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Practice versus policy-led coastal defence management

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ABSTRACT

Throughout northwest European coastal countries risks associated with coastal erosion are significant but spatially and temporally variable. The level of this risk is largely dependent on the extent of development within the coastal zones and a variety of approaches have been adopted for its management. The decision-making process for responding to erosion risk depends to a large extent on national policy. Coastal protection policy in northwest European countries varies in terms of the level of centralisation and formality of arrangements. In this paper the practical outworking of the informal practice-based system of Ireland, where there is no national policy framework, is compared with the policy-led system of England and Wales where formal national guidelines exist. Using case studies, the strengths and weaknesses of both the bottom-up and top-down approaches are assessed. The findings reveal strengths and weaknesses in both existing types of approach.

1. Introduction

Coastal zones worldwide occupy less than 15% of the earth's land surface, yet they contain more than 60% of the world's population [1]. Development in coastal zones creates risk since coastal geomorphological systems are exposed to erosion and deposition as they adjust to changing environmental conditions. In Europe all coastal countries experience coastal erosion although the extent to which it presents a problem varies according to the degree of infrastructural development and local social perception more than actual erosion rates [2]. From 1999 to 2002 between 250 and 300 houses were abandoned in Europe as a result of imminent coastal erosion risk and a further 3000 houses were subject to a decrease in market value of 10% or more [3]. These residential property losses are insignificant, however, in relation to the risk to other infrastructure from coastal flooding and erosion. Studies for the Intergovernmental Panel on Climate Change (UN-IPCC) estimate that over 158,000 people are subject to a coastal erosion or flood risk in 2020 in Europe [3]. On the other hand, interference in natural coastal systems to prevent erosion has severe environmental and economic consequences [4,2]. Balancing the competing demands of the environment with those from social and economic perspectives is the biggest challenge in coastal erosion management.

The topic of coastal erosion management has been recognised as an issue within Europe through the EC Communication on ICZM: a strategy for Europe (COM (2000) 547 final) and also by the European Parliament taking the initiative of a budget amendment in 2001 [3]. However, the way in which decisions are made in regard to coastal erosion varies greatly. Within the context of northwest Europe, with its diverse coastline and variable erosion risk, the aim of this study is to assess two contrasting approaches to decision-making in coastal defence. In this paper the approach in Ireland, where there is no national policy to steer local decision-making, is compared with that in England and Wales where a formal national policy and associated evaluation procedures exist. The research is based on case studies with which the authors are familiar. It has also drawn on interviews with national and local government officials directly involved in coastal protection at the operational level.

2. Ireland

The Republic of Ireland's coastline spans some 5800 km [5]. The southwest, west and northwest coasts mainly comprise resistant headlands with sand and gravel beaches developed in coastal embayments, often associated with estuaries. The east and south-eastern coasts are mostly composed of unconsolidated Quaternary sediments with fewer rock exposures. A lack of

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contemporary sediment input means that most of the soft coastline is eroding. Low densities of coastal habitation mean that coastal erosion was not historically regarded as a serious problem, and consequently no national policy existed for its management. However, between 1990 and 2000 Ireland experienced the second highest rate of coastal urbanisation of any EU State as agricultural land was developed into scattered residential areas [6]. This growth in urbanisation is the result of a period of rapid economic growth since the late 1980s. With this increase in the extent of developed coastline has come increased risk from erosion and attendant pressure from coastal property owners for coastal defence measures to protect their assets.

3. Irish shoreline management practice

Prior to May 2007 two main Government departments were involved in Irish coastal management. These were the Department of Communications, Marine and Natural Resources (DCMNR) and the Department of the Environment, Heritage and Local Government (DoEHLG). Although there is no overall coastal management policy, the Department of Communications, Marine and Natural Resources is responsible for most activities seaward of mean high water (MHW) and has little to do with activities above and landward of that boundary. The department is subdivided into sections dealing with separate issues such as coastal zone administration, coastal engineering and aquaculture. As part of its remit, the Department of the Environment, Heritage and Local Government deals with activities landward of MHW such as land-use planning and recreational activities. This Department guides local authorities who are, in effect, the implementation authorities for landward planning [7]. Local authorities generally take on the role of coastal zone managers although this is not done formally. The DoEHLG, through its agency the National Parks and Wildlife Service, is currently responsible for nature conservation and has responsibility for designating areas of conservation value such as Natural Heritage Areas (NHAs), Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). [1]

Coastal erosion in Ireland only came to the forefront of government thinking after a series of storms in the late 1980s [3] which took place during the early stages of the ongoing period of intensive coastal development. The Government set up the "National Coastal Erosion Committee" in 1991 and its subsequent report concluded that Ireland needed a coastal management policy rather than just a coastal erosion policy [8]. Consequently, the Government commissioned a draft coastal zone management strategy for Ireland [9], which in reality became a discussion paper rather than a strategy document.

