

Webinar Series for Coastal Communities

A series of webinars providing an introduction to Nature-based Solutions (NbS) for coastal community groups involved in climate adaptation



Presenter: Dr Kevin Lynch
Coastal Geomorphologist,
NUI Galway, Geography

Webinar 1: Understanding Nature-based Solutions Monday March 22nd, 8pm

Webinar 1 provides an introduction to Nature-based Solutions (NbS) for coastal community groups exploring the reasons why climate change and storm impacts might be solved by 'working with nature', how the science of various NbS work and issues around implementing NbS sooner rather than later.



Presenter: Dr Eugene Farrell
Coastal Geomorphologist,
NUI Galway, Geography

Webinar 2: Nature-based Solutions in Action Thursday March 25th, 8pm

Webinar 2 builds on Webinar 1 by illustrating how the scientific understanding of NbS plays out in real-world locations. It will present a series of examples of Nature-based Solutions (NbS) in action by coastal communities to adapt to the impacts of climate change.

Please register on [Eventbrite](https://www.eventbrite.com/)

For further information contact: caro@mayococo.ie



NUI Galway
OÉ Gaillimh

March 25, 2021

Presentation of “Nature-based Solutions in Action”

by Dr Eugene Farrell

for Climate Action Regional Office Atlantic Seaboard North

Contact Details for Dr Eugene Farrell

Lecturer & Researcher in Geography

Director of MSc Programme “Coastal and Marine Environments”

National University Ireland, Galway, Ireland

T: + 353 91 494336

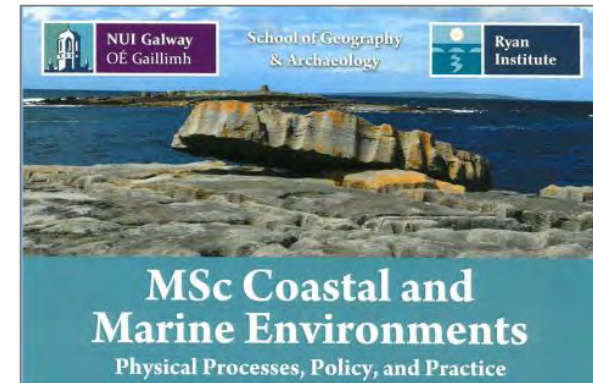
E: eugene.farrell@nuigalway.ie

Tw: @DoctorDune

Profile www.nuigalway.ie/our-research/people/geography-and-archaeology/eugenefarrell/

Research

- (1) Response - recovery patterns of nearshore-beach-dune systems to storms
- (2) Coastal resilience
- (3) Climate adaptation in coastal planning and governance
- (4) Nature-based solutions for coastal management
- (5) Links between aeolian processes and dune landforms
- (6) Source-to-sink: linking catchment dynamics with coastal and marine environments
- (7) Geomorphology: public outreach, education, civic engagement and crowd sourcing
- (8) Remote sensing technology (UAV; EO) in coastal environments





Source: Bill Doyle, Island Funeral; Location: Inis Oírr , 30 June, 1965

“An ecosystem is a community of living organisms in conjunction with the non-living components of their environment, interacting as a system”.

Nature-based Solutions (NbS) & Ecosystem Goods and Services (EGS) are newcomers to the lexicon of coastal management....but are not just “green jargon”. NbS offer a way to operationalise solutions of new climate-related policy that have a longer lifespan, lower maintenance costs and the added benefits. However, our coastal communities have a track record!



2. When can I call it a NbS?

The European Commission defines NbS as “solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits, and help build resilience,”⁶ noting that such solutions need to involve *locally adapted, resource-efficient* and *systemic* interventions, which result in bringing more and more diverse, nature and natural features and processes into cities, landscapes and seascapes. Hence, NbS must benefit biodiversity and support the delivery of a range of ecosystem services. As mentioned in Chapter 1, several ecosystem-based concepts fit under the NbS umbrella (see Figure 2 above), all of which can be categorised as protective, restorative (e.g. Forest Landscape Restoration), infrastructure-based (e.g. green infrastructure), management-based (e.g. Integrated Coastal Zone Management) or issue-specific (e.g. Eco-Disaster Risk Reduction) concepts (*Cohen-Shacham et al., 2016*; see Figure 3, below).

i) Does it use nature/natural processes?

ii) Does it provide/improve social benefits?

iii) Does it provide/improve economic benefits?

iv) Does it provide/improve environmental benefits?

v) Does it have a net benefit for biodiversity?

“Generally, if you can answer yes to all five questions, there is a good chance it can be considered a nature-based solution. Once it has been recognised as a nature-based solution, a simple first step towards evaluating the benefits of the nature-based solution can be taken by adding HOW in front of each of the 5 principles.” (Connecting Nature, 2018). (See also Chapter 4 on evaluating NbS.)



Climate impact projections: 30-year overview

Variable	Summary	Confidence	Projected changes
 Sea Level Rise	 Strong increase Sea levels are rising and will continue to do so for the foreseeable future.	HIGH	Projections of SLR to 2100 suggest a global increase in the range of 0.09–0.88m with a mean value of 0.48m. For 2050 it is reasonable to assume a sea level rise in the region of 25cm above present levels. It should be noted that due to an as yet limited understanding of some of the important effects that contribute to rates of increase, these estimates of sea level rise may prove optimistic, and estimates of up to 4–6 m have been projected by some models.
 Storm Surge	 Strong increase (B&W) In the north-west, surges between 50 and 100cm will be 30% more frequent.	MEDIUM	An increase in the number of intense cyclones and associated strong winds are expected over the north-east Atlantic. By the 2050s, storm surge heights in the range of 50–100cm are expected to increase in frequency for all coastal areas with the exception of the southern coast.
 Coastal Erosion	 Moderate increase Increasing sea levels and wave heights may result in increased levels of coastal erosion.	LOW	Currently approximately 20% of Ireland's coastline is at risk of coastal erosion, particularly areas of the south and east coast and also in isolated areas on the west coast. Rates of increase will be determined by local circumstances; however, it is expected that areas of the south-west are likely to experience the largest increases.
 Cold snaps/frost	 Moderate decrease (winter) Increasing average air temperatures may act to decrease the duration and intensity of cold snaps.	HIGH	By mid-century, minimum temperatures during winter are projected to increase by -2°C in the south-east and -2.9°C in the north. This change will result in fewer frost days and milder night-time temperatures.
 Heatwaves	 Strong increase (summer) Increasing average air temperatures are likely to increase the duration and intensity of heatwaves.	HIGH	Seven significant heatwaves (defined as 5+ days @ $>25^{\circ}\text{C}$) have been recorded in Ireland over the past 30 years, resulting in approximately 300 excess deaths. By mid-century, a projected increase in summer maximum daily temperature of approximately 2°C will likely intensify heatwaves, with maximum temperatures increasing and heatwave duration lengthening.
 Dry Spells	 Strong increase (summer) Increased seasonality in precipitation is very likely to result in more severe dry spells in summer.	MEDIUM	There have been seven periods of insignificant rainfall in Ireland in the past 40 years. Of these, the events of 1976 and 1995 were the most severe, averaging 52 and 40 days in duration respectively across Irish rainfall stations. An approximate 20% decrease in summer precipitation receipts in many areas is strongly indicated under a high emissions scenario. This decrease is likely to result in progressively longer periods without significant rainfall, posing potentially severe challenges to water-sensitive sectors and regions.
 Extreme Rainfall	 Strong increase (winter) Increasing seasonality in rainfall distribution is likely to result in an $>20\%$ increase in the number of very wet days.	LOW	Heavy precipitation days (in which more than 20mm of rain falls) are likely to increase in frequency in winter. By the 2050s an increase in the number of heavy precipitation days of around 20% above the level of 1981–2000 is projected under both low-medium and high emissions scenarios. This may have serious consequences for flood risk in sensitive catchments.
 Flooding	 Moderate increase (winter) Projected increases in winter rainfall will likely increase the risk of fluvial flooding in "fast response" catchments.	LOW	An Irish Reference Network of hydrometric stations has been established to assess signals of climate change in Irish hydrology. This network has detected an increasing trend in high river flows since 2000. Projections of future flows are beset by uncertainties at the catchment scale, but a broad signal of wetter winters and drier summers is evident across a number of independent studies.
 Wind Speed	 Moderate increase Models predict a slight increase in wind energy in winter of between 0 and 8%, with a minor decrease in summer of 4–14%.	MEDIUM	Observed wind speed over Ireland has not changed significantly in recent times, but it is anticipated that the distribution of wind will alter slightly in future, with winters marginally windier and summers marginally less so. Though the average windspeed is anticipated to change in only a minor way over the coming decades, the frequency of extreme wind storms is expected to increase due to alterations in the origin and track of tropical cyclones.

Local Authority Adaptation Strategy Development Guideline

Author: Stefan Gray



Issue
#1

Accept the
climate is
changing!

We will not will able to (eco)engineer our way out of (some/all/any) this.....

The Week

We must prepare for climate change – but not everywhere can or should be protected

Paul Melia



EVENTS in Galway this week show just how vulnerable we are to the ravages of climate change.

It's not just the City of the Tribes which is at risk. Over recent years we have seen devastation in Cork, Dublin, Limerick, Kilkenny and Athlone, and countless other settlements.

And while high tides and storm surges may have been the direct cause of the severe flooding which struck in the west, changing weather patterns highlight the need to protect our vulnerable communities. Flooding arising from more extreme weather events, coupled with coastal erosion, are among the greatest threats to our way of life. But just how prepared are we to cope with climate change?

The uncomfortable truth is we are lagging way behind in adapting to the new reality, and time is running out.

"Clearly what we've seen is we're very vulnerable," chief climate scientist at the Environmental Protection Agency, Frank McGovern, says. "The first step in long-term adaptation is understanding current vulnerability. We should have been able to forecast better the high tide that came in (to Galway). We're lucky people weren't killed."

Whatever about the need to undertake rapid decarbonisation to prevent further climate change, we must begin setting out the risks which currently exist, and the measures needed to adapt and deal with them.

While some sectors, including transport and agriculture, have published adaptation plans, a national framework has yet to be finalised. Due in the coming weeks, it must be implemented as a matter of priority.

It's also crucial that risks at a local level are identified. If dangerous conditions are forecast, we must know what parts of the country are vulnerable to flooding.

The National Flood Forecasting system will help in this regard. Announced a year ago, and currently being developed by Met Éireann with €3m in funding from the OPW, it is working on a model to help warn of impending risks to specific areas, allowing communities time to prepare for the worst.

But information about where flooding is likely to arise is only useful to a degree. The real issue is determining its impact.

In urban areas, are flood defences – permanent or otherwise – in place or available? What roads are at risk of flooding? Are contingency plans in place to run public transport services along alternative routes to allow daily life continue?

Are water treatment plants protected? What about businesses, hospitals, schools and other essential public services? Clearly, a national vulnerability study is required.

Key to setting out this information will be the establishment of regional climate offices. Sligo County Council chief executive Cláirín Hayes, who is also chair of the County and City Management Association's climate change committee, suggests these will be a game-changer in helping us adapt.

Proposed around 18 months ago,



but awaiting sanction for its €2m annual budget, the offices will be staffed by up to six experts ranging from engineers to climate scientists. They will work with available data, such as flood risk maps from the OPW, to pinpoint risks at a regional basis.

"The local government sector is at the frontline of the response," he says. "We need to be able to respond to extreme weather events, but also to enhance our own competency."

"The regional teams can look at impacts on a regional basis, and each local authority would take those impacts and adapt them locally. Each of the teams will also be connected to third-level institutions, engaging on research projects to get ahead of the curve."

Four regional offices will be established – one overseeing the region from Donegal down to Galway; a second from Clare to Cork; a third for Dublin; and the fourth for the Midlands and other counties.

Tapping into local knowledge is vitally important. Dr Margaret Desmond, an adaptation specialist with UCC, points to a study completed a number of years ago in the port of Cork following severe floods.

"We saw evidence of sea level rise and surges coming further in," she says. "One researcher spoke to a staff member who had worked there for 40 years, and he showed us

We must begin setting out the risks which currently exist, and the measures needed to adapt and deal with them



where water had risen to a level he had never seen before. That information wasn't mapped anywhere."

While we can take measures to protect existing settlements, planning where our homes are located will reduce risk. That means no building on flood plains, but also allowing flood waters to flow, perhaps allowing farmland, parks, car parks and school playgrounds to flood, with compensation for affected landowners if deemed appropriate.

Barry O'Dwyer is project leader at Climate Ireland, a website and source of adaptation information, and he says there could be opportunities for Ireland.

"Spatial planning will be key to reducing vulnerability. There is no doubt we are moving to a future where big business will see areas which are climate resilient as being advantageous. If you are a big corporation, you don't want to be in a place where staff can't get to work or your buildings are being damaged due to extreme weather."

Other measures are needed, too. The colour-coded weather warnings don't seem to resonate with the public, evidenced by the numbers driving through flood waters in Galway. Education is needed.

But we must also build flood defences. Projects costed at €550m have been identified, and they must be fast-tracked. But we must also realise that not everywhere can or should be protected.

"You have people saying that no blade of grass won't be protected," Margaret Desmond says. "This is silly talk. We have already abandoned homes along the Shannon. Being realistic, there won't be protection everywhere because we don't have the money. Concrete isn't the answer to everything."

