Postcards from the Edge

Adapting to our changing coast

This report compiles reflections, or 'postcards', from coastal flood and erosion practitioners to offer different geographical and thematic perspectives from Britain's coast, alongside some international perspectives.

CIWEM's Flood & Coastal Erosion Risk Management specialist panel have analysed these reflections to answer the question *'How do we realistically adapt to rising sea levels, coastal erosion and squeeze, and intensifying coastal storms?'*

Their answer is a series of challenges facing the sector and recommendations for government. The focus is largely on England and Wales, but many of the recommendations are applicable across the coasts of Britain, and potentially internationally.

CIWEM is the leading independent Chartered professional body for water and environmental professionals, promoting excellence within the sector

CIWEM
106-109 Saffron Hill
London EC1N8QS
Charity registration No 1043409 (England and Wales)
SC038212 Scotland

www.ciwem.org

From cover image: Dunwich ©Coastal Partnership East

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Christchurch Harbour ©Coastal Partners

We have an amazing and beautiful coast; one which is worth fighting for.

In the Flood and Coastal Erosion Risk Management (FCERM) sector we are lucky to have some amazing people working across incredible organisations who are doing just that. However, if we look closely the fight has been subtly changing over the past decade with the increasing certainty that climate science brings us, weighted with the heavy truth that things are going to change at the coast whether we want it to or not.

We cannot go on as we always have been. We cannot hold back the tides and it's time for more honest conversations about that with ourselves, with our politicians and with our coastal communities.

So how do we realistically adapt to rising sea levels, coastal erosion and intensifying coastal storms? The answer is in all of our gifts and will take momentous effort and careful planning, but I believe that by working together we can shape that answer collectively to ensure the future of our vibrant coasts.

This will not be easy and we must look inwardly to challenge ourselves and each other over what is and is not working in the sector in order to search for better outcomes at the coast. This is no longer a choice but a requirement.

Curated by CIWEM and its FCERM specialist panel this thought leadership report starts to ask some of those challenging questions about the current way we do things in FCERM. More importantly it puts forwards some constructive solutions and recommendations to move this important conversation at the coast forwards.

Mark Stratton
CIWEM FCERM Panel chair
Coastal Policy Environment & Research Team Service Manager, Coastal Partners

Our coast has been changing for millennia. A visit to the ruins of the former coastal city of Dunwich in Suffolk or a quick Google search for the lost villages of East Anglia tells us that our coastline has always been moving, in response to changes in sea level, wave action and coastal processes.

The EU Climate Change Service reported in February this year that the world had surpassed 1.5 degrees of warming for the first time for a whole year. Sea levels may rise by over 1m by 2100 in some parts in the UK. Predictions of increased storminess together with higher sea levels will put increasing pressure on our aging coastal defences. Put simply, the rate of coastal change will accelerate at a time where our policies and funding in the UK are largely geared towards defending against coastal flooding and erosion and holding our coastlines in place, particularly in more populous areas.

We need to act now at this time of climate emergency. This is not a future issue that the UK can defer to manage at some point down the road. Should we not move to a system that supports our coastal communities and the environment to adapt now then unmanaged change will happen regardless, with severe implications for people, businesses and our environment.

This report contains ten recommendations for how we can do just that and I encourage us all to read and absorb this report and push for action at both a local and national level.

Hannah Coogan
CIWEM Trustee and President Elect
Regional Delivery Director - Flood, Coast and Maritime, Binnies

Recommendations

Hemsby ©Coastal Partnership East

Summary recommendations

We call for the following changes to improve coastal management:

1. **A national statement to provide stronger policy direction for the UK's changing coast.** This would be a collective, UK vision for the coast, providing a clear purpose that transcends sectoral and political divides. This would drive action and a national conversation about the need for sections of coast to adapt.

2. **Increasing powers of Shoreline Management Plans**, by better embedding them into England's National Planning Policy Framework and making their immediate phase statutory. This would drive 'no regrets' actions now, but keep a wide range of adaptive pathways on the table with a financed delivery route to achieve them.

3. **Improved valuation of coastal benefits** to ensure that the multifaceted, shared value of the coast is properly accounted for in planning and funding decisions.

4. **Mainstreaming of coastal adaptation** through a strong steer on adaptation from central government which ensures honesty about and political support for transitioning our coasts. We propose Investment & Adaptation plans for sections of the coast where FCERM strategies are no longer appropriate.

5. **Proactive and transparent community engagement at the core of coastal adaptation**, coordinated and supported by central government. So that adaptation is perceived as a viable positive future for the coast and communities at risk from flooding and erosion are well informed and empowered to be proactive and make decisions about their futures.

6. **A review and simplification of the capital funding approach under FCERM.** This should seek to pool all relevant government funds at a national level. This will facilitate risk management authorities to work across sectors and ensure they are not wasting resources and duplicating effort trying to align funding sources and get schemes off the ground.

7. **A clear funding route for adaptation.** Facilitate access to funding for coastal adaptation by reviewing the FCERM economic appraisal process and outcomes. As a result, benefits are not limited to numbers of properties with reduced risk of flooding/erosion and adaptation interventions are considered cost-beneficial

8. **Provision of adequate resources for coastal local authorities for FCERM operations**, including community engagement. Support local authority hubs across the country that can share services and best practice.

9. **Access to funding for maintenance of existing defences**, similar to the FCERM Grant in Aid for coastal asset maintenance accessed by the Environment Agency. This would put funding for maintenance on a more equal footing to capital funding and provide a means to address rapidly deteriorating assets that are at a growing risk of sudden, catastrophic failure.

10. **Urgent action to address coastal landfills.** FCERM appraisal outcomes should be expanded to cover landfills, unlocking funds to enable the rapid mitigation of health and environmental risks posed by landfills leaching and eroding.

1. A collective vision for the coast

Challenge: with the world having surpassed 1.5 degrees of warming, climate change is advancing fast and translating into increasing sea level rise, coastal erosion and storminess. Yet these are still pitched as distant threats that can be deferred and we're not seeing concerted action at sufficient pace to adapt our coasts.

Some of the means to adapt to these threats are politically unpalatable. Meanwhile support for coastal management is fragmented across government departments and focused on defending the coast as we know it. Cross-party, long-term commitment to ensure a positive future for our coasts is required.

Recommendation:
We propose the development of a national statement by central government to provide stronger policy direction for the UK's coast, similar to the Marine Policy Statement. This would be a collective, UK vision for the coast, providing a clear purpose that transcends sectoral divides and ensures government departments, local authorities and other agencies are all aligned.

This 'Coastal Policy Statement' would reinforce the Flood and Coastal Erosion Risk Management (FCERM) Strategy for England (2020)[1], the National Strategy for Flood and Coastal Risk Management in Wales (2020)[2] and flood and coastal risk plans for Scotland and Northern Ireland. The Coastal Policy Statement would be adhered to across sectors and delivered through the Shoreline Management Plans (SMPs) and Local Plans.

Paired with this statement, we propose a national 'State of our Coast' report, written by the National Infrastructure Commission, to help drive action. This would show the coast's current state, key challenges and progress against targets to 2050 and 2100.

2. Shoreline Management Plans with increased power

Challenge: Shoreline Management Plans are held up as the bedrock of coastal risk management decision-making. They provide a framework of evidence on climate, coastal change processes, and land use to inform high-level, long-term decisions for managing coastal flood and erosion risk, reaching out to 100 years.

Yet they are non-statutory policy documents and consequently their influence within planning decisions at the coast varies. The associated lack of guaranteed funding hinders the delivery of actions; it can often take over ten years to go from SMP policy to breaking ground on project delivery.

Recommendation:
Clarification is needed about what the SMPs are trying to achieve, and whether any part or timescale of the SMP should be made statutory. If so, a 'common pot' of funding should be available to achieve this, i.e. accessible to all risk management authorities (RMAs) via a common funding framework.

We consider that near-term policies of the SMPs should be made statutory, with a non-statutory vision and plans to 100 years and beyond. Long-term investment scenarios would

be needed to inform the level of funding needed for shorter-term statutory actions. This would drive 'no regrets' actions now, but keep a wide range of adaptive pathways on the table with a financed delivery route to achieve them.

DLUHC and Defra must revise England's National Planning Policy Framework to ensure SMPs and the need for adaptation are more explicitly embedded in Local Plans, as it is in Wales' Planning Policy, and there is increased engagement of local planning authorities with SMPs. Land use planning should complement the SMP and manage development in areas of coastal change strategically to provide future proofed solutions. This should include consideration of alternative land uses and landownership beyond the usual 10-year Local Plan horizons to the 100-year horizon considered in SMPs.

More detailed 'Investment & Adaptation' plans are needed which sit beneath SMPs; these plans are described further in the next section. Coastal local authorities could be required to report on these plans, aligned with the Adaption Reporting Power under the Climate Change Act 2008.

In addition we recommend that sustained funding is provided for Coastal Group[i] SMP administration and governance, to ensure the periodic review and refresh of SMPs, maintaining them as living documents.

We welcome the proposed review of SMP policy in England by the Department for Environment, Farming and Rural Affairs' (Defra) by 2026. As part of this review, we urge that Defra consider the above points. Although no similar SMP policy review is planned for Wales, these points are relevant to Wales and we recommend the Welsh Government to consider them. In Wales we also propose that guidance is developed to trigger SMP changes in light of new evidence, similar to the guidance that already in existence in England.

3. Improved valuation of coastal benefits

Challenge: The multifaceted, shared value of our coasts to the nation is not properly accounted for in planning and funding decisions and is failing to translate into transitioning our coasts effectively. Coasts bring mental health and wellbeing benefits in ways that have not been fully measured. We rely on the coast for essential infrastructure such as power stations, wastewater treatment and telecoms cables. Ports provide hubs for offshore green energy and marine transport.

Recommendation:
We call for economic appraisal methods that are more transparent and equitable, and that consider a wider range of outcomes – including conservation benefits, health benefits, and benefits accrued below sea level. This will need to be guided by a centralised strategy, and will require cross-government department collaboration and funding approaches.

[i] Coastal Groups hold risk management authorities to account for SMP delivery. They bring together coastal managers from coastal local authorities, port authorities and the Environmental Agency. Other interested organisations, such as Natural England, English Heritage, land owners and Defra are also members. There are seven regional coastal groups in England, as prescribed by Defra in March 2008.

Consideration should be given to applying the goals of the Well-being of Future Generations (Wales) Act 2015 across the UK. The Act requires each local authority area to establish a Public Services Board with a collective duty to produce a plan for how they will improve the well-being of people and communities. It is thought to be having enormous benefit and has been used to justify projects such as Newgale Coastal Adaptation in Pembrokeshire[3].

4. Mainstreaming coastal adaptation

Challenge: England's FCERM policy already states the need for coastal adaptation, and coastal adaptation is a cross-cutting theme in Wales's forthcoming National Climate Resilience Strategy.

However, current funding policy rewards the protection of homes and creation of habitats, rather than adaptation and relocation. This means that there is no clear funding pathway for Risk Management Authorities developing adaptation/transition plans. And whilst there is emerging political support, dialogue around not protecting or developing in an area can be politically unpalatable and short-term political cycles frustrate the long-term commitment that is required for adaptation and relocation.

Recommendation:
We need political support and honesty around the future of coasts. Acting on coastal erosion and flooding should not be a political hot potato, thrown further down the line for another party to deal with. Politicians must get behind the need for adaptation and potential relocation, seeing it as a win rather than a failure – because it increases the long-term resilience of communities and is more sustainable when compared to traditional hard defences or protection.

We urge the UK's central government to take responsibility and provide a strong steer on coastal adaptation, using the Coastal Policy Statement described above as a vehicle. This should establish a policy 'backbone' across Defra, DLUHC, DFT and other relevant departments, a backbone that does not bend with the winds of politics and that facilitates sectors to work together locally.

We call for a funding mechanism that better aligns with the national FCERM strategies and that gives greater weight to coastal processes, ensuring adaptation has a more equal footing with traditional flood and erosion risk mitigation (see recommendations 6 and 7).

We propose that Investment & Adaptation Plans are a requirement for sections of the coast where FCERM strategies, traditionally focussed on coastal defence, are no longer appropriate. Development and delivery of these plans should be ideally led by local authorities but with resources and collaborative working with other key players including the environment agencies of England and Northern Ireland, Natural Resources Wales, the Scottish Environment Protection Agency, water companies, national parks and major landowners such as the National Trust and private investors. Communities should be an essential part of Investment & Adaptation Plans, and should be at the heart of decision-making.

The plans need to encompass adaptive pathways, with clear triggers for decision-making and with realistic actions for different types and scales of project. Crucially, these plans need buy-in and finance from government, and political support.

