



SID 5 **Research Project Final Report**

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Project identification

1. Defra Project code

2. Project title

3. Contractor organisation(s)

4. Total Defra project costs (agreed fixed price)

5. Project: start date

end date

6. It is Defra's intention to publish this form.
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Executive Summary

7. The executive summary must not exceed 2 sides in total of A4 and should be understandable to the intelligent non-scientist. It should cover the main objectives, methods and findings of the research, together with any other significant events and options for new work.

Objectives

Flood and Coastal Erosion Risk Management (FCERM) provides a complex mix of public and private benefits to, and burdens on, society over long time periods. However, there is currently only limited understanding and evidence of how different interest groups and sectors benefit from public investments (or decisions not to invest) in reducing flood and coastal erosion risks.

The project aims to contribute to our overall understanding of *Who Benefits From Flood Risk Management Policies?* It is a simple question to ask but one that is difficult to answer. The work builds on previous research but rather than focusing on project appraisal the aim is to provide a broader insight into which groups benefit, the size and scale of these benefits, and the potential distributional imbalances between groups resulting from current FCERM policies and activities. The specific objectives of the project were:

- to define those groups or sectors who benefit and lose out from flood and coastal erosion risk management (FCERM) policies;
- to develop robust methodologies to evaluate and communicate the flow of benefits;
- to test the methodologies and undertake case study assessments, and
- to draw conclusions to inform policy development.

Results

Methodology development and application

A generic framework for assessing *Who Benefits from Flood Management Policies?* has been developed that builds on the three central components of risk: probability, exposure and vulnerability. A methodology is presented that provides a systematic way of considering a wide range of potential beneficiaries, organises information, and provides a consistent structure for assessing the size and scale of the benefits they receive. It has shown promise as an analysis tool and further stages of the research could consider developing the approach to provide a more detailed analysis tool supported by appropriate methods and user guidance.

The methodology is applied to a number of case study assessments covering a wide range of FCERM activities and impacts. The case studies provided a basis for refining the methodology as well as providing an evidence base and improved understanding of how different interest groups and sectors benefit from FCERM investments, including the size and scale of distributional imbalances. Availability of information has been a constraining factor in many instances but the case study findings are intended to be illustrative

rather than detailed quantitative assessments.

Case study findings

Selected findings from the case study assessments include:

Distribution of costs and benefits

- The costs for FCERM activities are widely spread through society in the form of national and local tax payer contributions.
- Direct benefits are largely to property (domestic and non-domestic) accruing to private individuals and business concerns. The case studies highlighted varying degrees of benefit across these groups.
- In a largely urban context, reduced EAD benefits for the non-residential property sector can far outweighed reduction in EAD benefits to the domestic sector with, in some instances, a large majority of overall benefits going to a select few business concerns.
- Environment and amenity gains were evident in case studies such as West Bay but the value of these benefits remain relatively low in comparison with the benefits to property at risk.
- There was little evidence to show long-term adverse impacts on house prices for properties in flood prone areas, however it is difficult to extrapolate these findings beyond the case study areas themselves
- Intended benefits of FCERM activities are not necessarily realised and it can be difficult to predict in advance what the actual benefits of a particular FCERM activity will be. Benefits calculated from EAD assumptions can exceed those for simple write-off costs and may inflate benefit estimates.
- The consultancy and construction industry provide services for the design and construction of flood defence schemes and an element of profit will be factored into such services. For the case studies under investigation, Consultant costs varied between 5% and 12% of total costs and Contractor costs between 58% and 90% of total costs.
- A significant proportion of FCERM costs incur taxation and result in resource flows back to central government. Tentative estimates for West Bay suggest over £2.5M of the £18.3M Contractor's total costs alone were incurred as income tax. Further returns to central Government are incurred through VAT on supplies, materials, etc.

Wider benefits

- FCERM activities can be a major catalyst for local regeneration and/or development on the floodplain where significant risk of flooding has been mitigated. Successful regeneration has wider benefits on employment and regional development.
- Reduced vulnerability of key infrastructure services (eg water, wastewater, electricity, and transport) and avoidance of outage is of benefit to large numbers of domestic and non-domestic customers, many of whom may not be directly located in a flood risk zone.

Insurance

- Most flood risk management investment is based on future economic flood losses avoided and most of these flood losses are insurable.
- Investments in reducing flood or coastal erosion risk should result in a decline in insurance claims/payouts, but it has not been possible to ascertain how these benefits are re-distributed among the insurance industry and it's customer base.
- Cross-subsidisation within the domestic insurance market widely spreads the cost of insurance liabilities but the benefits (through insurance returns) are attributed to a much small number of insured property owners in areas at risk of flooding.
- Flood insurance provides cover for repair and replacement of material loss and temporary accommodation but does not cover health and social costs. An imbalance between estimated and actual losses was evident in some instances with insurance not covering the full costs of recovery for all flood victims.
- When invoked, insurance payouts result in surges in post-flood sales for goods and building services, but the distribution of this among the local and national economy has not been ascertained.
- SMEs are reported by the ABI to be major losers in flood events, with many being under-insured and/or failing to recover after a major flood incident.

Conclusions and recommendations

A number of gaps have been identified during the research and the direction of future work should take these into account. A key question to resolve before moving the research forward is to establish more

thoroughly the intended application of a methodology - *actual benefits* or *future potential benefits* - as this will determine the scope of analyses to be undertaken, influence the selection of data sources, and impact on recommended methods and measurement techniques.