More people too.... nearly 6,000,000 by 2040

Issue #2

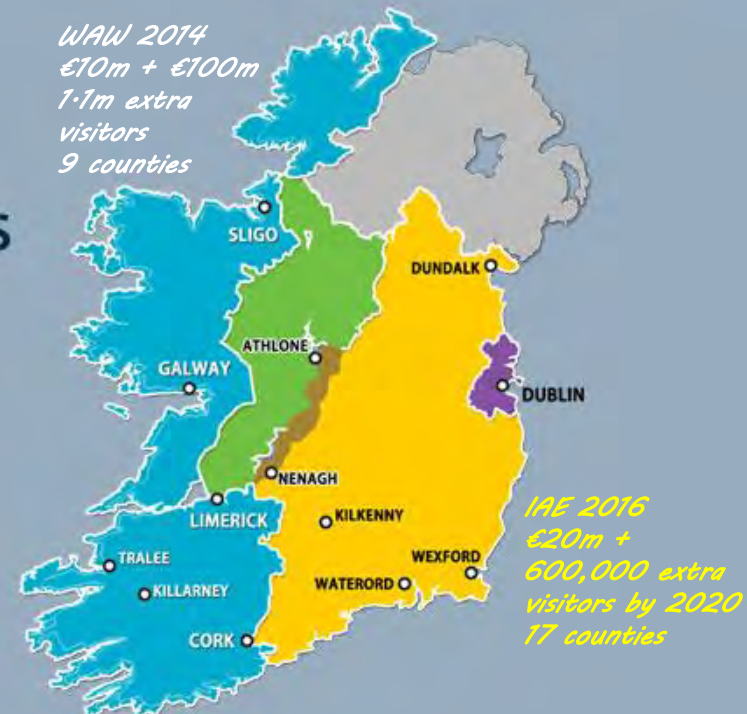
Accept that
there will be
more
people



Project Ireland 2040
Building Ireland's Future

IRELAND'S REGIONAL EXPERIENCE BRANDS

-  WILD ATLANTIC WAY
-  IRELAND'S HIDDEN HEARTLANDS
-  IRELAND'S ANCIENT EAST
-  DUBLIN
-  OVERLAPS





ideas that
are transformative
and radical

more of
same please

Issue #3

Our
Governments
are afraid to
change and
will watch you
wash away or
drown

'Principled Incompetence'

*it is not for lack of
means, motivation or
ability, but a deeply
political aversion to
the idea of decisive
large-scale state
intervention.*

What happens next on Climate Bill in build-up to Ireland's first carbon budget?

Government has approved the appointment of three new members to the Climate Change Advisory Council

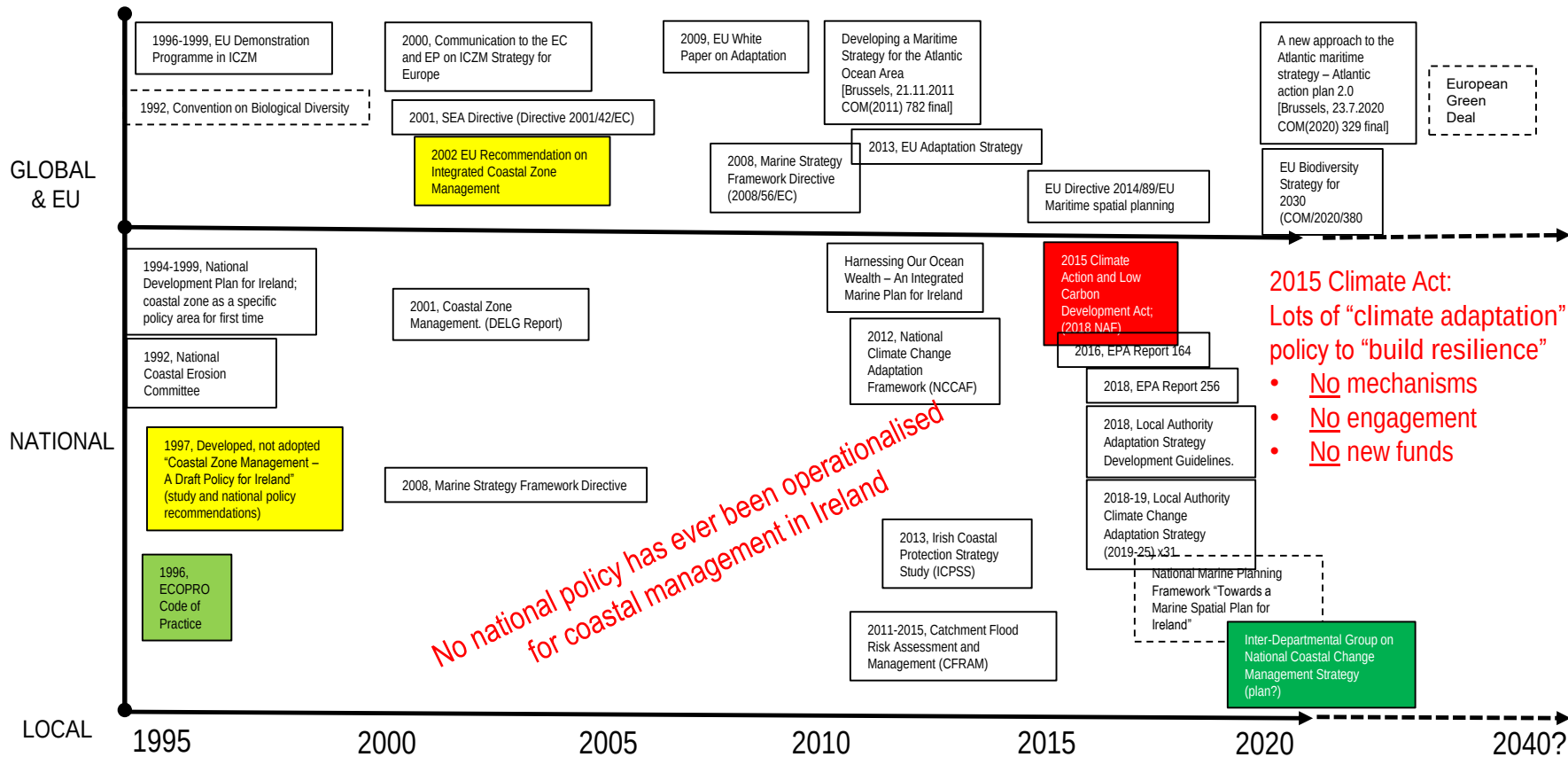
Kevin O'Sullivan Environment & Science Editor

THE IRISH TIMES

All new climate policies for coastal management are toothless....

with 2 faint glimmers of hope!

- CARO's
- National Coastal Strategy



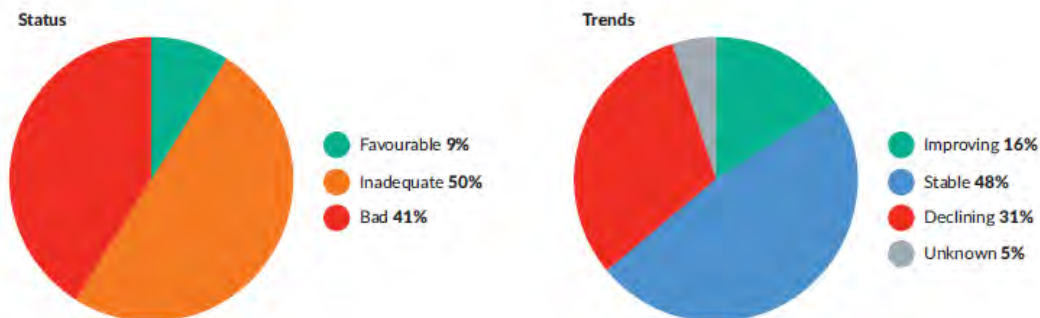


Figure 1. Overall assessment results for the status and trends in habitats protected under the EU Habitats Directive in Ireland 2007-2013.

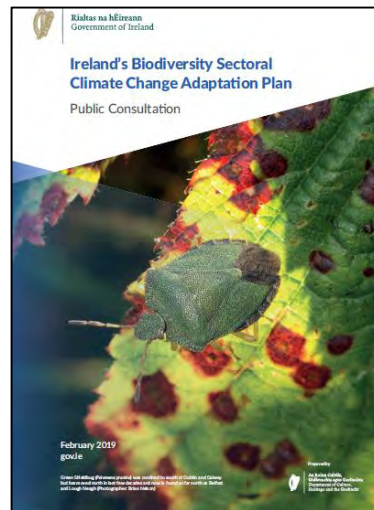


Table 5A: National overview of conservation assessments from the Coastal Monitoring Project (Ryle et al., 2009). Green: Favourable; Yellow: Unfavourable – inadequate; Red: Unfavourable – bad. The asterisk identifies EU Annex I priority sites.

Habitat Code	Habitat Name	Range	Area	Structure and Functions	Future Prospects	Overall
1210	Annual vegetation of drift lines					
1220	Perennial vegetation of stony banks					
2110	Embryonic shifting dunes					
2120	Shifting dunes along shoreline with <i>Ammophila arenaria</i>					
2130*	Fixed coastal dunes with herbaceous vegetation					
2140*	Decalcified fixed dunes with <i>Empetrum nigrum</i>					
2150*	Atlantic decalcified fixed dunes					
2170	Dunes with <i>Salix repens</i> ssp <i>argentea</i>					
2190	Humid dune slacks					
21A0*	Machairs					

Issue #4

Our habitats are not being managed and are degrading and/or disappearing

Table 5B: National overview of conservation assessments from the Sand Dune Monitoring Project published in NPWS (2013) and Delaney et al., 2013.

Habitat Code	Habitat Name	Range	Area	Structure and Functions	Future Prospects	Overall
1210	Annual vegetation of drift lines		↓	↓	=	↓
	ation of stony		=	=	=	=
	ting dunes			=	=	=
	along shoreline		=	=	=	=
	la <i>arenaria</i>					
	dunes with vegetation			=	=	=
	ed dunes with rum			=	=	=
	ified fixed			=	=	=
2170	Dunes with <i>Salix repens</i> ssp <i>argentea</i>			=	=	=
2190	Humid dune slacks	↓	↑	=	↓	↓
21A0*	Machairs		=	=	=	=

Issue #5

Our coastal ecosystems are valuable but do not receive proportional
€€€ investment

“Ecosystem goods and services are the benefits that natural environments supply to human beings”

Provisioning Services	Regulating Services	Supporting Services	Cultural Services
• Freshwater • Food • Fibre and Fuel • Genetic Resources • Mineral Extraction • Landscape for Industrial-Use	• Erosion Regulation • Flood Regulation • Water Regulation & Purification • Natural Hazard Regulation • Pest & Disease Regulation • Air Quality Regulation • Pollination	• Soil Formation • Primary Production • Nutrient Cycling • Water Recycling • Photosynthesis • Provision of Habitat	• Cultural Heritage • Recreation and Tourism • Aesthetic Value • Spiritual and Religious Value • Inspiration for Art/Folklore/Architecture • Social Relations • Educational Resource

Source: Everard et al., 2010, Table 3, 480-483)

“Have we neglected the societal importance of sand dunes?”

PROVISIONING

products obtained from nature, such as food and timber

REGULATING

services provided by nature that regulate our environment, such as water and air cleaning services

CULTURAL

non material benefits provided by nature which enrich lives such as recreation, learning and tranquillity

SUPPORTING

the underpinning (or supporting) services which enable other services to function, such as soil formation and nutrient recycling

The image shows the front cover of a report. At the top left, the EPA Research logo is displayed, featuring a stylized green leaf icon and the text 'epaResearch' in a sans-serif font, with 'Climate - Water - Sustainability' and 'enabling tomorrow's Ireland by policy - & technology solutions' in smaller text below. To the right of the logo, the text 'Report No. 239' is printed in a large, white, sans-serif font against a dark blue background. The main title, 'Valuing Ireland's Coastal, Marine and Estuarine Ecosystem Services', is centered in a large, bold, black sans-serif font. Below the title, the authors' names, 'Authors: Daniel Norton, Stephen Hynes and John Boyd', are listed in a smaller, black sans-serif font. The lower half of the cover is dominated by a photograph of a coastal landscape. In the foreground, there is a field of tall, golden-brown grass. Several people are visible: one person in a yellow jacket is crouching in the grass, another person is standing further back, and a third person is partially visible on the right edge. In the background, a body of water is visible, with a small boat and some industrial structures or masts in the distance under a pale sky. At the bottom left, there is a small white box containing the text 'EPA Research is a joint venture between the Environmental Protection Agency and the Department of the Environment, Heritage and Local Government'. At the bottom right, the website address 'www.epa.ie' is printed in a white sans-serif font.