The Investment & Adaptation Plan approach is planned to be trialled amongst a collaboration of local authorities on the south coast; the aspiration is that both authorities and communities will be better informed and prepared for coastal change. In Wales, Pembrokeshire's public service board is leading the way in developing a climate change adaptation strategy[4].

5. Proactive and transparent community engagement at the core of adaptation

Challenge: There is a need to raise awareness about adaptive resilience and provide support to those most at risk from coastal erosion and flooding. Defra's FCERM Policy talks about educating communities so that they can participate in decision-making, but there is little national coordination or support specifically for this.

Communication around the SMP policy categories can be challenging, particularly with 'managed realignment' and 'no active intervention' where the headline can convey the sense that people and property will not be supported. With eroding coasts, appropriate messages surrounding the risk and how it could change have not always reached or been understood by the right audiences.

Recommendation:
Community engagement should be at the core of coastal adaptation. Local authorities are best-placed to lead this but it needs concerted action, resources and national coordination to ensure fairness and consistency of messaging across the nation. Flowing from with the policy 'backbone' on coastal adaptation proposed in recommendation 4, we call for central government to lead and resource a long-term public awareness campaign about the changing coastal environment, with joint party cooperation and support - nationally and locally.

We must also have more honest conversations with communities – including planners – about the future of the coast and the need to adapt. This must include recognition that climate change is advancing fast, translating into increased rates of erosion, storminess and coastal squeeze.

There needs to be greater transparency over levels of protection of existing assets and the likelihood of flooding and erosion, and honesty about the inherent uncertainty over the lifetime of existing defences. There needs to be clarity over how adaptation will work, including what will happen, why and how, and what support there will be, so that people in challenging situations have a clear plan. This will empower them to be proactive and make decisions about their situation.

These conversations need to start now so that preparation happens at a generational scale. Adaptation should be framed as a viable positive intervention and as an alternative future for the coast to ensure we continue to have vibrant but sustainable coastal places. Coastal

heritage can help with understanding that the coast has always changed, and that it's part of a natural process. There are also lessons that can be learnt from existing adaptation projects – for example, the Coastal Transition Accelerator Programme in north Norfolk[5], the Fairbourne Learning Project[6], Flood and Coastal Resilience Innovation Programme[7] (FCRIP).

Within communities at risk from erosion, more guidance is needed for prospective and existing homeowners on erosion risk.

6. A review and simplification of the FCERM funding process

Challenge: A major challenge for Risk Management Authorities is securing the necessary partnership funding for coastal FCERM schemes, and in particular aligning funding sources that have different cycles and objectives. It has become 'like a monster', with some projects having up to 10-15 funding sources and taking many years to get off the ground. The time spent on speculative agreements and aligning funding is sucking up limited resources within local government. This brings uncertainty over whether the scheme can be delivered, and risks associated with aligning the different objectives and timescales of funding partners.

RMAs have difficulty accessing funding for coastal adaption (next recommendation) and for mitigating coastal instability due to issues outside the remit of SMPs, such as groundwater and drainage. Such issues could cause landslides and loss of cliff top property and infrastructure.

Recommendation:
We propose a review and redesign of the current capital funding approach under FCERM, led by Defra and the devolved governments and in time for the next 6-year capital investment programme. This will require support from all the Risk Management Authorities, including the Environment Agency, drainage boards and local authorities.

The funding process should be simplified and made more efficient and transparent. Whilst there is an element of the current 6-year FCERM Grant in Aid funding that has sought to recognise the benefits to other government department assets, a disjointed approach has continued. Future funding should bring together different funding streams at a national level, so that government departments that provide infrastructure (such as DLUHC, Transport, Health) pool their relevant funding. This will facilitate RMAs to work across sectors, and ensure they are not working independently and duplicating effort to get schemes off the ground.

Current partnership funding policy and outcomes must also better align with national FCERM policies and with stated ambitions, so there is greater certainty for Risk Management Authorities and communities.

7. A clear funding route for adaptation

Challenge: The current FCERM economic appraisal process and partnership funding calculator don't work for coastal adaptation projects. Benefits are demonstrated by properties with reduced risk of flooding or coastal erosion, rather than interventions that adapt the community.

Recommendation:
We urge that the FCERM economic appraisal process and outcomes are reviewed, so that they facilitate better long-term decision making. It needs to consider coastal adaptation to both flooding and erosion risk as a 'do something' option that can be funded, rather than an option that is pursued because building new defences is unaffordable. The concept of greater flexibility in investment so as to align with climate adaptation interventions was a key recommendation of the Committee on Climate Change (2018) and also of coastal research involving stakeholder workshops conducted by Brown et al (2023)[8].

In tandem, there needs to be greater clarity for Risk Management Authorities about how to access and fund adaptation. It's encouraging that Defra's Coastal Transition Accelerator Programme[9], being piloted in four locations, is exploring the funding and finance mechanisms regarding coastal adaptation; we look forward to seeing its outcomes.

8. Coastal local authorities that are adequately resourced

Challenge: Local authorities receive 'revenue' funding from the Department for Levelling Up Housing & Communities (DLUHC) for operational expenditure such as staff time, maintenance of infrastructure and engagement activities. However, this funding is stretched across many priorities including schools and social care. The level of funding received is a 'postcode lottery' based on historic priorities, with some local authorities better resourced than others to manage coastal flooding and erosion risk.

With the need for greater engagement with communities around coastal adaptation, local authorities need larger, more capable and resilient teams working on coastal management.

Recommendation:
We propose that funding for FCERM operations is ring-fenced clearly in central government grants to local authorities and calculated on a needs basis using flood and coastal erosion rates.

There are some excellent examples of coastal partnerships where local authorities bring together resources and services to deliver the very best outcomes – for example Coastal Partners – Hampshire and West Sussex[10]; Coastal Partnership East[11].These should be supported and promoted as best practice, with guidance on set up and governance.

9. Access to funding for maintenance of existing defences

Challenge: Budget within local authorities for maintaining infrastructure is thinly stretched. The Environment Agency can access Grant in Aid funds from central government for the maintenance of sea defences, based on the level of risk. However, coastal local authorities do not have access to this funding stream, even if the assets that they are responsible for have been built using Grant in Aid. Local authorities are left with a growing set of rapidly deteriorating coastal assets, a ticking timebomb.

Furthermore, there appears to be no consistent national level understanding of the status and maintenance of coastal defences for the entire coastline.

Recommendation:
Funding for the maintenance of existing FCERM assets should be put on a more equal footing to capital funding. Maintenance is crucial for saving homes and lives and it should be framed that way. It makes financial sense too: for river flooding, ABI and Flood Re found[12] that for every £1 spent on flood defence maintenance saved £7 in spending on new defences. The case for coastal flood and erosion risk assets would likely be even stronger given the comparatively higher costs of coastal schemes.

We recommend giving local authorities similar access to FCERM Grant in Aid for coastal asset maintenance as the Environment Agency for both flood risk and erosion risk management assets.

10. Urgent action to address coastal landfills

Challenge: Approximately 1200-1400 historic landfill sites are at risk of coastal erosion and flooding in England & Wales[13]. There is limited understanding of the potential consequences on the environment and human health if they are left to leach or erode. The existing FCERM funding mechanism doesn't fund new schemes which purely protect coastal landfills[ii]. This is despite a lack of certainty about what they contain and goes against the precautionary principle.

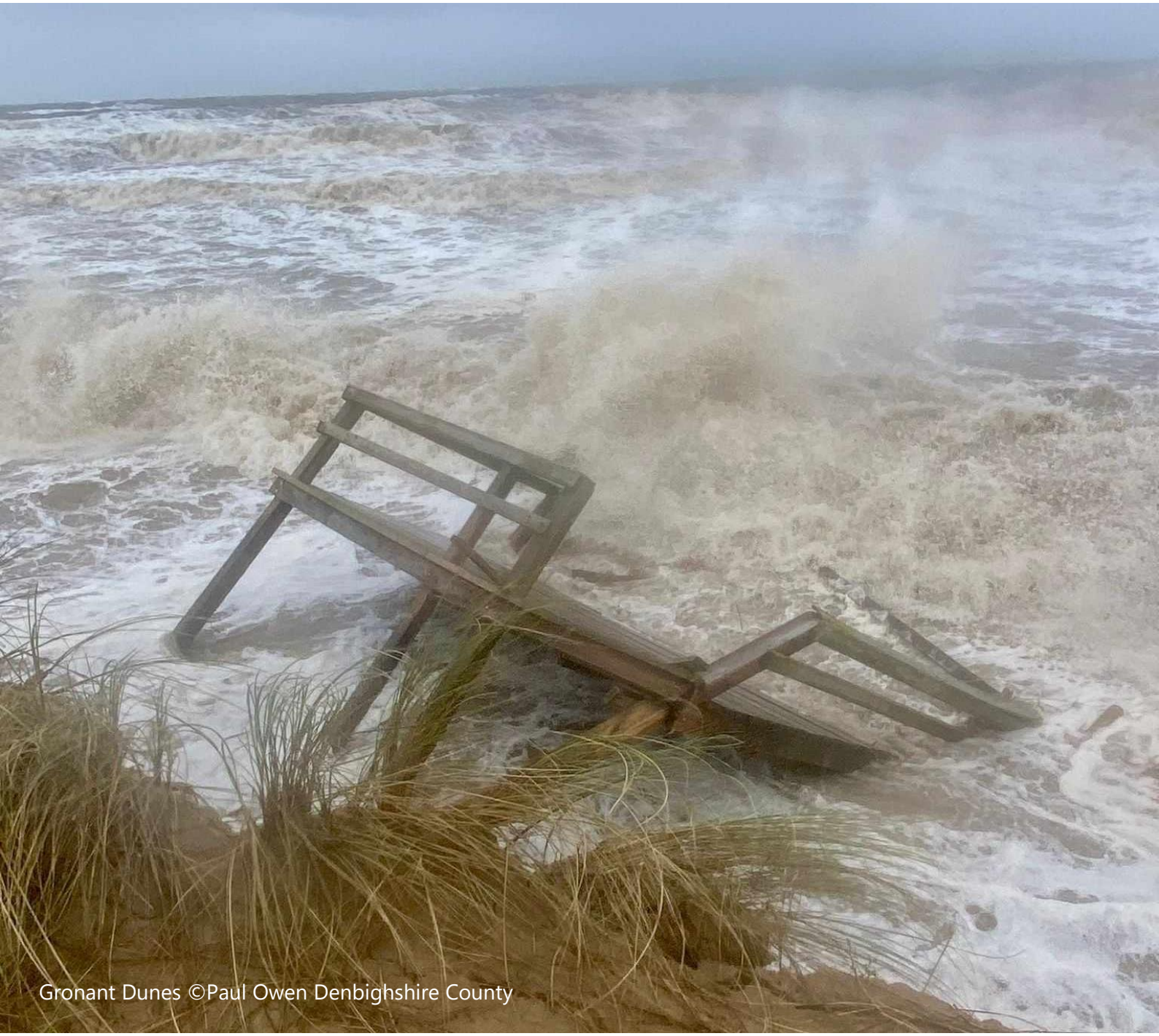
Defra is undertaking a assessment of coastal landfill sites in England to inform a potential policy review. This is welcome, but the issues have been known to exist for over ten years and a review does little to help coastal managers facing pressing decisions about how to reduce risks.

Recommendation:
Legislation does exist to prevent the release of waste into the coastal environment, but the thresholds for harm are set so high that the impact of the pollution is often hard to prove.