No further national-level developments have occurred in the realm of coastal defence management, although a review is currently underway. In 1996, however, the Government agency Forbairt (now Enterprise Ireland) in collaboration with DCMNR distributed a manual [10] "Environmentally Friendly Coastal Protection- Code of Practice" (ECOPRO) to each local authority engineer as a guide to dealing with coastal protection in their area. This was consistent with the current system of practice-based coastal defence management that exists in the absence of a national level policy. This practice-based approach is outlined below.

3.1. Current practice

The practice of coastal management in Ireland (Fig. 1) varies greatly from one local authority (County Council) to another [8]. The role of local authorities is to implement the policies of the DoEHLG whilst being responsible for coastal management though planning and protection of coastal infrastructure, such as roads and flood defences. In many local authorities the informal but *de facto* role of coastal manager has traditionally been held by either a road or environmental engineer. These individuals may or may not have had formal training in coastal management and/or experience in the development of coastal protection strategies. Any lack of relevant training and experience is compounded by a universal lack of data, as there are currently no long-term coastal monitoring schemes in place to support management strategies. As a result, decisions made by any coastal manager with respect to coastal protection initiatives are usually based on short-term assessments immediately prior to implementation, or upon specially commissioned reports usually undertaken by consultant engineers.

Irish legislation dealing with coastal protection works is diverse. The main acts are: The Coastal Protection Act, 1963; the Foreshore Acts 1933–2005; the Planning and Development Act 2000 and the Harbours Acts 1946–1996. The Coastal Protection Act is seldom used now. The DCMNR had the power, under the Foreshore Act, 1963, to grant foreshore licences which authorise the licensee to 'place or erect any articles, things, structures or works on such foreshore, to remove any beach material from, or disturb any beach material in, such foreshore, to set and take

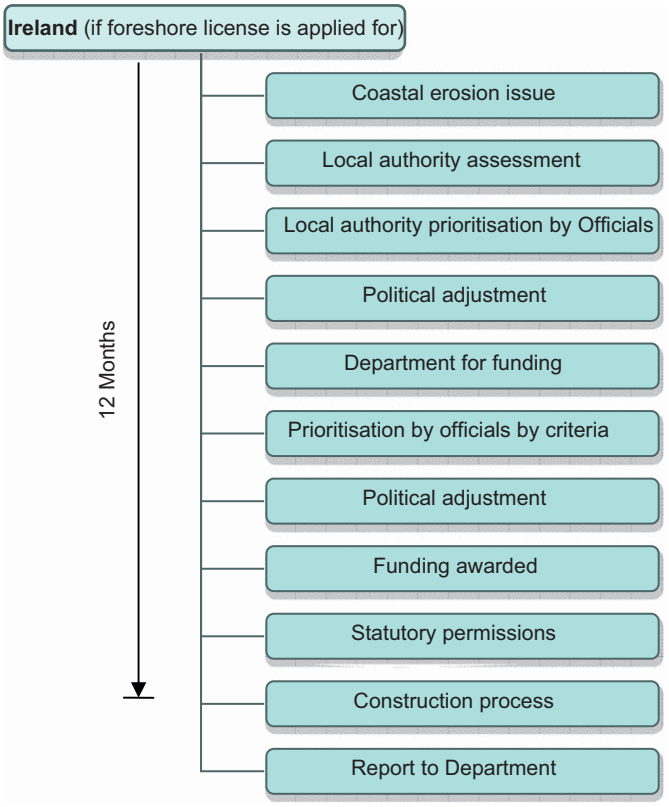

Fig. 1. Procedure associated with Irish coastal protection practice.

[1] Under a new parliament in June 2007 a number of changes were made to the former Department of the Marine, Communications and Natural Resources. Responsibility for marine matters was assigned to the Department of Transport and the Department of Agriculture, Fisheries and Food. The latter had responsibility for foreshore licensing. In December 2008 responsibility for coastal flooding was transferred to the Office of Public Works and at the time of writing the exact format of this responsibility, i.e. responsibility for foreshore licences, remained unclear. For this reason the administrative structure and institutional functions described in this section remain as they were before the recent changes in government structure. In any case, the situation regarding national policy on coastal erosion has not changed.