Ecosystem service	CICES classification	Estimate of the quantity of ES per annum	Estimate of the value of ES per annum (£)
Provisioning ecosystem service			
Offshore capture fisheries	Wild animals	466,735 tonnes	472,542,000
Inshore capture fisheries	Wild animals	14,421 tonnes	42,113,000
Aquaculture	Animals and aquaculture	39,725 tonnes	148,766,000
Algae/seaweed harvesting	Wild plants and algae/plants and algae from aquaculture	29,500 tonnes	3,914,000
Genetic materials	Genetic materials from biota	Not quantified	Not valued
Water for non-drinking purposes	Surface water for non-drinking purposes	1,189,493,326 m ³ of seawater used for cooling in power plants	Not valued
Regulating and maintenance ecosystem services			
Waste services	Mediation of waste, toxics and other nuisances	9,350,842 kg organic waste	316,787,000
		6,834,783 kg nitrogen	
		1,118,739 kg phosphorus	
Coastal defence	Mediation of flows	179 km of coastline protected by saltmarsh	11,500,000
Lifecycle and habitat services	Lifecycle maintenance, habitat and gene pool protection	773,333 ha protected through SACs	Not valued
Pest and disease control	Pest and disease control	Not quantified	Not valued
Climate regulation	Atmospheric composition and climate regulation	42,847,000 tonnes CO ₂ absorbed	818,700,000
Cultural services			
Recreational services	Physical and experiential interactions	96 million marine recreation trips per year	1,683,560,000
Scientific and educational services	Scientific and educational services	Marine education and training fees	11,500,000
Marine heritage, culture and entertainment	Heritage, cultural and entertainment	Not quantified	Not valued
Aesthetic services	Aesthetic	Flow value of coastal location of housing	68,000,000
Spiritual and emblematic values	Spiritual and/or emblematic	Not quantified	Not valued
Non-use values	Existence and bequest	Not quantified	Not valued

Chapter 11: Coastal Margins

Coordinating Lead Author: Laurence Jones
Lead Authors: Stewart Angus, Andrew Cooper, Pat Doody, Mark Everard, Angus Garbutt, Paul Gilchrist, Jim Hansom, Robert Nicholls, Kenneth Pye, Neil Ravenscroft, Sue Rees, Peter Rhind and Andrew Whitehouse

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UK
£48 billion p.a. (3.46% GNI)

Ireland (equivalent?)
€2.57 billion p.a.
 > potential value
 > knowledge gap

THE SAND MOTOR: A NATURE-BASED RESPONSE

TO CLIMATE CHANGE

FINDINGS AND REFLECTIONS OF THE INTERDISCIPLINARY
RESEARCH PROGRAM NATURECOAST

EDITED BY
Arjen Luijendijk
Alexander van Oudenhoven

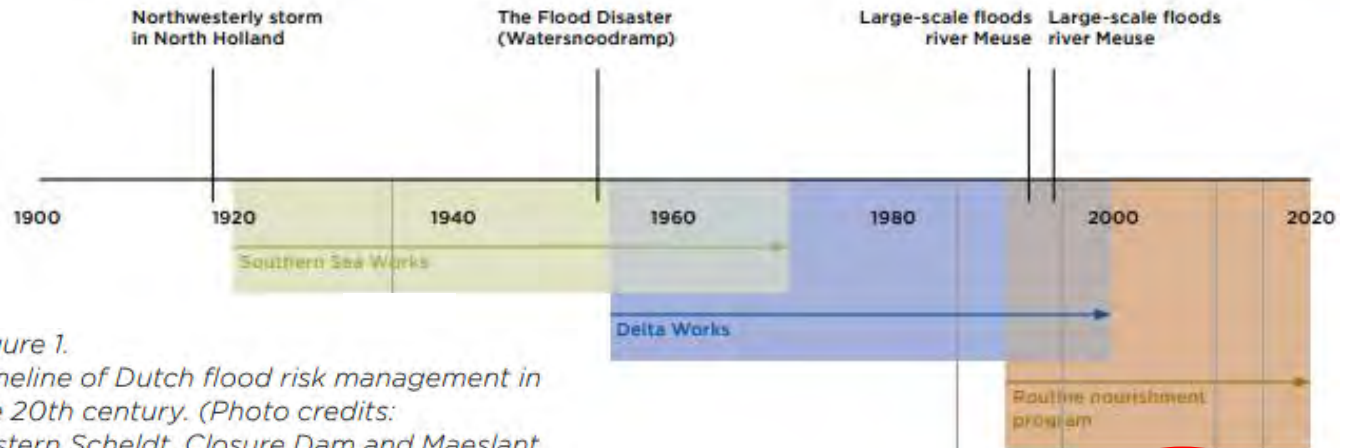
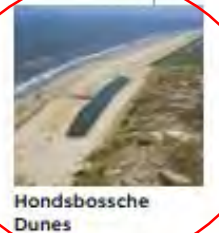
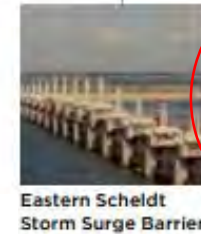


Figure 1.
Timeline of Dutch flood risk management in
the 20th century. (Photo credits:
Eastern Scheldt, Closure Dam and Maeslant
Barrier: beeldbank.rws.nl;
Sand Motor: Rijkswaterstaat, Joop van Houdt;
Hondsbossche Dunes: Boskalis)

Figure 2a and 2b. (below)
Illustration of "hard" versus "soft"
engineering. The photo on the left shows
the original "Hondsbossche en Pettemer
Zeewering", a large dike in North Holland,
whereas the photo on the right shows
the same construction fortified by sand
nourishment rather than additional hard
structures. (Photo credit: Boskalis.)



Almost 90% of the world's wetlands disappeared over the past three centuries, according to the Ramsar Convention, an organization formed around a 1971 treaty to protect wetlands. The loss rate has accelerated since the 1970s, with wetlands now disappearing three times faster than the world's forests.

Medberry (UK) “Let it flood”

- Managed realignment of coast for sustainable flood risk management;
- Maximise wetland habitats;
- Community participation.

See presentation:



The consequences of wetland loss can be profound:

- * Roughly 5,000 wetland-dependent **species threatened with extinction**, including mammals, birds and amphibians, according to Ramsar.
- * Fewer natural storage areas to hold back torrential rains and storm surge means more **severe floods**
- * Draining wetlands can release huge amounts of the **greenhouse gas carbon dioxide**, a major contributor to climate change.

Small-scale, local interventions (planting; fencing) along a dune to reduce vulnerability to storm erosion and flooding.

October 2020



Small-scale, local interventions (planting; fencing) along a dune to reduce vulnerability to storm erosion and flooding....
can lead to results but it comes at a heavy price to the community



Maharees Conservation Association

Protecting | Enhancing | Preserving



Ocean-based NbS

1. Kelp beds
2. Oyster reefs
3. Seagrass meadows



Kelp: a nature-based solution for coastal protection?

DR EUGENE FARRELL
& EMILY RICK

COASTLINE NEWS

OCEAN FOCUS | SUMMER 2020

Coastal protection on soft coasts around Ireland has traditionally relied on controlling the sea using 'hard' engineering solutions (sea walls, rock revetments, groynes). The disparity between civil engineers and coastal processes is well known, as discussed by Ann-Marie O'Hagan and Andrew Cooper in [Spatial variability in approaches to coastal protection in Ireland](#).

These artificial defences are appropriate to protect critical infrastructure; however, there are negative and unforeseen impacts that can arise including the loss of natural habitats (habitat fragmentation; disruption of ecological connectivity; decrease biodiversity) and alteration of natural processes by changing the geomorphology and hydrodynamics.

THE UNSEEN PROTECTOR?

Forest-forming kelps grow on rocky reefs in the cool waters of the subtropics, making the north, west and south coasts of Ireland ideal habitat. Although many kelp species exist around Ireland, the UK, and around the Western coast of Europe, the dominant forest-forming species is *Laminaria hyperborea*, which has been commonly recorded around the coast of Ireland for over three hundred years.

These species can grow up to 3 metres in length, living for up to 15 years. Kelp are uniquely resilient, as their morphology allows these large plants to remain fixed in place, while having the adaptive flexibility to move and respond to changes in incoming wave climates or water levels.

Cumulatively, these traits (durability, size, age, resilience and biomass density) are important considerations when assessing the long-term effectiveness of kelp as a coastal protection strategy.



Eco-engineering large-scale kelp forests? Commercial, recreational, environmental, cultural and societal interests.

A numerical model in Australia found that kelp can significantly reduce coastal erosion (up to 90%) during simulated storms and sea-level scenarios. Jury still out!

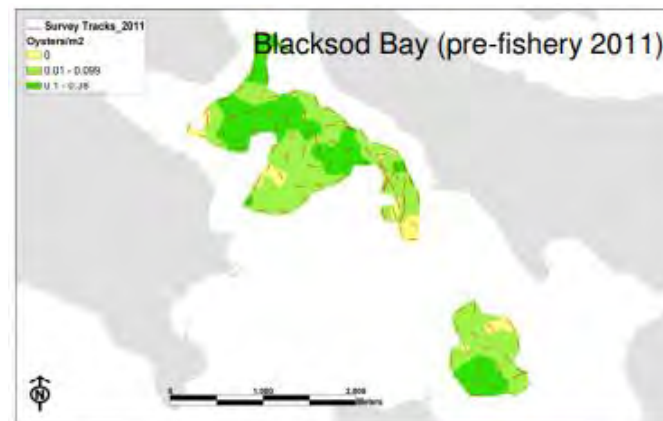
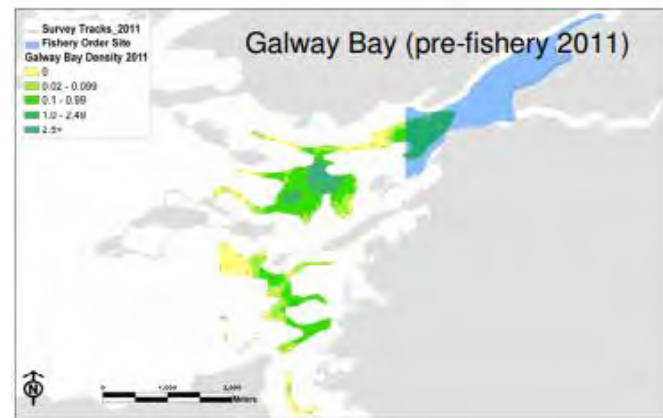
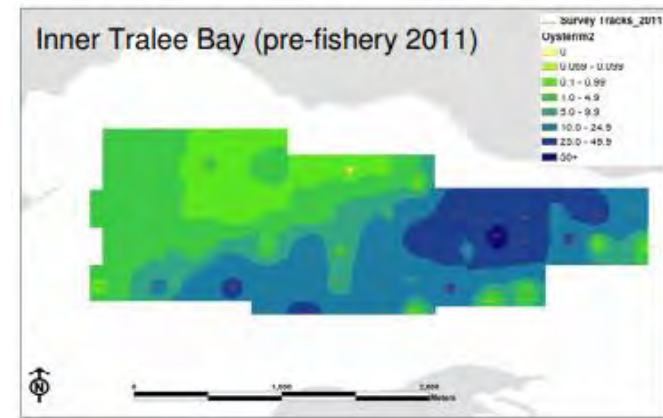
The Status and Management of Oyster (*Ostrea edulis*) in Ireland

Although commercial fisheries for oyster continue in many oyster beds in Ireland, data on the distributional extent and status of native oyster have not been reported in recent years.

Oyster stocks are, however, known to have declined significantly in Ireland compared to the historic highs of the 19th century. The species is listed by OSPAR as threatened or declining and a number of pressures from coastal development, disease and alien species continue in many areas.

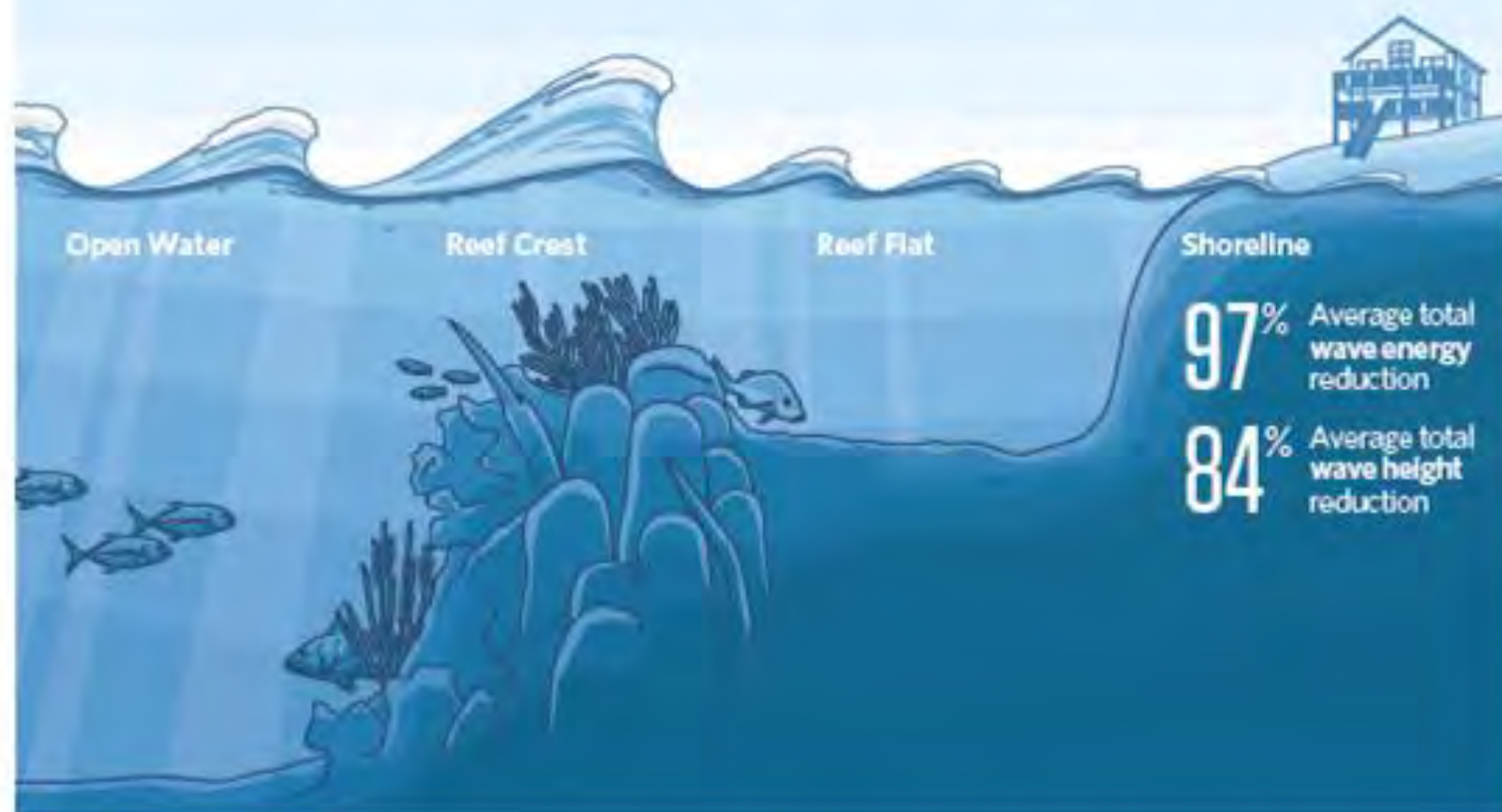
All commercially fished oyster beds in Ireland occur in Special Areas of Conservation (SAC) designated under the Habitats Directive (Council Directive 92/43/EC).