[ii] An example from Cardiff (Lambey Way) demonstrated the challenge of securing FCERM funding when only the landfill is at risk, and there is no linked flood risk to people or property

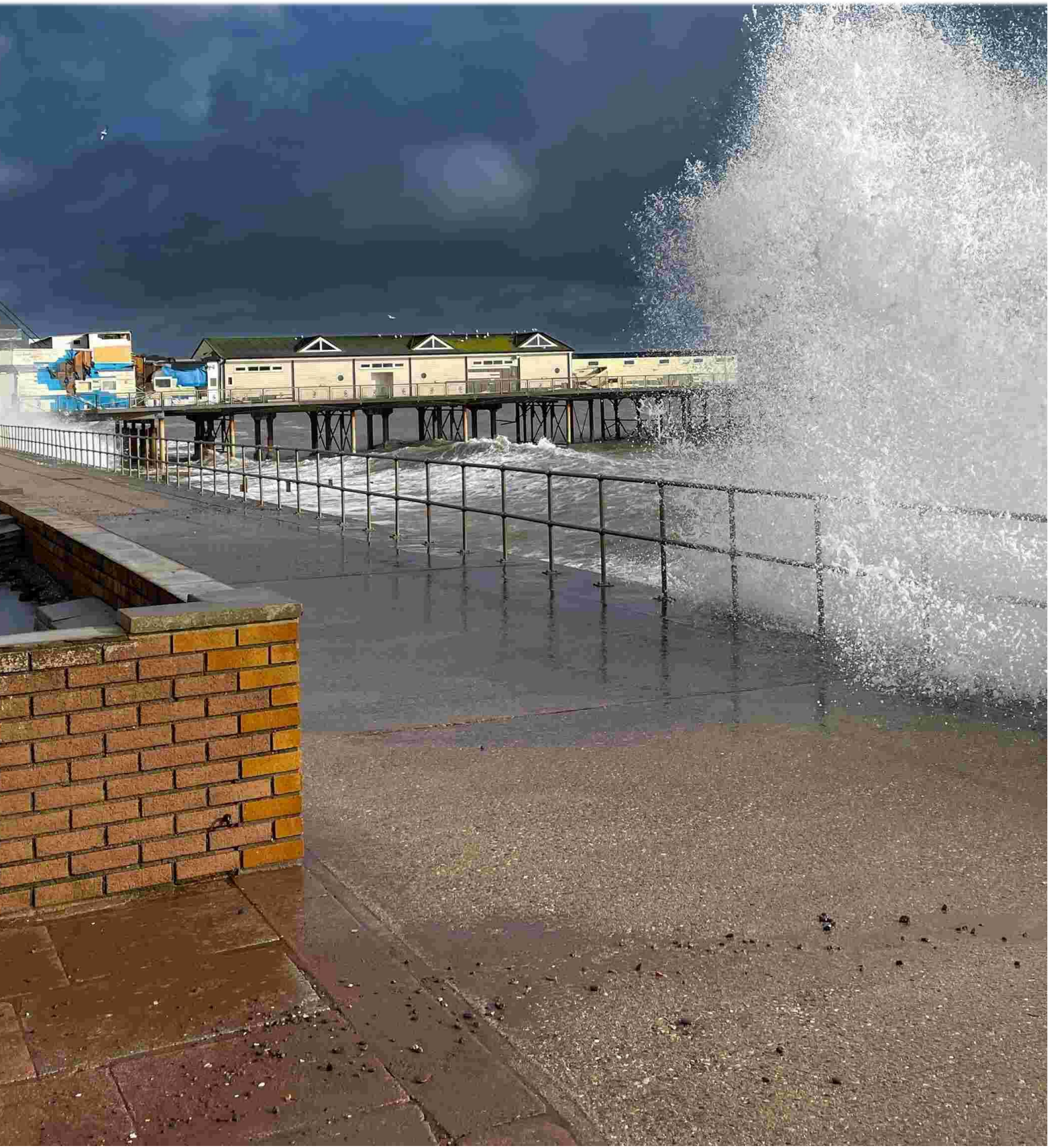
The legislation needs tightening so there is greater clarity around the 'levels of harm' and how these are enforced. If the FCERM appraisal outcomes were expanded to cover landfills, this would then provide a clear legal driver to unlock FCERM funding.

However, fixing the issue of coastal landfills is likely to cost billions, and local authorities, who now own most of the sites, do not have the funding to fix the issue, even if enforcement action was taken against them. We therefore call for urgent action to ensure funding is allocated to mitigating risks from coastal landfills. For landfills currently in operation, we suggest that a landfill levy is developed on operator licenses to help fund the mitigation of current and potential future pollution.



Gronant Dunes ©Paul Owen Denbighshire County

Postcards from the Edge



Here we present reflections or 'postcards' from coastal practitioners. These offer a range of geographical and thematic perspectives from Britain's coasts, alongside some international perspectives.

The postcard from the crumbling east coast raises the issue of multiple eroding towns. As each town is impacted there is a gradual reduction in the benefits the coast offers. "Is the ongoing and growing loss to the nation of this disappearing coastline being properly considered?", the postcard asks.

The postcard from the south coast talks of the vicious cycle of coastlines developed over centuries that are now highly-defended with sea walls and cliff stabilisation. Many of these defences have reached – or are reaching – the end of their effective design life, requiring ever more maintenance. Budgets for maintenance are stretched and so there is a growing risk of sudden, catastrophic failure during storms.

Meanwhile, the postcard from the Welsh coast offers a positive reflection on the recent Coastal Risk Management Programme which has unlocked millions of pounds of investment to help fortify, adapt and support struggling coastal communities in Wales. The postcard hails the programme as an exemplar of strategic planning, innovative solutions and collective action, which has championed nature-based solutions alongside innovative engineering.

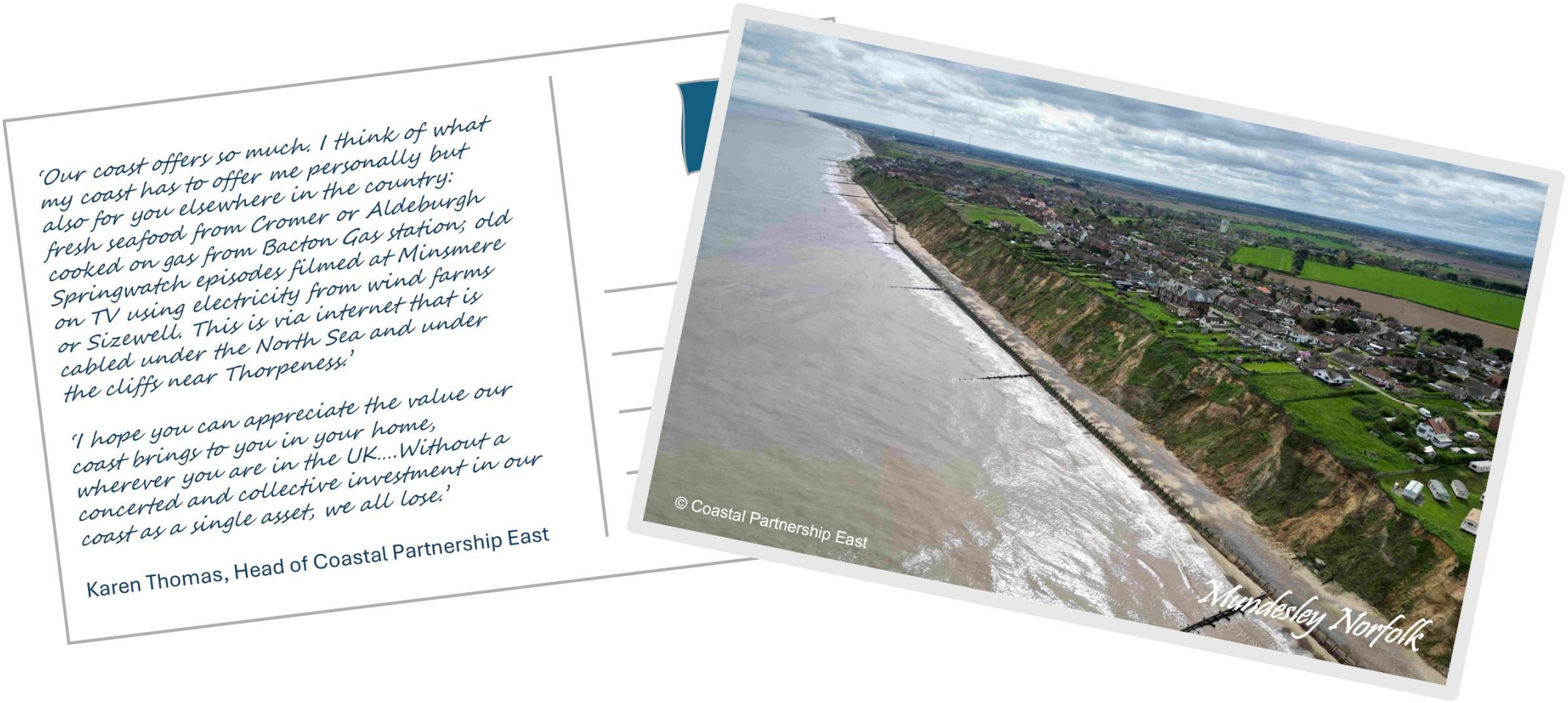
A postcard from a coastal scientist discusses the uncertainty around storm patterns, storm surges, tidal ranges and waves, all exacerbated by climate change. The uncertainty poses immediate challenges to coastal practitioners in terms of design and scheme life of coastal defences, as well as 'an uneasy reality' over decisions such as the commissioning of new defences or implementing strategies to realign the coast. There is also the looming reality of the next big storm, and whether coastal practitioners can balance this with a strategic plan.

But coastal storms are often a wake-up call for change. Our international postcards from France and New Zealand cite key storms as pivotal in recognising that protection is not the only viable response, and the need to consider managed realignment of the coastline and relocation. From the Netherlands, we hear how major flood events in the 1990s triggered a shift to providing more room for water and the initiation of the Dutch Delta Programme.

In England and Wales, this evolution is reflected in a transition from policies of 'Hold the Line' to those of 'No Active Intervention' or 'Managed Realignment' in Shoreline Management Plans (SMPs). SMPs are the subject of another postcard from coastal managers on the south coast. SMPs are deemed to be the bedrock of coastal decision making, providing an evidenced-based, long-term vision for more sustainable coastal management. But much more work and funding is needed to make them a reality. For those communities literally on the front line, there is a pressing need for investment in adaptation plans.

Finally, a postcard focusing on coastal waste management highlights the alarming issue of the more than 1000 historic landfills at risk of leaching pollutants and even crumbling into coastal habitats. The cumulative impacts on wildlife, water quality health are unknown and potentially huge.

A postcard from the East - a soft eroding coast



It has been 25 years since the first Shoreline Management Plans (SMPs) aimed to better understand how our coasts works and how they should be managed. Around 100km of our coast in Norfolk and Suffolk has 'No Active Intervention' or 'Managed Realignment' policies to deliver from the year 2025. With no current funding mechanisms to deliver these policies in some rural locations, we are experiencing increased challenges for coastal communities facing erosion.

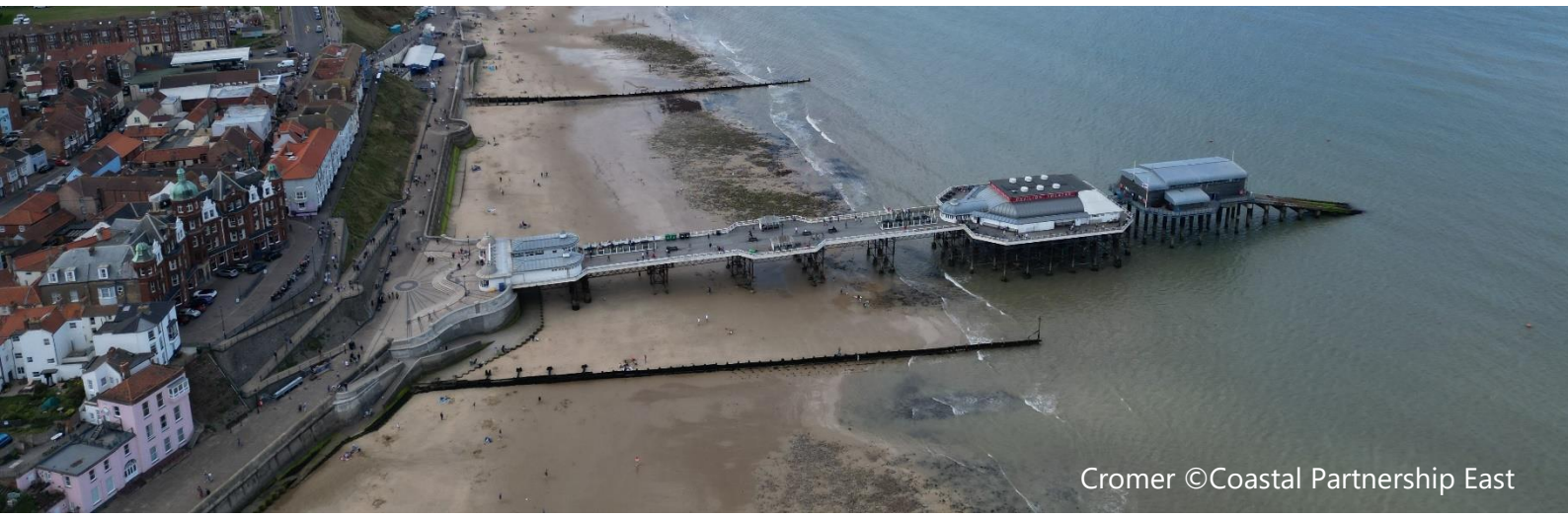
Despite the considerable increase in Flood and Coastal Erosion Risk Management (FCERM) funding for the 2021-2027 period to £5.2billion, we need to attract additional funding through partnerships and initiatives outside of the usual box. Currently there are a lack of mechanisms in place to do this and we have relied heavily on the Environment Agency's FDGiA. In most cases this served us well, but we now need to explore and develop new and innovative funding streams.

