shadow networks (chiefly known as Coastal Action Groups) to campaign for a change in policy [69]. For those who stand to lose personal property, decisions which do not ‘hold the line’ or stipulate ‘no active intervention’ are highly contentious. Changes in policy between SMP1 and SMP2, and a perception that the policy is being imposed, add to the sense of grievance. Nevertheless, these cases set public interests against individual interests, and another reading is that public officials are representing the interests of others who stand to lose a supply of sediment alongshore. Most commentators seem to accept public engagement could be considerably improved. Some debate has arisen in the literature about whether improved dialogue, building trust, and social capital could prevent conflict [70,71], or whether ultimately some people will simply never support certain policies because it is not in their interest [72]. O’Riordan et al. [73] argue that for people affected by coastal change to adjust to new policy options, it will require engagement with their identity and sense of place, which technocentric professional decision-making is not well set up to do. Blunkell [30] sees potential solutions in more deliberative models of engagement. Either way, there are large potential populations to be engaged. It seems unlikely that technocentric SMP could revert back to small-scale community groups which characterised ways of working in earlier centuries [55]. Instead, more bespoke efforts at deeper engagement provide a model to overcome these challenges. In four low-lying areas of southern and eastern England with high risk, DEFRA Coastal Change Pathfinder projects will operate 2023–2027 to improve engagement and adaptation.

3.2.4. Phase 4 (2020–Present) SMP Refresh and Coastal Change Adaptation Planning

More recently, a new phase of Shoreline Management has developed as the 22 SMPs in England and Wales are being ‘refreshed.’ This ‘refresh’ has been required by the need

for SMPs to respond to updated projections of climate change impacts and implement improvements without writing whole new plans. In Scotland, a system of Coastal Change Adaptation Planning has now been launched, with the first guidance provided by the Scottish Government in 2023.

A 2024 review for the Environment Agency [74] p.24 observed that “links from SMP’s to climate adaptation and nature restoration are under developed...” The slow implementation of the managed realignment policies set out in SMP2 has been highlighted by the Committee on Climate Change [65] as an indication of a gap between policy and implementation. The uptake of managed realignment is five times too slow to meet the stated 2030 targets. But adaptation principles are being implemented. In Scotland, Coastal Change Adaptation Plans (CCAPs) are envisioned to replace but continue to build on many of the characteristics of SMPs. In line with adaptation theory, a key policy reform for both SMP Refresh and CCAPs has been the use of ‘trigger points’ and ‘adaptation pathways’ rather than epochs. This is based on the argument that SMP epochs have proven ineffective in generating policy innovation and responsiveness, as they tend to lead to decisions being postponed to the future, and there is a lack of identified juncture at which action will be taken to transition to a new policy.

In Northern Ireland, no SMPs have yet been produced but work is underway to provide more systematic regional coastal monitoring, through the establishment of a Northern Ireland Coastal Observatory, and since 2016, a Coastal Forum and working group has brought together national agencies, local authorities, and research organisations. Whilst close co-operation between scientists and local authorities has been argued to improve decision-making in this context, there is reportedly a limit to what can be achieved with *ad hoc* approaches [75].

4. Discussion

Figure 5 summarises changes in approach which have occurred. The analysis suggests that SMP has evolved the governance system over a number of phases from a reactive, engineering-focused, administratively based approach to a long-term, risk-based, geostrategic, technically informed approach.

	PRE-SHORELINE MANAGEMENT		SHORELINE MANAGEMENT
Goals	Defence and Protection	to	Risk Management and Resilience
Mode of decision-making	Ad hoc decision-making	to	Strategic planning, options must be justified
Spatial basis	Administrative Units	to	Sediment/Behavioral Cells of geomorphological systems
Timeframes	Current issues	to	Medium and Long term up to 100 years
Evidence base	Local expertise	to	Regional observatories, monitoring programmes, downscaled national sea level rise projections and flood risk assessments
Mode of engagement	Relational, interest groups	to	Technocentric vs interest groups

Figure 5. The evolving Shoreline Management Planning governance framework.

