Aspiration and reality: flood policy, economic damages and the appraisal process

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Research shows that flood damage potential has increased significantly in the last 15 years. At the same time, flood policy has shifted away from simplistic flood defence towards ‘living with floods’ and ‘making space for water’. This paper explores the mis-match between the aspiration in policy ideals, the reality of rising potential economic damages and the inability of the flood risk appraisal process to match the aspiration with the reality. Unless investment appraisal procedures are changed, the increase in damages will undermine policy changes that seek a different pattern of flood risk management, away from economically dominated decision-criteria towards more sustainable objectives.

Key words: flood risk management, England and Wales, flood damages, quantitative analysis, project appraisal

Introduction

The economic damages associated with floods are receiving increasing attention in policy, the media and society more generally. This is being driven by the expectation that flood probabilities and their consequences will continue to rise in the coming decades – brought about by a combination of a changing climate (Evans et al. 2004) and an increase in flood plain occupancy (Howe and White 2001; Penning-Rowsell and Wilson 2006). This is being complemented by policy changes in which the nations’ citizens are being asked to ‘live with floods’ (ICE 2001), ‘prepare for floods’ (ODPM 2002), ‘live with risk’ (UN/ISDR 2004) and ‘make space for water’ (Defra 2004a).

The drivers of change are expected to increase flood risk damages in the future (Hall et al. 2003; Evans et al. 2004), And, as it is neither economically feasible, nor possible, to defend against all floods, the need to provide a wider portfolio of risk management options is increasingly recognized; not least significant of which is improvements in flood warnings and awareness raising (Tunstall et al. 2005), spatial planning (Pottier et al. 2005), home-owner adaptations, insurance, emergency planning (Penning-Rowsell and Wilson 2006) and the proper consideration of the health effects of flooding, vulnerability and ‘social costs’ more generally (Tapsell et al. 2002; RPA/FHRC 2004). Tackling these issues has become all the more important as, over the last decade or so, the flood damage potential of residential and non-residential properties has appeared to have risen significantly in real terms (Penning-Rowsell et al. 2003). This has implications for both those at risk and, as key economic benefits in the project appraisal process, also for the prioritization of capital expenditure on flood and coastal risk management in England and Wales (Defra 2004a 2005a).

The purpose of this paper is, first, to illustrate the trends in flood damage potential as revealed in recent research. Secondly, we examine the implications of these results, given the changing policy context, and the associated flood risk appraisal process that is a key tool in policy implementation by guiding decision-making. In so doing, we see a discontinuity between the aspiration in policy ideals and the reality of rising potential economic damages, and that the appraisal process, in its present form, is unable to bridge this gap.
The reality – rising flood damage potential

The context
Within England and Wales, the Government – via the Department for Environment, Food and Rural Affairs (Defra) – recommends that the assessment of potential economic flood damages to residential and non-residential properties uses the data-sets developed by the Flood Hazard Research Centre at Middlesex University. These data-sets are generally regarded as accurately gauging potential economic losses across a range of flood severities (Penning-Rowsell and Green 2000). Initiated in the 1970s by Penning-Rowsell and Chatterton (1977), these have been updated in subsequent years, with the latest research reflecting values at 2005 prices (Penning-Rowsell et al. 2005).

Since the previous comprehensive assessment (Suleman et al. 1988; N’Jai et al. 1990), there have been changes in project appraisal guidance (MAFF 1999), public attitudes (e.g. on health and safety), technological developments, institutional structures, building regulations, the ownership of household goods and alterations to building fabrics. The UK economy (as represented by increases in GDP) has more than doubled in size (Clegg 2002), resulting in a more affluent society with increased investment in floor materials (e.g. wood block flooring) and carpeting (BMRB 1998).

By contrast, over the same period, the philosophy and methodology for assessing the flood-damage potential of properties have remained relatively unaltered, thus allowing sensible comparisons between the 1990 and 2005 data-sets. In essence, this method involves costing the likely direct economic damage from flood events with a range of magnitudes and durations but assuming normal flood water velocity, effluent and silt content. Thus, depth of flooding remains the primary determinant of flood loss. Flood duration is assumed to be of lesser importance, and the part played by flood water velocities is assumed to be small; not least because the incidence of structural failure of buildings in UK floods is very limited.