Oysters are potentially keystone habitat (reef) forming species or important characterising species in these areas and the maintenance of favourable conservation status (FCS) of oyster habitat is a requirement.



Coral Reefs Reduce Wave Energy and Height

Coral reefs reduce wave energy by an average of 97 percent across all studies globally. The reef crest, or shallowest part of the reef where the waves break first, dissipates 86 percent of wave energy on its own.



Study Citation: Ferrario, F., M.W. Beck, C.D. Storlazzi, F. Micheli, C.C. Shepard, L. Aioldi, 2014. The Effectiveness of Coral Reefs for Coastal Hazard Risk Reduction and Adaptation. *Nature Communications*. [DOI:10.1038/ncomms4794](https://doi.org/10.1038/ncomms4794)

© 2014 The Pew Charitable Trusts

Seagrass Meadows and Reef Reconstruction



The importance of seagrass meadows

Seagrass meadows are important features in the coastal environment as they reduce flow velocities, increasing sedimentation and limiting erosion. In addition, they form important marine habitats for flora & fauna while also sequestering carbon.

<https://www.maccaferri.com/uk/solutions/seagrass-meadows/>

Seagrass on Irish coastline part of global habitat in decline - report

Such plants are 35 times more efficient at capturing and storing carbon than tropical forests

© Mon, Jun 8, 2020, 22:08

Kevin O'Sullivan Environment & Science Editor



Part of Rossbeigh strand in Co Kerry, where seagrass is severely depleted. Photograph: Coastwatch Kerry

THE DRIFTWEED DILEMMA

Kelp have a seasonal life cycle. Rapid growth in spring and summer is followed by shedding during autumn and winter. Large volumes of discarded and living kelp can be washed onshore during storms. This driftweed – or beach cast seaweed or kelp wrack – is an important food source and habitat for a whole food web on otherwise sterile beaches.

The surface roughness element of driftweed promotes sand deposition by slowing the wind and can act as a catalyst for embryo dune formation. Beach-dune systems are a critical sand reservoir during times of extended wave run up, and are the first lines of defence from storm surge.

Despite the suite of ecosystem services provided by driftweed, public perception at home and **abroad** can be very negative. Many beach users do not like the smell or texture or look of seaweed on the beach and support its removal.

'The removal of all surface debris creates a sterile, artificial environment and further exacerbates the disconnection between society and our natural environment.'
Lissa Batey, a marine policy expert at England-based NGO the Wildlife Trusts.



Seaweed 'clean-up' projects occur frequently on Grattan Beach and have been proposed elsewhere such as Bearna Beach, Co Galway, but are in conflict with natural optimums for the coast (see list below by Prof. Karl Nordstrom).

A recent GoFundMe initiative 'The Bearna Beach Big Clean-up' (June 2020) raised nearly €6,000 (128 donors) to remove seaweed dumped from a storm to 'restore our village beach to all its glory again'.

The reasons cited for the 'clean-up' project include: decaying seaweed is (1) full of flies; (2) emitting bad odours; (3) affecting our village and our enjoyment of the coastal area and (4) not safe.

An ongoing challenge for us in our role as scientists and managers is to find compromise between conflicting needs of stakeholders. Not everyone wants a 'postcard' beach. It is incumbent upon us - in our roles as educators and/or experts - to provide tools and forums that facilitate increased awareness and appreciation of coastal process-landform relationships. Removing seaweed may be removing the only protection from storm surge.

A major concern highlighted in the **2005 NPWS report** is that mechanical harvesting in our nearshore may significantly lower organic matter input (in the form of driftweed) to intertidal shore ecosystems (both sandy and rocky shores) and potentially have major ecological impacts upon the structure and dynamics of intertidal and strandline invertebrate communities and shorebirds.

Workmen get their buckets and spades out to clear beach of rotting seaweed

BY BERNIE PHILATHARTY

Residents in Grattan Road are thrilled that they have their beach back just in time for the last few weeks of the summer holidays.

Local people had complained to Galway City Council that rotting seaweed which reached a height of one foot in places was coming between them and their enjoyment of Grattan Road beach.

The seaweed had built up over the summer months as the tide brought it in on a daily basis.

So much of it had accumulated in fact that local people said they couldn't use the beach at all as you had to wade through the rotting mass of seaweed to get into the sea.

However, Galway City



City Tribune: Aug 10, 2007

City Tribune: Aug 03, 2007

Council under fire for rotting mess on beach

Residents furious at neglect of Grattan Road strand



Grattan Beach, Galway City

Note the presence of embryo dunes on beach



Embryo dunes build the beach and are a sand reservoir during storm erosion events.



Post-cleaning of driftweed



Post-cleaning of driftweed



Finding Compromise Between Conflicting Goals and Conditions

Cultural Optimums

- Good views/access
- Familiarity/predictability
- Stability
- Safety
- Cleanliness
- Property demarcation
- Maintenance (roads, lots)

Natural Optimums

- Topographic relief and vegetation
- Diversity and complexity
- Accretion/erosion, growth/decay
- Unconstrained wind/wave action
- Beach litter
- Cross-shore zonation
- Transfer of sediments/biota

Can Humans and Coastal Landforms Co-exist in The Future?

Yes, but:

They won't be fully natural

They will depend on human action

They will optimize different values



- ID value of landforms in new context
- Assess stakeholder attitudes
- Identify workable target states
- Identify compatible management options
- Establish programs for education

Silverstrand Beach & Knocknagoneen Drumlin, Galway

Sometimes decisions can be as good as a Nature-based solutions.....



Galway City has a long-term goal of providing a coastal walk linking Salthill and Silverstrand. Is this a smart decision? Should Natura 2000 conservation outweigh societal / economic needs? 20 years later and still in the planning system.

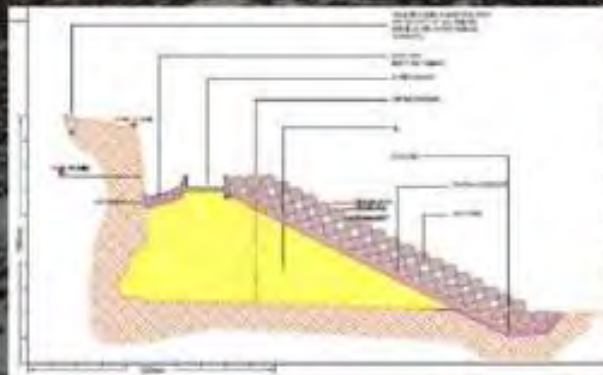
Rusheen Bay (SAC; SPA):
intertidal flats in sheltered estuary

Proposed bridge to
cross tidal inlet

Proposed wooden walkways
along cobble spit

Salthill

Silverstrand



Proposed rock armour to
protect the cliffs from erosion



Bertra Connected @BertraConnected · Feb 24
Unbelievable scenes at Bertra yesterday that was too good not to share! It is vital for communities to take the lead in shaping blue and green spaces for the future. #buildingclimateresilience @CARO_ASBN @MayoCoCo @JLikeDunes @DoctorDune @GeogNUIG





1. Re: Bertra Beach

19 Feb 2017, 23:23

[Save Reply](#)

They have redone the car park and put up boulders so you can no longer drive down into the dunes.

[Report inappropriate content](#)

2. Re: Bertra Beach

20 Feb 2017, 08:41

[Save Reply](#)

Hi

Thanks for your reply, does that mean you can't drive to the original car park where you could park and look directly out to the sea.

Thanks again.

[Report inappropriate content](#)

3. Re: Bertra Beach

20 Feb 2017, 08:47

[Save Reply](#)

The car park is beside the beach but not on the beach. I don't know what it was like before the storm damage so can't really compare...

[Report inappropriate content](#)

4. Re: Bertra Beach

20 Feb 2017, 10:03

[Save Reply](#)

Hi

After the storm damage the council made another car park beside the toilets. Before the storm damage you drove your car past the toilets for about 300metres to a lovely car park right at the beach this is the car park that I would like to know if it is in use again.

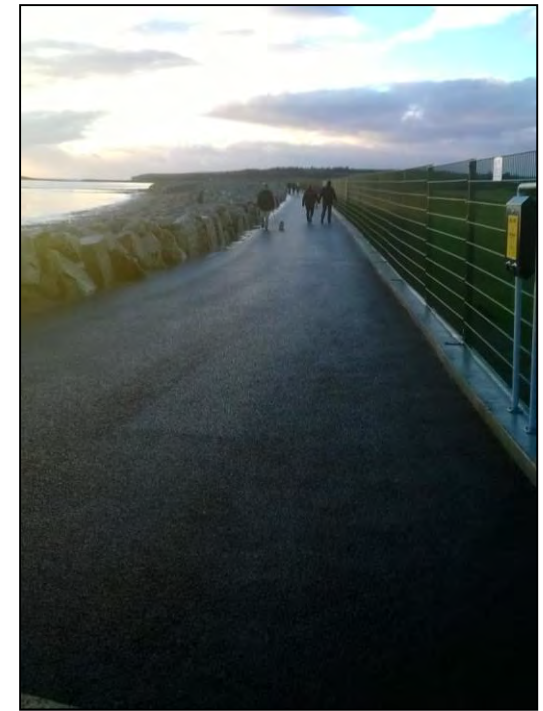
Many thanks

Bertra Barrier, Clew Bay, Co. Mayo



MAYO COUNTY COUNCIL
PLEASE TAKE NOTICE
WARD FIVE

Sometimes decisions are NOT Nature-based Solutions.....



The spectrum of coastal management:

ADAPTATION:

We adapt human activities to suit a changing environment We change what we do!

RESISTANCE:

We adapt environment to maintain human activities We carry on!



Sometimes decisions are NOT Nature-based Solutions.... but smart!



After Sandy, Not All Sand Dunes Are Created Equal

February 18, 2013 4:08 PM ET
Heard on All Things Considered

TWO WAYS TO MAKE A DUNE
1. Mother Nature's Old Fashioned Dune



The infographic illustrates the natural process of dune formation through four circular icons arranged horizontally. From left to right: a circle of sand, a circle of water, a circle of wind, and a circle of grass. Below each icon is its respective label: sand, water, wind, and grass. The background shows a beach scene with a small lighthouse on the left and a bird in the sky on the right.

sand water wind grass

2. Quick Man-Made Dune



The infographic illustrates the man-made process of dune creation through three circular icons arranged horizontally. From left to right: a circle containing a yellow bulldozer (labeled Equipment), a circle containing a green tree and white fence posts (labeled "Additives"), and a circle containing stacks of money (labeled Cash). The background shows a beach scene with a house on the right.

Equipment "Additives" Cash

How To Make A Dune: Two Recipes

Natural



No money, no labor
PREP TIME: 1-2 decades

Man-Made



A lot of money, labor
More fragile
PREP TIME: 3-4 months

Credit: Adam Cole/NPR

Storm Response-Recovery of Beach-Dune Systems in Ireland

Dr Eugene Farrell & Dr Kevin Lynch



Photo source: Michael Diggin

The Maharees: A legacy of chronic coastal erosion

See presentation:



“It should also be pointed out that if the dune structures are not protected it will be very costly to repair the damage done in the future. The threat will be not only to the public road but to the longer term viability of the Maharees Peninsula”.