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any minerals in such foreshore to a maximum depth of 30 feet or to use or occupy such foreshore for any purpose'. A strict reading of this provision would suggest that it is necessary for local authorities to obtain a foreshore licence before undertaking any coastal protection works.

The enactment of a new Planning and Development Act in 2000 made significant changes to the administration and management of the foreshore by extending the planning code to cover any development on the foreshore. The 2000 Act (section 227 (8)) stipulates that the Foreshore Acts do not apply to any local authority-led development. The same Act, however, requires any local authority-led, or commissioned, coastal protection works to seek permission from An Bord Pleanála (The Irish Planning Appeals Board). They are in turn advised to inform the Department and it is recommended that the local authority seek pre-planning consultation, also with the department. (This change is a consequence of the 2000 Act which, for development purposes, made the foreshore subject to planning control.) 'Development' as defined in this Act could include a coastal protection scheme. All documentation concerning such a scheme must be forwarded to the DCMNR and the Minister has the opportunity to respond in writing.

For any other development on State-owned foreshore, which is not led by the local authority, a foreshore licence must be sought from the department. These developments are also subject to evaluation and monitoring by regional engineers from the DCMNR. Privately owned foreshore is not covered by the same legal regulation; however consultation with the department is advised. The Foreshore Act, 1933 covers State-owned foreshore and the Planning and Development Act 2000 applies to development on such foreshore, essentially subjecting development on the foreshore to planning permission. The Departmental guidance notes for foreshore applications state that "Developments on privately owned foreshore also require the prior permission of the Minister under the Foreshore Acts" [11].

The existing procedure for application for financial assistance for coastal protection from national Government requires local authorities to submit a list of priority coastal protection projects to the DCMNR on an annual basis. This list is typically drawn up by the local engineer with some input from the regional DCMNR engineers (only with respect to urgent works). The need for coastal protection work and the nature of such works is subject to the expertise of the engineer. Protection is, therefore, usually undertaken in response to a particular erosion incident or threat of risk to the public and/or existing infrastructure. The need for protection is often strongly influenced by public pressure which manifests itself in the form of political influence being exerted directly or indirectly on the local engineer. The priority list is also subject to revision by elected representatives of the local authority (which is more likely to reflect political expediency, rather than strategic need) before it is forwarded to the Department for consideration by the Minister. This means that expert opinion can be weakened by political considerations.

An additional consequence is that the Irish system tends to be wholly reactive to erosion problems, and deals with immediate issues. It is, therefore, difficult for a proactive, long-term or large spatial perspective to feature in the decision-making process.

Some coastal protection works are funded solely by DCMNR and these are usually carried out in areas where the infrastructure at risk is under the authority of a State or semi-State body (e.g. National Parks and Wildlife Service, or one of the Port companies; [8]), or where the DCMNR is in a better position to complete the work than the relevant local authority (Jim Casey [DCMNR], *Pers. Comm.* 2007). In these cases the works are designed by DCMNR engineers and supervision of the work, which is undertaken by local authority engineers, is also carried out by Department engineers.

Most coastal protection works are only partially funded by the Department and they are designed and carried out by the local authority or put out to tender and carried out by an external engineering firm. Before allocating any funding to local authority schemes, DCMNR uses a set list of criteria to assess each priority list. These assess whether the proposed works will:

- protect public safety, public property or infrastructure;
- protect areas of socio-economic, tourism or recreational importance;
- support the economic development, or increase the economic potential (of the area);
- provide essential protection for areas or features of environmental or heritage significance;
- avert the need for costly remedial works at a later stage [12].

Once the projects are assessed using the above criteria they are reappraised according to national political imperatives. This involves allocation on a county-by-county basis of the available funds. When all the criteria have been met, financial assistance is approved for certain schemes based on the funding plan agreed by the Engineering and Sea Fisheries Administration Divisions of the Department. It is normal practice for available funding to be spread around the country, rather than granted to one major scheme. (Such political considerations again hamper any attempt at national-level or long-term considerations.)

To comply with the law, local authorities must then apply for a foreshore licence and/or planning permission as necessary in order to carry out the protection work. Due to the nature of the consultation process; however, delays are common and frequently this could result in funding being lost for a particular project, as funding is only granted for one particular financial year. In the past, a consequence of this was that many local authorities did not seek a foreshore licence and carried out the works immediately after funding was granted, in order to retain financial assistance [8].

Although each local authority operates under the same legal framework and is required to submit a priority list of coastal protection work to the DCMNR, there are no national guidelines for authorities as to how works are to be prioritised, and this results in marked variation in approach across the country. These inconsistencies arise from the prioritisation procedure, the political sensitivity of any decision and also whether or not a foreshore licence is sought [8].