Changing residential flood damage potential 1990–2005
Comparing the 1990 and the 2005 data (N’Jai et al. 1990; Penning-Rowsell et al. 2005) shows a substantial and above-inflation increase in the potential economic damages to residential properties. The 1990 values have been adjusted to 2005 prices using the Consumer Price Index (Table 1). For both short (<12 hours) and long duration floods (>12 hours), there has been a significant increase in potential damages at all depths of flooding (Table 1). This increase has not, however, been uniform either across depths, durations or flood damage type.

Firstly, long duration floods still produce greater total damages (£32,754 and £26,105 at 0.3 m flood depths for long and short durations, respectively), but duration is no longer as significant in affecting flood damage potential as once was the case. This is mainly because the susceptibility percentages for short duration flooding for many household goods have now risen to 100 per cent (i.e. damage equals total pre-flood value), whereas this was once the reserve of long duration flooding (Penning-Rowsell et al. 2005).

Secondly, the results show the increased damage potential of floods of shallow depths, with the greatest increases from 1990 to 2005 observed at 0.1 m and 0.05 m depths. At 0.05 m, for example, the damages have risen 915 per cent for a short duration flood and 498 per cent for a long duration flood, with these large increases driven by householders’ investment in floor materials (e.g. wood block flooring) and carpeting (BMRB 1998).

Thirdly, average increases conceal different rates of increased damage potential for household goods and building fabric items. The potential damage of household inventory items has risen markedly faster than total flood damage (Table 1). This is a direct result of the increase in the quality, quantity and susceptibility of household goods at significantly lower depths of flooding, together with a large increase in the cost of domestic clean-up (ONS 2001 2002; Mintel 1999–2001; BHPS 1991–2000; Penning-Rowsell et al. 2005). Changing technology is also a factor, as many more household goods now have intricate electronic components which mean that salvage values after flooding are negligible.

Changing societal attitudes are also important for the increases observed. The results are indicative of the ‘throw-away’ society in which we now live where household goods are ‘written off’ when even only slightly damaged. This is a factor that is particularly significant for short duration floods when it could safely be assumed previously that a more repair-orientated culture operated. Furthermore, as many more household inventory items are now covered by new-for-old insurance policies, there is little incentive for householders to salvage and repair items slightly damaged on contact with flood water. Both trends have led to significantly higher susceptibility to flood damage percentages observed at all flood.
Table 1  Real % change in potential economic flood damages (residential) between 1990 and 2005

| Depth (m) | Short duration flooding (<12 hours) | | | | | | | Long duration flooding (>12 hours) | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Building fabric | Inventory | Total damage | | Building fabric | Inventory | Total damage | | Building fabric | Inventory | Total damage | | |
| | 1990 (£)* | 2005 (£) | Real % change | 1990 (£)* | 2005 (£) | Real % change | 1990 (£)* | 2005 (£) | Real % change | 1990 (£)* | 2005 (£) | Real % change | 1990 (£)* | 2005 (£) | Real % change |
| 0 | 478 | 611 | 128 | 0 | 0 | 0 | 478 | 611 | 128 | 744 | 1960 | 263 | 745 | 1960 | 263 |
| 0.05 | 599 | 1798 | 300 | 598 | 9175 | 153 | 1199 | 10973 | 915 | 1763 | 5346 | 303 | 1793 | 14592 | 498 |
| 0.1 | 930 | 3530 | 380 | 995 | 9977 | 100 | 1932 | 13502 | 699 | 3187 | 8687 | 273 | 3204 | 18925 | 391 |
| 0.3 | 2171 | 8060 | 371 | 2891 | 18046 | 624 | 5062 | 26105 | 516 | 6416 | 14466 | 225 | 6500 | 32754 | 329 |
| 0.6 | 2848 | 10217 | 359 | 3948 | 19051 | 483 | 6796 | 29286 | 431 | 8037 | 15465 | 192 | 8132 | 34921 | 276 |
| 0.9 | 3539 | 11028 | 312 | 4667 | 20237 | 434 | 8206 | 31265 | 381 | 9348 | 16383 | 175 | 9506 | 36977 | 252 |
| 1.2 | 4427 | 12617 | 285 | 5020 | 20423 | 407 | 9447 | 33040 | 350 | 12013 | 17499 | 146 | 12248 | 38299 | 216 |