Summarising the policy analysis against the evaluative criteria outlined in Section 2.2:

Considering efficacy, SMP has transformed decision-making about the implementation of coastal schemes. With the establishment of set policy and criteria, ad hoc decision-making

is less common because strong justification is required to have schemes approved. This is borne out by comparison with Northern Ireland where SMPs have not been in place, and more piecemeal shoreline armouring has continued [44]. Reactive decision-making can still arise where there is competition to win newly announced funding, but the strong influence of climate adaptation and biodiversity goals at the national scale means that there is much more balanced consideration of environmental outcomes in decision-making, which aligns with ‘working with nature’ principles. The inability to propose policies other than ‘hold the line’ or have them approved suggests an overall lack of efficacy. However, in line with risk management principles, coastal schemes post-SMP1 have made much greater use of soft-engineering and managed realignment options as illustrated in Table 1. A comparison with other nations who have predominantly engineered their shorelines is instructive, albeit some of these nations have less space for adaptive strategies [74]. Implementation of Managed Realignment strategies has been slowed by funding criteria, and reliance on partnership funding [76].

The much lauded aim that SMPs will influence the planning system has proven tricky. There is evidence of continued development on floodplains and zones at risk, driven by ambitious housing targets and the desirability of coastal locations. Multiple sets of evidence across all phases point to the need for greater staff capacity and long-term resourcing to deliver collaborative working [77,78].

Considering efficiency, transaction costs increase with more collaborative and participatory approaches to planning [79]. As a government-financed system of planning, these costs cannot realistically be ‘unlimited’, and have to compete with other forms of public expenditure. Since the projected costs are increasing with more developed coasts demanding protection and the risks of hazards increasing, this represents a challenge for SMP. Before the first generation of SMPs, the National Audit Office stated that it was difficult to say whether the public was getting value for money for coastal defence. Certainly, with the exception of ‘no active intervention’ the policy options are expensive and often inflexible. It is well accepted among professional practitioners in the UK [76] that attempting to keep the shoreline exactly as it is everywhere through engineering would impose very significant costs on future generations and is therefore unsustainable. The Committee on Climate Change identified that many policy options had poor benefit–cost ratios. On the other hand, the UK Climate Change Risk Assessment has estimated that avoided losses outstrip costs of SMP2 policies overall, and the review of England SMPs assessed that 9 of 20 SMPs were effectively influencing sustainable flood risk investment, with 11 developing with the need for improved lines of sight between policy and investments [74].

Considering equity, the social justice dimension has increased in importance in recent shoreline management planning with the inclusion of outcome measures which prioritise this. However, transparency, fairness, and inclusion in agreeing on SMP options are arguably the more contentious equity issues at the present time. Public perceptions that regulators care more about dwindling budgets, or the environment, than human protection are leading to a sense of aggrievement among some. Another way of reading the situation is to understand it as a dilemma of adjudicating between public and private interests.

Considering elegance, it is instructive to recall the tensions between national and local government which led to the 1906–1911 Royal Commission on Coastal Erosion. The current, proactive shoreline management planning systems seem to provide a much better regime for collaboration between organisations. Yet a consistent challenge for SMP policies has been that technical assessment produced in plans has been rejected by local politicians who refuse to sign off policies in the face of public unpopularity. Coastal Action Groups have arisen seeking to influence policy, whilst the Coastal Transition Accelerator Programme is an attempt to bridge the gap. But this in turn results in a new level of complexity and

bureaucracy. The bureaucratic system created by SMP is large and unwieldy, leading to a loss in relational engagement. But in hypermodernity, complex issues defy simple solutions.

Considering effectiveness, the findings of this study are not able to provide an overall conclusion. This awaits a further critical appraisal of the sustainability and implementation of each process unit. But this study indicates some ways in which SMPs have achieved impressive outcomes, and other ways in which they have fallen short. The first and second generation of SMPs were criticised for falling short in adopting or implementing nature-based solutions. Increases in managed realignment and restoration of habitats are evidence of adaptation occurring, though it is argued that the rate of change is still not sufficient [16]. Significant national programmes for habitat restoration and national policies for net zero and net gain are now helping drive these efforts, but criteria for schemes still do not properly account for nature-based solutions when appraising flood risk schemes, and partnership financing complicates efforts [80]. SMPs have been limited by design to four key policy options. It is possible that some maladaptation is a consequence of this. For example, with no active intervention policies, the implications for properties at risk are left unresolved, in the absence of a coastal re-location policy at the national level. Overall, whilst the system has evolved to be more sophisticated and fit more strongly with the nature of coastal systems, the analysis above reveals challenges for policy implementation, summarised in Table 2 below.