Further work is needed to assess the application of the methodology at a CFMP and SMP level and to investigate the use these analyses as a basis for achieving a national picture of distributional effects. Potential exists to link the assessment procedure more closely to analysis tools (eg NaFRA, MCM, etc.) and other national datasets as a means to assess impacts and benefits at a range of levels, as well as disaggregating information according to sub-groupings such as levels of protection, socio-economic classifications, business types, and key assets at risk.

In view of the complexity, and despite best endeavours, the study was unable to amass sufficient evidence to conclusively prove one way or the other which specific sectors and/or interest groups benefit at a national-level. The research has also encountered a number of barriers and lessons learned should be used to determine what this means for future research and the problems faced in taking the work forward. Some of the original research questions remain unanswered or partly answered and for such an important question as *Who benefits from FCERM policies?* it is essential that the present research is not an end, but a start.

Project Report to Defra

8. As a guide this report should be no longer than 20 sides of A4. This report is to provide Defra with details of the outputs of the research project for internal purposes; to meet the terms of the contract; and to allow Defra to publish details of the outputs to meet Environmental Information Regulation or Freedom of Information obligations. This short report to Defra does not preclude contractors from also seeking to publish a full, formal scientific report/paper in an appropriate scientific or other journal/publication. Indeed, Defra actively encourages such publications as part of the contract terms. The report to Defra should include:
- the scientific objectives as set out in the contract;
 - the extent to which the objectives set out in the contract have been met;
 - details of methods used and the results obtained, including statistical analysis (if appropriate);
 - a discussion of the results and their reliability;
 - the main implications of the findings;
 - possible future work; and
 - any action resulting from the research (e.g. IP, Knowledge Transfer).

OBJECTIVES

The overall purpose of the project is to improve understanding of how different interest groups and sectors gain or lose from existing Flood and Coastal Erosion Risk Management (FCERM) policies and to provide evidence for the nature and scale of all key resource flows.

The specific objectives of the project are:

- to define those groups or sectors who benefit and lose out from FCERM policies;
- to develop robust methods to evaluate and communicate the flow of benefits;
- to test the methods and undertake case study assessments, and
- to draw conclusions to inform policy development.

The work aims to provide a clearer understanding of the size and scale of any distributional imbalances, which in turn may inform future policies and programmes. The focus of the work is toward who benefits from policies *now* rather than how future policy choices will influence and change beneficiary groupings. The latter could however be informed by this research.

Finally, at this point in time, the emphasis is on advancing understanding rather than the formal development of an appraisal or evaluation tool, although future phases of the work may focus in this direction. The framework should be primarily applicable to the assessment of present policies and benefits but it should also be flexible enough to allow for the assessment of future policy alternatives, should this be required at a later stage.

In view of the complexity, and despite best endeavours, the study was unable to amass sufficient evidence to conclusively prove one way or the other which specific sectors and/or interest groups benefit at a national-level. The research has also encountered a number of barriers and lessons learned should be used to determine what this means for future research and the problems faced in taking the work forward. Some of the original research questions remain unanswered or partly answered and for such an important question as *Who benefits from FCERM policies?* it is essential that the present research is not an end, but a start.

METHODS USED

The work involved:

- Interpretation of FCERM policies
 - Identifying in a structured way the activities that comprise Flood and Coastal Erosion Risk Management (FCERM) and that give rise to benefits and costs.
- Understanding & defining beneficiary categories
 - Determining an appropriate classification of beneficiaries with consideration given to the degree of disaggregation of beneficiary/sectoral groups to ensure a balance between complexity and ability to capture the major winners and losers
- Impacts of FCERM activities & resource flows
 - Developing a methodology and stepped approach to identifying the impacts of FCERM activities
- Application to Case Studies
 - Using the methodology to identify the impacts of FCERM activities and resource flows for a series of case study assessments
- Gap analysis
 - Identify limitations of the methodology and its application with consideration given to availability and uses of information, the validity of the approaches at different scales
- Implications of the research
 - Links to high-level FCERM activities and how the research may relate to and support the various these
- Presentation of findings and evidence base
 - Producing a technical report outlining the methodology, documenting results from case studies, drawing conclusions, and outlining potential future directions for the work.

We used a number of sources of information and methods of research to achieve the objectives of the project. The work was primarily desk-based research supported by case study assessments based on available primary and secondary data sources. Tools and techniques included desk-based reviews, analysis of data sources, interviews, and case study assessments.

Desk-based reviews

We undertook desk based reviews of existing FCERM policy and strategy documents at an early stage in the project to identify key policy directives, statements and intentions. The review also served to better understand the translation of policy in to practice and the range of FCERM activities that may influence beneficiaries and losers. The scoping phases of the work also reviewed alternative approaches for the assessment of disaggregated costs and benefits among different beneficiary groupings. The reviews identified a range of methodologies and their relative advantages and limitations. Other literature and materials were reviewed as required.

Case study assessment

Discussions early in the project between the Steering Group and the project team flagged concerns about the extent to which readily available national-level information would be relevant in exploring disaggregated benefits. Case study assessments were agreed as the most appropriate means to achieve an improved understanding and three case study locations were selected for detailed analysis. The case studies aimed to be representative of a broad range of FCERM activities and the benefits they bring to different interest groups and sectors.