There are also some practical problems related to permitting of the process of works implementation, even after financial resources have been obtained. All works are technically subject to a monitoring procedure, and since some authorities do not seek a foreshore licence or planning permission it could be argued that such works may be in breach of the Foreshore Acts and/or the Planning and Development Act. Some local authorities tend to favour assessment by the regional engineers only when the work is complete, whilst others use progress reports as evidence of monitoring rather than adopting a formal monitoring procedure. Some coastal protection schemes are subject to Environmental Impact Assessments (EIAs) due to their size, sensitive location and/or nature. In these cases assessments are more frequent and monitoring is ongoing.

3.2. Case study

Inch Strand in Dingle Bay, Co. Kerry, southwest Ireland, forms part of a large barrier-dune system, with a dissipative shoreface

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and a high energy tidal delta system [13]. It is backed by an extensive dune system comprising transverse and active parabolic dunes. Research indicates that high magnitude storm surges, operating on approximately a 60 years storm cycle have been instrumental in controlling the system over the last 200–500 years [13].

The northern part of Inch Strand abuts the base of a cliff that supports the R561/N86 coast road which is heavily utilised by tourist traffic to the Dingle Peninsula especially during the peak season from June to September. Acutely aware of the significance of this route, the County Council had previously commissioned a report (2000) to assess the potential of slippage along this stretch of road. The report recommended action at three key locations along the road. However, the substantial resources required were not readily available, and the structural protection works were put on hold for several years until a major incident caused an immediate reconsideration.

In April 2007 a section of the coast road on Slea Head to the west of Inch Strand did collapse causing major structural damage to the road (Fig. 2). This incident influenced the Council's decision to immediately reinforce the toe of the cliff at Inch. Such works technically require a foreshore licence; however, the Council reasoned that this was an emergency situation and therefore not subject to a licence, and it pushed forward with the construction of a large scale (ca. €4m) armoured structure at Inch between April and July 2007. This decision was in no doubt influenced by the fact that there is no statutory time limit on the time given to the DCMNR to process a foreshore application and decisions can take several months.

Usually prior to embarking on such a scheme a local authority would apply for central funding from the DCMNR to cover the capital expenditure. On this occasion the decision was made relatively quickly, so the cost had to be covered by a conventional bank loan. The council also made an application to DCMNR for financial support for the scheme, despite the fact that the DCMNR is also the department with responsibility for foreshore licensing and leasing with which the council had not complied. This implies substantial flexibility in the interpretation of existing regulations and provisions.

4. England and Wales

The coast of England and Wales is about 4274 km long [3] of which 2080 km has artificial coastal defences, comprising 5100 structures and a further 640 km makes use of natural defences [14]. The coast is considerably more heavily developed than that of Ireland and this, coupled with a propensity to natural erosion, particularly on the eastern coast, has led to an extensively defended coastline. Currently about a third of the coastline of England and Wales is protected, [15]. Even with this level of defence in place, recent estimates are that 1,062,000 flats and houses, 82,000 businesses, 2.5 million people, 2 million acres of agricultural land worth about £120 billion are at risk from flooding and coastal erosion in England and Wales [16]. Of this at least £10 billion of assets are at risk from coastal erosion [17].

The management of coastal protection in England and Wales (Fig. 3) involves both statutory [18] and non-statutory components [19]. Both are guided by a national policy for risk management in relation to the protection of low-lying land from flooding, and the protection of the coast from erosion that is the responsibility of the Department for Food and Rural Affairs (DEFRA). The stated aim of that policy is [20]

'To manage the risks from flooding and coastal erosion by employing an integrated portfolio of approaches which reflect both national and local priorities, so as:

- to reduce the threat to people and their property
- to deliver the greatest environmental, social and economic benefit, consistent with the Government's sustainable development principles, and,
- to secure efficient and reliable funding mechanisms that deliver the levels of investment required to achieve the vision of this strategy.'