Table 2. Challenges in SMP policy implementation.

Challenge	Issue	Evaluative Criteria
Criteria	Funding criteria and strategies disadvantage managed realignment schemes leading to slow implementation	Efficacy
Collaboration	SMPs fail to influence the landuse planning system	Efficacy
Costs	>1500 km policies have poor (<2) benefit–cost ratios	Efficiency
Contentious decisions	Some of the public consider defence of the coast to be a government duty. No Active Intervention policies do not solve adaptation nor relocation issues	Equity
Competing priorities	Development continues in coastal locations with high flood and coastal erosion risk	Effectiveness
Cultural attitudes	Working with nature principle lacks socio-political acceptance, especially on eroding eastern and southern shorelines	Elegance

It is hard to evaluate the counterfactual for governance systems, but considering no-regret strategies and SMPs, the East Coast of England storm surge in 2013 (after the second-generation SMP) with two fatalities and significant economic damage was comparatively less harmful than the equivalent 1953 storm surge which led to 307 fatalities [13]. Admittedly, much of this is to do with the flood warning and emergency planning systems, but what SMP has delivered should not be discounted. Very regrettably and tragically, deaths occurred from coastal flooding in the 2005 storm surge in the Uists, Scotland where an SMP was not in place.

5. Conclusions

In conclusion, by implementing principles of long-term planning, considering natural systems, working with nature, working in partnership, and promoting an adaptive approach, SMP has contributed to effective risk management. SMPs have identified op-

portunities for adaptation via managed realignment and less use of shoreline armouring; better considered responses to climate impacts; and increased collaborative solutions to find cross-cutting benefits in responding to hazards. They have likely slowed the increase in coastal hazard vulnerability.

Major challenges remain. Since the risk varies over space, finding sustainable solutions to these challenges is harder in high-risk areas and for small settlements. The analysis demonstrates that SMPs are not up to this challenge in isolation, but have required a range of ancillary governance arrangements. For example, the multi-year Coastal Transitional Accelerator Programme, which has taken a much deeper community approach than SMPs to find if and how managed relocation options might be suitable. Such approaches add further to the bureaucracy described in Section 1.5, which is a challenge from the perspective of efficiency, but complex problems often defy simple solutions.

Another major challenge is the disjunct between professional and public understanding. Engagement with local communities as part of partnership working is a key principle of SMPs, but a large proportion of the population remain unaware or disagree that it is ‘not a statutory duty for the state to defend the coast’ [81] or that ‘doing nothing’, or letting natural processes function, might be a sustainable option in the face of increased risk [80]. Perhaps the terminology of the ‘shoreline’ in SMP is partly to blame for this communication failure. The term shoreline continues to give an impression of a static two-dimensional feature which re-enforces the idea that the coast is a line to be defended. The three-dimensional geomorphological term of the ‘shoreface’ is more apt to convey the dynamic zone, subject to the action of energy from waves, currents, tides, and wind, which is increasingly at risk from coastal hazards under future climates. A transition from a shoreline to a shoreface framing can help improve management of global coastal hazards. This framing highlights another policy option which is not explicitly considered in SMPs. That is the notion of coping or embracing living with inundation and risk [82]. But an ‘embrace’ option will not be achieved by changing minds or by exhorting individuals to be resilient. To embrace risk, a defend–defend–defend mentality would likely need more sophisticated systems for community support, or increased public subsidy to support private adaptation, in order to generate socio-political acceptance. This study provides an example of critical, long-term policy analysis which supports the appraisal of sustainable options.

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Conflicts of Interest: The author declares no conflict of interest.