Case study assessments required a range of tools and techniques to be applied. Analysis of primary and secondary data sources were used quantify costs and benefits for different interest groups. Typical analyses included disaggregation of data from Project Appraisal Reports (PARs), reassessment of benefit assumptions and benefit calculations, collation and analysis of costing data, and supplementary analyses.

Meetings and interviews (telephone and face-to-face) were an integral part of the case study assessments. The steps to identify the resource flows generally involved in-depth interviews with the primary stakeholders such as:

- Environment Agency staff
- District and City Council staff
- Local businesses
- Local residents
- Local estate agents
- Consulting engineers
- Amenity users

Interviews were also conducted with other key actors for specific aspects of the work, for example with the Association of British Insurers (ABI) in relationship to the linkage between insurance issues and FCERM activities.

Case studies were undertaken one at a time to enable lessons learned and issues arising to be taken into consideration. A first case study was used to help develop the methodology with subsequent case studies used to fine-tune the approach.

Regular meetings of a mini-Steering Group, comprising a sub-set of the full Steering Committee, became an important forum for discussion and steer during the project. The mini-Steering Group had key representatives from Defra and the EA with expertise in policy, investment and economics. The meetings enabled concepts and interim outputs to be presented and discussed before agreeing further stages of the work.

DEVELOPMENT OF A METHODOLOGY TO ASSESS THE DISTRIBUTIONAL EFFECTS OF FCERM ACTIVITIES

Scoping of the methodology

The scoping phases of the work researched alternative approaches for the assessment of disaggregated costs and benefits among different beneficiary groupings. The review identified a range of methodologies, see Table, and their relative advantages and limitations were assessed against the project requirements.

Alternative methodologies and approaches

Methods & Techniques	Comments
Agent-based modelling	<p>Potentially a powerful method to model the overall consequences of the behaviour of individual entities within an environment.</p> <p>Beneficiaries could be modelled as dynamically interacting rule-based decision-makers within the 'FCERM environment', developed independent of specific policies. Policy interventions then applied to the system as a set of initial changes to different beneficiaries, and the consequences and responses of affect beneficiaries evaluated over time and space.</p> <p>Can be resource intensive in setting-up 'agents' sufficiently to adequately model their behaviour and rule-based decision-making. Significant effort would be required to fully develop a robust framework that provided confidence in the conclusions produced. However, such an approach may be more likely to uncover less obvious consequences of policy intervention.</p>
Impact assessment / cause-and effect modelling / 'Ripple analysis'	<p>Relatively flexible and simple to set-up a conceptual model that defines the resource flows between different beneficiaries by impacts and their causes and effects.</p> <p>Limitations of this approach are that the links between beneficiaries may be limited to those that are already immediately apparent and may not necessarily uncover less obvious consequences.</p>
Combination of a cause and effect model with an element of ABM	<p>One potential solution for this project is to set-up a cause-and-effect model supported by a relatively simple agent-behaviour model that attempts to draw out potential responses of individual beneficiaries due to a change in environment (e.g. increased perception of flood risk). This agent-model would not be sufficiently developed to determine what 'would' happen but could inform as to what 'could' happen.</p> <p>This approach would support development into a full Agent-based model in the future.</p>
Disaggregated cost-benefit analysis (FD2018)	<p>Based on widely used and accepted cost-benefit analysis. Monetised benefits distributed between beneficiaries. For appraisal purposes can be combined with MCA to account for non-monetised benefits.</p> <p>Relevant to appraisal and may not be appropriate for this project in evaluating and communicating resource flows and highlighting less obvious consequences from policy intervention.</p>
Multi-criteria analysis	<p>MCA provides a mechanism by which monetised and non-monetised benefits can be included in an appraisal.</p> <p>As with CBA, this is primarily an appraisal technique and may not be appropriate for this project in evaluating and communicating resource flows and highlighting less obvious consequences from policy intervention.</p>

It was noted by the Steering Group early in the project that the majority of effort was to be targeted toward improving understanding via the application of a methodology, rather than in the detailed development of a software analysis tool or similar. A number of the analysis techniques reviewed above would require significant effort and resources to develop (eg agent-based modelling) and it was clear that this would detract from the true focus of the work.

A procedural step-by-step methodology linked to cause-and-effect impact assessment was finally selected for use in the case assessments. This ensured flexibility in the application of the methodology and maintained an ability to make adaptations to the approach as the research progressed and lessons were learned. The methodology also ensures a higher degree of transparency in how findings and results are determined, which can often be lost in black-box system-type analyses.

The outline methodology provides a systematic way to consider a wide range of potential beneficiaries, to organise information, and to provide a consistent structure for assessing the size and scale of the benefits they receive. The framework is applicable to the assessment of present FCERM policies and activities also has

flexibility to allow for the assessment of future policy alternatives, should this be required at a later stage. The approach also ensures the methodology can be extended and enhanced as time progresses.