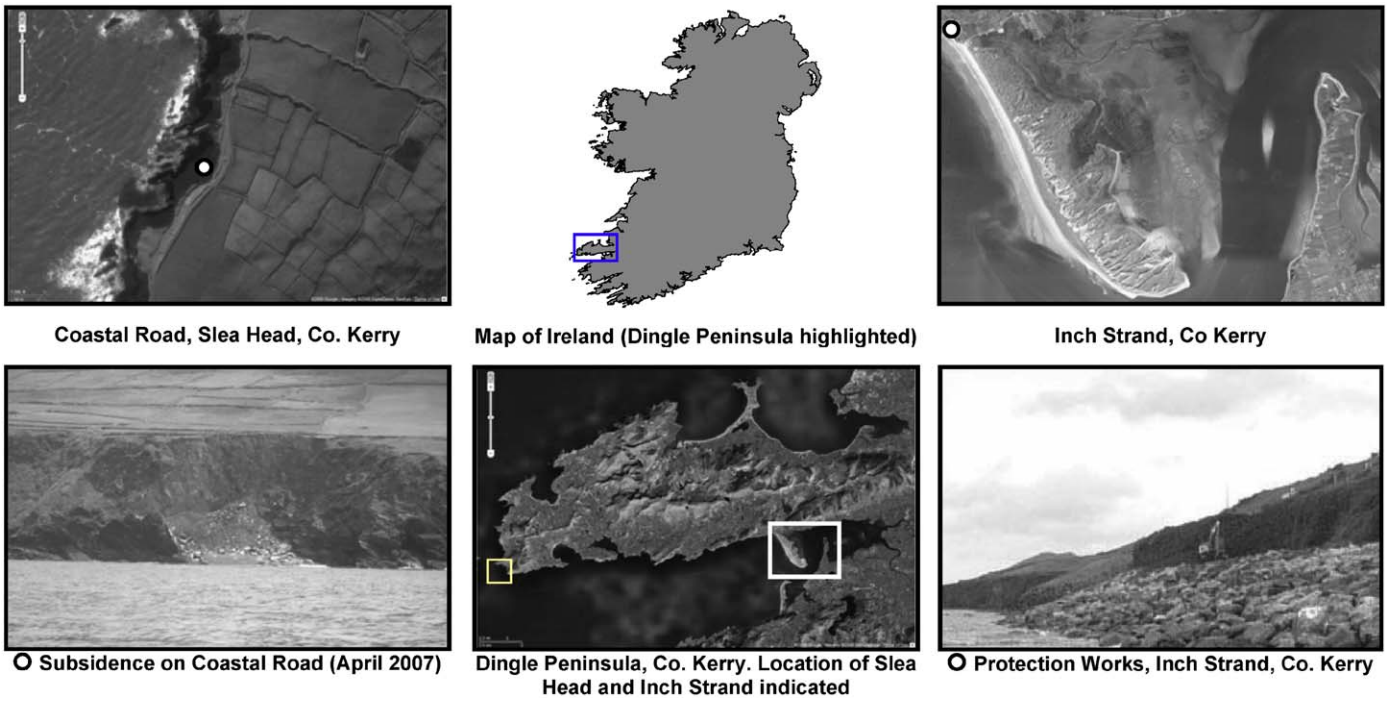

Fig. 2. Irish case study locations, Inch Strand and Slea Head Dingle Penninsula, Co. Kerry. Images show example of road damage at Slea Head and protection works at Inch Strand. Images courtesy of Ordnance Survey of Ireland, google and University College Cork.

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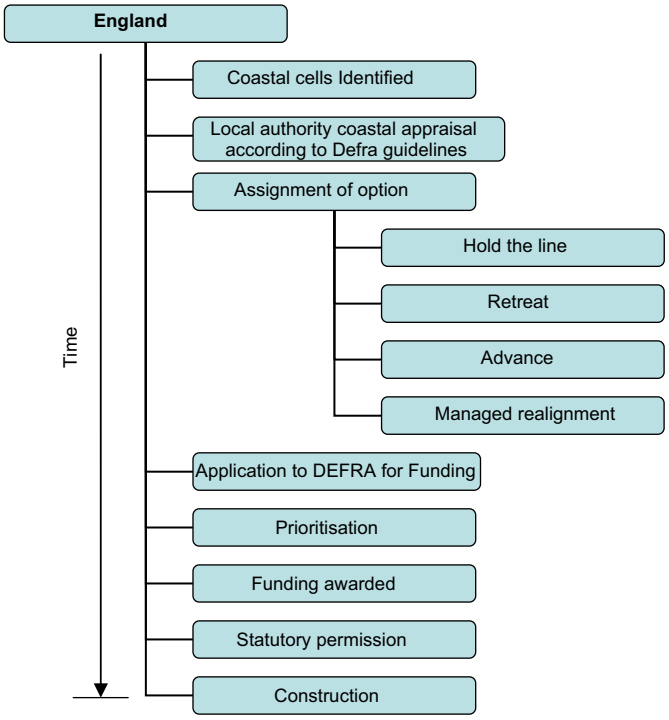

Fig. 3. Procedure associated with English and Welsh coastal protection policy system.