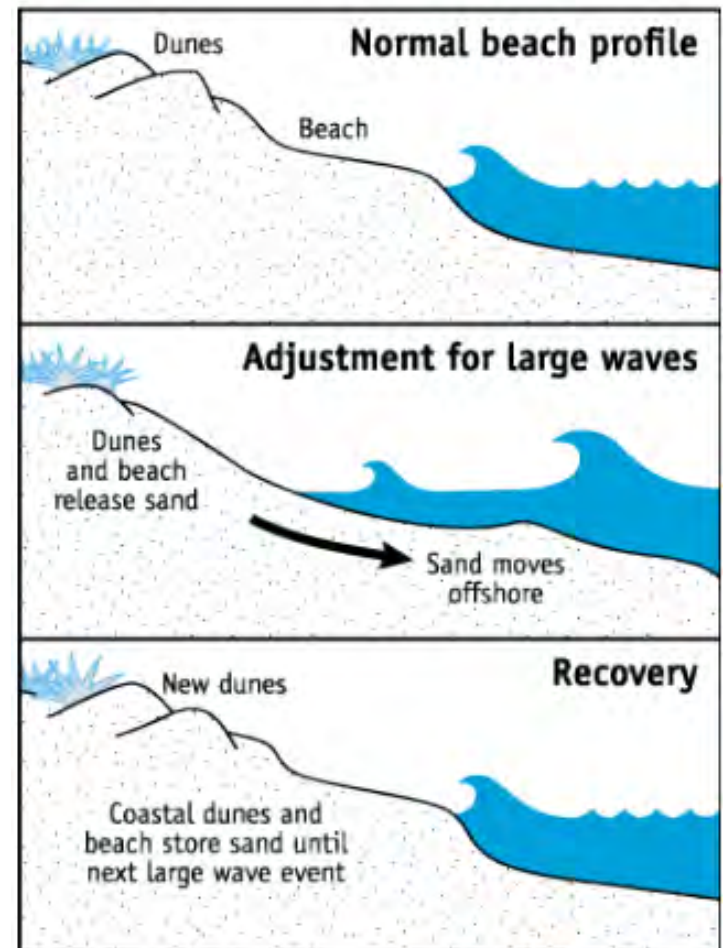
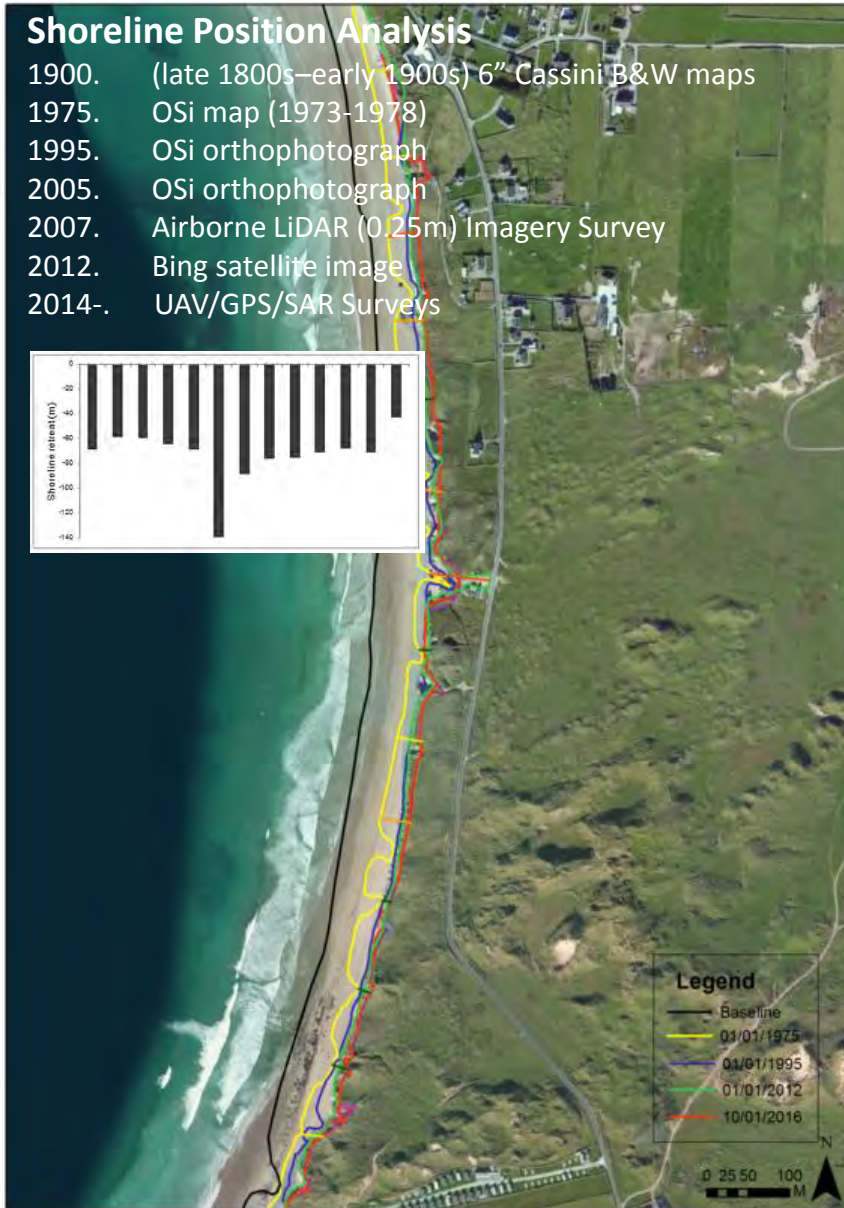
Source: Peter Hennessy, Local resident

The Maharees:

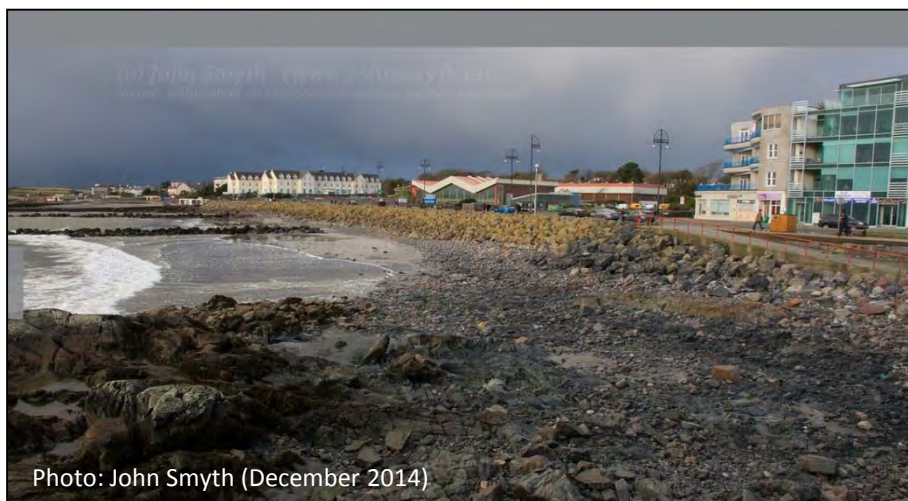
A legacy of chronic coastal erosion

Shoreline Position Analysis

- 1900. (late 1800s–early 1900s) 6" Cassini B&W maps
- 1975. OSi map (1973–1978)
- 1995. OSi orthophotograph
- 2005. OSi orthophotograph
- 2007. Airborne LiDAR (0.25m) Imagery Survey
- 2012. Bing satellite image
- 2014-. UAV/GPS/SAR Surveys



In theory, the amount of sand stays constant (equilibrium!).
It just moves around because of the changing wave regime.



In theory, the amount of sand stays constant (equilibrium!).
It just moves around because of the changing wave regime.

Some beaches “recover” faster/slower than others.

Sands of time return Achill beach 30 years after it washed away

Ocean deposits thousands of tons of sand at Dooagh, recreating the strand

© Mon, May 1, 2017, 01:00 | Updated: Mon, May 1, 2017, 11:07

Lorna Siggins

▶ Video

imgae



▶

The beach near Dooagh village on Achill Island was washed away in 1984 but over the past few weeks has returned, to the joy of local people and holidaymakers. Video: Seán Mollóy

▶ Beach on Achill Island disappears following heavy storms

Updated / Friday, 11 Jan 2019 19:08

f t in e p



▶

January 2019

0209



pyr·rhic¹

/ˈpɪrɪk/ 

adjective

(of a victory) won at too great a cost to have been worthwhile for the victor.



The Maharees: A legacy of chronic coastal erosion & pressures from tourism

Public meeting Feb 2016



RECOMMENDATIONS....ROADMAP AHEAD

1. Liaise with **KCC** so your 'cell' is represented in their plans for **Capital Expenditure** & OPW (Mr Eamonn Scanlon, Mr Brian Lennon)
Give Councillors and TDs the requisite information to represent the problem/community
2. Community is engaged in the problem and united in finding a fix
 - Work and speak as a Group; active on social media; learn from other Groups
 - Initiate education programmes: ecology, vegetation, flora and fauna, geo! (added value!)
 - Citizen science?
3. Start collating the information for a version of a **coastal erosion risk management study**
 - Historical review (topographic; airborne and terrestrial LiDAR; historical maps)
 - Planning documents (National Strategy Plan; Regional Development; County/Local Plans)
 - Cost to fill gaps; walkover survey/inspection; compare to ICPSS; climate change impacts
 - Map existing and future erosion/deposition in study area (2050 & 2100)
 - Preliminary environmental/impacts assessment (Directives: SEA, EIA, AA) & Community
 - Consider different measures that will, by current guidelines, be investigated:
Do nothing; Do minimum; Hold the Line; Advance the Line; Managed Realignment
More rock armour? Geotextile barriers? Sand fence? Dune vegetation planting?
4. What value does the NPWS place on this SAC? Always speak of the integrated dune system!
What if they are lost to erosion? Issue: EU conservation status = "Unfavourable-Bad"

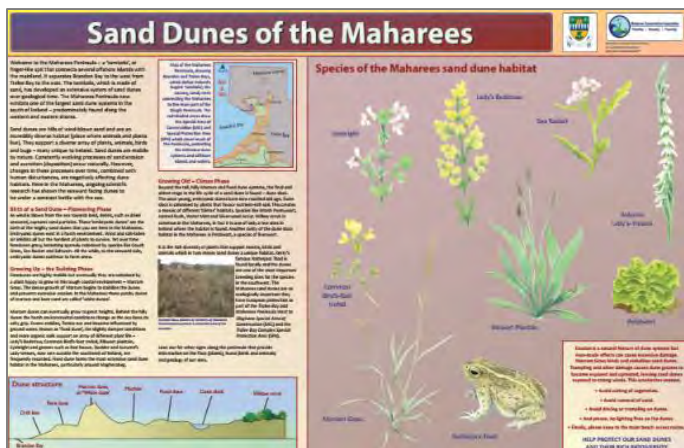
315 “actions” documented from February 2016 to January 2020



Maharees Conservation Association

Protecting | Enhancing | Preserving

	2019	J	F	M	A	M	J	J	A	S	O	N	D
Meetings	MCA committee	X (#32)			X (#33)	X (#34)			X (#35)			X (#36)	
	Community/public			X					X(AGM)				
	Stakeholders	XXXX	XX						X	X		X	
	Managers/Politicians/Engineers		X			X		XXXX			XX		X
Fundraising	Event	X											
	Online												
	Application	X	X	X		X					X		
Nature-based solutions	Marram grass planting			XXX			X	XXX		X			
	Sand trap fencing			X	X								X
	Straw bales												
	Other (Xmas trees)												
Management	Access fencing					X	X						
	Signage			X	X		X	X		X			
	Sand transfer												
	Enforcement				X			X	X				
Environment	Beach clean				X		XX	XX		X		X	
	Biodiversity					XX	X	XX	XX				
	Land-based clean				X	X							
Heritage	Category to be inputted												
Media	Broadcasting: TV		X										
	Broadcasting: Radio		X									XX	
	Newspapers							X				X	X
	Magazines												
	Other				X	X	X					X	
Education & outreach	Presentations	X	X		XX	X				X		X	
	Fieldtrips (education)				XX	X							
	Fieldtrips (organisations)			X			X	XX		X			
	Guided walks					X		XX	XX				
	Health and well being						XX						
	Other				X	XX			X	XX	X	XXXX	
Partnerships	Managers/Politicians												
	Research						X	XX		X			
	Other												
	Consultation												
Awards	Funding			X						X		X	
	Recognition									X			X



Eugene Farrell @DoctorDune · Dec 20, 2020

"The traditional lesser-known #place names of a locality are rooted in its #topography and #cultural history and reflect the close relationship between a #community and its immediate #environment" #coastal #resilience takes many forms; this is one! Well done @mahareesmatters

Logainmneacha na Machairí

- The Traditional Place Names of Maharees -

AA mahareesplacenames.com

The Lonesome Hole

Oileán Bó (ilawn boh) - The cow's island.

Leac a' Stóra (lak uh stohruh) - The flagstone of the store.

The Ladder - In September 1929, Mrs Ellen Sullivan (Nell Ferriter) from Ceann Duibhche went to stay on Oileán tSeanaigh.

Na Clocha Dubha (klyuhuh doo) - The Clocha Dubhas - fields.

Poll Bui (poul bwee) - The yellow hole.

Béal Geal (bee-ul gal) - The bright

AA mahareesplacenames.com

Logainmneacha na Machairí

- The Traditional Place Names of Maharees -

≡

mahareesplacenames.com

Oileán tSeanaigh

Oileán tSeanaigh (ilawn tanigh) - The island of St. Seanaigh (shanuch), named after the monastic settlement founded by him in the 7th century.

Oileán Bó (ilawn boh) - The cow's island.

Leac a' Stóra (lak uh stohruh) - The flagstone of the store.

The Ladder - In September 1929, Mrs Ellen Sullivan (Nell Ferriter) from Ceann Duibhche went to stay on Oileán tSeanaigh.

mahareesplacenames.com

The Lonesome Hole

The Lonesome Hole

Clocha Dubha

The Scrub Ditch

The Lonesome Hole

The Béal Geals

mahareesplacenames.com

on to the road, Kerry County Council commenced a scheme to reinforce the fences.

The Lonesome Hole - A low point on the present road to Castlegregory, running through a dune slack, associated in the past with ghostly appearances at night.

Na Clocha Dubha (klyuhuh doo) - The Clocha Dubhas - fields.

Poll Bui (poul bwee) - The yellow hole.