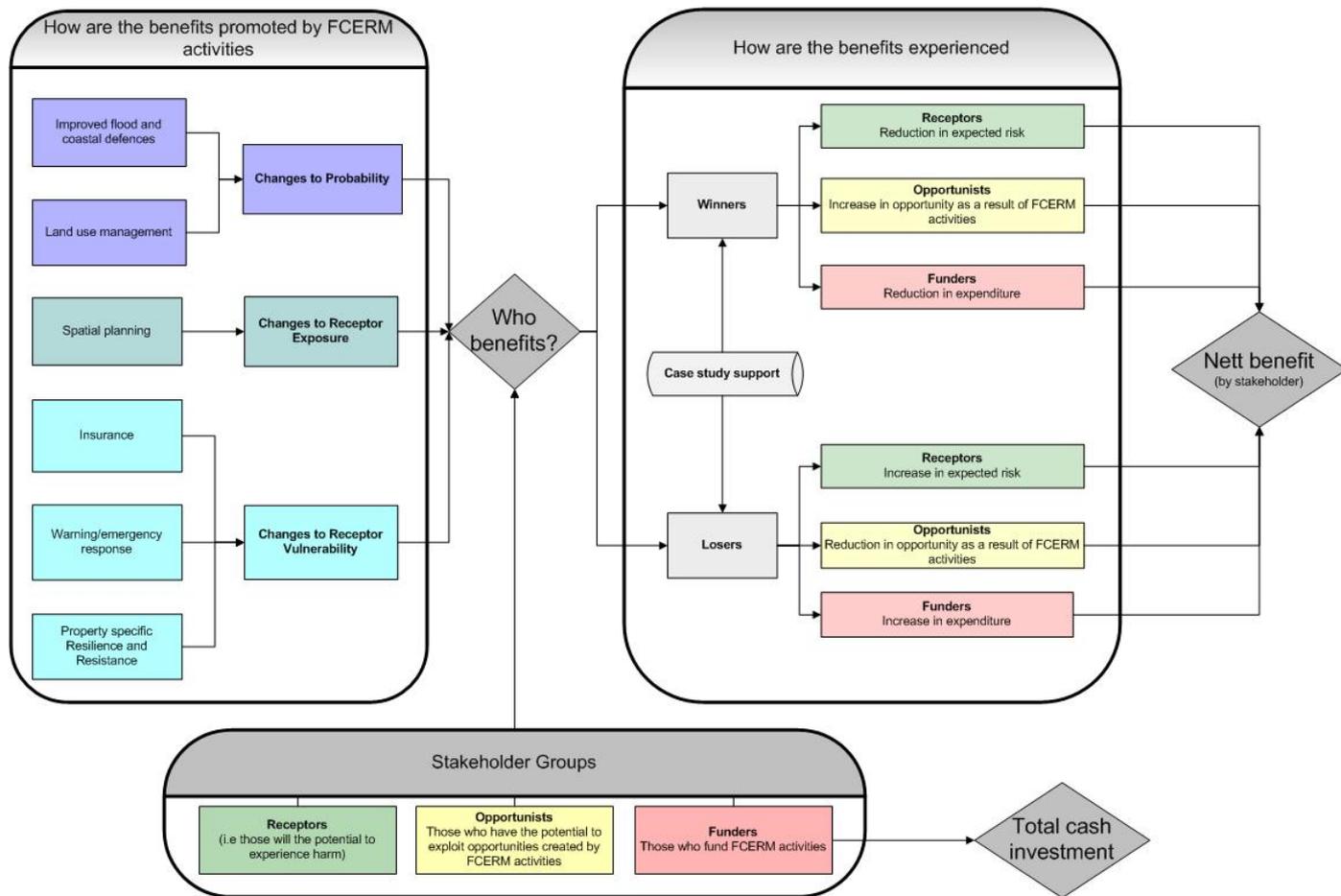
Application of the outline methodology is supported by a number of templates and impact diagrams to support the structured approach to the assessments. Impact diagrams provide guidance on likely impacts of different FCERM activities and the templates are intended to provide a summary of the evidence gathered. As importantly, these are intended to help capture and communicate findings by showing how costs and benefits are distributed among different groups.

Outline methodology

The key steps in the outline methodology by which the distributional effects of FCERM activities can be assessed are:

Step No.	Question
1	What are the characteristics of the FCERM policy/activity that we are examining?
2	What are the likely impacts of these measures?
3	Who are the funders of these measures: those who pay for flood and coastal erosion risk management?
4	Who are the gainers and losers from these measures?
5	What is the value of these gains and losses?
6	What are the distributional effects on different interest groups?
7	What gaps in our knowledge/data limit the above analysis and therefore how robust are the results?
8	What are our conclusions as to how the gains and losses from the FCERM policy/activity are distributed in society?

The philosophy behind the methodology is encapsulated in the in the schematic shown below.



CASE STUDIES

Case study selection

Three geographic case studies were undertaken as an integral part of the project. Together, the case studies aimed to include a rich mix of FCERM activities and to be a source of information and evidence-base for a range of issues associated with *Who benefits or loses?* and *How do they benefit or lose?*

Carlisle: Carlisle was selected as a first case study location as it has a rich mix of FCERM activities. It was expected to be of particular use in adding value on the distributional impacts of:

- Capital flood defence schemes
- Insurance related issues,
- Flood forecasting and warning, and
- Emergency planning and response.

Information from recent flood events also enabled a number of supplementary assessments to be undertaken, including information on some of the wider consequences and benefits of flood management activities and policies.