This is achieved via the involvement of a number of organisations, including local authorities, internal drainage boards and the Environment Agency. At the time of writing responsibility for delivering this policy was being delegated to the Environment Agency, and changes in the organisation and responsibility of all the agencies concerned were being discussed and put in place. Although the roles of the various actors in delivery may change, it is not anticipated that the method of delivery will change substantially. Whilst the above objectives are delivered via a variety of mechanisms such as flood warning, development control and adaptation techniques, the discussion below will focus on the process of deciding whether or not to build defences and the process for gaining approval for and constructing those defences. This is normally undertaken by the Environment Agency or maritime local authorities.

DEFRA, previously MAFF (Ministry of Agriculture Fisheries and Food) has taken a strategic view to the delivery of their objectives for some time and one of their key initiatives, Shoreline Management Plans (SMPs), was initiated in the 1990s. The development of this concept was based on a key issue: lack of geographical integration; the concern being that no regard was being taken in relation to impact elsewhere along the coast of schemes being implemented at any one point. The starting point for this approach was the definition of littoral cells by [21] HR Wallingford which provided the initial boundaries within which SMPs would be developed. This move away from administrative boundaries to natural sedimentary systems was only one of the innovative approaches promoted by MAFF. Others included consideration of longer timescales (50 years in the first generation SMPs), consideration of environment and cultural heritage issues, a transparent evidence-based approach and an emphasis on consultation and local ownership of the plan. Problems with this approach related to gaps in information, policies developed that were not robust and a lack of adoption by planners [22].

Both during the process of developing the first generation of SMPs and after subsequent review, guidance from central Government has been updated with the latest guidance for second generation SMPs being tested on pilot areas prior to finalisation for other areas. The weaknesses identified in the first generation have been broadly addressed with the exception of filling data gaps and linkage in to development plans via planners. Whilst the need for robust policies has been addressed in the development phase there are still problems adopting the plans where the policies do not agree with local aspirations (see below). Problems also still exist relating to data gaps and linkage in to development plans via planners.

While SMPs do not obligate local authorities to carry out their recommendations it is understood that local authorities would not be able to access grant aid for schemes without a SMP in place. Once in place the recommendations of the SMP can be pursued. Typically these can be considered under four categories; a recommendation of 'do-nothing' relates to no active intervention but implies that monitoring should still be undertaken to inform future reviews. An 'active' policy such as 'advance the line', 'hold the line' or 'managed realignment' allows the local authority or Environment Agency (depending on who is promoting the scheme) to develop the detail of the scheme and apply for grant aid to implement the recommendation. There are also recommendations in relation to studies either to improve understanding at a process level such as monitoring, or studies on tidal currents, sediment movement or joint probability. Alternatively the second type of study relates to those areas that were considered too complicated to resolve within the SMP due to complex processes or inter-related benefit areas. These studies need to be undertaken to confirm policy options and prior to detailed design and grant application.

Either as a direct result of a policy recommendation within an SMP, or as a result of recommendations in a strategy study, a project may be promoted but prior to grant approval a Project Appraisal Report (PAR) is required. The PAR considers the detail of the construction and economic justification. Although environmental issues are considered a separate Appropriate Assessment may be required. The PAR is then submitted for appraisal and it is decided if the scheme is acceptable; grant aid, however, also depends upon the scheme achieving a satisfactory priority score compared to other schemes submitted at the time around the country.

The perceived benefit of the above approach is that it is robust, transparent and allows for the equitable distribution of limited funds for the construction of coastal defences. The disadvantage is that the process diverts money away from physical intervention, and as the recent National Audit Office report [14] highlights the 29% of construction funding that is spent on developing proposals might be considered excessive.

4.1. Practical application

Littoral Cell 11 covering North Wales and the North West of England is currently commissioning its second generation of SMPs. Five SMPs within this area cover nearly 700 km of open coast and numerous estuaries in order to interface with River Management Plans, more normally referred to as Catchment Flood Management Plans. A decision had to be made as to how these SMPs were to be procured. Considering the balance between consistency and economies of scale through the appointment of one consultant and competition and faster completion through a more open competition amongst many consultants the former option was chosen. As a result of five SMPs being undertaken by one consultant, the anticipated time for completion rises from 18 months for a typical SMP to 30 months for the five. However, this is only part of the time required for the development of the

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SMP. In the lead in to the appointment of the consultant it is necessary to bring together the various actors with an interest, maritime local authorities, the Environment Agency, Natural England, English Heritage, DEFRA and the Welsh equivalents in order to collate the data required for the SMP, decide on procurement and consultation approaches, identify appropriate boundaries, decide on funding splits and develop the management framework. Whilst these actors generally meet as part of the Coastal Groups that operate around the coast of England and Wales, these activities can still take a significant amount of time with approximately 2 years passing between initial discussions in relation to the commissioning of SMPs and being in a position to appoint a consultant to undertake them.