Béal Geal (bee-ul gal) - The bright opening/mouth.

The Béal Geals - Fields.

Old Magherabeg - The location of the original settlement of Magherabeg is unknown. Around the turn of the eighteenth century, blowing sand forced the inhabitants to move to a location overlooking the sea near The Bior. In 1841, the village had

mahareesplacenames.com

Clais Garbh

Clais Garbh

The Big Bank

Clais Garbh

Béal t'Chomhair

Tráigh Dhiomhaoin (trawg yeeveen) -

HAZARD 1: Blowout growth

Signage, fences & barriers



Welcome to Maharees
Please respect this special area of conservation and use official camp sites.
No unofficial camping permitted.
Thank you for your cooperation

Welcome to the Maharees

THE MAHAREES SAND DUNE SYSTEM IS DESIGNATED AS A SPECIAL AREA OF CONSERVATION AND IS PROTECTED UNDER THE EU HABITATS DIRECTIVE

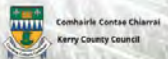
All sand dunes are environmentally sensitive areas which support a rich variety of wildlife. The marram grass which stabilises the sand dunes is fragile.

Please help us to protect this important habitat and coastal defence: do not light fires or camp on the dunes; do not walk or climb on the dunes - please use designated beach access paths and official campsites.

As plastic has a detrimental effect on our wildlife, please bring your litter home with you.

Thank you for your help in preserving this important natural feature of the Maharees.

 Maharees Conservation Association
Protecting | Growing | Flourishing

 Comhairle Contae Chiarraí
Kerry County Council



The Role of Fences

- on coastal sand dunes

INTRODUCTION

Without fencing, damage to vulnerable sand binding vegetation on dunes from pedestrians in high use areas can lead to significant erosion.



A short section of fence either side of the ends of accessway, or 'wings' may be all that is necessary to encourage pedestrians to keep to formal tracks.



A fence design that has minimum impact on the environment and is easy and low cost to erect and maintain may be all that is required in even high use areas. This low cost fence comprises waratahs placed 10 m or more apart with two conspicuous yellow cords, is easy to maintain and move as the dune vegetation expands or the dune erodes. In addition, accessway signs encourage pedestrians to keep to formalised routes to and from the beach.



Fences either side of accessways should be placed close to board walks to prevent pedestrians walking off boards and scouring out sand immediately next to the fence.



Regular inspection and maintenance of all fence types is essential so that they continue to protect dune vegetation from pedestrian and vehicular traffic effectively. Where sand is accumulating, bollards and posts will require lifting. Broken rails will require replacement and broken wires or cord restraining.

HAZARD 1: Blowout growth

Prevent growth of **reactivated** dune blowouts using straw bales and Christmas trees



2017



2019



2020



HAZARD 1: Blowout growth

Prevent growth of **new** dune blowouts using planting and control access.



Planted March 2016

June 2016 (+3 month)



March 2016

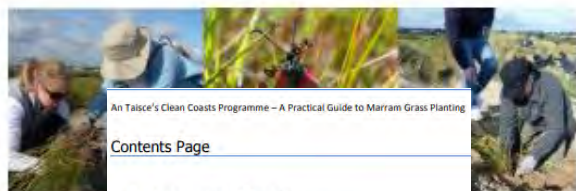
Source: Maharees
Conservation Association

December 2015





A Practical Guide to Marram Grass Planting: A Natural Coastal Defence



An Taisce's Clean Coasts Programme – A Practical Guide to Marram Grass Planting

Contents Page

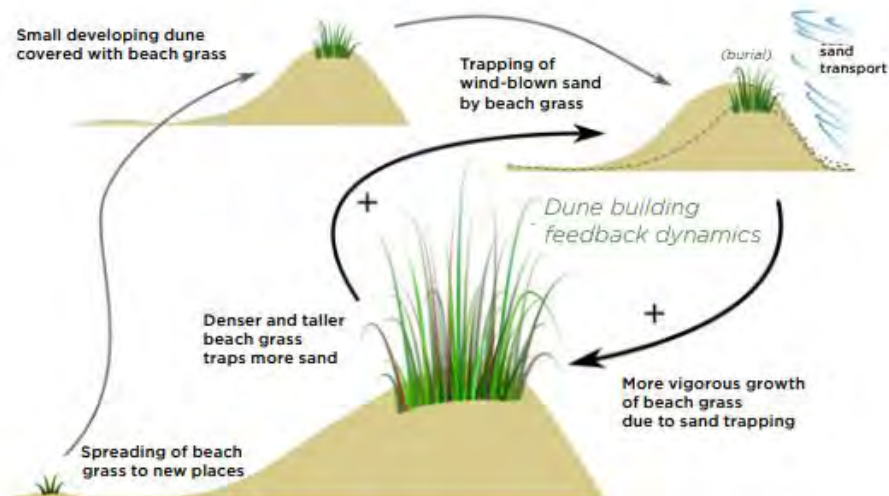
1. Background & Context
2. Dune Formation & Destruction
3. Coastal Dune Erosion Influences
4. Destruction of vegetation
5. How do we work to prevent coastal erosion?
6. Marram Grass Planting – Getting Started
 - Contacting interested parties
 - Time of year and site restrictions
 - Impact on the environment
 - Health and safety
 - Useful resources

Step 4: Double over the bundle of marram grass in half. The idea of this is to trick the transplanted grass into thinking it is totally covered in soil. This encourages the plant to work harder to photosynthesis (The process by which green plants use sunlight to synthesise foods from carbon dioxide and water). This procedure should result in faster growth.



Figure 1.
Overview of how
plant-sand feedback
dynamics drives
coastal dune
development.

Small developing dune
covered with beach grass



7. A Step by Step Guide to Marram Grass Planting



Step 1: Dig holes roughly 30-90cm apart, in a checkerboard pattern to ensure good coverage. If the area is eroding at a noticeable rate it is best to plant the grass closer together.

Step 2: Uproot marram grass from an area that is plentiful and close to the location of the proposed planting area. This can be done by hand or by digging.

By hand, take a small section of plant and twist it until it comes out of the ground easily.

When digging out grass be careful not to leave areas exposed and vulnerable to blow outs.

The removed plant should have at least 150mm of healthy root attached.

HAZARD 1: Blowout growth



June 2016 (+1 month)

Prevent growth of **new** dune blowouts using planting.
Increase dune elevation and sand reservoir.

February 2017 (+12 months)



September 2017 (+19 months)



September 2017 (+19 months)



October 2017 (+20 months)



June 2019 (+28 months)





July 2020 (+29 months)

October 2020 (+32 months)



October 2020 (+32 months)





Source: Maharees Conservation Association

Source: Maharees Conservation Association

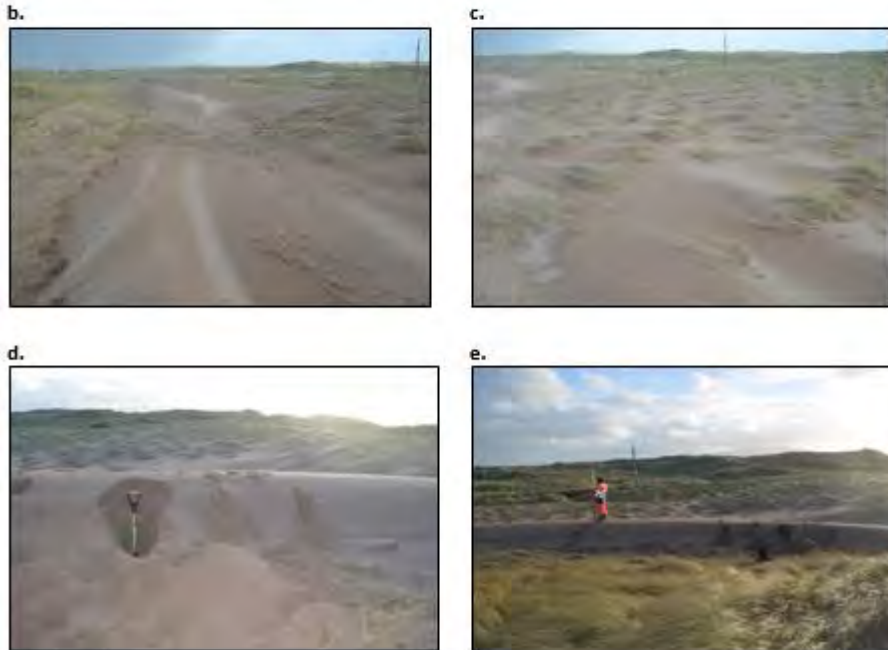
HAZARD 2: Too Much Sand

Over the winter of 2015-16, the only road in and out of the Maharees peninsula was impassable on 17 occasions.

Kerry County Council refused to intervene as it was an SAC ∴ NPWS
NPWS 'science-first, top-down, non-communicative'.



Figure 4a. Aerial picture of vegetated dune July 2016



HAZARD 2: Too Much Sand



October 07, 2016
Maharees Conservation Association (Mr Ray Buckley; Mr Martin Lynch)
Kerry County Council (Mr Eamon Scanlon; Mr Damien Ginty; Mr Gerry Riordan)
National University Ireland Galway (Dr Eugene Farrell; Dr Kevin Lynch)
National Parks and Wildlife Service (Mr Frank McMahon; Dr Philip Buckley).



How did we unlock the impasse?

1.  Health and safety risks
2.  Site Management
3.  Kerry County Council
Local Engineer €5,000
4.  Maharees Conservation Association volunteered to install

November 2016.

MCA submits report to Kerry County Council

“The benefits (of fences) are manifold including:

- Reduction of sand volumes blown onto road
- Retention of blowing sand on the dunes
- Monies saved by council by not having to clear the road
- Example of local communities, NPWS and KCC working together
- Raising of awareness of coastal risk mitigation and ‘actions’
- Prevent (ongoing) trampling on this area of the dunes
- Proof of concept to repeat case study in other areas of Maharees and Kerry”

April, 2017



Date	Event
2016 - October	On-site consultation with MCA, KCC and NPWS
2016 - November	Proposal to KCC Local Area Engineer, €5000 from KCC councillors to purchase chestnut fencing
2017 - April	Installation of 3 fences by MVA
2017 - September	GNSS Survey 1
2018 - January	Fences dug out and lifted
2019 - July 03	Most seaward fences dug out and lifted
2020 - Feb 23	Installation fences on top of most seaward buried fence
2020 - October 20	GNSS Survey 2

Road has not been blocked once since fences were installed.



When do we need permission? Where can we work?

The Habitats Directive states that ‘**Any plan or project not directly connected with or necessary to the management of the site** but likely to have a significant effect thereon, either individually or in combination with other plans or projects, **shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives...**’

The focus of AA is targeted specifically on Natura 2000 sites and their conservation objectives.

Article 6(3) requires that any plan or project that is not directly connected with or necessary to the **management of the Natura 2000 site** concerned but is likely to have a significant effect on it, on its own or in combination with other plans and projects, is to be **authorised only if it will not adversely affect the integrity of that site.**

Screening for AA and, if screening indicates the need, AA itself, must be carried out and the assessment and conclusions recorded to ensure that existing and future plans or projects are not authorised if they are likely to adversely affect the integrity of a site. These safeguards are designed to ensure the conservation of Natura 2000 sites.

All such cases should be **supported by sufficient scientific and other necessary evidence** and backing to show cause for the project and to address any questions that might be raised in relation to compliance, including any other possible impact.

Appropriate Assessment of Plans and Projects in Ireland

Guidance for Planning
Authorities



Comhaltas: Oidhreacht agus Rialtas Áitiúil
Environment, Heritage and Local Government



TRAFFIC CONGESTION

TRAFFIC CONGESTION

The health and safety of residents and visitors in areas like the Maharees (Picture July 19, 2020) is at serious risk as emergency services cannot access the area quickly during summer months.

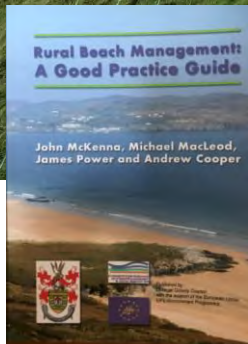


Control of traffic to beaches is made difficult by a number of additional factors:

- (i) The day-to-day unpredictability of the rush to the coast because of daily variations in weather;
- (ii) The narrow winding roads typical of many rural areas;
- (iii) lack of parking areas near the beach which forces cars to park roadside and reduces traffic to single lane;
- (iv) The concentration of some beach facilities in limited areas, e.g. parking, toilets and lifeguarded zones, which in turn concentrates visitor traffic;

Response: Traffic congestion can be eased by a number of strategies:

- (a) Provision of **off-road parking areas close/on the beach**.
- (b) Good early signposting of the beach and its facilities plus warnings about restrictions.
- (c) Use of traffic wardens, signs, cones, road markings to prevent roadside parking.
- (d) The use of beach webcams to provide prior warning of traffic conditions.
- (e) Provision of public transport from the largest nearby town. If the service is frequent and the fares competitive many visitors may leave their cars at home to avoid the problems of traffic congestion and parking.