West Bay: The West Bay Coastal Defence and Harbour Improvement Scheme was selected because it appeared have a number of special features relevant to the *Who Benefits* project:

- The scheme was a fairly recent one developed mainly within the current policy regime, with multipurpose elements.
- It was judged to be a successful engineering project.
- It has been singled out as an example of a successful partnership project
- It drew a variety of funding sources.
- It appeared to be likely to have a variety of beneficiaries.
- It aimed to offer significant amenity gain.
- It was linked to local regeneration schemes and potential developments in the area.

Lyth Valley: The Lyth Valley scheme was selected because it had a number of features relevant to the *Who Benefits* project:

- It was an ex-IDB scheme now maintained by the EA
- It combined land drainage and flood protection
- The area suffers from both fluvial and tidal flood risk
- Benefits were originally targeted toward the agricultural sector
- Maintenance costs remain relatively high under a business as usual case
- Environmental issues are relevant to the case.

A matrix of anticipated key issues versus case study location is provided in the Table below.

Case studies and anticipated issues

No.	1	2	3
Location	Carlisle (Cumbria)	West Bay (Dorset)	Lyth Valley (Cumbria)
Issue	Regional town suffering severe flooding in 2005 and with a range of FCERM measures	Coastal defence scheme promoted by the district council in partnership with the EA.	Former IDB scheme now maintained by the EA with coastal and fluvial flood risk.
Role of insurance in influencing benefits/losses	√	√	
Cross subsidy influences on resource flows			√
Influence on house prices and property values	√	√	
Development on the floodplain	√	√	
Influence on production in industrial/commercial sectors	√		√
Influence on employment and regional development	√		
Impacts on the construction industry	√	√	
Impacts on manufacturers, distributors and retailers	√	√	
Health and welfare issues	√		
Quality of life, environment and amenity gains	√	√	√
Differential impacts on groups	√	√	√

RESULTS OF THE CASE STUDIES

Selected findings from the case study assessments are summarised below. The findings respond to the key issues flagged in the original specification and highlight evidence and examples from the case studies where appropriate.

Distribution of costs and benefits

- The costs for FCERM activities are widely spread through society in the form of national and local tax payer contributions.
- Direct benefits are largely to property (domestic and non-domestic) accruing to private individuals and business concerns. The case studies highlighted varying degrees of benefit across these groups.
- In a largely urban context (eg Carlisle), reduced EAD benefits for the non-residential property sector can far outweighed reduction in EAD benefits to the domestic sector with, in some instances, a large majority of overall benefits going to a select few business concerns.

- Environment and amenity gains were evident in case studies such as West Bay but the value of these benefits remain relatively low in comparison with the benefits to property at risk.
- There was little evidence to show long-term adverse impacts on house prices for properties in flood prone areas (eg Carlisle), however it is difficult to extrapolate this finding beyond the case study areas themselves
- Benefits calculated from EAD assumptions can exceed those for simple write-off costs (eg Lyth Valley) and may inflate benefit estimates.
- The consultancy and construction industry provide services for the design and construction of flood defence schemes and an element of profit will be factored into such services. For the case studies under investigation, Consultant costs varied between 5% and 12% of total costs and Contractor costs between 58% and 90% of total costs.
- A significant proportion of FCERM costs incur taxation and result in resource flows back to central government. Tentative estimates for West Bay suggest over £2.5M of the £18.3M Contractor's total costs alone were incurred as income tax. Further returns to central Government are incurred through VAT on supplies, materials, etc.

Wider benefits

- FCERM activities can be a major catalyst for local regeneration and/or development on the floodplain where significant risk of flooding has been mitigated. Successful regeneration has wider benefits on employment and regional development.
- As an example, Carlisle Renaissance aims to transform Carlisle in to the north west's prime regional centred and to attract enhanced and new institutions (regional university) and commercial sectors to the city. On the other hand, in West Bay there was little evidence of development opportunities driven directly by the FCERM activities.
- Reduced vulnerability of key infrastructure services (eg water, wastewater, electricity, and transport) and avoidance of outage is of benefit to large numbers of domestic and non-domestic customers, many of whom may not be directly located in a flood risk zone.

Insurance

- Most flood risk management investment is based on future economic flood losses avoided and most of these flood losses are insurable.
- Investments in reducing flood or coastal erosion risk should result in a decline in insurance claims/payouts, but it has not been possible to ascertain how these benefits are re-distributed among the insurance industry and it's customer base.
- Cross-subsidisation within the domestic insurance market widely spreads the cost of insurance liabilities but the benefits (through insurance returns) are attributed to a much small number of insured property owners in areas at risk of flooding.
- Flood insurance provides cover for repair and replacement of material loss and temporary accommodation but does not cover health and social costs. An imbalance between estimated and actual losses was also evident (eg in Carlisle) with insurance not covering the full costs of recovery for all flood victims.
- When invoked, insurance payouts result in surges in post-flood sales for goods and building services, but the distribution of this among the local and national economy has not been ascertained.
- SMEs are reported by the ABI to be major losers in flood events, with many being under-insured and/or failing to recover after a major flood incident.

DISCUSSION AND GAP ANALYSIS

A number of gaps and limitations have been identified in the application of the methodology and the development of the evidence base. These raise issues on the future direction of the research as well as questions that this research has raised but not resolved.

Application of the methodology

There has been considerable debate as to whether the research should in the development of a methodology consider the *anticipated* or the *realised* benefits. This question highlights the fact that that the 'actual benefits' will depend to some extent at least on the point in time at which an attempt is made to assess them. There is greater uncertainty at the project appraisal stage whereas at later stages there is more chance that other intervening factors apart from the FCERM activities may influence the apparent benefits and this also should be understood.