For Norfolk and Suffolk, which has some of Europe's fastest eroding coastal zones, there are some 2500 properties at risk from erosion, and the number is growing.

But just as we calculate the number of properties better protected by a potential scheme or adaptive solution, we lose them to demolition. And overnight the next row of homes is presented to the waves making it hard for the benefits to ever stack up while a place is slowly 'salami sliced' into the sea.

As we assess the economics of our coastal communities in terms of their individual 'value to the nation' to meet Treasury rules, there appears to a widely held economic view that if one seaside location is lost, people can always go to the one further along the coast. Leading us to the questions, what if the next town is also eroding, and the next town, and the next?

What if the sum of the parts is a much greater loss than we can calculate and attract funding for? As each town is impacted there is a slow reduction in the benefits these places offer. We are effectively writing them off. This is not being considered as an ongoing loss to the nation. Is that fair or equitable? Does this fit the national 'Levelling Up' agenda?



Cromer ©Coastal Partnership East

And what of our national ambition for climate resilient infrastructure?

Many of our key assets must be based on the coast. Our ports serve offshore wind and provide hubs for green energy and marine transport, keeping lorries off our roads. Nuclear power and gas and electricity pipelines criss-cross our soft glacial cliffs. They go over, under and through despite our erosion risk maps and Shoreline Management Plans clearly showing the risks further down the line.

Water and sewage treatment facilities, burgeoning new desalination plants and hydrogen hubs all need to be close to the coast. These aim to futureproof our water supplies against drought, remove our waste and lower our carbon emissions. This raises the question, is the asset truly resilient if the community is lost or the power supply they rely on has flooded?

East coast tidal surges and ongoing erosion threaten major roads and prized coastal routes. These offer locals and visitors alike the chance to connect with the landscape and environment. This brings benefits to mental health and wellbeing in ways that have not yet been measured completely. The need for our coast to be managed for both wildlife and people, business, and commerce, local and visitor are all intertwined. So why don't we have funding strategies that better allow for that?

To deliver wider outcomes, we can no longer rely on central government funds and much less so from single government departments. It is very rare that local government can contribute significant sums to schemes either.

A new era of coastal management

Through the DEFRA Flood and Coast Innovation Programme (FCIP) we are aiming to bring in a new era of coastal management that allows for adaptive resilience. On our coast I hope we can create a framework that allows those at most risk from erosion to be supported to move away from high-risk areas, into new relocation zones with meaningful support packages. We must establish an evidence base that considers new valuations of the coastal economy, society, and environment to allow funding to flow from those who now recognise that they are benefitting from the coast.

A change in perspective

As the government accelerates green energy to counter emissions and meet climate change targets, the east coast is becoming a key clean energy hub for the UK. The World Bank is now funding sand engines like Bacton's for developing nations affected by sea level rise. Should our coastal communities be remunerated for the situation they now face because of climate change, ultimately caused by our collective energy and resource consumption? This year we have had to inform two communities that we are unable to do more for them to stop the rate of erosion. This has been increasingly difficult in the aftermath of 2023's relentless storms.

Ultimately, if our coast is of value to us as a nation, we need cross-government and cross-sector investment support for our coastal authorities in their management of the coast and our coastal communities and businesses to deliver wider outcomes. We also need to generate increased partnership funding contributions from the private sector. Coastal towns

drive our national coastal tourism, energy and port economies and are custodians of our coastal wildlife and environment so its sustainable, resilient, and thriving for us all to continue enjoy and benefit from.

Our coast offers so much. As I sign off this 'postcard from the edge' I think of what my coast has to offer me personally, but also for you elsewhere in the country: fresh seafood from Cromer or Aldeburgh cooked on gas from Bacton Gas station; old Springwatch episodes filmed at Minsmere on TV using electricity from Outer Gabbard, Vattenfall and Vanguard wind farms or Sizewell. This is via internet that is cabled under the North Sea and under the cliffs near Thorpeness.

I just hope these things we have come to enjoy are sustainable on our coast. I hope you can appreciate the value our coast brings to you in your home, wherever you are in the UK. I love our coast. It's a national treasure, a unique 12,500 maritime 'corridor' and therefore a 'place' in its own right. It needs and deserves a 'place-based approach' through a multi-sector lens of investment. Without a concerted and collective investment in our coast as a single asset, we all lose.

Karen Thomas, Head of Coastal Partnership East

Corton ©Coastal Partnership East

A postcard from the South – a highly defended coast

'Within the many estuary systems along the south coast, the presence of defences...has led to the reduction in inter-tidal habitat such a salt marsh, reducing the ecological functioning of these areas as well as reducing a natural wave attenuation buffer...'

'Many of these defences are now reaching the end of their effective design life and require ever greater amounts of maintenance. Budgets available for maintenance are limited, meaning there is a growing risk of sudden, catastrophic failure during storm events.'

Alan Frampton - FCERM Strategy, Policy & Environment Manager, BCP Council
Mark Stratton - CIWEM FCERM Expert Panel Chair; Coastal Policy, Environment & Research Team Service Manager, Coastal Partners

Along the south coast of England there are many towns and cities that have developed over centuries, accompanied as they have grown by the construction of coastal defences and slope stabilisation schemes to protect against the risks of coastal flooding, coastal erosion and coastal landslides.

Consequently, many of these developed and defended areas have cut off the natural supply of sediment to the coastal system and interrupted transport of sediment along the shoreline. This has led to narrowing and lowering beaches along defended coasts, requiring either larger hard structures or the regular supply of sediment from distant sources through beach renourishment. This latter approach provides a nature-based solution to address coastal flood and erosion risks; it also has the benefit of providing an attractive amenity resource that underpins vital local tourism economies that many communities are highly reliant on.

Within the many estuary systems along the south coast, the presence of defences, often accompanied by land reclamation, has led to the reduction in inter-tidal habitat such a salt marsh, reducing the ecological functioning of these areas as well as reducing a natural wave attenuation buffer that is beneficial for flood and erosion risk management.

Many of these defences are now reaching, or have reached, the end of their effective design life and require ever greater amounts of maintenance. Budgets available for maintenance are limited, meaning there is a growing risk of sudden, catastrophic failure during storm events.

Many of these defences will also soon require replacement and upgrade if they are to continue to provide communities with ongoing resilience as the climate changes. But here there are challenges with the current funding arrangements that focus on a narrow band of FCERM outcome measures that are not designed to consider the needs of place-based resilience. This means that communities that could be made resilient are currently unable to access central government funding to achieve this. If defences cannot be replaced in the coming decades, it will likely lead to sections of failed defences impacting the usability of, and accessibility to, sections of the coast that people have enjoyed in decades past.

The second generation of Shoreline Management Plans (SMPs) adopted in 2010/11 largely set out a long-term vision and policy approach of 'hold the line' of existing defence for these developed areas of coast. If this is to be achieved, in addition to the funding challenges outlined above, there are a range of other challenges that climate change poses to towns and cities along the south coast, including:

- Wave overtopping of defences will occur much more frequently and will become more of a problem in the immediate future as it occurs well before defence crest levels are exceeded by sea levels. Wave overtopping leads to inundation by fast flowing, debris-filled water that poses a risk to property, infrastructure and life.
- Sea level rise will cause a more gradual, though accelerating, change in tide and storm surge levels. Longer-term this will mean existing defence levels will be exceeded more often.
- Beach lowering and narrowing in response to higher sea levels and more frequent storms, leading to more frequent wave overtopping of defences and/or failure of defences. This will be exacerbated as sources of available sediment for beach renourishment become scarcer and/or it becomes uneconomical.

- Coastal squeeze in front of retained defences in estuarine systems, combined with other environmental factors such as pollution, higher temperatures and high nutrient levels, further reduces the amount of inter-tidal salt marsh habitat, with subsequent impacts on ecology.
- In order to construct new defences that add to habitat loss via coastal squeeze, there is a legal requirement to provide compensatory habitat. However, the number and location of suitable sites to achieve this is limited, meaning that in future FCERM schemes could be refused environmental consent due to the lack of ability to provide compensatory habitat. This is an issue that is likely to increase in its prevalence in coming years, especially with the additional need to also consider Biodiversity Net Gain.
- There are some areas of coastal landfill that could potentially make ideal locations for realigning defences to restore habitat but that are off limits due to the presence of a historic landfill that has to be defended to avoid it eroding into and polluting the environment. In addition, the current lack of funding to defend coastal landfill sites means there is an increasing risk of them being eroded and increasing pollution in the coastal environment, with associated consequences.
- The ability to implement and even consider relocation of development in many urbanised areas due to lack of space within local planning authority boundaries is a problem. This, combined with pressure for more housing and many brownfield regeneration sites being within flood zones, means that there is pressure to allow new development in coastal risk areas.
- Areas of high-ground that can be defended against coastal erosion from the sea by defences at the shoreline are still vulnerable to coastal instability due to groundwater and drainage processes. These areas require extensive and expensive slope stabilisation measures, yet there is currently no national funding mechanism available to enable such measures to be installed. As the climate changes, there will be an increasing risk of more frequent coastal landslides that will cause loss of cliff top property and infrastructure. Arguably, it is these high ground areas that we need to relocate development to from the lower-lying areas at risk of flooding, and so should be seeking to defend. Yet the current economic appraisal process for FCERM schemes does not support this.


Chesil beach gabion damage ©Alan Frampton

The challenges outlined above are not exhaustive, but illustrate the range, scale, complexity and, in some cases, interaction between them. How these are addressed will require a multi-sector, integrated approach. In many places, it may require a change in defence approach if 'hold the line' is to be achieved. It will also require an acceptance of a loss of beaches and inter-tidal habitats, meaning many of our coastal towns and cities will look and feel very different in the long-term compared to the seaside resorts we picture them as being today.

Failure to grasp these challenges will mean the risks identified will become a growing reality for many communities, leading to fewer beaches for amenity, loss of habitats, and a coastline strewn with failed defences that will reduce the attractiveness of the coast as being a place to live, work and visit.

Alan Frampton - FCERM Strategy, Policy & Environment Manager, BCP Council

Mark Stratton - CIWEM FCERM Expert Panel Chair and Coastal Policy, Environment & Research Team Service Manager, Coastal Partners

Note: This article has deliberately focussed on the challenges posed to areas of development where there is an intent set-out in SMPs to continue to provide defences over the next century. It should, however, be acknowledged that there are also many smaller settlements along the south coast that will not be defended longer-term and will be vulnerable to coastal change in different ways and so need to plan proactively to adapt, although there is a current lack of policy to enable this to happen.

Eastoke Hayling Island ©Coastal Partners

A postcard from Wales - an exemplar of coastal adaptation

'The Coastal Risk Management Programme has championed nature-based solutions such as wetland restoration and beach nourishment, alongside coastal defences and innovative engineering solutions.'

'As climate change bites, these pioneering projects serve as guiding lights, illuminating the path towards a safer, more sustainable tomorrow for Wales and its coastal communities.'

Mike Wellington - Director of Flood Risk & Drainage, WaterCo

The coast of Wales is approximately ten times longer than its border with England. This great natural wonder brings numerous opportunities, but also risks of coastal erosion, rising sea levels and storm surges.

The Welsh coast, as with the UK coast as a whole, has also struggled with socio-economic decline over recent decades. Many towns relied heavily on industries such as fishing, shipping and manufacturing which declined significantly in the latter half of the 20th century and led to unemployment and economic stagnation.

With the advent of affordable air travel, more people began opting for vacations abroad, reducing the number of tourists visiting British seaside towns. Neglect and lack of investment in infrastructure, including transportation, accommodation and attractions, make seaside towns less appealing to tourists and residents alike and businesses struggle to remain profitable during the off-season.

The Coastal Risk Management Programme – an exemplar for coastal change

To fortify the coastline against the risks of coastal erosion and storm surges, and to support struggling coastal communities, the Welsh Government launched an ambitious £150 million Coastal Risk Management Programme (CRMP) in 2014. This added to the £245 million already committed to flood and coastal defences and made available from 2018.

The CRMP Capital Investment Programme has taken a proactive, strategic approach to tackle the complex challenges posed by coastal risks. Combining infrastructure development, sustainability and community engagement, the CRMP protects vulnerable communities, historic coastlines and natural environments, and fosters resilience to the changing climate. It is an exemplar of strategic planning, innovative solutions and collective action. On completion, the CRMP programme will have funded 15 schemes across Wales benefitting over 15,000 properties.

