

Sea level rise and the case for Managed Retreat –

The US experience and lessons for Ireland by Ciaran Hayes

Summary

This briefing explores the technical, financial, and socio-economic issues exercising policy makers as the effect of climate change and ever-rising sea levels bear down and impact on coastal communities. It identifies the issues and ponders whether a policy of Managed Retreat should be incorporated into a menu of solutions. The Briefing will be of interest to senior policy makers across local government in Ireland as well as having an international relevance to readers in other jurisdictions.

Introduction

By 2100, sea levels are expected to rise by 2 meters over 2000 levels and 2.5 meters cannot be ruled out. In the US, some 49 million housing units are situated in coastal counties and a total \$1.4 trillion of real estate is positioned within 700 feet of the coastline. Some cities will not be around in their current state for the grandchildren of today's generation. An estimated 11m Americans will have to relocate in the coming decades with the numbers affected accelerating after 2050.

The Greenland ice sheet is melting, a consequence of which is an increased flow of fresh water impacting the salinity of the ocean, weakening, and slowing the flow of the Gulf Stream. Already 15% weaker than the mid-20th Century, ongoing weakening is expected in the coming years as the ice sheet continues to disappear. With the water density drivers lessening, less water will be drawn north.

Globally, 50% of the worlds GDP will be affected by climate change and sea level rise will be foremost among the challenges facing countries and local communities alike. Our emotional, cultural, traditional, and historic association with 'place' will forever be altered. Added to sea level rise, some areas now witness heat to an extreme not previously experienced, a phenomenon set to continue and increase in frequency and intensity. There's a scarcity in

the availability of fresh water where once it was plentiful and an increasing incidence of wildfires in what are now drought-stricken areas.

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US coastal cities are exposed to varying levels of risk from rising sea levels. However, Charleston in South Carolina offers a good insight into the intersection between climate risk and public policy making. A commentary on Charleston is therefore included and the briefing concludes with a reflection on the lessons for Ireland.

Technical Overview

Can human settlements survive the effects of climate change at some coastal locations impacted by rising sea levels? Is it always possible or appropriate to implement adaptation measures, or should other options be considered? Is it always the case of armouring the coast or constructing other engineering solutions to hold the tide back? Can the sea be held back in every location? Should it be?

The formulation of technical solutions is complex. It entails detailed examination of tidal flows, assessment of all engineering interventions and examination of the impact of the intervention on the adjoining coastline prior to recommendation of a preferred solution. Detailed analysis and design of an appropriate solution for each location is both time consuming and costly.

Adding to the complexity is the multiplicity of agencies with a stake in the implementation of a solution. In the United States, Agencies include Federal, State and Local levels, but there appears to be an absence of any one agency taking full ownership of the overall solution. Other stakeholders and important players in the process include the Federal Emergency Management Agency (FEMA) and the US Army, but the latter is only allowed to plan for storm surges and only as a response to a sudden event.

Assessment of risk could identify slower-onset trends such as continuing subsidence, recurrent high-tide flooding, permafrost melt, groundwater salinisation or desertification. Differing risks give rise to differing options and solutions. Given the risks and the logistical and financial impracticality of protecting all vulnerable coastal areas, the politically fraught and unpopular option of managed retreat needs to be considered.

None of the options available are palatable and all require significant financial resources. Protection against sea level rise requires construction of extensive coastal defences, an option that, at first glance, may find political consensus. But at what cost? Proposed defences in Manhattan are said to be costing in the \$Billions. Similarly in Miami, Boston, and other US east coast cities. And who pays?

To date, most climate adaptation has been small scale and short term, involving minor modifications to standard practices such as planting crops earlier in the season or building floodwalls to address storms. Given the projected increase in sea levels, the ambition and innovation in adaptation would seem to fall significantly short, not only of future climate risks, but also existing risks.

What engineering innovations will be needed to support infrastructure that is permanently inundated, sited on melting ground, or repeatedly exposed to wildfires? The economics of staying in place needs to be contrasted against a managed retreat policy, as mismatched incentives or risk perceptions lead to market failure.

Socio-economic:

Against the background of the minimalist approach taken to date, the scale of intervention requires choices, none of which are easy or palatable. Will strategic infrastructure be prioritised over urban settlements or vice versa? Within the at-risk coastal groups, those from the socio-economic categories that have the ability and means will relocate, but what of those without means? Are they forever destined to be trapped in situ? As the stakeholders most immediately affected, how is their voice being incorporated into the solution?

Real and just solutions require both a top-down and bottom-up approach where all voices and socio-economic groups can be heard and can have input into and ownership of the adaptation process. A vision of the future to guide adaptation, which is informed by a top-down only process, risks further alienation of the marginalised. Effective processes can reduce political polarisation, involve marginalised groups, address historic wrongs, situate local concerns within broader contexts, and highlight interactions and interdependencies within and across systems to collaboratively construct future visions.