The methodology aims to highlight *actual benefits* and beneficiaries but this depends on the point in time at which the methodology is applied and the data on which it draws. Data on actual benefits at a particular point in time rather than predicted benefits is often difficult to obtain and requires significant effort to elicit from different information sources.

Timing may impact on investigations of benefits in a number of ways.

If a scheme is very recent, complete data may be as yet unavailable. If it is relatively long completed, data may be archives and memories may be fading, and therefore it may be more difficult to obtain data. Benefits may be immediate (e.g., where flood defences are installed) or they may take longer to be realised (e.g. effective flood warning services). Thus the point in time in relation to the completion of a FCERM programme or project may be influential in terms of the benefits identified and how these may change over time

The methodology was applied to a number of FCERM schemes some of which were completed some years earlier and it was therefore possible to identify 'actual' benefits at a point in time rather than the predicted or anticipated benefits of the scheme. There will always be a substantial degree of *uncertainty* about potential benefits and beneficiaries and the application of the methodology has demonstrated that benefits expected from a scheme prior to its implementation may not always be realised.

In applying the methodology, it is important to report on possible benefits and beneficiaries that do not materialise. For example, where there is no evidence of increases in property values and saleability to resident or commercial property owners as this negative finding is important within the net impacts of particular stakeholder groups.

For both pre- and post-project assessments of the beneficiaries of capital projects, the PAR will inevitably be an important part of the evidence and a starting point. For post-project assessments of benefits/beneficiaries it will be necessary to consider whether the benefits have been realised as anticipated and if not the benefits and beneficiaries should be reconsidered for the time of the assessment.

The costs for FCERM activities are attributed to national and local tax payer contributions. Due to time and resource constraints, the split between local council tax and national tax contributions was not ascertained under the present project but discussion with local authorities (eg in West Bay) did suggest the information could be made available by the local authority accountants if time were made available.

Gaps and data constraints

Obtaining accurate data on the numbers of beneficiaries and the monetary value of their benefits can be problematic. For example, where FCERM activities lead to recreation and amenity benefits, as in West Bay, there are serious difficulties in attaching numbers and monetary values to these benefits. Data is usually sparse and a lack of baseline data results in difficulties in estimating pre- and post- situations when assessing differential benefits.

Many benefits lie in the changes that may be brought about by the FCERM activity. Therefore good information is needed on these changes through *before* and *after* information. Even then, it is necessary to be aware of other intervening factors that may be the explanatory factors for change rather than or in addition to the FCERM activities.

Data availability and resourcing constraints does limit analyses. Proxies are often required and preferred methods too expensive and/or difficult to carry out. These difficulties may be addressed but the resulting estimates will inevitably be a matter of judgement and of variable quality.

The project adopted a rapid appraisal approach to the case study work. The aim was to '*illustrate*' who the beneficiaries were and how they benefited with a focus on distributional impacts rather than detailed quantification and qualification of individual impacts. The research methods deployed a mix of fieldwork and desk study activities maximising the use of readily available information and this approach achieved a reasonable degree of success. In some instances, greater effort may have led to more detailed information but there are likely to be diminishing returns in terms of information forthcoming and effort deployed. In spite of the rapid appraisal approach, the skills required in obtaining data on beneficiaries, including through in-depth interviews, should not be overlooked.

Communicating the purpose of the work and the getting buy-in to the process of developing a *Who Benefits?* analysis from a diverse range of stakeholders – many of whom hold the key to vital data sources - has been variable. Many datasets and information are not readily attuned to such analyses and therefore require stakeholder effort to extract, often without any perceived direct benefit to the stakeholders themselves.

Some of the case study results are *light* on hard quantitative information. This is because: some data is confidential to its holders, and is not easily extracted (e.g. insurance data), some data for schemes implemented some time ago is simply now not available, and some data is simply not often collected (e.g. the benefits of amenity changes). Lessons can be learned as to which data items are most easily extracted and what is not, but the difficulty in obtaining data and information should be a consideration in taking this research further.

For example, some FCERM activities leads to environmental gains but a question remains as to who are the beneficiaries of such gains? They could just be local people, related to a particular scheme, but it could also be argued that the whole national gains from better environments locally. There are national targets for biodiversity, so local changes make a national contribution here. So, in any distributional analysis it is not clear who are the beneficiaries of these gains that particular investment.

Scaling up

The findings from the case study assessments cannot be used directly to 'scale up' to the national scale and to gauge the beneficiaries, losers and distributional affects from the national spend on FCERM. A scaling-up exercise is likely to include a combination of approaches including case supported evidence, grossed up local or regional investigations (such as CFMPs/SMPs/PARs) and the combination and interrogation of combined national datasets.

Detailed pilot studies could be used to provide a quantified distributional (by stakeholder group) analysis of 'unit' impacts for a range of FCERM activities (e.g. reduced liability per protected insured property). National scale analysis and data, including that undertaken for projects such as NaFRA could then be used to 'scale-up' these 'unit' impacts to a national scale based on an analysis of the number of stakeholders affected by FCERM activities nationally. This would then provide a national scale distributional (by stakeholder group) analysis of who benefits from FCERM activities and the magnitude of such benefits.