The programme has unlocked millions of pounds worth of investment over 5 years by utilising public sector borrowing powers. Local authorities can use the Prudential Capital Finance scheme to borrow at levels higher than those supported in the Government revenue support system. Under this scheme, the amount of debt local authorities can incur is not capped, but must be affordable and well-planned.

CRMP has championed nature-based solutions such as wetland restoration and beach nourishment alongside fortifying coastal defences and innovative engineering solutions to protect key infrastructure. Nature-based solutions not only mitigate risks but also promote biodiversity conservation and ecosystem restoration, enhancing ecosystem resilience and preserving the natural heritage of Wales's coasts for generations to come.

Through engagement initiatives, CRMP also empowers local communities to understand, prepare and respond effectively to potential threats, fostering a culture of resilience. Safeguarding coastal infrastructure, communities, tourist destinations, businesses, and transport links secures livelihoods and supports the sustainable growth of Wales's coastal economy.

A catalyst for regeneration

In many coastal areas that have suffered economic decline, projects under CRMP have been catalysts for regeneration.

Rhyl on the Welsh north coast, for example, has witnessed a transformative coastal protection scheme carried out in three phases since 2009. The first phase, completed in 2012, redeveloped an old fairground attraction site as a retail park, bringing much needed investment to the area. The second phase, ending in 2022, now protects 1,650 properties in East Rhyl from coastal flooding.

Meanwhile, the Colwyn Bay waterfront project has aimed at revamping the waterfront while fortifying flood defences. The project integrated two separate council schemes for coastal defence and for environmental improvements, as neither scheme could be sustained independently. This drew on funding from Council Capital Funding and Welsh Government Tourism, Coastal Defence and Transportation funding. The latter was used to protect the highway assets and enhance the provision of active travel.

At Fairbourne, Gwynedd, an innovative approach has been taken to protect the village community and the area's infrastructure. This approach involves managed realignment allowing certain areas to return to a more natural state, including the creation of new habitats, property buyouts and infrastructure relocation. It's been hailed for its long-term vision in addressing coastal risks sustainably.

The Barmouth coastal defence scheme, on the other side of the Afon Mawddach estuary, highlights a holistic approach by combining traditional defences like sea walls with natural measures such as dune regeneration. By integrating engineering solutions with nature-based strategies, it has significantly reduced flood risks to the town safeguarding homes, businesses and infrastructure.

These initiatives lay the groundwork for a resilient, adaptive and environmentally conscious future. As well as offering immediate reduction in flood and erosion risks, they are preserving ecosystems, heritage sites and local economies. Their long-term benefits, including reduced maintenance costs and increased resilience to climate change, outweigh the initial investments. As climate change bites, these pioneering projects serve as guiding lights, illuminating the path towards a safer, more sustainable tomorrow for Wales and its coastal communities.

However, challenges persist: balancing environmental conservation with infrastructure development; securing funding for large-scale projects; and ensuring effective community engagement to enable implementation. There is a need for continued collaboration between governmental bodies, stakeholders and local communities to ensure the success and sustainability of coastal risk management initiatives. Investing in research, innovative technologies and long-term planning will also be pivotal in enhancing Wales's resilience against future coastal threats.

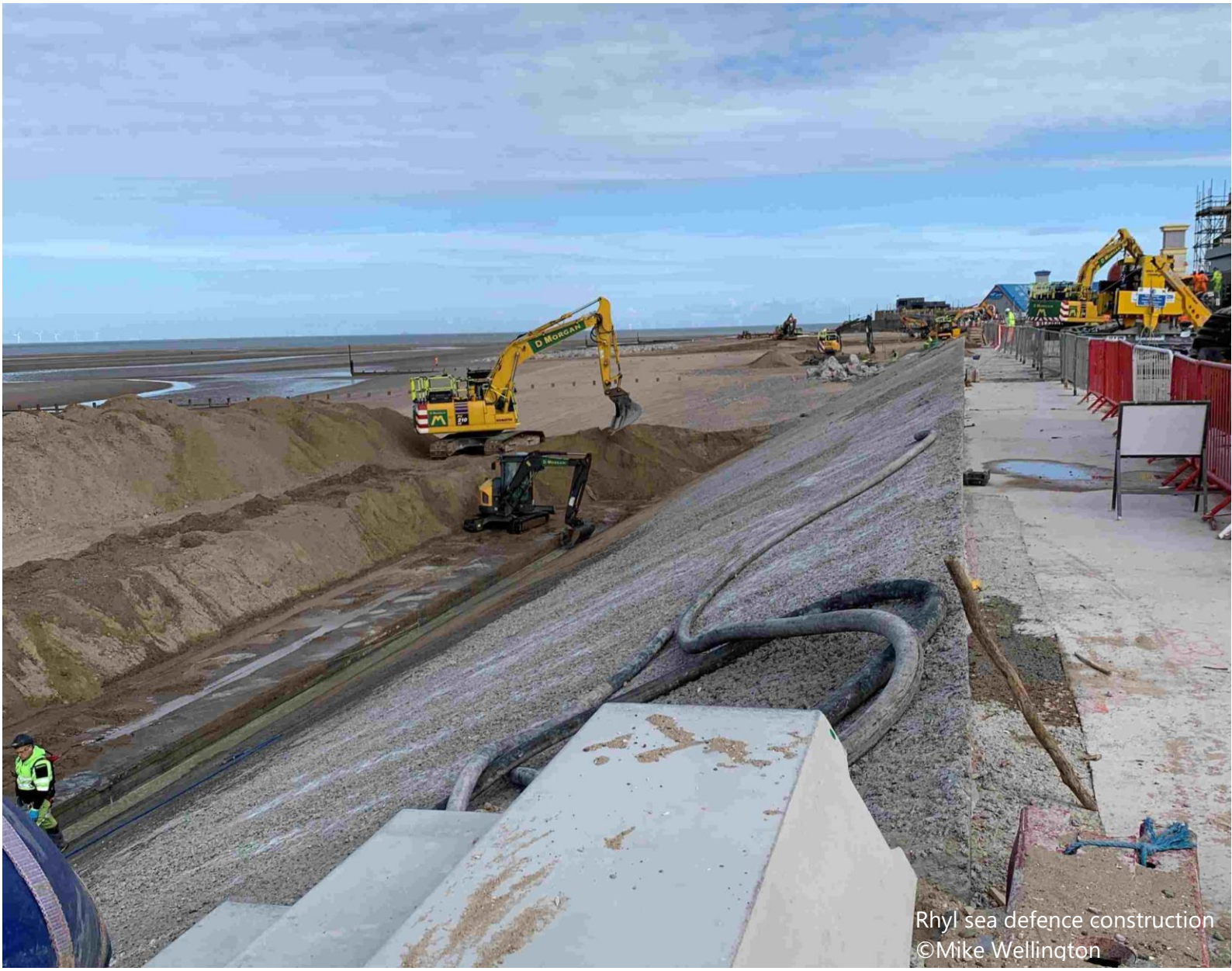
Looking ahead: mainstreaming an adaptive, nature-based approach

Looking ahead, a shift towards adaptive strategies and nature-based solutions will be crucial in tackling future threats: incorporating natural elements into coastal defences, promoting ecosystem restoration and enhancing community resilience through education and awareness campaigns. Crafting ecologically conscious coastal defence strategies requires a nuanced approach which adheres to regulations and embraces sustainable methodologies and community engagement. Only by harmonizing protection needs with environmental preservation can we safeguard our coasts for generations to come.

Yet despite adaptation and resilience of communities to climate change being highlighted in several strategic documents (including the National FCERM strategy and the 5-year climate change adaptation plan, Prosperity for all - a climate conscious Wales[14]) the current governance and legislative frameworks have not evolved rapidly enough to enable wider delivery of adaptation.

One key issue for further consideration is the difference in Risk Management Authorities' powers between the Coastal Protection Act (CPA) 1949 and the Flood and Water Management Act 2010. The CPA 1949 is framed around erosion and is not aligned with delivering climate change adaptation. Do we need a CPA for the 21st century which properly considers the changing climate which wasn't anticipated in 1949?

Mike Wellington, Director of Flood Risk & Drainage, WaterCo



Rhyl sea defence construction
©Mike Wellington

A postcard about Shoreline Management Plans

'Shoreline Management Plans have been the foundation of FCERM for nearly three decades in England and Wales, held up nationally as the bedrock of coastal decision making...'

'Not only are SMPs non-statutory policy documents, they come with no guarantee of funding to deliver them.'

Mark Stratton - CIWEM FCERM Expert Panel Chair and Coastal Policy, Environment & Research Team Service Manager Coastal Partners
Alan Frampton - FCERM Strategy, Policy & Environment Manager BCP Council

Shoreline Management Plans (SMP's) have been the foundation of FCERM for nearly three decades in England and Wales, held up nationally as the bedrock of coastal decision making and often revered internationally. They take a comprehensive look at coastal process across regional stretches of coast and consider land use, existing development, the natural environment and community viewpoints, all in the context of coastal flood and erosion risk. This is used to determine the most sustainable coastal management approaches over the next 100 years. That's the theory anyway.

They are often described as mutually owned plans: developed in partnership by the Environment Agency, local authorities, regulators and other coastal partners. The second round of SMPs were adopted around 2010 and identified 'sustainable' management approaches over three planning timeframes: Short-term: 2005 to 2025, Medium-term: 2026 to 2055 and Long-term: 2056 to 2105.

They then set policies ranging from Holding the Line (HTL) to No Active Intervention (NAI) alongside policies which promote habitat creation through Managed Realignment (MR) or land reclamation via Advancing the Line (ATL). These are set for discrete lengths of shoreline called policy units. Policies exclusively relate to sustainable management of coastal flood and erosion risk. However, they are not in and of themselves an integrated coastal zone management (ICZM) plan15, but one of a suite of plans across various sectors that, in theory, have ICZM principles embedded within them, including a collective approach.

There are 22 SMPs around the coast of England and Wales, and there should be no argument that the evidence base underpinning them is second to none and the guidance on how to develop them is world class. These plans and policies are then used to guide the ensuing FCERM approach, often leading to strategy and scheme delivery. They are also expected to be a material consideration for the planning system and be considered when developing Local Plans or determining planning applications.

Now let's talk about how they actually work. Given the national complexity of the coast and the reality that every stretch of coast is different, trying to fit often large stretches of coast into one set policy descriptor proved extremely challenging and has left a legacy of challenge around interpretation.

Alongside this, back in the early 2000s when the second round of SMPs were being developed, communities and local politicians were not so well versed in coastal management as they are today. In some cases, this arguably resulted in the wrong policies being adopted as a result of public and political pressure, i.e. short term policies of HTL were chosen with deferral of NAI or MR to a future time epoch with the notion that with time, the necessary work to plan for and then implement the change at a later date could be achieved.

One might expect that if an SMP had been adopted by the Local Authority and approved by the Environment Agency and Defra then it would go on to be delivered. Think again.

Not only are SMPs non-statutory policy documents, they come with no guarantee of funding to deliver them. This was made even more complicated by the introduction of Partnership Funding in 2012. This required FCERM projects to find funding contributions alongside Defra FCERM Grant in Aid (GiA) to be delivered; the amount is dependent on how many homes are protected from flooding or erosion or how much habitat is created.

Having a strong benefit-cost ratio is no longer enough to secure full funding from Defra FCERM GiA, even if the adopted SMP is saying it's the right thing to be doing.

In theory, after the SMPs, the next stage in the FCERM process is to develop a strategy to determine how to actually deliver the policies that have been set. After that, individual schemes come forward, often separated by three different Environment Agency funding gateway decisions.

Experience has shown that it can take ten years or more to get from the SMP policy to breaking ground on scheme delivery with no cast iron guarantee along the way that the next step in the process will be taken or funding will be secured. So, in essence, SMPs are simply providing a long-term vision for a more sustainable coastal risk management approach and a set of policies to get there over the 100-year planning horizon. Much more work (and funding) is then needed to actually deliver the policies.

SMPs are crucial documents for the planning system but are notoriously difficult to unpick or understand unless you have actually worked on their delivery. This is the case for many coastal risk managers as well as those in other sectors with even less knowledge of the FCERM sector. In practice planners are often left perplexed by the fact that policies state HTL or MR yet there is no certainty of it happening.

How then can they be expected to make planning decisions or develop local plan policy?

As SMPs transition from policies of HTL to those of NAI or MR there is a pressing need for investment and adaptation/transition plans. However, there is no clear guidance available to local authorities on how to do this and no clear funding pathway because the current funding policy rewards protecting homes, not moving them out of at-risk areas. Where does that leave communities on the front line?