Appendix A. Corpus of Policy and Review Documents for Analysis

1.	House of Commons Environment Committee (1992) Report on Coastal Zone Protection and Planning Vol 1 Report and Minutes of Proceedings. HCP17-1 and Vol 2 Minutes of Evidence and Appendices.	Policy
2.	Department of Environment (1992) The Government’s Response to the Second Report from the House of Commons Select Committee on the Environment: coastal zone protection and planning. Cm 2011.	Policy

3.	National Audit Office (1992): Coastal defences in England	Review
4.	Department of Environment/Welsh Office (1992) PPG20 Coastal Planning	Policy
5.	DoE/MAFF (1992) Circular 30/92 Development and Flood Risk	Policy
6.	Welsh Office (1992) Circular 68/92 Development and Flood Risk	Policy
7.	MAFF/WO (1993) Strategy for Flood and Coastal Defence in England and Wales. MAFF Publications PB1471	Review
8.	DoE (1993) Coastal Planning and Management: a Review. Rendel Geotechnics	Policy
9.	MAFF (1993) Coastal Defence and the Environment: a guide to good practice. MAFF Publications PB1191	Policy
10.	MAFF (1993) Coastal Defence and the Environment: a strategic guide for managers and decision-makers	Policy
11.	MAFF, Welsh Office, Association of District Councils, English Nature, National Rivers Authority (1995) Shoreline Management Plans. A Guide for Coastal Defence Authorities. PB 2197	Policy
12.	Department of Environment (1996) Policy Guidelines for the Coast	Policy
13.	Scottish Office (1997) NPPG 13-Planning and the Coast	Policy
14.	House of Commons Select Committee on Agriculture (1998) Flood and Coastal Defence	Policy
15.	Scottish Office (1998) Planning Advice Note 53 Classifying the coast for planning purposes.	Policy
16.	Welsh Office (1998) Planning Guidance TAN (Wales) 15 Coastal Planning	Policy
17.	Welsh Office (1998) Planning Guidance TAN (Wales) 14 Development and Flood Risk	Policy
18.	DETR (2000) A review of shoreline management plans 1996–1999 (March 2000)	Review
19.	Lee, M. Cooper, N. (2000) A review of shoreline management plans 1996–1999. Final Report FD1703	Review
20.	Local Government Association (2000) On the Edge Dealing with Coastal Risk	Policy
21.	House of Commons Agricultural Committee (2001) Flood and Coastal Defence: Follow-up 31 January 2001, HC 172	Policy
22.	DEFRA (2001) Shoreline Management Plans: a guide for coastal defence authorities. PB5519	Policy
23.	Department for Transport, Local Government and Regions (2001) Planning Policy Guidance 25: Development and Flood Risk	Policy
24.	Ballinger et al. (2002) Managing Coastal Risk: making the shared coastal responsibility work. A report to Local Government Special Interest Group on Coastal issues.	Review
25.	Office for Science and Technology (2004) Foresight Report Flood and Coastal Defence (April 2004)	Review
26.	Welsh Government (2004) Technical Advice Note (TAN) 15: Development and Flood Risk	Policy