* Updated by CPI
depths, but the effect is particularly strong at lower depths (Penning-Rowsell et al. 2005).

In addition, there have been rising potential post-flood costs of building fabric repair and renovation items over this period; whilst these are less substantial than for household goods, they remain significant (Table 1). These increases are a result of the changing unit cost of building fabric items, increased real labour and materials costs, and building construction changes both in terms of house types and materials. As with household goods, flood duration now appears to be less significant than previously assumed because, once again, many building repair costs after short duration flooding now equate to the total value of the item – a factor that was less common in 1990 (Penning-Rowsell et al. 2005).

Changing non-residential flood damage potential 1990–2005

As with residential properties, flood damage for non-residential properties depends upon the type of property and its size; however, for non-residential properties the function of the premises is obviously important. The data on non-residential properties derived in 2005 results from new research (Penning-Rowsell et al. 2005), which attempts to simplify and make more transparent the methods used to determine direct flood losses to retail, commercial and industrial properties (cf. Penning-Rowsell and Chatterton 1977; Parker et al. 1987).

A number of factors make a comparison between the 1990 and 2005 flood damage data somewhat difficult. First, the flood depths for the new data, and hence, the damages, have been amended (e.g. 0.25 m, 0.5 m rather than 0.3 m, 0.6 m). Secondly, the 1990 data does not include flood depths above 1.0 m, although this is less of a problem given the relative infrequency of such flooding in England and Wales. Thirdly, the property categories have been changed, and many direct comparisons are not possible. Sample sizes also vary between the 1990 and 2005 examples.

The result is that the figures given here can only serve as broad comparisons. Table 2 illustrates the increases in the sector average potential damages for selected non-residential property types between 1990 and 2005, with the 1990 values again adjusted to 2005 prices using the Consumer Price Index.

These increases are significant across all categories of non-residential properties, but the largest increases illustrated here are those for retail supermarkets and hyper-markets, with significant increases across all flood depths. This can be partly explained by the changes that have taken place within this type of retail outlet over the last decade or so. Figures for offices and workshops also reflect the changes in their character over the last 15 years as multifarious electronic equipment at point of sale, and in the back office, have become commonplace. The concept of a ‘throw-away’ society is also as true for businesses today as it is for residential properties because promoting customer confidence and the earliest resumption of trading/operating after flooding is paramount, thus leading to far less emphasis now than previously on salvaging partly damaged items and thus reducing calculated damages.

The basic data collected was for 12 hours’ flood duration, and surveys showed that many businesses do not judge that there would be substantial differences in damage with increased duration or with better flood warnings. Flood depth continues to be more significant than duration in affecting damages, but long duration flooding enhances damage to

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Retail supermarkets/ hyper-markets</th>
<th>Offices (financial)</th>
<th>Manufacturing/workshops</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1990 (£)*</td>
<td>2005 (£)</td>
<td>Real % increase</td>
</tr>
<tr>
<td>0.00</td>
<td>0</td>
<td>110</td>
<td>N/A</td>
</tr>
<tr>
<td>0.15</td>
<td>113</td>
<td>293</td>
<td>159</td>
</tr>
<tr>
<td>0.30</td>
<td>138</td>
<td>491</td>
<td>256</td>
</tr>
<tr>
<td>0.60</td>
<td>272</td>
<td>915</td>
<td>236</td>
</tr>
<tr>
<td>1.00</td>
<td>349</td>
<td>1352</td>
<td>287</td>
</tr>
</tbody>
</table>

* Updated by CPI
building structure, and certainly leads to greater loss of profit from being unable to trade for a longer period as customers migrate to rival companies.