The environmental consequences of the SMP's decision making should also not be underestimated. If a policy of HTL is selected adjacent to an environmentally designated coastal stretch it will cause harm as intertidal habitats like saltmarsh and mudflats are squeezed and lost as sea levels rise. With this comes a legal responsibility to offset that loss through habitat creation projects. Without the offset schemes, you may not get regulatory consent for a HTL intervention that protects life and property; another uncertainty for delivery.

Christchurch panorama ©BCP Council

It's not all doom and gloom though. SMPs provide a framework of evidence which can be built upon. Over the last four years, the Environment Agency has also worked closely with coastal groups to improve and refresh Shoreline Management Plans by:

- reinvigorating and re-establishing SMP management groups and strengthening the governance and scrutiny of how the plans are implemented at the coastal group level;
- improving the evidence that informs SMPs, including flood and erosion risk and coastal habitat change mapping;
- bringing SMPs up to date to reflect changes in guidance and evidence since they were adopted in 2011;
- being clearer on what the adopted policies mean and the management approaches and actions required to implement them; and
- trying to make them more accessible so they guide local planning and coastal management investment decisions across all sectors (following ICZM principles being implemented via multiple sector plans).

Most importantly, the SMP action plans have been given an overhaul to make them sharper and easier to use and SMPs are being made more accessible via a new national online SMP website, 'SMP explorer'. The overall aim of this recent SMP refresh was to move towards a point of ongoing shoreline management planning whereby the adopted SMPs are treated as living documents and kept up to date as more evidence emerges.

As coastal managers the SMPs run deep in our blood. We have worked on their development and gone on to deliver the strategies and schemes which flow from them. They are a valuable evidence base and a good starting point, even if they are left aspirational without the certainty of funding for their delivery.

It's also worth remembering, however, that a lot can change as time moves on and as new evidence comes to bear; SMPs aren't the be all and end all. Perhaps we could do better as a sector at closing the loop, updating SMPs as we go, and communicating what this actually means for communities – often in reality not a lot – and therefore embracing the overall aim of the recent SMP refresh work to move to a situation of ongoing shoreline management planning.

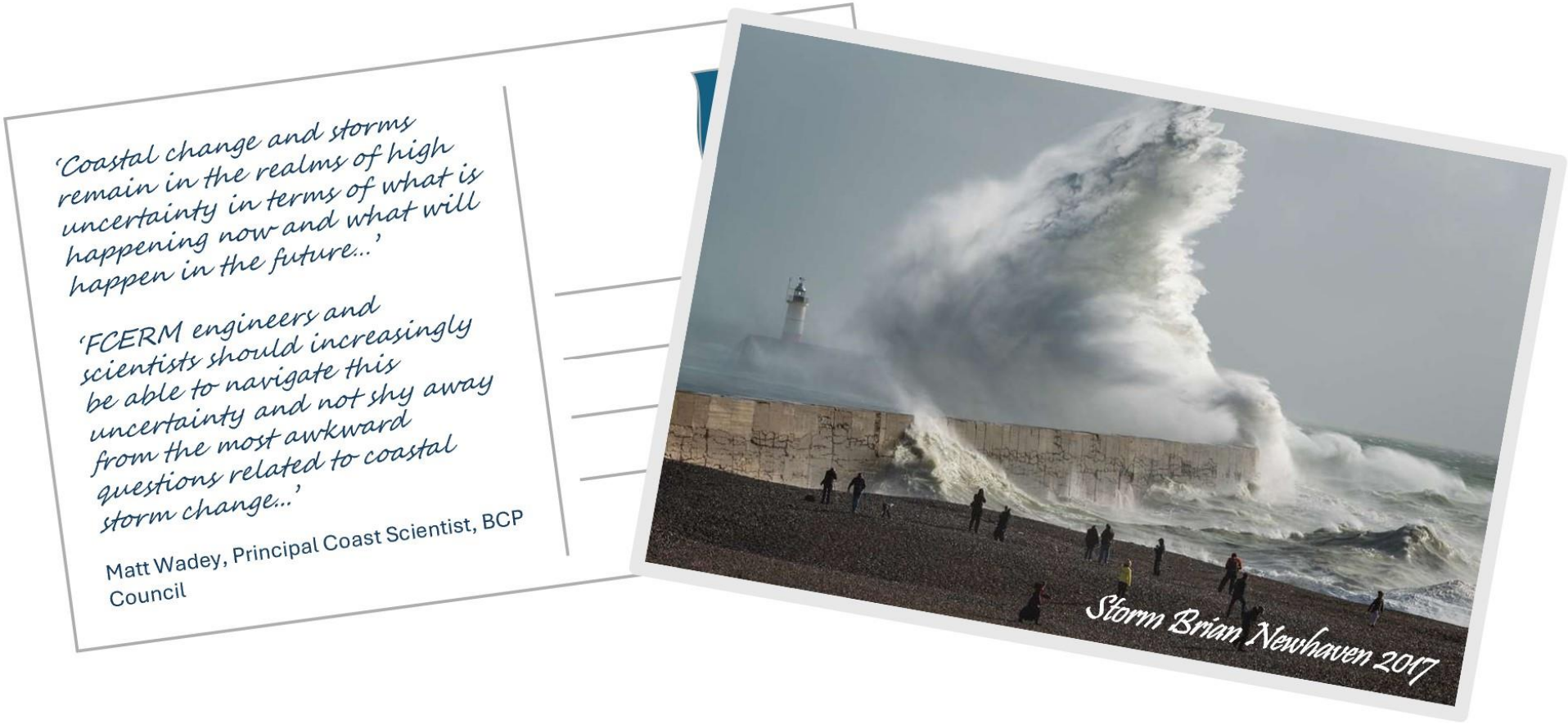
We are very lucky as a nation to have SMPs but let's not forget that they can be unduly influenced by local circumstance. Therefore we need to be mindful of what they are, what they are not and what they should be used for and what they should not.

The problem is that the answers one gets to these questions often depends on who you are asking. None the less, SMPs are doing their best, as are all the partners involved, to guide us towards more sustainable management of coastal risk.

Mark Stratton - CIWEM FCERM Expert Panel Chair and Coastal Policy, Environment & Research Team Service Manager, Coastal Partners

Alan Frampton - FCERM Strategy, Policy & Environment Manager, BCP Council

A postcard from a coastal scientist: the changing nature of coastal storms



Most thoughts around coastal change and storm impacts revolve around mean sea level rise (MSLR). This is because there is some consensus from long-term tide gauge and altimetry data which indicates an ongoing increase in MSLR around most of the world; this is expected to cause increasing loss of land and more severe flooding. MSLR projections are available to inform design considerations of new FCERM schemes via the Environment Agency's FCERM project appraisal guidance.

Yet there are many other relevant variables beyond MSLR, including all aspects of waves and sediment transport. In addition, there is considerable uncertainty in the physical processes that drive coastal change, some of which may have more immediate impacts than MSLR. For example, a recent study on the south coast of England which reviewed tide and wave timeseries showed that trends and signals in tidal ranges and storm surges showed little statistical significance. This poses challenges to coastal practitioners compared to MSLR in terms of design details, scheme life and the calculation of benefits.

For schemes along the south coast, waves exert a relatively greater effect on coastal risk compared to the east coast. Storm surges are smaller, yet Atlantic swell exposure is readily present. This adds further uncertainty over the commissioning of new defences, decommissioning of old defences, and implementation of managed realignment. Existing natural changes along with climate change exacerbate uncertainty by altering hydrodynamics and sediment transport pathways.

There is also increasingly a need to consider the interaction between coastal and subaerial processes and drainage, although this is often outside of the scope of FCERM schemes. This is important where outfalls, piers and other infrastructure are marked features in coastal systems yet their management often lies outside of the FCERM remit – e.g. with water companies or other private bodies.

A first reflection around coastal storms is about data: how do we prioritise existing observed sea level and wave data sets, both in terms of the hardware and the provision of data? This includes the national Class A tide gauges, as well as the wave buoys hosted by the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) and the National Coastal Monitoring Programmes. All are valuable yet vulnerable to decline despite being integral to forecasting. These data sets can be used to engage people and bring obvious benefits in terms of being able to critique plans and/or build theories and numerical models to inform scheme development.

A second reflection is on the everyday looming reality of the 'next big storm'. Can this be balanced effectively with a strategic vision for coastal change?

Analysis of past events is relevant to understand the trajectory of FCERM actions and maintain focus. For example, the north sea flood of 1953 tragically killed over 300 people in the UK as well as causing 100s of deaths at sea. The event exposed shortfalls in forecasting and strategic planning. It was in response to the event that drastic actions were taken to reduce future risks, such as the flood warning service and the Thames Barrier.

The storm of 1953 also shows how some events, with or without climate change, are just extraordinary. There are aspects of the 1953 storm that were quite unique, similarly indicated when reviewing much older records of storms (e.g. 1607, 1824). In all past fatal floods or permanent loss of land through erosion, there were missed opportunities to reduce the impacts.

The third reflection is broad and challenging: how, in view of both climatic and non-climatic related change, can we best serve coastal communities? It's important to remember that, whether working for a local authority or consultant, FCERM civil engineers must deliver robust schemes centred around specific outcome measures.

However, there is also a need to consider the host of other societal benefits and opportunities coastal schemes can deliver. For example, mental health benefits of beaches and natural habitats, placemaking and community, and mitigating health impacts relating to historic landfill erosion. When trying to implement the core of FCERM along with long-term and wide-ranging sustainability goals (e.g. carbon net zero), can this distract from what could be more meaningful opportunities to manage coastal change?

A fourth and final reflection is on the storms of winter of 2013/14 and how this links to observed changes and potential responses. It can be debated whether 2013/14 was a one off or marker of a new storm era, and whether it left a distinct permanent mark on sediment systems and other aspects of coastal stability (e.g. the removal of sediment that cannot recover naturally.)

A key concern is whether there is sufficient sediment supply to maintain beaches and other sediment-based assets. Many coastal features such as beaches are undervalued and sand is being consumed rapidly for other infrastructure; yet some of this infrastructure will inevitably be unprotected if we cannot protect the coast.

Meanwhile, there appears to be little learning in terms of planning following the 2013/2014 storms, and there is a need to feedback urgently on planning advice. For example, places that were flooded for the first time in 2014 and were marked for 'change' now have newbuild houses on them.

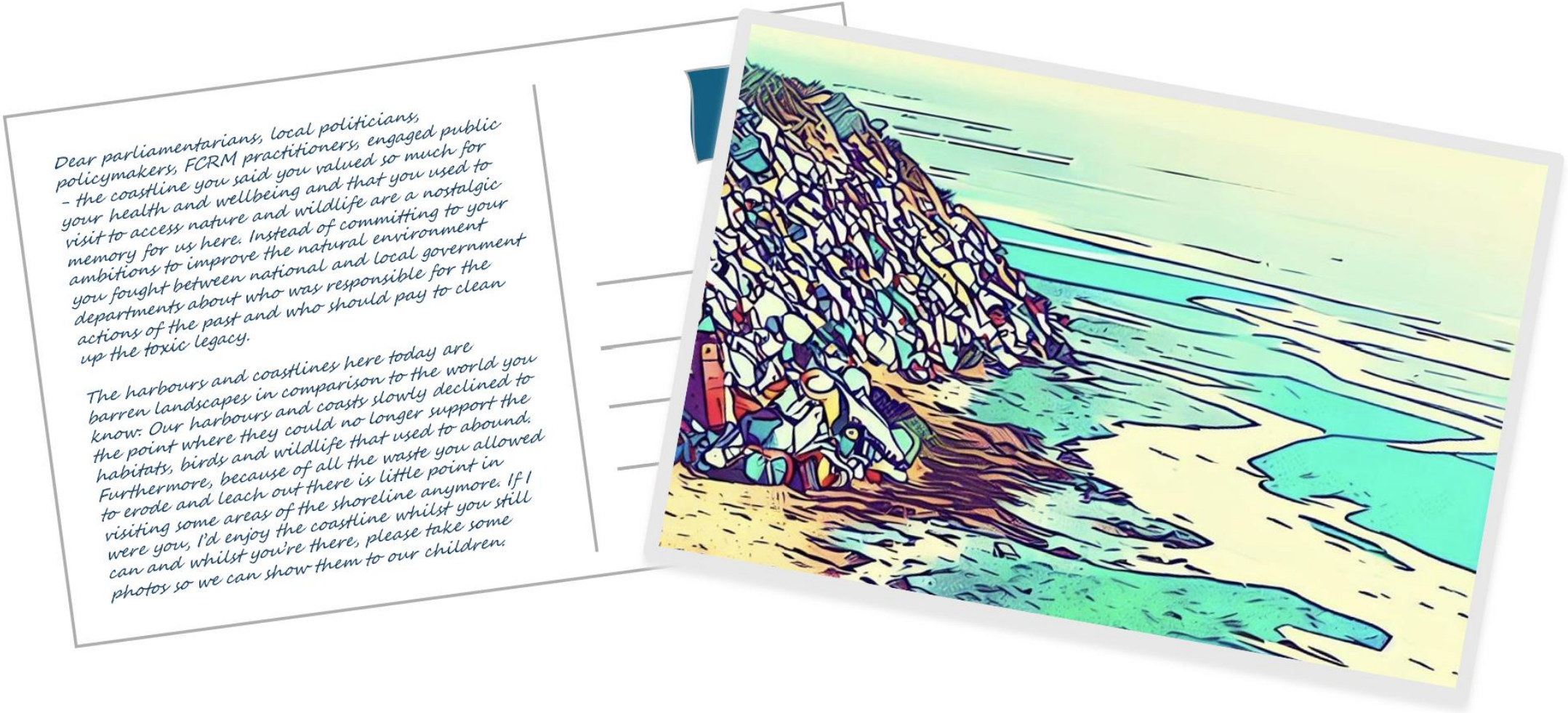
Coastal change and storms remain in the realms of high uncertainty in terms of what is happening now and what will happen in the future. The projections around sea level are generally forecast to occur relatively slowly, at least compared to the timescales of consciousness for the average human life. Meanwhile, other storm-related parameters remain uncertain, yet the impact of a single event can have profound impacts overnight on human lives and the pathway of coastal change.