The national scale data that is either already available (through NaFRA) or which could be determined using a combination of existing datasets include:

- Number of households (differentiated into different socio-economic groups) protected by flood defences (classified by Standard of Protection);
- Number of households (differentiated into different socio-economic groups) protected by flood warning service (classified by Standard of Service);
- Number of businesses (differentiated into different business types) protected by flood defences (classified by degree of protection provided);
- Number of businesses (differentiated into different business types/scales) covered by flood warning services (classified by Standard of Service classifications);
- Key Infrastructure and environmental/heritage assets protected by flood defences.

The national scale data that is available for property (through FHRC's 'Multicoloured Manual' and the Dundee data on insurance claims NaFRA) or which could be determined using a combination of these existing datasets include:

- Property direct damage and loss can be scaled up from local or regional investigations because property values are known for the whole country and loss data is available nationally;
- Resource flows that result from a typical house that is flooded to enable the impacts that result from replacement and repair to items, renovation of the building fabric, and building clean-up to be distributed across a range of beneficiaries at several levels (first order, second order, etc.)

On the expenditure side, national scale information that would be of value includes:

- Annual expenditure on implementing and operating a flood warning service;
- Annual expenditure on constructing and maintaining flood and coastal defences;
- Annual expenditure on emergency response in relation to flood events;
- Annual expenditure on implementing property-level flood resilient and resistance measures;

Other factors present greater challenges:

- Insurance data – number of properties insured / proportion of premiums allocated to providing 'flood' insurance / how flood FCERM measures are taken into account when setting premiums/excesses.
- Environmental and amenity gains from FCERM activity is highly site-specific and no way is current seen whereby these benefits and their distribution could be grossed up to a national scale without making gross assumptions.
- Local, site-specific, issues such as tourism, amenity use and urban development would need to be carefully considered when scaling up impacts identified as part of the detailed case study work.
- Indirect benefits such as the reduction of traffic disruption or the loss of value added in flooded non-residential properties is very site-specific but might be 'grossed up' if nationally available data were available on the properties and communication links at risk nationally (probable but not guaranteed);

As a result of the above 'scaling-up' exercise, the losses and gains experienced by each different stakeholder groups (and potentially disaggregated into socio-economic and business type classifications) could be investigated, and potential distributional imbalances identified.

CONCLUSIONS & RECOMMENDATIONS

Conclusions

The research contributes to a better understanding of who benefits from FCERM activities and provides evidence of distributional effects in selected case study assessments. The research considered benefits from both structural and non-structural measures and beneficiary groups beyond those normally associated with project appraisals: for example, reflecting on potential benefits to contractors, consultants and the insurance industry.

The findings re-affirmed that the majority of costs for FCERM activities are widely spread through society yet direct benefits are to few. The direct benefits of FCERM activities are largely to property (domestic and non-domestic) accruing to private individuals and business concerns. Intended benefits of FCERM activities are not always realised and a true measure of sustainable benefits may only be evident many years after the implementation of policies and programmes. Wider benefits accrue from opportunities provided by reduced flood risk but the take-up of these opportunities is influenced by many factors such as the buoyancy of the economy and its effect on the development, business, and housing markets.

A methodology for assessing *Who Benefits from Flood Management Policies?* has been developed to provide a systematic way of considering a wide range of potential beneficiaries, to organise information, and to provide a consistent structure for assessing the size and scale of the benefits they receive. It has shown promise as an analysis tool and further stages of the research should consider developing the approach to provide a more detailed analysis tool supported by appropriate methods and user guidance.

In general, it proved easier to evaluate benefits associated structural flood defence schemes rather than non-structural measures. Information on the costs and benefits of such schemes are often readily available, albeit in an *ex-ante* context, and supplementary analyses to re-confirm benefits can be relatively straightforward. On the other hand, non-structural measures were more difficult to assess as information is often fragmented and not readily available, if at all. However, this should not detract from the importance non-structural measures play in maintaining and reducing flood and coastal erosion risk and the benefits they bring.

In view of the complexity, and despite best endeavours, the study was unable to amass sufficient evidence to conclusively prove one way or the other which specific sectors and/or interest groups benefit at a national-level. The research has also encountered a number of barriers and lessons learned must be used to determine what this means for future research and the problems faced in taking the work forward. Some of the original research questions remain unanswered or partly answered and for such an important question as *who benefits from FCERM policies* it is essential that the present research is not an end, but a start.

Wider considerations and issues

Based on the findings of the research, the following points are raised to stimulate discussion and debate:

- The vast majority of FCERM costs are widely spread through society yet direct benefits accrue to relatively few. Is this a fair use of national and local tax-payer contributions?
- There are distributional imbalances in the costs and benefits of FCERM activities. How could individual gains and losses be balanced against wider local, regional and national benefits?
- Defra do not have an explicit policy on what the beneficiary mix should be although the broad priorities are embedded in a number of ways such as use of outcome measures for setting targets, and appraisal processes. Would such a policy be helpful in targeting FCERM activities and/or increasing the added-value of FCERM activities across society?
- Opportunities to benefit from FCERM activities can be realised by a range of stakeholders (eg developers, asset owners, etc.). Could, and indeed should, a mechanism be put in place to secure contributions for FCERM activities and to share costs in-line with the benefits commensurate with a beneficiary pays principle?
- Where potential benefits of FCERM activities were foreseen but not realised, how should FCERM policies/activities be realigned to balance costs and benefits across different groups?
- Measures to reduce flood and coastal erosion risk often lead to reduced estimated annual damages. How are these benefits shared among the insurance industry and its customers and what evidence is there to show this?