27.	DEFRA (2004) Making Space for Water. Developing a new Government strategy for flood and coastal erosion risk management in England. A consultation exercise. July 2004. PB 9792	Policy
28.	DEFRA (2005) Making Space for Water. Taking forward a new Government strategy for flood and coastal erosion risk management in England. First government response to the autumn 2004 making space for water consultation exercise.	Policy
29.	DEFRA (2006) Shoreline Management Plan Guidance. Vols 1 and 2.	Policy
30.	Department for Communities and Local Government (2006) Planning Policy Statement 25; Development and Flood Risk. December 2006	Policy
31.	Environment Agency (2008) Social justice in the context of flood and coastal erosion risk management: a review of policy and practice (FD2605)	Policy
32.	Planning Cooperative (2010) Translating shoreline management plans into spatial plans. Volume 1. final report for the Environment Agency.	Policy
33.	Royal Commission on Environmental Pollution (RCEP) (2010) Adapting Institutions to Climate Change. 28th Report. CM7843	Review
34.	DEFRA (2010) Adapting to Coastal Change: Developing a Policy Framework.	Policy
35.	Environment Agency (2010) Managing the Environment in a Changing Climate. Flooding and Coastal Erosion	Policy
36.	DCLG (2010). Planning Policy Statement 25 ‘Development and flood risk’ (PPS25) (December 2007, updated March 2010).	Policy
37.	Scottish Planning Policy SPP (2010). Coastal Planning [Sec 98–103]. February 2010	Policy
38.	Environment Agency (2010) Working with Natural Processes to Manage Flood and Coastal Erosion Risk. Guidance report.	Policy
39.	HM Government (2011) UK Marine Policy Statement. Especially Sections 2.6.7 Coastal Adaptation and 2.6.8 Coastal Change and Flooding.	Policy
40.	DEFRA, EA (2011) Understanding the risks, empowering communities, building resilience: the national flood and coastal erosion risk management strategy for England.	Policy
41.	Welsh Government (2011) National Flood and Coastal Erosion Strategy for Wales	Policy
42.	Defra (2012) UK Climate Change Risk Assessment: Government Report	Review
43.	Defra (2013) The National Adaptation Programme: Making the Country Resilient to a Changing Climate.	Policy
44.	MHCLG (2014) National Planning Policy Guidance (NPPG)	Policy
45.	Environment Agency (2014) Funding Flood and Coastal Erosion Risk Management (FCERM) Maintenance: Learning from Existing and Past Practice (FD2678)	Review
46.	Environment Agency (2014) Working with Natural Processes Research Framework (SC130004)	Policy
47.	EA (2015) Adapting to coastal erosion: evaluation of rollback and leaseback schemes in Coastal Pathfinder projects (FD2679)	Review
48.	EA (2015) Enhancing ex-post evaluation of flood and coastal erosion risk management plans and schemes. FD2698	Policy

49.	Audit Wales (2016) Coastal Flood and Erosion Risk Management in Wales. 21 July 2016	Review
50.	Committee on Climate Change (2017) Climate Change Risk Assessment, including sub reports on Future Flooding	Review
51.	Environment Agency (2017) Working with Natural Processes evidence base (SC150005)	Policy
52.	Committee on Climate Change (2018) Managing the Coast in a Changing Climate. CCC, London. October 2018.	Review
53.	Scottish Natural Heritage [Now NatureScot] (2019) Planning Ahead for Coastal Change.	Policy
54.	EFRA Committee (2019) Inquiry Coastal Flooding and Erosion and Adaptation to Climate Change. HC56 (Interim report Published 1 November 2019)	Policy
55.	Natural England (2019) Coastal Change Management Areas: opportunities for more sustainable solutions in areas subject to coastal change. A report by Royal Haskoning DHV to Natural England. Report No.275.	Policy
56.	MHCLG (2019) National Planning Policy Framework (NPPF) Chapter 14	Policy
57.	Environment Agency (2019) Working together to adapt to the changing climate: flood and coast (FRS17192)	Policy
58.	EFRA Committee (2020) Inquiry on Flooding HC170.	Policy
59.	Environment Agency (2020) National Flood and Coastal Erosion Risk Management Strategy for England	Policy
60.	Public Accounts Committee (2021) Inquiry on Managing Flood Risks. Report HC931	Review
61.	Committee on Climate Change (2022) Climate Change Risk Assessment	Review
62.	Natural Resources Wales (2021) Shoreline Management Plans: Supplementary guidance for their ongoing maintenance and delivery—Wales. NRW Evidence Report, Natural Resources Wales, Cardiff.	Policy
63.	Environment Agency (2021) Evaluating the effectiveness of flood and coastal erosion risk governance in England and Wales. November 2021.	Review
64.	Environment Agency (2021) Flood and coastal erosion risk management research and development framework: working with communities. April 2021	Policy
65.	Environment Agency (2021) Coastal Nature-Based Solutions: A Quick Scoping Review. FD2738	Review
66.	Scottish Government (2023) Coastal Change Adaptation Planning. Interim Guidance.	Policy
67.	Environment Agency (2023) Shoreline Management Plans Supplementary Guidance. First published October 2020	Policy
68.	Environment Agency (2023) Working together to adapt to a changing climate-flood and coast. FRS17192	Policy
69.	Environment Agency (2024) Independent Review of Shoreline Management Plans	Review
70.	EFRA Committee (2024) Evidence session on flooding. 20 February 2024	Policy