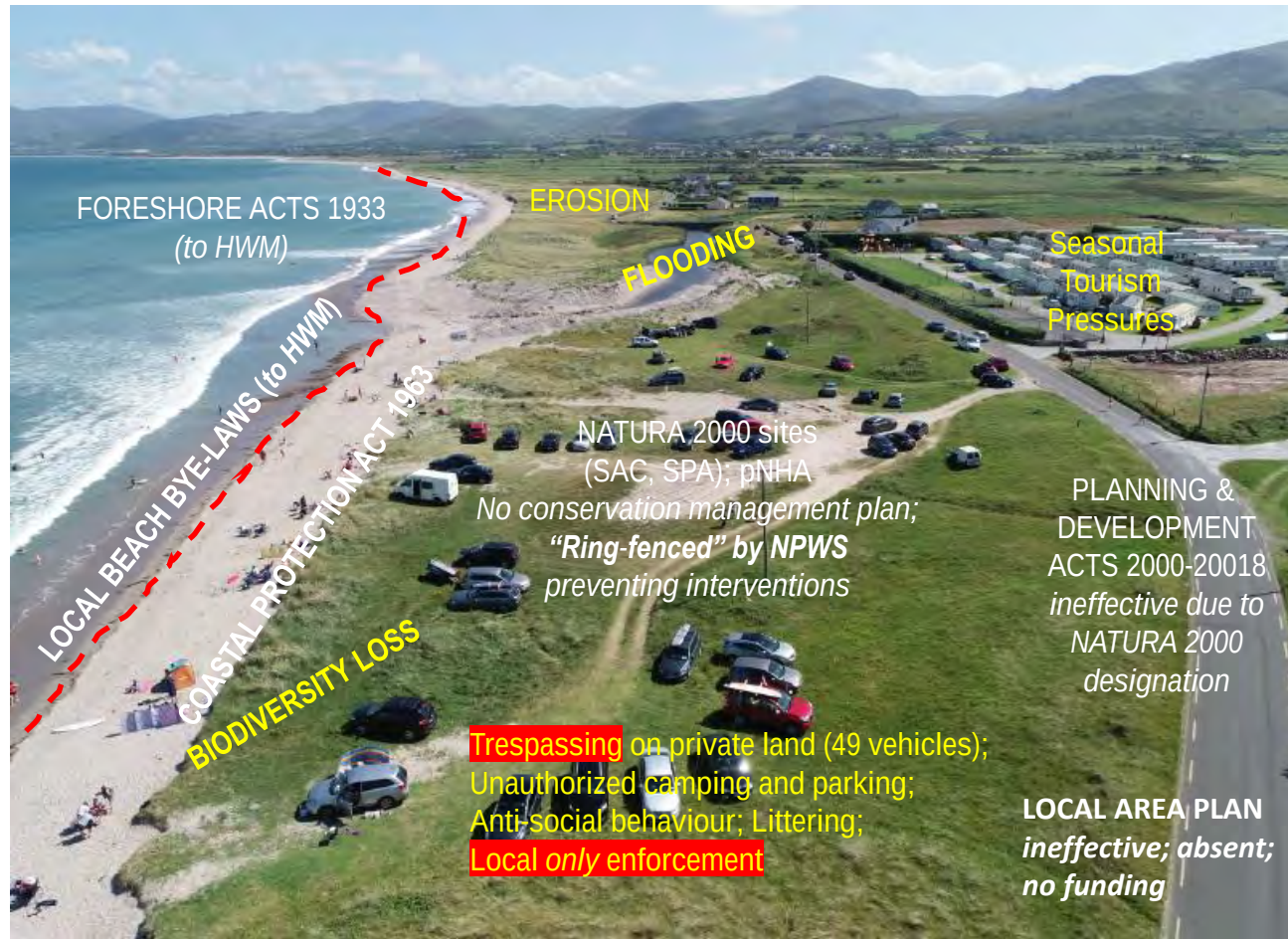
TRAFFIC CONGESTION

Temporary path during summer from carpark to beach requires:

1. Landowners permission ✓
2. "Site management" project ✓
3. Screen for AA & assessment report ✗



....much larger (non)planning & enforcement issues are the problem



There is a disproportionate balance between biodiversity preservation and economic, social, cultural and regional requirements (By EU law, ALL requirements are supposed to be accounted for).

Emphasis on scientific knowledge to avoid political negotiation separates People from Nature.

Biodiversity is degrading and/or disappearing.

Formal compliance with EU Directives (Habitats; Birds) is resulting in environmental and conservation objectives fading to the background.

HAZARD 2: Too Much (Bare) Sand

Sea Buckthorn (Hippophae Rhamnoides) is dark greens/brown colour surrounded by dune marram grasses. Anecdotal evidence from local farmers and NPWS staff suggests that Hippophae rhamnoides was planted some time in the 1970s. The Coastal Monitoring Project 2004-2006 survey states that it was planted by Kerry County Council to combat dune erosion (Ryle et al 2009). The plantations have been expanding ever since are impacting adjacent native flora . A recent study by Grobler (2017) showed that the total coverage of 13.56 hectares has been increasing at an average rate of 27% or 0.39ha per year since 1995.



HAZARD 3: Flooding

NbS will not work here..... and engineering solutions will never be approved.
..... so how does the community adapt to live with floods?



Source: Darren Jones (MCA)

Present Day ICPSS Coastal Flood Extents – Low Probability

Layer Information
This layer shows the modelled extent of land that might be flooded by the sea in a very extreme flood event.

Coastal flooding may also be referred to as tidal flooding in the maps and reports.

Low Probability flood events have an indicative 1-in-a-1000 chance of occurring or being exceeded in any given year. This is also referred to as an Annual Exceedance Probability (AEP) of 0.1%.

The Present Day Scenario is referred to as the Current Scenario in the maps and reports. The Present Day maps were generated using methodologies based on historic flood data, without taking account of potential changes due to climate change. The potential effects of climate change have been separately modelled and reported on.

ICPSS 2050 Erosion Line (2010 – 2014)

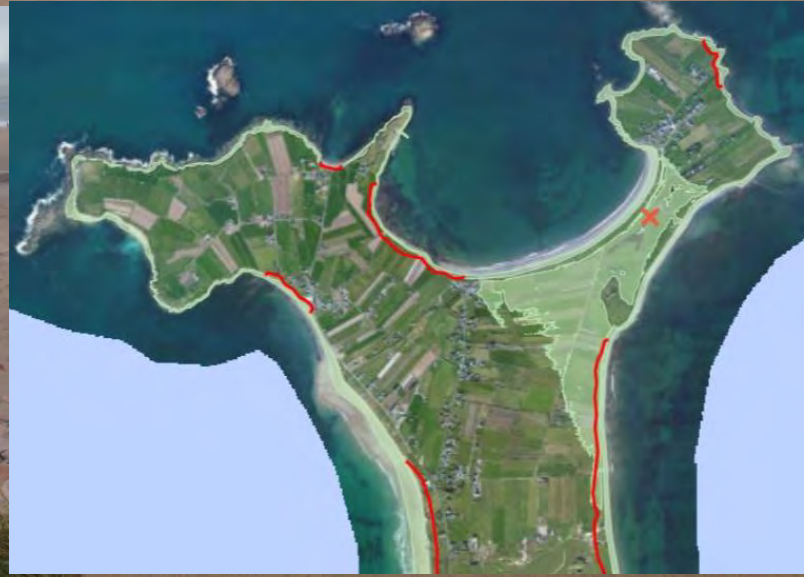
Layer Information
This layer shows the predicted location of the coastline in 2050.

The erosion maps have been produced for existing conditions only and do not include for projected future changes in climate such as sea level rise, increased storm frequency or associated variations in erosion rates.

The Irish Coastal Protection Strategy Study (ICPSS) erosion hazard mapping is for strategic purposes, and minor or local features may not have been included in their preparation. Therefore, the maps should not be used to assess the erosion hazard and risk associated with individual properties or point locations, or to replace a detailed local erosion hazard and risk assessment. It was not possible to eliminate the effect of existing coastal defence structures from the erosion hazard and risk assessment. Consequently, there will be areas where no erosion line is shown that are at risk from erosion, should present defences fail or not be maintained in the future. Equally, there may be an erosion line shown in areas that are now adequately defended by coastal protection structures that were introduced during or after the assessment period. Full details are available [here](#).



Parts of the dune system are protected by low angled rock armour.
We need to protect the dune toe....



Small-scale, local interventions (planting; fencing) along a dune to reduce vulnerability to storm erosion and flooding....
can lead to results but it comes at a heavy price to the community



Maharees Conservation Association

Protecting | Enhancing | Preserving



What do you see here?



NbS: Barriers to implementation



Uncertainty about performance and costs:

Uncertainty on the **long-term maintenance, performance and (cost-) effectiveness of NBS**, due to a lack of systematic testing, monitoring and reporting. The higher uncertainty associated with NBS in comparison to conventional solutions is an important factor that inhibits their wider acceptance and implementation.

Institutional, regulatory and governance barriers:

There are at present **no specific funding schemes** for fostering the implementation of nature-based solutions on a national level.

Bean counters and decision-making processes often fail to capture the **longer lifespan, lower maintenance costs and the added benefits NBS** can offer.

The **site-specific nature of NBS** further requires these measures to be adapted and designed for each case individually, preventing the development of a technical 'one size fits all' solution.

Uncertainty over responsibility for ownership and maintenance:

Conflicts emerge in determining **who pays for, operates and maintains NBS in the long-term**, particularly in situations where NBS on public and private properties are concerned. Currently our coastal communities are solely responsible.

Land requirements:

Certain types of NBS require large areas of **land for their implementation, which can be costly and difficult to accept for planners and local authorities**. This makes the selection of NBS over traditional engineered approaches especially unlikely if the wider environmental and social benefits are not considered in decision-making processes.

Roadmap to Implementing Nature-based Solutions in Ireland



STAGE 1: "ORGANIZE"

>ENABLERS: INTERNAL TO COMMUNITY

>COMMUNITY LEADERS/CHAMPIONS

E1. Identify and support local champions of climate adaptation

>COMMUNITY GROUP

E2. Frequent, organized (agenda; chair; inclusive), minuted **public meetings**; Good template for community consultation: <https://www.mayo.ie/community/participation/community-futures>

E3. **Steering committee** (diverse members) to organize actions

E4. *Good **governance** arrangements

E5. Motivation/priority consensus: **protection of land, protection of lives, conservation, socio-economic?**

E6. *Apply for **Charitable Status** by Charities Regulatory Authority

E7. Strong presence on **print, broadcast, social media** (Proactive Moderation)

E8. Identify template based on **successful communities adapting or "making changes"**

>ENABLERS: EXTERNAL TO COMMUNITY

E9. **Scientific monitoring (evidence/valuation)** of local coastal ecosystems

E10. **LA has statutory obligations** in line with national policy objectives of transitioning to a low carbon, climate resilient, environmentally sustainable economy by 2050

E11. Support from **champions within LA's** and other management agencies

E12. Support from local **political representatives (champions)** at any/all levels

>BARRIERS: INTERNAL TO COMMUNITY

B1. **Competing values and priorities** within the community

B2. **Disenchanted** from past experiences; no appetite to (re)organize

B3. **Lack of leadership**; no champion

B4. **Reactive (vs. Proactive)** action to impactful "event" or "perturbation"; not sustainable

B5. **Not aware** of future climate risks

B6. Not patient. **Transition takes time**

B7. **Landowners** unwilling to participate; Commonage = added complexity

B8. **Incapable of organizing**

B9. Relying on **anecdotal evidence (vs. scientific evidence)** to highlight the risks

> BARRIERS: EXTERNAL TO COMMUNITY

B10. **No central coastal community information hub (CCCCCCC?)**

B11. ***No roadmap** to organise actions

B12. **NATURA 2000 designations** preclude management/community interventions

Public meeting



Action "on the ground"



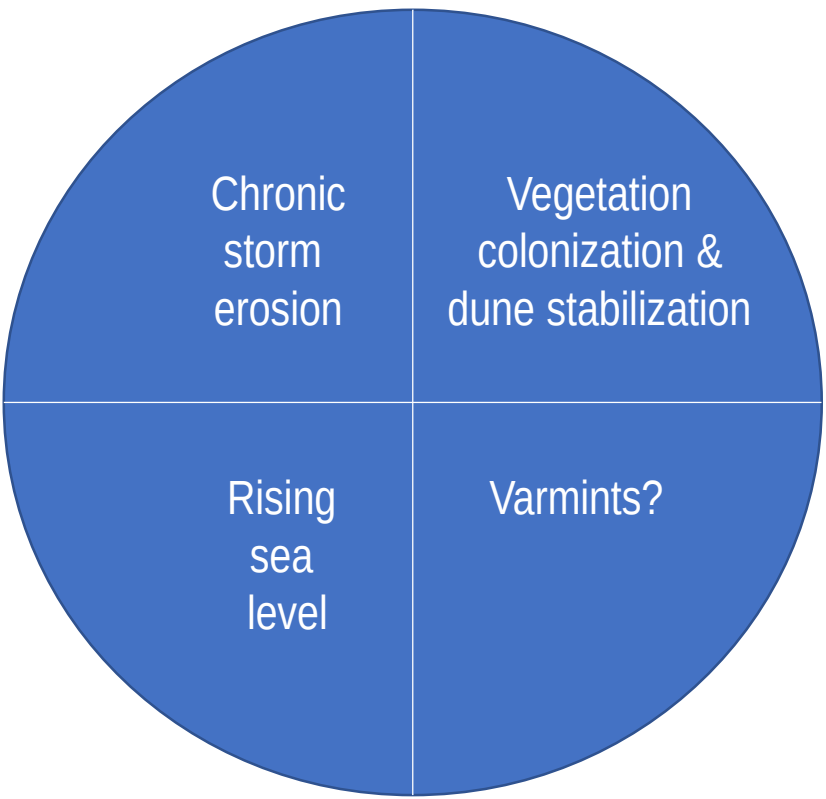


Why is the coast changing?