These figures show that the rate of increase has not been as great, on average, as for residential property. The markedly higher damages, where they occur, are largely the result of new technologies and higher stock and equipment values within the non-residential property sector. Customer confidence and avoiding public health risks are also key influences on the increased levels of goods and equipment ‘written off’ after floods, thereby increasing susceptibility levels and thus damage potential. Getting back to business as soon as possible after a flood is more important than saving small increments of flood damage.

### The aspiration – the changing policy context

The changes described above in flood damage potential have been matched by quite radical changes in the approach to managing flood risks in England and Wales, although the two are not directly related. Hitherto the strategy (MAFF 1993), and hence the focus for project appraisal, was predominantly urban in focus, flood defence oriented, and somewhat narrowly scheme-specific. The appraisal process was dominated by a relatively narrow benefit–cost approach, founded on tangible economic costs and benefits that were easily quantifiable.

Almost all of this is now changing. There is now an explicit recognition of the need to embody the principles of sustainable development into, first, flood risk management and hence, secondly, into its appraisal methods. The former has resulted in the development of the new strategy entitled *Making Space for Water* (Defra 2004a 2005a), and the latter has resulted in the development of new Treasury investment appraisal guidance (HM Treasury 2003) which encourages somewhat more ambitious methods and embodies a concern about distributional impacts. *Making Space for Water* (Defra 2004a 2005a) proposes a more holistic approach to flood risk management, where risk is defined as the probability and consequences of flooding, and the focus is on a much more integrated approach to risk management (Table 3). The aim is to manage the risks from flooding and coastal erosion by employing a portfolio of approaches which reflect both national and local priorities, and ‘to deliver the greatest environmental, social and economic benefit, consistent with the Government’s sustainable development principles’ (Defra 2005a). In addition, the policy seeks to secure efficient and reliable funding mechanisms that deliver the levels of investment required to achieve the vision of this strategy.

This new government strategy is also illustrative of the influence of European legislative requirements such as the Water Framework Directive (EU 2000), the Habitats and Birds Directives (EEC 1992), and the Aarhus Convention on stakeholder engagement. Likewise, it has taken on board the importance of cross-Governmental policy, such as the Government’s Sustainable Development Strategy (HM Government 2005) and Sustainable Communities Plan (ODPM 2003).

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Table 3  Key principles underlying the new approaches to flood and coastal erosion risk management (adapted from Defra 2004 2005)

<table>
<thead>
<tr>
<th>Principle</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managing risk from all sources of flooding which, in addition to coastal and fluvial flooding, also includes pluvial, groundwater and sewer flooding. This is in accordance with the suggestions made in the Foresight programme (Evans et al. 2004), and will require significant developments in our understanding and mapping of these risks and a clarification of the roles and responsibilities of the various stakeholders involved.</td>
<td></td>
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<tr>
<td>Adopting a risk-driven, rather than a project-driven, approach to managing floods, requiring better and more reliable information at the catchment scale as well as a greater understanding of the main drivers for increasing risk.</td>
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<tr>
<td>Seeking multi-functional benefits from flood and coastal risk management interventions, particularly with respect to water quality and water resources, consistent with the requirements of the Water Framework Directive.</td>
<td></td>
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<tr>
<td>Considering a wide range of risk management options, and a wide range of techniques and decision-making processes, to better account for the social and environmental consequences of flooding.</td>
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<td>Emphasizing the social pillar of sustainable development by extending the risk management tools such that flood risk management decision-processes take account of social justice and equity issues as required under the Government’s Sustainable Development and Sustainable Communities strategies (HM Government 2005).</td>
<td></td>
</tr>
<tr>
<td>Enhancing the clarity of the social and environmental consequences of flood and coastal erosion in the decision-making process.</td>
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Enhancing the clarity of the social and environmental consequences of flood and coastal erosion in the decision-making process.
Implicitly, the new policy framework is also designed to respond to the widespread floods of Easter 1998 and autumn 2000 (Johnson et al. 2004 2005), and it recognizes the findings of the Foresight ‘Future Flooding’ project which showed the possibility of significantly increased flood and coastal erosion risks in the next 100 years, under all the scenarios considered. These trends are driven mainly by climate change, urbanization, environmental regulation, rural land management, and increasing national wealth and social factors (Evans et al. 2004), the last two of which – as we have seen – are exactly the processes that are driving up residential and non-residential flood damage potential. Without a change in policy, the economic impact alone of future flooding is likely to be large, with annual losses in England and Wales ranging from c.£1 billion to some £27 billion, depending on the scenario (Evans et al. 2004). In addition, it is expected that the flood risks from inadequate sewers and urban drainage will increase significantly.