71.	Environment Agency (2024) National assessment of flood and coastal erosion risk in England 2024	Review
72.	Naylor, L.A et al. (2024) ‘Coastal change adaptation—are we prepared?’ A report to ClimateXChange	Review

Appendix B. Generations of Shoreline Management Plans

Appendix B.1. First-Generation SMPs

SMP Cell	SMP1	Lead	Developer	Coastal Group	Published
1a	St Abb’s Head to the River Tyne	Wansbeck District Council	Royal Haskoning	North Eastern	1998
1b	River Tyne to Seaham Harbour	Sunderland City Council	Babtie Group	North Eastern	1998
1c	Seaham Harbour to Saltburn	Hartlepool Borough Council	Babtie Group	North Eastern	1999
1d	Saltburn to Flamborough Head	Scarborough Borough Council	Mouchel Consulting	North Eastern	1997
2a, 2b	Flamborough Head to Humberston Fitties (Donna Nook)	East Riding of Yorkshire Council	Posford Duvivier	Humber Estuary	1998
2c	Humberston Fitties (Donna Nook) to Gibraltar Point East	Environment Agency	Anglian Coast Management	Humber Estuary	1996
2d	Gibraltar Point to Snettisham	Environment Agency	Environmental Agency and Mouchel	Anglian	1996
3a	Snettisham to Sheringham	Environment Agency	Halcrow, Environment Agency	Anglian	1996
3b	Sheringham to Lowestoft North	Norfolk District Council	Halcrow Group Ltd.	Anglian	1996
3c	Lowestoft to Harwich	Suffolk Coastal District Council	Halcrow Group Ltd.	Anglian	1998
3d	Harwich to Canvey Island [Grain Island]	Tendring District Council	Environment Agency, Anglian Region	Anglian	1997
4a, 4b	Canvey Island [Grain Island] to Dover Harbour [South Foreland]	Canterbury City Council	Halcrow Group Ltd.	South East	1998
4c	South Foreland [Dover Harbour] to Beachy Head	Shepway District Council	BMT Ltd.	South East	1996
4d	Beachy Head to Selsey Bill	Arun District Council	Gifford	South Downs	1997
5a, 5b.1	Selsey Bill to River Hamble	Chichester Council	HR Wallingford (Halcrow?)	East Solent	1997

SMP Cell	SMP1	Lead	Developer	Coastal Group	Published
5b.2	River Hamble to Hurst Spit	New Forest District Council	Halcrow Group Ltd.	West Solent	1997
5d, 5e	Isle of Wight	Isle of Wight Council	University of Portsmouth; Royal Haskoning	Isle of Wight	1997
5f	Hurst Spit to Durlston Head	Bournemouth Borough Council	Halcrow Group Ltd.	Poole and Christchurch Bays	1999
5g	Durlston Head to Portland Bill	West Dorset District Council	Halcrow Group Ltd. (Part1) Mouchel (Part 2)	Weymouth Bay	1997 (Part 1) 1998 (Part 2)
6a, 6b, 6c	Portland Bill to Rame Head	West Dorset District Council	Posford Duvivier	Lyme Bay and South Devon	1998
6d	Rame Head to Lizard Point	Caradon District Council	Halcrow Group Ltd. and Mouchel	Cornwall and Isles of Scilly	1999
6e	Lizard Point to Land's End	Penwith District Council	Halcrow Group Ltd. and Mouchel	Cornwall and Isles of Scilly	1999
	Isles of Scilly	Isles of Scilly (IOS)	Aspen Burrow Crocker (Vol.1) Halcrow Group Ltd. and Mouchel (Vol. 2)	Cornwall and Isles of Scilly	1997 (Vol. 1), 1999 (Vol. 2)
7a, 7b	Land's End to Hartland Point	Caradon District Council	Halcrow Group Ltd.	Cornwall and Isles of Scilly	1999
7c, 7d	Hartland Point to Brean Down (Bridgewater Bay to Bideford Bay SMP)	West Somerset District Council	Halcrow Group Ltd.	North Devon and Somerset Coastal Group	2000
7e, 8a	Brean Down to Lavernock Point (Severn Estuary SMP)	North Somerset District Council	Giffords Associated Consultants	Severn Estuary Coastal Group	2000
8b	Lavernock Point to Worm's Head	City and County of Swansea	Shoreline Management Partnership	Swansea Bay Coastal Engineering Group	1995
8c	Worm's Head to St Govan's Head	Carmarthenshire County Council	Shoreline Management Partnership	Carmarthen Bay	2001
8d.1	St Govan's Head to St Ann's Head	Pembrokeshire County Council	WS Atkins	Cardigan Bay	2001
8d.2	St Ann's Head to Teifi Estuary	Pembrokeshire County Council	WS Atkins	Cardigan Bay	2001
9a.1	Teifi Estuary to Dyfi Estuary	Ceredigion County Council	Posford Duvivier	Cardigan Bay	2002
9a.2	Dyfi Estuary to Bardsey	Sound Gwynedd County Council	Posford Duvivier	Cardigan Bay	2002
10a, 10b, 10c	Bardsey South to Great Orme's Head Conwy	Conwy County Borough Council	Gwynedd Council Coast Protection Unit	Cardigan Bay	2002
11a	Great Orme's Head to Formby Point	Wirral Metropolitan Borough Council	Shoreline Management Partnership	Liverpool Bay and Tidal Dee Coastal Group	