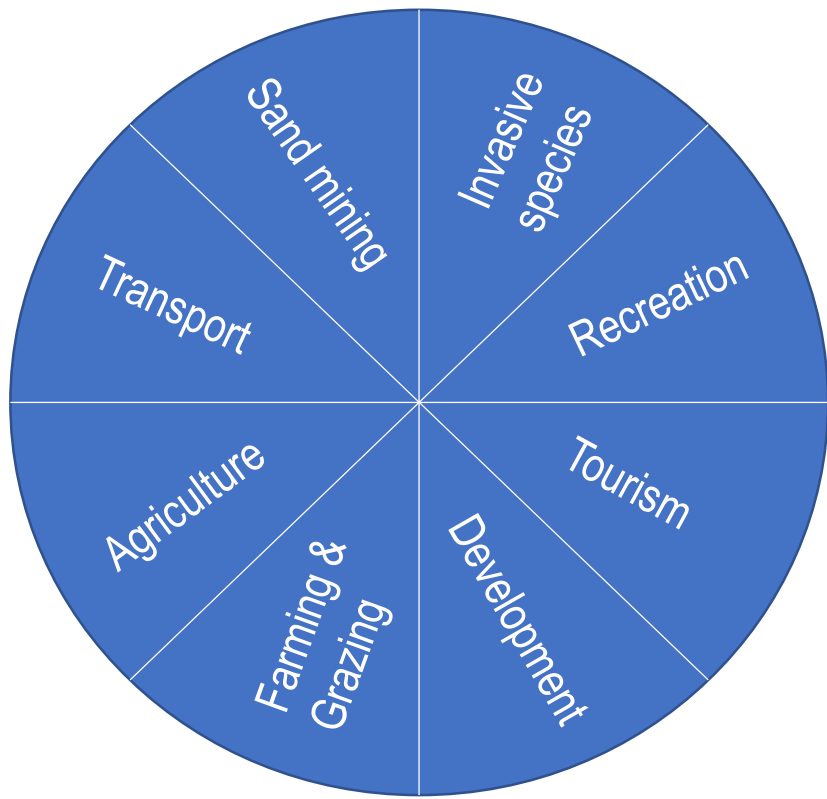
How much and how fast is change occurring?

Can we “*fix it*”? How long will it take?

Ocean & Nature



People





NUI Galway
OÉ Gaillimh



Whitaker
Institute



Whitaker Institute Policy Brief Series

Cluster:

Theme:

Further Reading:

Contact:

Read More About:

The Economic Value of Outdoor Recreation on a Coastal Beach and Dune System in Ireland's Southwest

In Ireland, 1.9 million people (40% population) reside within 5km of the coast. Legally, the coastal zone in Ireland has no defined limits, yet is our most stressed environment due to rising anthropogenic pressures and evolving climate hazards. Sandy beaches and coastal dunes are experiencing chronic degradation and the diverse array of 'natural' ecosystem services they provide to coastal communities and economies, including coastal defences and outdoor recreation opportunities, are being lost. Environmental economists have been vocal in advocating for the non-market economic valuation of coastal ecosystem services as a means of aggregating and justifying equitable policies that conserve the natural capital of these often rural areas.

How a healthy sand dune system can be worth €9 million per year?

This research is the first study to estimate the recreational value of Irish coastal beach-dune systems. A negative binomial individual-level Cost Model (TCM) was developed using data collected in two John-a-moo-style surveys in the Maharees and Castlegregory communities, Dingle Peninsula, Co. Kerry, during summer 2019. Cost of the Surplus (CS) value of €3.09 per person per beach-dune visit was estimated, comparing favourably with CS values of Mediterranean destinations. Aggregated seasonal CS figures amount to €165k based on 53,000 visitation levels. Using survey data, summer visitors to Castlegregory and the Maharees spend in excess of €9mn in the local economy through accommodation, food, recreation bookings, and transportation expenses. Additionally, a qualitative cross-comparison of over 30 intermediate Irish coastal destinations named by survey respondents revealed that only Achill Island, Co. Mayo could match the Maharees in terms of fully providing the key natural amenities enjoyed by visitors. This finding highlights the Maharee's uniqueness and socioeconomic value for beach-dune recreation.

Policy Implications

Quantifying the value of ecosystem services in coastal areas provides requisite information for policy development and resource management in line with advancing efforts to more fully estimate the value of Ireland's 'blue economy'. In a political and business climate where decisions are typically guided by cost-benefit analyses and market development, explicitly rendering 'hidden' ecosystem service and natural capital values can guide policy makers to allocate vital government resources toward underserved rural areas in a more socially equitable manner. Thus, as well as being a practical natural resource policy and management tool, ecosystem services valuation can empower rural advocacy efforts and counteract policy marginalisation. Coastal areas like the Maharees possess high natural capital values, justifying the call to increase efforts to stem chronic degradation, support their conservation, and ensure their continued delivery of their ecosystem services which serve as the foundation for life and livelihood for these rural communities.

Sign up to the Policy Brief Series [Here](#)

Photo credit: Michael Diggin





**There are structures that
COASTAL COMMUNITIES
can follow to gain access
to public funds and networks!**

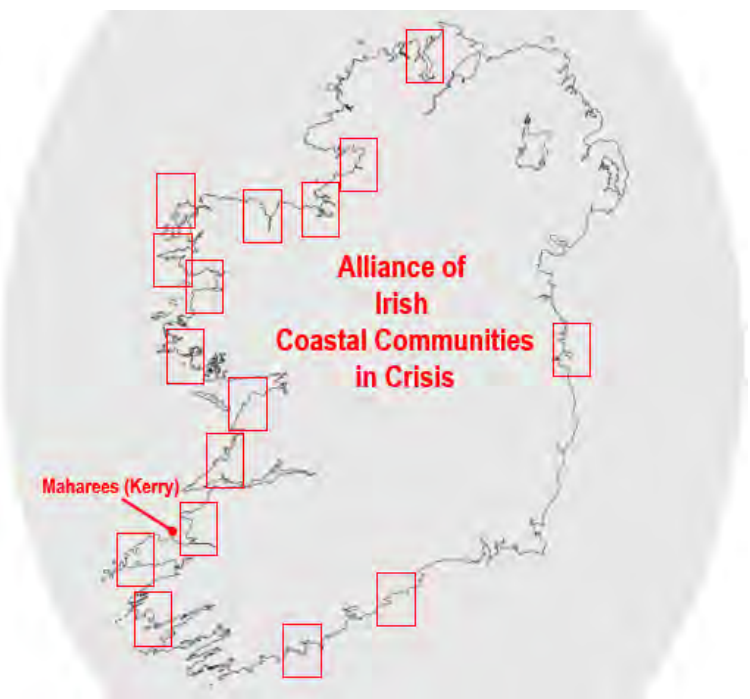


Figure 1

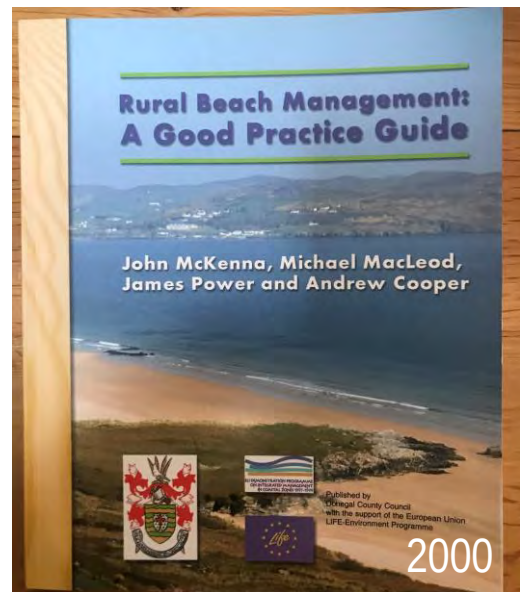
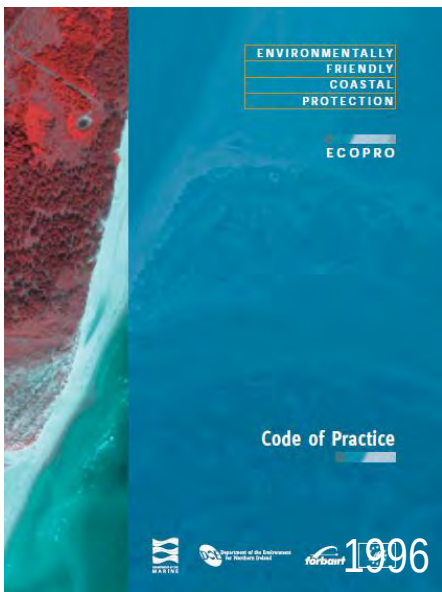
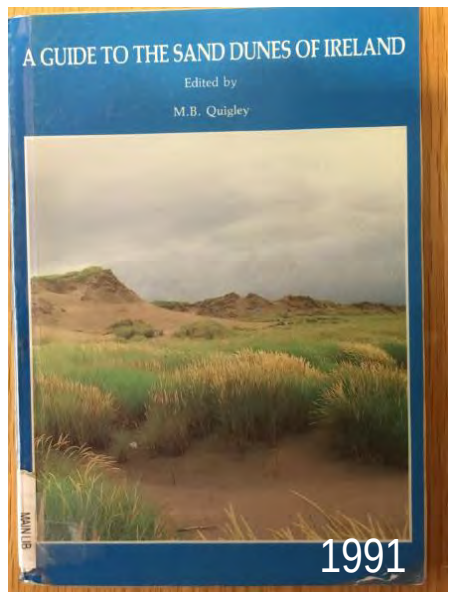
Structure of the Community Wetlands Forum



**An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreacht**
Department of Housing,
Local Government and Heritage



+ all the others



A pipedream being realised (maybe?)

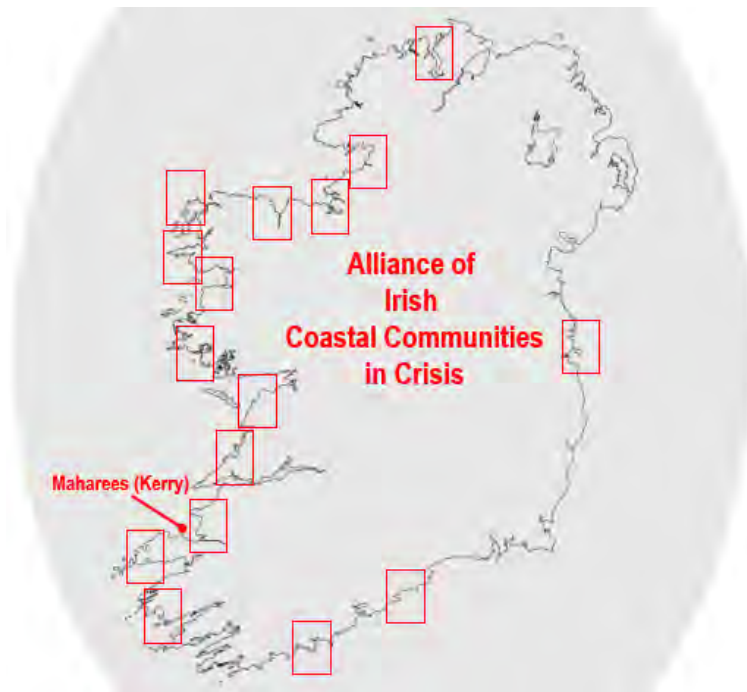
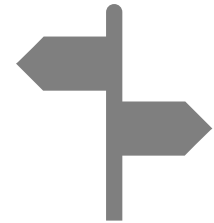
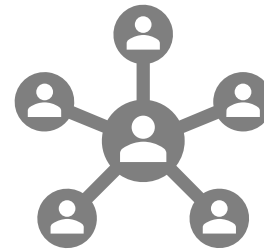
Contact: Dr Kevin Lynch

2

Contact: Ms Martha Farrell

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Connecting Coastal Communities
Concerned with Climate Change Chaos
-The 7Cs network -



We need a cultural shift in how we treat our coast

Curraclloe (Summer, 2018)



Source: Jack Meehan Irish Air Corps

We need a cultural shift in how we treat our coast



“When my Gaelic football team reached the County U21 final one of training sessions comprised of a four-hour army bootcamp on Cullenamore Beach in Strandhill County Sligo.

The final part of the training was for every member of the team to reach the top of the dune while carrying a sandbag. At the time I, as well as my team, was uneducated on the importance of dune systems at the time and feel as though even one simple sign could have prevented twenty-five young adults carrying sandbags from running up it.

*With such a simple and relatively inexpensive fix it is clear to me that the focus of coastal dune management should be on the management of people not management of natural processes. No naturally occurring process in Ireland could have inflicted the damage my team, as humans, did to the dune system in the space of a five-minute period. Not everyone is educated on the importance of dunes but most are educated enough to read a **sign and obey the guidelines it sets.**”*

It's tourist season, yet you're not allowed to shoot them...

9 June 2013



Tourists II by Duane Hanson

Roadmap to Implementing Nature-based Solutions in Ireland

A landscape photograph showing a coastal area with tall, dry grass in the foreground. A wooden fence made of vertical posts runs across the middle ground. In the background, there are rolling hills and mountains under a clear blue sky. The text is overlaid on the image.

*“the erosion of a landscape will bring the erosion
of a community”* The Doughmore Coastal Protection Issue

*“all land is a ghost given up for a while by water,
then taken away”* Poet, Mark Roper

END