In a US context, conversations about how to help shrinking settlements thrive or how to address historic injustices may be crucial for future adaptation responses, although such options may be limited due to current inhibitions of social or political risks.

An opportunity and less of a threat?

While retreat is controversial, as it challenges the status quo and has potential to cause major and inequitable losses, conversely, managed retreat has enormous potential to inform adaptation precisely because it challenges the same status quo. It also raises difficult questions about justice, forces people to confront the inevitability of change, and encourages people to make mindful choices about trade-offs and losses in the futures they pursue. For these reasons, strategic managed retreat may not be implemented in many places, yet bringing it into adaptation conversations now, despite its complexities, creates better chances of long-term, sustainable well-being under intensifying climate risks.

Finance:

Given the scale and urgency of the issue, the questions of ownership of solutions, top-down and/or bottom-up consultation processes and subsequent wrangling of who pays, will serve to prolong the debate, and extend an already delayed decision-making process. Insurance must also be factored into the debate. Yet insurance risk is already mispriced with US disaster relief serving as a form of insurance for local government.

There is presently no national programme for large scale managed retreat and resettlement and the Federal Emergency Management Agency (FEMA) has bought out just 40,000 properties since 1989. It is nowhere near enough. Agencies respond well to major weather

events and disasters, but there appears to be little by way of collaborative inter-agency and community planning and even less consideration for managed retreat as an option.

Whether there's forward planning or not and regardless of the proposed solution, significant costs will be required for whatever preferred option transpires. The irony is that major costs will equally be borne for failure to implement any adaptation measures.

It is also interesting to observe current events in the financial markets. During the mortgage bubble in the early 2000s, when investors were feverishly trading faulty subprime bonds, a few savvy sceptics recognized the bonds were doomed, so they bet against them. They shorted the bonds and made billions.

Now one of those players is doing the same thing, but not on subprime. He's doing it based on the risks to the housing market from climate change.

That player is David Burt who said, *'To support a gradual and equitable rationalization of climate costs in the single-family property market, policymakers would have to measure the costs and benefits of various reforms and adaptation efforts, as well as remove the subsidies that are fuelling climate risk pricing distortion. NFIP premium rates that are disconnected from actual risk, politically influenced FEMA risk mapping processes, risk agnostic lending policies, and poor enforcement of insurance mandates all need to be addressed in thoughtful and compassionate ways that can soften damaging effects on the borrowers who will inevitably be 'distressed'.'*

The spectre is being raised of the climate induced sea level rise causing a housing market crisis similar and perhaps bigger in magnitude than that of 2007 arising from Credit Risk Transfers (CRTs) sold by Government Sponsored Enterprises (GSEs), which are securities based on a pool of loans. GSEs pay interest to investors as well as a portion of a guarantee fee GSEs are paid monthly. In the event of a default, the GSEs stop paying the portion of the guarantee.

At this point, the CRT market is described by some as 'very frothy' and it's not clear GSEs are factoring in extreme climate risks to coastal real estate. Time will tell as to whether there is mispricing or not but if there is, the impact on the market will be negative.

In simple terms, GSEs guarantee loans on houses which, because of their coastal location, may be overstretched and overvalued and/or, the land on which the houses are built are at risk of flooding in the future, thus raising a question over the loans. It's potentially 2007 revisited.

So what does this mean in day to day life?

Charleston:

Looking to a community such as Charleston, many of these issues are currently being played out. An attractive coastal city in South Carolina and former federal stronghold where the first shots of the Civil War rang out, Charleston is a desirable destination for 7.5m tourists annually. Tourism is an important economic driver for the city with its cobblestone streets, horse-drawn carriages, pastel antebellum houses, and miles of beaches adding to its appeal.

Its appeal extends beyond tourism. A pro-active, Mayoral driven, has policy advanced the development of infrastructure and housing construction in recent decades. A relatively small city, it witnessed significant growth through development and the annexation of suburbs into the city in the last 30 to 40 years. Its appeal has been such that Charleston and its region has been a hot real estate bubble.

But storm clouds are gathering. Charleston is built on a floodplain, trapped between the sea to the east and a network of rivers coming from the west, and regularly flooded by both. Already subject to regular storm surges, it has the added consequence of being inundated from above resulting in flooding from heavy rains.

Records indicate the already frequent flood events are increasing in frequency and intensity. One quarter of all flood events between 1922 and 2022 happened in the last five years. By 2050, moderate floods will happen at least once a week, minor floods every other day. The city's new housing developments, while contributing a vital source of income, have added to the problems as they too were built on the flood plain, further compressing the earth beneath.