Considering the above reflections, and particularly the importance of data, FCERM engineers and scientists should increasingly be able to navigate this uncertainty and not shy away from the most awkward questions related to coastal storm change, admitting what we don't know but being in an informed position to challenge central government positions.

Matt Wadey, Principal Coast Scientist, BCP Council

Storm Ophelia Port Leven 2017

A postcard from the future: coastal landfills



Landfill has been part of waste management for over 100 years in England. The legacy of controlled tipping at the coast since the 1920s came about because of the perceived low value of the natural environment at that time, alongside the lack of the more stringent coastal regulation we see now. Using the coastal zone to dispose of waste and at the same time reclaim land for an alternative use was seen as a win-win scenario.

At present there is often a limited grasp of what potential contaminants may be contained within these legacy coastal landfill sites. There is also little understanding of the potential consequences if the contents are left to leach or erode out onto natural coastal habitats and what the cumulative impacts might be on wildlife, water quality and human health. Many coastal landfill sites are also likely to contain early plastics which will persist and pollute the oceans for decades to come.

There has never been a more pressing need for an immediate and long-term plan to deal with former coastal landfill; one that is both technically viable and affordable. The Shoreline Management Plans already form the bedrock of that plan. However, many of the policies that they set to 'Hold the Line' and protect coastal landfill in situ are often aspirational because there is no appropriate funding mechanism to deliver them.

It is estimated that in England and Wales there are approximately 1200 to 1400 historic coastal landfill sites at risk of coastal erosion and flooding. The number varies depending on who you speak to or what methods you use to quantify risk, but the number is almost irrelevant when you consider the potential impacts of allowing them to spill out onto the often-designated natural environments around our beautiful coast.

Vast amounts of waste and associated pollutants could be, and in some cases already are being, released into the marine environment from these sites particularly where existing coastal defences are failing or were never built in the first place. It may be difficult to predict the exact impacts and consequences given that often very little is known about the contents of these landfills. It is not, however, difficult to conclude that climate change and sea level rise will significantly raise the risks and subsequent impacts if nothing is done to improve the situation.

Over the past 5 years or so the profile of the issue facing local authorities, who have often inherited ownership of these sites, has been pushed up both the political and media agenda through the good work of the Local Government Association Coastal Special Interest Group and the Coastal Group Network.

The Regional Flood & Coastal Committees have also taken a keen interest. Sadly, aside from some strong national news coverage very little has actually moved in a positive direction in terms of policy solutions. This comes as no surprise given the Office for Environmental Protection's independent assessments of progress against the Environmental Improvement Plan for England conclude that the government is largely off track to meet its environmental ambitions[16].

Defra is currently undertaking a national assessment of coastal landfill sites to try gain a more consistent understanding of the scale of the risks. Whilst a positive recognition of the challenges ahead, this does very little to help local authorities that already understand the risks along their coasts, with many coastal managers on the front line facing difficult and pressing decisions about how to reduce the risks of landfill pollution.

Hands are tied: doing nothing is not morally sound albeit the chances of regulatory enforcement are low because of the high thresholds set for being able to prove harm to the natural environment. Meanwhile, maintaining ageing sea defences is almost impossible given dwindling Local Authority budgets and the fact that the national FCERM funding mechanism does not fund new schemes to protect coastal landfills, despite the obvious benefits.

The potential costs to the nation to solve this problem will undoubtably run into the billions. Is that a valid reason not to act? Imagine a postcard from the future, like the one written above, where we do nothing as a sector to try and find a way to adapt to the coastal change that we know is coming.

As a sector we appear to be very good at talking the talk and acknowledging that change is coming and that change is needed. However, it is apparent we are not quite so good at affecting meaningful action to deal with that change unless the issue is highly visible, occurring or likely to cause political turmoil.

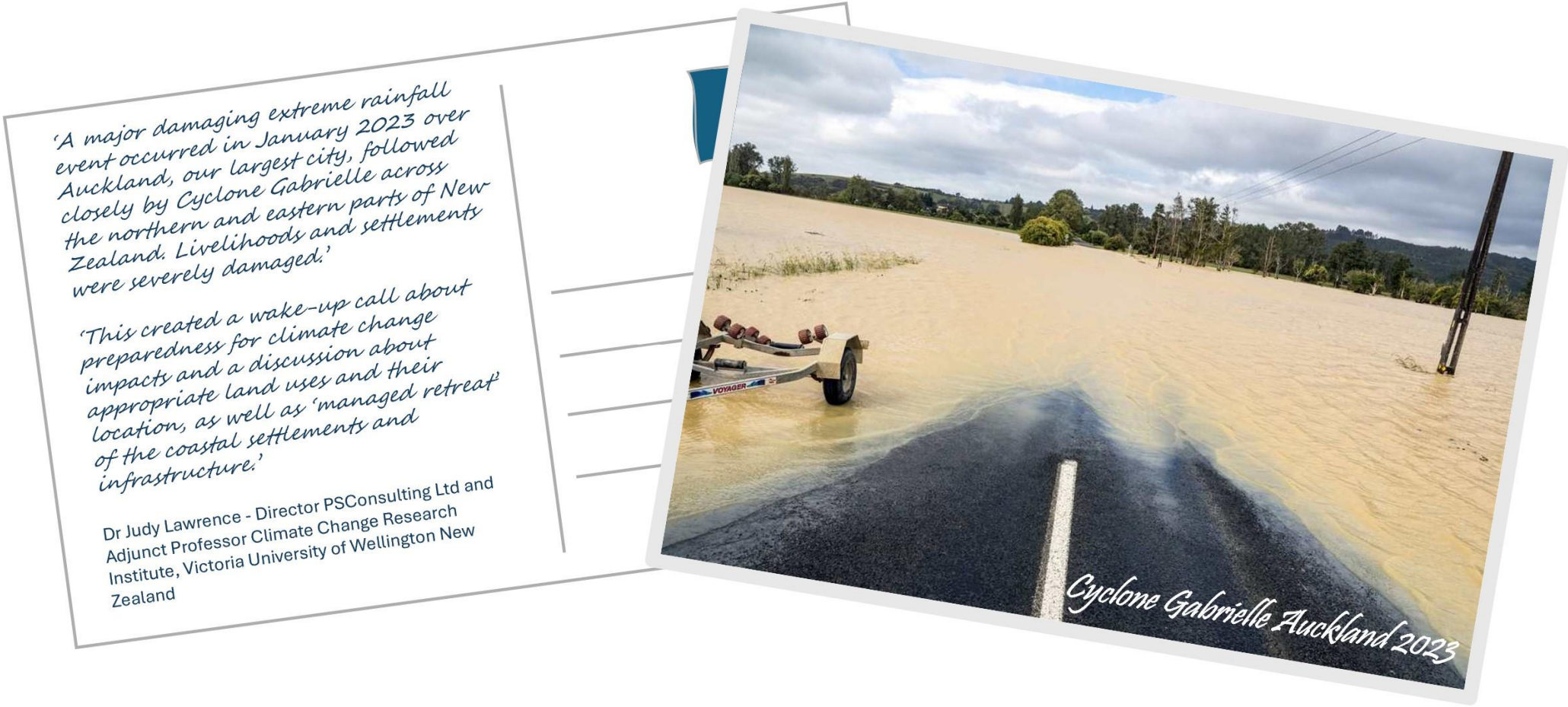
Sadly, policy takes years to develop and behaviours even longer to change. The threats posed by flooding and erosion of coastal landfills are a collective responsibility. If we want to avoid risking the health of future generations and the natural environment, instead of adopting a 'wait and see approach', organisations must work together creatively to clean up our act.

What we are really talking about here is a moral question about how much pollution we deem acceptable as a society, and how much is too much before we decide to act. However, it's also quite a simple engineering question which is easily solvable with political prioritisation, policy and funding.

Mark Stratton - CIWEM FCERM Expert Panel Chair and Coastal Partners Team Manager

Barrow Landfill ©Mark Stratton

A postcard from New Zealand



New Zealand is an island nation with a coastline of 15,000km, sitting astride the 'roaring 40s'. The coast is exposed to both extreme storm events and rising sea levels, being subject to storm swells from the Southern Ocean, ex-tropical cyclones from the north, and westerly storms. This results in storm surges and extremely high orographic rainfall in the west.

Many of our cities are located in low-lying coastal and estuarine areas or on floodplains. Impacts are compounded in estuarine areas and open coastal locations, which are also subject to rising groundwaters, salinization, erosion and flooding[17]. Effects of rising seas due to climate change combined with vertical land movement[18] also compound to produce increasing near-term impacts due to the exposure of assets and settlements in low-lying areas[19].

The response to extremes and progressive coastal impacts has been typically reactive and is built into a well-established Emergency Management regime. This includes a post-hoc approach with a Disaster Fund for recovery.

Since 2019, the Climate Change Response Act has embedded a periodic National Risk Assessment, a National Adaptation Plan and an independent Climate Change Commission that reports on adaptation progress and its effectiveness, and advises on how to overcome barriers to adaptation implementation.

A major damaging extreme rainfall event occurred in January 2023 over Auckland, our largest city, followed closely by Cyclone Gabrielle across the northern and eastern parts of New Zealand. Livelihoods and settlements were severely damaged. Urban function was highly impacted in Auckland as stormwater, wastewater flooding and flood protection systems failed with severe damage to houses and properties rendering some uninhabitable.

On the east coast, high sediment and debris loads compounded, destroying horticulture in the Esk Valley of Hawkes Bay leaving rural settlements stranded to fend for themselves for some time. There were 11 deaths from this storm sequence and mental health issues and community anxiety are ongoing.

This created a wake-up call about preparedness for climate change impacts and a discussion about appropriate land uses and their location, as well as 'managed retreat' of the coastal settlements and infrastructure. This resulted in the implementation of a one-off government buy-out scheme in the worst affected areas.

An expert working group reported in late 2023 on a national approach to implementing and funding managed retreat[20], and a Parliamentary Committee called for public submissions on managed retreat with a view to an Adaptation Act. A major insurance group has signalled an intended retreat of insurance cover for those living in exposed places for foreseeable risks like sea level rise. Updated national guidance on coastal hazards and climate change has been completed[21], covering the use of sea level rise scenarios and increments alongside the use of dynamic adaptive pathways planning (DAPP).

DAPP is now being used widely across several domains and sectors as an approach to manage the uncertainty of climate impacts as they become more frequent and the performance of adaptation options fail to meet their objectives and the expectations of communities.