Thus, as the new government strategy recognizes, there is a need to improve our understanding of – and examine our institutional arrangements towards – the management of pluvial, sewer and groundwater flooding. There is also a need to examine the catchment-level processes through which risks can be managed, moving away from a project-by-project basis, and building on the new Catchment Flood Management Plans (with their flood damage dimension), Shoreline Management Plans and Water Level Management Plans.

The new Defra strategy is to be applauded for its catchment-wide, holistic, participatory, multi-functional and multi-strategy approach. However, the techniques, information and science upon which decisions are to be made at the catchment and local level require significant improvement if they are to develop from their current scheme focus – dominated by economic damages – to one focused on managing risks across catchments in accordance with the economic, social and environmental pillars of sustainable development. The relationship between Making Space for Water and a modernized appraisal and funding structure, and the knowledge base upon which it is founded, is an important one for effective policy delivery.

This situation is not unique to the UK. Indeed, countries throughout the EU, and more widely, are moving away from flood defence towards flood risk management with each country differentially positioned along this transition pathway. The recently proposed European Commission directive, and adopted common position, for the assessment and management of floods is illustrative of this wider change (EU 2006). Similarly, the language of flood risk policy is changing with a greater emphasis on integrated approaches (Japan), applying risk-based approaches to flood mitigation, preparedness, response and recovery (USA), and seeking to make ‘room for rivers’ (Netherlands – Commissie Waterbeheer 2000). As with the UK, however, this global recognition that you cannot defend against all floods has not diminished the significance of attempts to reduce the potential damage that they can cause. In turn, it has not reduced attempts to put economic values to flood risk variables in order to estimate the benefits of flood protection measures. However, in keeping with the varied geographies and histories associated with flood risk management, flood damage estimation is similarly varied with countries such as Australia (Blong 2004; Gissing and Blong 2004), the Netherlands (Meyer and Messner 2005) and the USA (Downton and Pielke 2005) illustrating a long history of flood damage estimation in the project appraisal process, whilst the application of flood damage analysis in the Czech Republic (Meyer and Messner 2005), Brazil (Nascimento et al. 2006) and Bangladesh (Islam 2005), for example, is relatively new.

Modernizing the appraisal and investment prioritization systems

This changing policy context seeks a different pattern of flood risk management effort and expenditure, which the investment appraisal system should help to deliver. But matching the appraisal systems to policy aspirations continues to be difficult.

Problems with the current appraisal system

A key problem, first, is that Defra’s current flood and coastal defence project appraisal guidance notes (the PAGN series) are provided for the assessment of benefits from fluvial and coastal flooding only, with Ofwat and the water utilities responsible for managing the risks associated with sewer flooding. This is not in keeping with the Making Space for Water need to manage the risks from all sources of flooding, particularly the risks associated with groundwater and pluvial flooding. Flooding from inadequate urban drainage is likely to be more polluted, groundwater flooding involves some very long flood durations (Green et al. 2005) and, therefore, the flood damage costs of both are likely to be high and need to be properly assessed.