- Returns to central government from FCERM spend can be significant. What are the resource flows associated taxation, VAT, etc. and what percentage of overall FCERM spend do they represent?

RECOMMENDATIONS

This early stage research into ‘*Who Benefits from Flood Management Policies?*’ has focused on the development of an outline methodology and its application to a range of case study assessments as a basis for improving understanding and providing an evidence base on actual winners and losers. A number of gaps, limitations and issues have been identified and the direction of future research should take these into account.

Policy interpretation and implementation

At an early stage, the research team noted the difficulty in dealing with the notion of ‘policy’ as this varies significantly in its authority (intent, guidance, desire, etc.) and in its interpretation. For the purpose of this work, it was agreed to interpret policy in terms of its translation into FCERM activities on the ground, whilst acknowledging that there is not a one-to-one correlation of between a ‘policy’ and an ‘activity’. There are many different ways of achieving higher-order policy outcomes and the present research has endeavoured to capture this through setting the methodology, and the interpretation of FCERM activities, within a broader risk-based framework. This is likely to better meet the needs of higher-level policy analysis, rather than localised scheme specific analysis, and should be retained in any future research work.

Application and focus

A key question to resolve before moving the research forward is to establish more thoroughly the intended application of a methodology as this should drive further development needs. The framework for the methodology is generic but its application, the selection of data sources, the analyses undertaken and the methods used will be dependent upon whether it is intended to assess *actual benefits* (at this point in time) or whether its main function is to assess *future potential benefits* (arising from policy change).

Scale of analysis

During the case study assessments, the methodology has been applied primarily at a local case study level. Further work is needed to assess the application of the methodology at a CFMP and SMP level and to investigate the use these scales of analysis as a basis for achieving a national picture of distributional effects.

Scaling-up to a national-level

Scaling up to a national-level should recognise that some benefits of FCERM activities and policies can be ‘grossed up’ from local or regional investigations but that others cannot. Property direct damage and loss can be scaled up because data is available nationally whereas other aspects are very site specific, such as environment and amenity gains or the avoidance of disruption to transport and other services.

Linking to other assessment tools

Potential exists to link the assessment procedure more closely to existing analysis tools. The tools developed under the NaFRA programme, in conjunction with other datasets, provide a means of assessing flood risk and potential benefits at a range of levels as well as disaggregating information according to levels of protection, different socio-economic groupings, business types, and assets at risk. The accuracy of the results will be dependent upon the accuracy of the data captured within NaFRA (and other) datasets, but on-going refinement, calibration, pilot verification and ground-truthing means the quality of such results is constantly improving.

Skills and resources

The skills required to obtain and analyse data on beneficiaries, including through in-depth interviews, should not be overlooked. Future stages of the research could more explicitly consider the skills of the proposed user community and provide appropriate guidance not only on the application of the methodology but also on the assessment methods implicit in its application, and include training in these where appropriate.

Data and information constraints

Lessons have been learnt through the case assessments as to which data items are most easily extracted and what is not. The difficulty in obtaining data and information and the level of detail required should be key considerations in deciding how to move the research forward.

Gaps in the Insurance analysis

This stage of the research has been unable to satisfactorily unravel the complex role flood insurance plays in managing flood risk, and indeed which stakeholder groups ultimately benefit or disbenefit from reduced flood risk and associated reductions in damages avoided. Continued collaboration with the insurance industry is encouraged to ensure any future analysis is based on transparent and robust data and information.

Communication and collaboration

Communicating the purpose and value of this work and gaining commitment from relevant stakeholders to support the undertaking of a *Who Benefits?* analysis is essential to ensure full collaboration and access to key datasets, many of which are not readily attuned to such analyses and may require stakeholder input and resources to make information available in a usable format.

Other aspects

Resource flows that result from a typical house that is flooded would enable the impacts of insurance claims and payouts to be estimated at several levels. Flood damage results in replacement and repair to items, renovation of the building fabric, and building clean-up and there are a range of beneficiaries at several levels (first order, second order, etc.) who benefit directly or indirectly as a result of flood damage to properties.

POSSIBLE FUTURE WORK

The work has not been able to gauge the beneficiaries, losers and distributional affects from the national spend on FCERM. A scaling-up exercise is required and structured analysis through NaFRA , CFMPs and SMPs would be possible and should be investigated. Tools embedded within the NaFRA, MDSF2 and PAMS programme, in conjunction with other datasets, provide a means of assessing flood risk and potential benefits at a range of levels as well as disaggregating information according to levels of protection, different socio-economic groupings, business types, and assets at risk.

Other more complex distributional effects are more difficult to derive directly through NaFRA (using currently available data and methods) and, for example, local amenity gains, environmental gains, and business opportunities require further investigation to resolve.

The work has been unable to satisfactorily unravel the complex role flood insurance plays in managing flood risk, and indeed which stakeholder groups ultimately benefit or disbenefit from reduced flood risk and associated reductions in damages avoided. Continued collaboration with the insurance industry is encouraged to ensure any future analysis is based on transparent and robust data and information.

References to published material

9. This section should be used to record links (hypertext links where possible) or references to other published material generated by, or relating to this project.

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