SMP Cell	SMP1	Lead	Developer	Coastal Group	Published
11b	Formby Point to Rossall Point	Blackpool Council	Shoreline Management Partnership	Ribble Estuary Shoreline Management Plan Partnership	1995
11c	Rossall Point to Earnse Point, Walney Island	Lancaster City Council	Shoreline Management Partnership	Morecambe Bay Shoreline Management Plan Partnership	1995
11d	Earnse Point, Walney Island to St Bee's Head	Copeland Borough Council	Bullen Consultants	North West Coastal Group	1998
11e	St Bee's Head to Solway Firth	Allerdale Borough Council	Bullen Consultants	North West Coastal Group	1995
-	Humber Estuary Shoreline Management Plan	Environment Agency	Environment Agency	N/A	2000
-	Angus	Angus Council	Angus Council	(Scotland)	2004
-	Dumfries and Galloway	Dumfries and Galloway	HR Wallingford	(Scotland)	2005
-	East Lothian	East Lothian Council	Babtie	(Scotland)	2002
-	Fife	Fife Council	Posford Duviver	(Scotland)	1998
-	Highland (Inner Moray: Burghead to the Sutors)	Highland Regional Council	Highland Council	(Scotland)	1998

Appendix B.2. Second- and Third-Generation SMPs

SMP2	Lead Organisation	Lead Developer	Coastal Group	Published
<u>SMP 1 Scottish border to the River Tyne (Northumberland and North Tyneside)</u>	Northumberland County Council	Royal Haskoning	North East Coastal Authorities Group	2007
<u>SMP 2 The Tyne to Flamborough Head (North East)</u>	Scarborough Borough Council	Royal Haskoning	North East Coastal Authorities Group	2009
<u>SMP 3 Flamborough Head to Gibraltar Point</u>	East Riding Yorkshire Council	Scott Wilson	North East Coastal Authorities Group	2010
<u>SMP 4 Gibraltar Point to Hunstanton (The Wash)</u>	Environment Agency	Royal Haskoning	East Anglia Coastal Group	2010
<u>SMP 5 Hunstanton to Kelling Hard (North Norfolk)</u>	Environment Agency	Royal Haskoning	East Anglia Coastal Group	2010
<u>SMP 6 Kelling Hard to Lowestoft (Kelling to Lowestoft)</u>	North Norfolk District Council	AECOM	East Anglia Coastal Group	2009
<u>SMP 7 Lowestoft to Felixstowe (Lowestoft Ness to Felixstowe Languard)</u>	Suffolk Coastal District Council	Royal Haskoning?/ Terry Oakes Assoc	East Anglia Coastal Group	2010