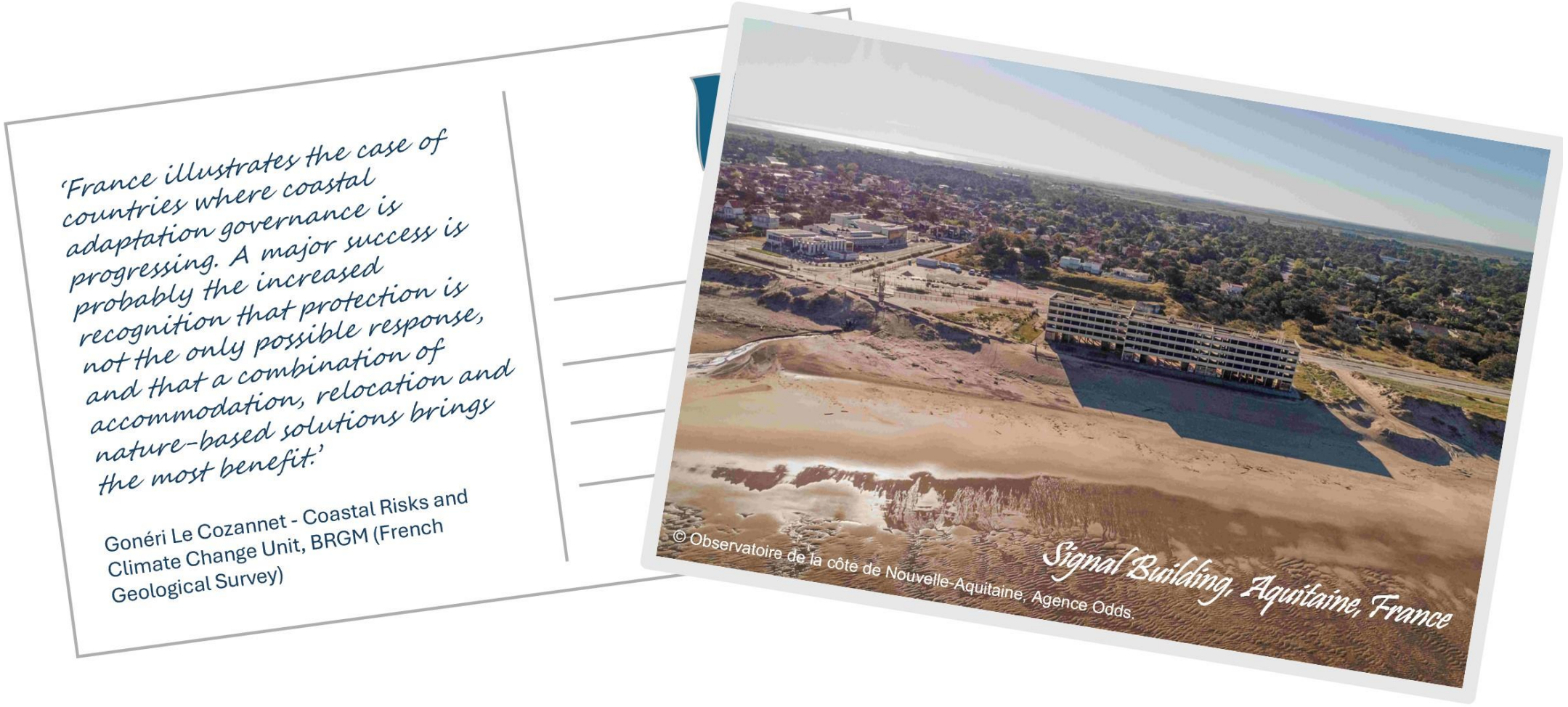
New Zealand's National Adaptation Plan 2022[22] includes an action on adaptation guidance for completion in 2024. Currently the government is developing an 'enduring' adaptation framework and is undertaking a cross-party inquiry into climate adaptation.

While the institutional framework is partly in place and being further developed, the difficult funding discussion has yet to be concluded. There is heightened interest in who pays and ongoing uncertainty as to where managed retreat will land as a policy response. Meanwhile the impacts of climate change continue to encroach on people's places at the coast, and funding pressures for adaptation at a local level persist.

Dr Judy Lawrence - Director PSConsulting Ltd and Adjunct Professor Climate Change Research Institute, Victoria University of Wellington New Zealand

Logs washed up by Cyclone Gabrielle, east coast of New Zealand

A postcard from France & the French Caribbean



The coastline of mainland France is 5,000km long, among which at least 20 per cent is currently eroding. This takes place in a context where urbanisation is 2.5 times higher in coastal municipalities than in the hinterland, with even higher exposure within the 500m zone along the coastline. Several major storms and erosion events occurred over the last 25 years, such as the Irma cyclone in the northern islands of the French Caribbean in 2017, Xynthia in 2010 along the Atlantic coast and the storms of winter 2013/2014 along the western European coast that resulted in sandy shoreline retreats reaching 20m in several locations in south-western France.

In response to these events, and as concerns are rising regarding sea level rise and climate change, the governance of adaptation is evolving[23]. This includes increased preparedness for national flood and surge alerts operated by the Meteorological Office after Xynthia, and increased prevention policies. Coastal risk prevention plans are a key mechanism as they limit further urbanisation of low-lying areas and ensure the reduced vulnerability of existing infrastructure.

Other incentives such as regional or local climate plans are increasingly encouraging municipalities and regions to move away from a strategy based on protection and to consider other options such as relocation and nature-based solutions. The climate and resilience law (2021) is creating new legal mechanisms to manage property sales and lease agreements, including options to terminate the lease and build up a financing reserve to enable re-naturalisation when a building is threatened by erosion.

This remains a voluntary mechanism, and the main benefit for municipalities is eligibility for scientific and technical studies to better anticipate the magnitude and rates of erosion. These mechanisms meet resistance locally because they limit development in coastal municipalities.

Storm Irma Caribbean 2017

The national Court of Auditor's 2024 report on adaptation to climate change demonstrated that these incentives for 'soft' approaches toward coastal management, while promoted nationally and in pilots by the coastal conservation agency[24], have not resulted in the development of local strategies with clear coastal visions. Furthermore, the emergence of high-tide events such as in French Guiana[25] and the long-term challenge of managing meters of sea level rise within centuries remain essentially blind spots in the coastal adaptation strategies, despite some progress on the management of coastal landfills[26].

Lastly, the current mechanisms to finance relocation and, to some extent protection, are contested politically and legally. This could result in legal and political conflicts in the future as approximately 50,000 buildings will be exposed to erosion in mainland France over the 21st century.

The Signal building, located in Aquitaine, south west of France is a perfect example of struggles around erosion. This block of flats was built more than 200m from the coast in the 1970s. Yet it was increasingly threatened by erosion during the 2000s and 2010s due to the rapid erosion caused by storms, waves and currents in this very dynamic coastal environment.

The building was declared uninhabitable after the storms of 2013/2014 and scheduled for demolition. This case created an intense debate, as no compensation mechanism existed in France for the retreat of sandy coass, unlike buildings affected by the retreat of cliffs. After lawsuits and protests, a specific compensation mechanism was voted for this building in the national parliament, and it was destroyed in 2023. While sea level rise is not the main driver of this event, the resulting social conflict is likely to be typical of many other places in France.

Progress around adaptation funding is anticipated: the government is considering targeted financial support for the relocation of buildings affected by sandy shoreline erosion. This financial support will likely be limited to principal residences and set at a minimum amount, in order to avoid the cost to society of supporting owners of rental properties, luxury homes or second residences. However, it remains unclear whether the lack of long-term vision for coastal zones will be addressed soon. Increased awareness and decisions in this domain may unfortunately only materialise following another extreme coastal storm event.

In summary, France illustrates the case of countries where coastal adaptation governance is progressing. A major success is probably the increased recognition that protection is not the only possible response, and that a combination of accommodation, relocation and nature-based solutions brings the most benefit. Yet, this national vision is not fully materialising on the ground, and it remains relatively unclear how it will be financed.

Gonéri Le Cozannet, Coastal Risks and Climate Change Unit, BRGM – French Geological Survey

A postcard from the Netherlands

The Netherlands is situated along the North Sea coast in the low-lying delta of the rivers Rhine, Meuse, Scheldt and Ems coast. With around 60 per cent of the country's area susceptible to large scale coastal or riverine flooding and most of its inhabitants and economic activities in the coastal zone, water management and adaptation to sea level rise and climate change is essential for its existence[27].

Climate change will result in a) an increase in flood risk due to sea level rise, increased river inflow in winter, and extreme rainfall, and b) a decrease in freshwater availability while water demand increases due a combination of longer drought periods, lower summer river flows and more saline conditions due to sea level rise. Some of these impacts are already appearing.

The Netherlands has a long history of water management, shaping the country and culture and enabling socio-economic developments[28]. Polders were developed through draining floodplain and peat areas. Rivers were embanked to protect the hinterland and partly canalised to support navigation between the sea harbors and countries upstream. A comprehensive set of drainage canals, pumps and water inlets supports agriculture in the coastal zones despite increasing saline conditions.

The major coastal flood events of 1916 and the need for food production after World War I triggered the damming of Zuiderzee Estuary resulting in the freshwater Lake IJssel and polders. After the 1953 storm surge and extensive flooding, the 1st Delta Committee was established which advised to improve flood protection by shortening the coastline with dams and a storm surge barrier.

While flood protection and fresh water supply is still the main strategy, two near flood events in the 1990s triggered a change towards providing more room for water. In 2007, the government established the 2nd Delta Committee to advise on the future management of the Dutch coastal area. The advice resulted in the Dutch Delta Programme starting in 2010, a national programme wherein national and local government are working together to improve flood risk and freshwater management, and support land use adaptation. The Delta Programme has a legislative foundation in the Delta Acts and has a Delta Fund of €1 billion per year which is reserved until 2029[29].

The Delta Programme follows an adaptive approach, referred to as adaptive delta management, inspired by the Dynamic Adaptive Pathways Planning approach[30] and the UK Thames Estuary 2100[31]. The idea behind this approach is to anticipate future uncertain climate change and socio-economic developments by taking the necessary near-term actions, while reducing 'lock-in' and 'maladaptation' and keeping options open to further adapt depending on how the future unfolds.

A group of experts was appointed to detect relevant changes and inform whether implementation needed to be accelerated or the plan adjusted[32]. The plan and its implementation are evaluated every 6 years. By linking the need for further decisions on conditions (e.g. a certain amount of sea level rise), the plan became independent of climate scenarios that are adjusted regularly by the IPCC and other climate scientists. This has proven

to be beneficial in recent years, whereby new scenarios did not require adjustment of the plan, only to its timing (e.g. when a certain amount of sea level rise would happen).

The adaptive plan of the Delta Programme[33], published in 2015, largely continues the historic pathways with further protection by improving, and in the long-term replacing, storm surge barriers with the intention to keep the river mouths open. Sand nourishment to maintain the sandy coast also continues, adapting the annual volume of sand to the actual rate of sea level rise.

Along the rivers, a combination of raising dikes and providing more room for the river should lower flood risk. Fresh water supply for the western part of the Netherlands will be improved by increasing the capacity of upstream river water supply routes and increasing storage in Lake IJssel. Here, more pumps will be installed to drain water to the Wadden Sea. While engineering protection and pumps is an important component of the strategy, nature-based solutions are becoming more popular. For example, mega sand nourishments along the coast with natural distribution; widening riverbeds; protecting marshland to help reduce wave height.

New research about a potential accelerated sea level rise that could result in 2m of sea level rise by 2100 and 5m by 2150[34,35] has triggered research[36] and societal debate[37] about how the Netherlands can continue to exist in a low-lying delta with multimeter sea level rise, either in the next 100 years or in the next centuries. An uncertain but potential accelerated sea level rise is a gamechanger for the Netherlands Adaptation needs to happen much faster or account for a much greater sea level rise. Important decisions must be made in the next decade on infrastructure maintenance and adaptation, housing developments, and energy transition. This will be a challenge: planning and implementation of strategies requires time and in the past this took 20-40 years[38].

Four adaptation strategies with related adaptation pathways and pivotal decisions have been presented: (1)'Protect-open' with an open river mouth, (2)'Protect-closed' - close the coast and pump out the rivers, (3)'Advance' - with a new coastline and potential for development and river flow storage, and (4)an accommodate-retreat strategy referred to as 'Moving with water'[39,40].

In all strategies the Netherlands will change enormously; they will have spatial consequences albeit to different extents. Space is needed for protection, drainage and storage of river water, and land use changes are needed as saline conditions and floods after extreme rainfall cannot be fully prevented.

Recent climate change impacts and projections on top of societal developments have raised awareness about the need to rethink the long-term adaptation strategies of the Netherlands. This is not only related to sea level rise, but also to extreme rainfall (triggered by the 2021 flood event), subsidence problems for housing, biodiversity loss, and water quality problems. Concluding, it is clear that sea level rise requires long-term planning linked to near-term challenges and decisions.

Marjolijn Haasnoot, Researcher climate change adaptation and water management at Deltares, Professor at Utrecht University

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policy@ciwem.org

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