The North West region of England covers 659 km [23]. In this region a number of activities were recommended on the basis of the first generation of SMPs. Several of these were Strategy Studies. In Wyre, a Strategy Study has been undertaken that reconciles those issues that were too difficult to resolve in the SMP. This process took four years but has resulted in a detailed plan for the area setting out both capital and maintenance works with intervention dates or triggers. In Sefton, a Strategy Study was required for the area from Crosby to Formby, but this has taken 7 years to complete to a draft strategy stage. The principal reason for this delay was the need to put the project on hold until the results of a fluvial management plan were identified, as this could have undermined the results of any coastal strategy. Even after this length of time some of the recommendations are not considered to be satisfactory to local stakeholders, although the guidelines provided by DEFRA have been adhered to.

Once a policy is decided upon and the PAR stage is reached, there can be delay for a number of reasons such as satisfying administrative requirements, avoiding objections related to environmental designations, lack of experience amongst the staff promoting the scheme and the potential need to combine multiple funding streams. In the case of an £8 million scheme in Southport all these issues applied. Staff had no experience of promoting a major coastal defence scheme either in terms of some of the technical issues that might arise or the guidance that had to be adhered to. This situation is not uncommon as major coastal protection schemes tend to be undertaken infrequently within any one authority, while some of the issues could be addressed through the use of a consultant there was still a learning curve. There were serious discussions with the agency responsible for nature conservation, but the main problem with environmental designation was the use of the process, via an objection lodged at a European level, as a stalling tactic by a group objecting to the construction of a seawall. As the objectives for the scheme included tourism and regeneration other funding streams were sought to fund the additional elements of the construction related to these objectives but these had to be co-ordinated with Government funding and all had to be in place prior to the award of the contract. All the above issues led to the process, taking just over five years from the decision to pursue the scheme to a start on site.

5. Discussion

There is a marked difference in approach to coastal protection in Ireland compared to England and Wales. Coastal protection management in Ireland operates on the basis of practice in the absence of a strategic national policy. This is related to the low levels of risk from erosion that existed until quite recently, during which local level interventions were deemed a satisfactory way to deal with problems as they arose. The extent of coastal development in the recent past has prompted an ongoing government review of this situation. In England and Wales the extent of coastal erosion risk is much greater, and a national policy has guided the process of decision-making since the early 1990s. The two systems are therefore quite different, the Irish being practice-led and relatively informal and the English, policy-led and quite formalised. As the above examples show, there are a number of advantages and limitations associated with both types of approach (Fig. 4).

The advantages of the Irish operation include strong local involvement in identifying problems and flexibility in decision-making to suit particular needs. Local people do quickly recognise erosion and through political engagement can prompt rapid response by local authorities. The lack of prescription in terms of prioritisation of schemes allows local authorities to follow procedures best suited to their capacity and resources. In the Co. Kerry case study, the Council was able to act immediately in its own interests without having to pursue lengthy permitting procedures from central Government. The lack of prescribed