SMP2	Lead Organisation	Lead Developer	Coastal Group	Published
<u>SMP 8 Essex and South Suffolk</u>	Environment Agency	Royal Haskoning	East Anglia Coastal Group	2010
<u>SMP 9 River Medway & Swale Estuary</u>	Environment Agency	Halcrow	South East	2009
<u>SMP 10 Isle of Grain to South Foreland</u>	Canterbury County Council	Halcrow	South East	2010
<u>SMP 11 South Foreland to Beachy Head</u>	Shepway District Council	DEFRA, English Nature, Environment Agency	South East	2006
<u>SMP 12 Beachy Head to Selsey Bill (South Downs)</u>	Arun District Council	DEFRA, English Nature, Environment Agency	South East	2006
<u>SMP 13 Selsey Bill to Hurst Spit (North Solent)</u>	New Forest District Council	DEFRA	Southern	2006
<u>SMP 14 Isle of Wight</u>	Isle of Wight Council	Royal Haskoning	Southern	2010
<u>SMP 15 Hurst Spit to Durlston Head (Poole & Christchurch Bays)</u>	Bournemouth Borough Council	Royal Haskoning	Southern	2011
<u>SMP 16 Durlston Head to Rame Head</u>	Teignbridge District Council	Halcrow	South West Coastal Group	2010
<u>SMP 17 Rame Head to Hartland Point (Cornwall & Isles of Scilly)</u>	Caradon District Council	Royal Haskoning	South West Coastal Group	2011
<u>SMP 18 Hartland Point to Anchor Head (North Devon & Somerset)</u>	North Devon District Council	Halcrow	South West Coastal Group	2010
<u>SMP 19 Anchor Head to Lavernock Point (Severn Estuary)</u>	Monmouthshire Council	Atkins	Severn Estuary	2010
<u>SMP 20 Lavernock Point to St Ann's Head (South Wales)</u>	Carmarthenshire Council	Halcrow	South Wales	2010
<u>SMP 21 St Ann's Head to Great Ormes Head (West of Wales)</u>	Pembrokeshire Council	Royal Haskoning	West of Wales	2012
<u>SMP 22 Great Ormes Head to Scotland (North West England and North Wales)</u>	Blackpool Borough Council	Halcrow	North West Wales	2012
<u>Thames 2100 Estuary Management Plan</u>	Environment Agency	JBA Consulting	-	2012, 2023
Angus	Angus Council	CH2M (Halcrow)	(Scotland-Local authority)	2017
Dumfries and Galloway	Dumfries and Galloway	RPS	(Scotland-Local authority)	2023
Fife	Fife Council	Mouchel	(Scotland-Local authority)	2011
North and South Ayrshire	N/.S.Ayrshire Councils	RPS	(Scotland-Local authority)	2018

Refreshed SMPs: England: <https://environment.data.gov.uk/shoreline-planning> accessed on 26 June 2025; Wales: <https://naturalresources.wales/flooding/managing-flood-risk/shoreline-management-plans/?lang=en> accessed on 26 June 2025.

Appendix B.3. Coastal Change Adaptation Plans (Scotland)

CCAP	Lead Organisation	Lead Developer	Coastal Group	Published
Aberdeenshire Coastal Change Adaptation Plan	Aberdeenshire Council	JBA Consulting	(Scotland-Local authority)	Draft 2024
Berwickshire Coastal Change Adaptation Plan	Scottish Borders	Mott MacDonald Limited	(Scotland-Local authority)	Draft 2025
East Lothian Coastal Change Adaptation Plan	East Lothian Council	-	(Scotland-Local authority)	Underway 2025
Edinburgh Coastal Change Adaptation Plan	City of Edinburgh Council	Mott MacDonald Limited	(Scotland-Local authority)	Underway 2025
Highland Regional Coastal Change Adaptation Plan	Highland Council	-	(Scotland-Local authority)	2025
Moray Coastal Change Adaptation Plan	Moray Council	JBA Consulting	(Scotland-Local authority)	2023
North Ayrshire Local Coastal Change Adaptation Plans	North Ayrshire Council	-	(Scotland-Local authority)	Draft 2025
Orkney Coastal Change Adaptation Plan	Orkney Islands Council	Mott MacDonald Limited	(Scotland-Local authority)	Underway 2025
South Ayrshire Coastal Change Adaptation Plan	South Ayrshire Council	Atkins Realis	(Scotland-Local authority)	Underway 2025

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