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In addition, secondly, the current appraisal system is still project specific in that there is as yet no guidance on how to assess a portfolio of flood risk management measures. The PAG3 guide seeks an economic optimum from the implementation of one measure alone, and one for which a standard of protection can readily be specified (MAFF 1999). This guidance would generally strike out those parts of a portfolio that are not as cost-beneficial as others, thus threatening the logic of the portfolio approach, the protection standards within which, moreover, are likely to be spatially variable rather than uniform. Here again the appraisal system will – with time – have to be altered to match and deliver the new strategy.

Furthermore, thirdly, the strategic intentions to develop a more ‘balanced’ approach to project appraisal between the three pillars of social, economic and environmental development cannot yet be achieved. Therefore we cannot be at all sure that we can deliver ‘the greatest environmental, social and economic benefit’ as Making Space for Water requires, because we cannot measure each element in the same way or even in some readily comparable form. At present, environmental and social costs remain extremely difficult to quantify, and the tools and techniques for integrating intangible benefits into the appraisal process remain poorly developed, despite some progress (RPA/FHRC 2004; RPA 2005).

Defra has hopes that Multi-Criteria Analysis (MCA) might fill this gap (RPA 2005), but the weighting and scoring that MCA requires is difficult to implement in a multi-stakeholder/multi-functional context (e.g. whose weights should one use?). In any case, MCA fails to answer the crucial question as to how much to spend to achieve any particular standard of flood risk reduction, and how to judge one scheme against another (especially if they are very different in character).

### Investment priorities
Traditionally, Defra has decided on investment priorities through its approval process. Under the new block grant system (Defra 2003), the Environment Agency no longer has to seek Defra approval for projects that are part of approved strategies and cost less than £5 million. Defra can ‘call-in’ projects of more than £2 million where they are not part of an approved strategy, or in excess of £5 million where they are. In addition, Defra approval needs to be sought for projects where an assessment is required under the Habitats directive (EEC 1992), regardless of cost (Defra 2006).

Importantly, however, and irrespective of the routing of the funding, all projects must continue to meet the technical, economic, social and environmental criteria as set out in the PAGN series, and they must also meet the priority threshold score to be considered for funding. The priority scoring system (Defra 2006) attaches scores to the appraised benefits for each of the three pillars of sustainability – environment, people and economics. As it currently stands, out of the total potential score of 44 (although in reality most do not exceed 32), 20 points are allocated to ‘economics’ (the benefit–cost ratio) and 12 points each to ‘people’ (the number of people at risk, their vulnerability and public safety) and the ‘environment’ (a combined habitat and heritage score) (Defra 2006: Table 4).

Virtually all proposed projects to be considered for funding must achieve a certain priority threshold.
score, which for 2005–6 is set at 19. Indicative scores were originally set by Defra of 19 and 15 for the following two years (Defra 2005b). However, these have since been rescinded (Defra 2006) due to concerns about the number of commitments already in the ‘pipeline’ and the planned introduction of new Output and Performance Measures for flood and coastal erosion risk management in April 2008 (Defra 2005c).

Theoretically, the current 19 threshold could be met by economics alone, where a benefit:cost score of 10.5:1 or greater is available. Whilst this is unlikely in practice, it is also unlikely that the ‘people’ and ‘environment’ scores could in combination dominate the priority scoring system. Indeed, careful analysis of Table 4 illustrates that to pass the 19 threshold at least half of the contribution must come from the economic score. And, given that economics are dominated by the number of residential and non-residential properties in the floodplain there is, in turn, a high correlation between the people score determined by the number of people at risk and that of economic damage. This in effect means that to pass the priority threshold a project must yield a benefit:cost score of greater than 5.0:1, which is very high indeed by historical standards and certainly runs counter to the policy priorities of Making Space for Water. It is, however, worth noting that such high benefit:cost scores provide the government with very high returns relative to its public expenditure.