Historically associated with the slave trade, racial issues persist. An oft vandalised and defaced statue erected in 1878 in honour of John Calhoun – South Carolina's public representative of almost 40 years and strong advocate for slavery – was only taken down in June 2020 following the murder of George Floyd. Erected near the Neck neighbourhood where most of the free Blacks lived and some of their descendants still reside, it served as a constant reminder of White supremacy being the order of things in the deep south.

A city that was predominately Black, has been gentrified since the 1980's. The glamorous downtown neighbourhoods, in fact the entire peninsula, is now mostly White, following the clearing and relocation of Black communities to the particularly low-lying and frequently-flooded East Side on the Cooper River where most of the City's public housing is located. Black Charlestonians account for 82% of the residents of the two census tracts that make up the East Side.

That the East Side was constructed on top of an old landfill compounds the problem. Nor was the landfill sealed or managed to today's environmental standards, giving rise to contamination which is further exacerbated by subsidence.

Mayor Techlenburg's response is to prioritise flooding and drainage relief. He has also determined that managed retreat will not happen on his watch.

A strong and urgent case exists for a national US programme of large-scale managed retreat and resettlement programme and Charleston's risk profile would seem to make it an ideal candidate for such a case study or pilot.

People's association with 'place' makes managed retreat a difficult policy to sell at any time, made practically impossible in the absence of local political support. Factor in the inability of adaptation or engineering solutions to adequately address the issue, scale of finance required for such adaptation 'solutions', socio-economic issues, increasing frequency and ferocity of extreme weather events, insurance implications and the multiplicity of agencies involved including Federal, State and Local Government, it's apparent the omens are not good.

Charleston can brace itself for many more major flooding events. Is it a doomed city?

Ireland:

What then are the lessons for Ireland and the twenty-one coastal counties of the Republic? At the outset, it's important to recognise the commitment of the Government of Ireland to the issue through the establishment of the Inter-Departmental Group on Managing Coastal Change. It has a brief to scope out an approach for the development of a national co-ordinated and integrated strategy to manage the projected impact of coastal change.

That the high-level group is jointly chaired by the Department of Housing, Local Government and Heritage and the Office of Public Works (OPW) and contains representatives from other state agencies, is an indication of the complexity of the matter and the multiplicity of public agencies with a stake in coastal issues.

A national assessment of coastal erosion has been undertaken by the OPW and the data is available to Local Authorities for the development of appropriate plans and strategies. The establishment of the Inter-Departmental Group and sub-structures, inclusivity of its membership, and professionalism of the technical expertise available to it reflect well from a top-down, governance and technical perspective.

What's interesting however is the repeated reaffirmation by the group that coastal protection and localised flooding issues are matters, in the first instance, for each Local Authority to investigate and address.

Local Authorities may carry out coastal protection works using their own resources but may also put forward proposals to the relevant Government Department for funding of appropriate measures. The OPW for its part operates the Minor Flood Mitigation Works and Coastal Protection Scheme and invites applications from Local Authorities for measures costing up to €750,000 in each instance.

The availability, scale, and absence of a guarantee of funding to address rising sea levels and coastal erosion however is a cause of concern. Coastal protection and adaptation measures will require multiples of the existing allocated funding if the risks on the scale envisaged are to be remediated.

On examination of the Group's Terms of Reference, while there is no overt reference to managed retreat, neither is it specifically excluded. Notwithstanding the loss of one house to coastal erosion in north County Dublin in recent years and the endangerment of another, managed retreat has barely featured in the public discourse. Public discussion on the matter is warranted if expectations are to be managed appropriately, giving rise to a need for a communications strategy.

Undoubtedly, managed retreat will emerge as a viable option in particular circumstances. Where that occurs, the involvement of all local stakeholders in an inclusive and meaningful bottom-up process will be vital not only to advancing the solution, but to ensure the socio-economic issues currently experienced in Charleston do not become a feature. As the level of government closest to those communities, this will fall to the Local Authority to manage but the absence of a guarantee of funding will restrict its ability to get local buy-in to such a process.

Rising sea levels present considerable risks to Ireland that will require significant financial, technical, and human resources to address. It will not be possible to adapt and protect all parts of the country's soft coastline. Strategic infrastructure will be prioritised. So too will certain settlements.

Comment

Perhaps an economic case can be made for some State assistance in Ireland to support certain private land holdings and enterprises due to their economic benefit to a region. Advanced Manufacturing facilities and highly visited recreation and amenity facilities might be ready made examples. But what of, for example, private golf links? It is relatively easy to anticipate the nature of the public debate that would ensue in such instances would likely be difficult.

This could be particularly the case where other settlements and enterprises will not be prioritised, and difficult decisions will have to be imparted to private landowners and local politicians advocating on their behalf.

Each area of coastline under threat will have its own issues and menu of solutions. For some managed retreat should be considered as part of that menu.