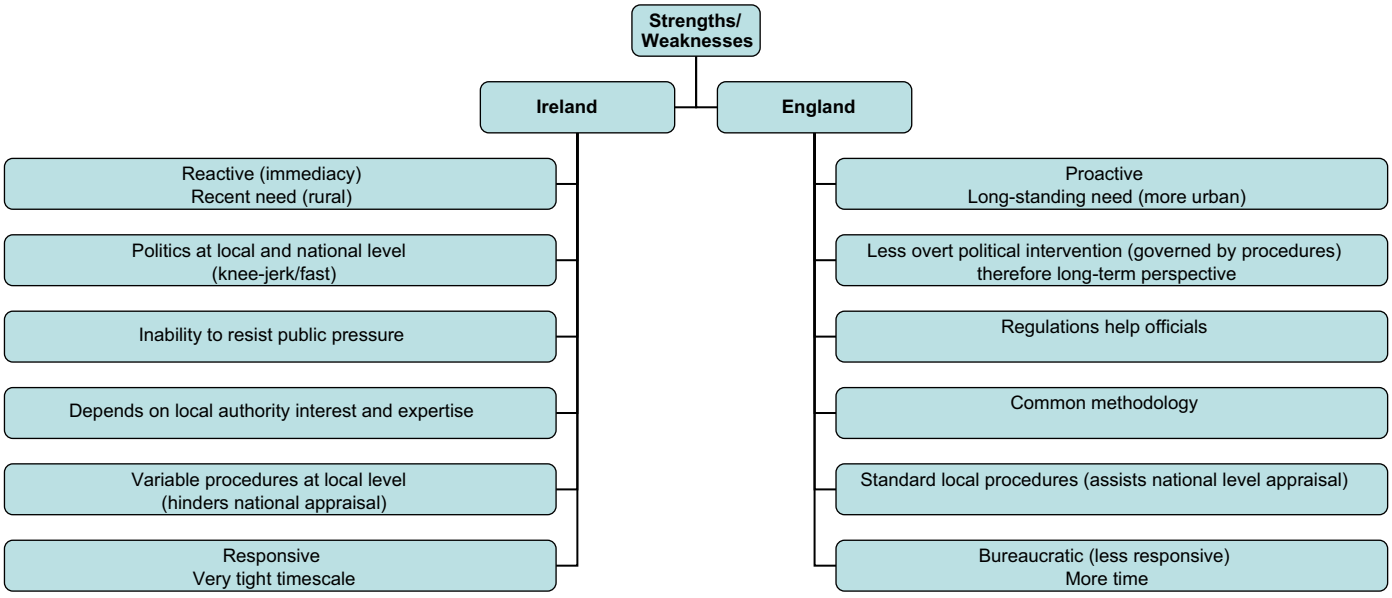

Fig. 4. Strengths and weaknesses of Irish and English/Welsh coastal protection procedures.

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management choices (e.g. defend, retreat and managed realignment), however, means that defence is usually considered the only option to erosion problems; the logical conclusion of such an approach would be for every stretch of soft coastline to defended. It is possible that this reaction stems from the reality that local authority personnel are ultimately responsible for protection of infrastructure rather than proactive environmental management. There is also a high potential for political interference both in prioritising schemes at the local level, and in distribution of national funds on an equitable basis. The lack of a strategic perspective means that local and short-term concerns dominate over the national interest which should be large-scale and long-term. Inevitably, this means that properties are likely to be defended even when it is against the common good [2]. There is an inability to resist public pressure for defence and cases put forward for funding are usually dependant on local authority interest and expertise.

In practice the Irish legislative provisions relating to licensing and leasing are subject to somewhat varying degrees of implementation, and many local authorities assess the need for foreshore licensing on a case-by-case basis. It would appear that they do not feel obligated to apply for foreshore licences for coastal protection in every instance (if at all). This is, at least in part, driven by the length of the decision-making process with regards to foreshore licensing, and in part by the short timescale within which allocated funding is to be spent. There is little evidence to suggest that there has been any censure from central Government when councils decide that a licence is not required; indeed a lack of a licence does not appear to rule out an application for central funding. The high degree of flexibility in approach to existing regulations seems to be a tacit acknowledgement that the current practice-based system is "technically" inoperable, but that local authorities find various ways to cope with emergencies as they arise.

The English/Welsh approach has the advantage of a national perspective in which each stretch of the coast is assigned to a particular response category with regard to coastal protection. This has the advantage that local level decision-making is guided by a pre-existing over-arching national policy. In addition, decisions regarding central funding support are taken with this national policy in mind, and according to a prescribed set of criteria which reduces the potential for political interference. Historically the English and Welsh have tended to have larger dedicated budgets for erosion, and more of their local authorities have put monitoring schemes in place. The system is proactive and takes a long-term perspective. Its disadvantages might include a lack of local input—on the other hand this might be an advantage.

A shortcoming of the English and Welsh policy is that it operates according to specified goals. The decision process for the categorisation of each stretch of coast involves a high level of local involvement. This reduces the ability of Government to make necessary decisions not to defend stretches of the coast [2]. Such a situation is evident in the extent of current defences and the propensity to defend every developed section of the coast.

The weaknesses identified in both existing approaches argue for a new, hybrid coastal management policy in which national guidance provides an overarching general framework but which permits local decisions to be made within that framework. This is particularly necessary if a sustainable policy is to be developed: purely local decision-making cannot deliver sustainable approaches to coastal management [24]. Using a top-down approach with dedicated legislation while facilitating local decision making will encompass the strengths from both systems, while aiming to avoid the pitfalls from solely bottom-up or top-down approaches to coastal management.

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