The result is that the potential benefits from residential and non-residential properties remain the most critical factor in flood risk management. Where the resulting decisions are not regarded as socially equitable, the Treasury ‘Green Book’ (HM Treasury 2003) recommends that potential benefits should incorporate distributional impacts, with the potential damages weighted accordingly (Defra 2004b). However, whilst this is an important first step in accounting for social issues in the economic appraisal process, it does not reduce the importance of economic benefits, which have increased so significantly in the past 15 years.

The priority scoring system is, in effect, both a screening and a rationing system, designed both to prevent ‘too many’ schemes from being seen as fundable, and ensuring that those that are funded are those that deliver the most benefits. The problem is that the economic benefits still dominate, despite the Making Space for Water aspirations about a balanced appraisal process. Indeed, with the kind of increases in residential and non-residential damages reported in this paper, the trends will be in the other direction: the queue of projects will be dominated by those with the largest economic benefit:cost ratios, rather than those that deliver ‘the greatest environmental, social and economic benefit’.

The priority scoring system needs to change, in line with the Making Space for Water aims. This, we believe, is Defra’s intention in developing their new Output and Performance Measures. However, whilst the indicators thereby developed may help in guiding investment decisions that maximize benefits in line with the Making Space for Water aspirations, this can only be achieved by significant improvements in the appraisal system itself. There is an urgent need, in this, to develop significantly improved techniques and guidelines in project appraisals for schemes that enhance social and environmental flood risk management benefits.

Conclusions
Changes in flood damage potential (Penning-Rowsell et al. 2005), coupled with new Treasury guidance on discount rates (HM Treasury 2003), are markedly increasing the calculated economic benefits of flood risk management schemes.

There are two important implications. First, the public will be surprised that so many flood risk management schemes that are demonstrably highly cost-effective will not be funded. Secondly, whilst Defra’s new policy on Making Space for Water seeks a new balance of schemes in favour of those which generate social and environmental gains, this will not happen if the appraisal process and the parallel priority scoring systems remain as they are. Indeed, the increased flood damage potential reported in this paper is in danger of destabilizing the decision-making process in favour of a narrow economic focus just at a time when government wants the emphasis to shift in the other direction.

The appraisal system for investment decision-making is the most effective vehicle for implementing Defra’s flood and coastal risk management policies, and it is essential that appraisal and policy are brought into line. Without this, the government’s key sustainability objectives and the admirable ambitions of Making Space for Water in this field will remain mere aspirations and the reality will be the continuation of the status quo.

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References


Blong R 2004 Residential building damage and natural perils: Australian examples and issues Building Research & Information 32 379–90

BMRB 1998 Target group index international British Market Research Bureau, London

Centre for Ecology and Hydrology (CEH) 2001 Hydrological yearbook 2000 CEH, Wallingford


Downton M and Pielke R 2005 How accurate are disaster loss data? The case of US flood damage Natural Hazards 35 211–28


Gissing A and Blong R 2004 Accounting for variability in commercial flood damage estimation Australian Geographer 35 209–22

Green C, Wilson T, Masterton T and Boothby N 2005 Groundwater flooding in Hampshire – an assessment of the flood losses as compared to FLAIR data Flood Hazard Research Centre, Enfield


Howe J and White I 2001 Flooding: are we ignoring the real problem and solution? Regional Studies 35 368–71

ICE 2001 Learning to live with rivers. Final report of the Institution of Civil Engineers’ presidential commission to review the technical aspects of flood risk management in England and Wales Institution of Civil Engineers, London

Islam K M N 2005 Assessment methods and standard loss database for Bangladesh Palok Publishers, Dhaka

Johnson C L, Tunstall S M and Penning-Rossell E C 2004 Crises as catalysts for adaptation: human response to major floods ESRC Environment and Human Behaviour RES-221-25-0037 research report Flood Hazard Research Centre publication 511 Middlesex University, Enfield


MAFF 1999 Flood and coastal defence project appraisal guidance (3): economic appraisal (FCDPAG3) MAFF, London

Meyer V and Messner F 2005 National flood damage evaluation methods, a review of applied methods in England, the Netherlands, the Czech Republic and Germany UFZ Discussion Papers 21/2005 Department of Economics, Leipzig


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