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Minimising the Cascading Effects of Flooding through Property-level Flood Adaptation: Working Paper on Incentivising Property-level Flood Adaptation

Jamie Brown[a], Gayan Wedawatta[b]

[a]*Mott MacDonald, Birmingham, UK*

[b]*School of Engineering and Applied Science, Aston University, UK*

Abstract

Significant numbers of homes within the UK remain at risk of flooding despite significant investment on community=level flood protection schemes. Although community level flood protection schemes are the first line of defence for mitigating flood risk, not all properties are protectable. Property-Level Flood Protection (PLFP) provides those unprotected homeowners with an approach for protecting their homes from flooding. Although the level of take-up of such measures seems to have increased over the years, significant barriers still seem to exist preventing wider adoption. Government incentives have been identified as an effective method of encouraging property owners to adapt their properties and introduce flood resilience and resistance measures to their properties. The study seeks to discuss how such incentives have contributed towards property-level flood resilience and resistance measures being introduced by property-owners. Community perception of incentives and the likelihood of adapting if suitable incentives are available will also be investigated. An exploratory case study was undertaken to this end by conducting a survey of flood victims and at-risk residents in Worcestershire.

Keywords: Adaptation, Flood risk, Incentives, Insurance, Property-level Flood Protection

1. Introduction

Within England estimations suggest that around 1 in 6 properties are at risk of flooding (coastal, river or surface water flooding) equating to around 5.2 million properties (non-business) (Environment Agency, 2009a). Of those properties not all will benefit from community level protection schemes as it is impossible & uneconomical to protect all from flood events (Environment Agency, 2009a). Furthermore, as forecasters predict precipitation rates to increase by 16% and sea levels to rise by up to 36cm by the year 2080 in the UK (Defra, 2009), we can assume the number of properties at risk will increase, given the direct link between precipitation and sea level rise to flooding (Met Office, 2011). The prior figures suggest there is extensive material need for individuals to personally protect their homes from flooding, via harnessing the use of resistant or resilient measures.

In addition to direct impacts, flooding can have cascading effects on communities affected. As noted by Jha et al (2012) in considering the impact of floods, and the benefits of prevention, the potential for cascading impacts should also be considered. Property-level flood protection is an effective means of avoiding/minimising such potential cascading effects of flooding on local communities and cities.

Currently despite the well documented availability of Property Level Flood Protection (PLFP) measures by the Department for Environment Food and Rural Affairs (DEFRA) & the Environment

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Agency (EA), along with the expressed financial benefits (RICS 2014); take up still remains low (Harries, 2012). A survey undertaken by Harries in 2012, suggested that "only 33% of people who have experienced a flood take steps to protect their homes from further flooding and less than 8% of those do who have never been flooded".

This study examines as to why future government incentives (cash or reward based) are needed for property level flood protection measures and explores if new incentive models were to be introduced; would the take up of PLFP increase & what would be the extent of support required. The study also gives an appreciation for the current and past government grant & incentive schemes for PLFP, exploring both their coverage and effectiveness.

The paper begins by exploring as to why there is a need for property level flood protection measures and the respective need for funding models in the UK, followed up by detailing and analysing the past & current incentive models. A case study is then explored in an area which is deemed to be considerably vulnerable to flooding (Worcestershire). Quantitative data was collected in the area by way of surveys; this allowed an understanding to be grasped on homeowner's perceptions of property level flood protection and their likelihood of adapting should suitable incentives be present.

The study concludes with discussion and analysis of findings discovered in the available literature and case study, followed up by providing recommendations on the future direction of property level flood protection and whether there is a need for further government intervention.

2. The Need for Property Level Flood Protection

2.1 Flood risk in the UK

It is estimated that around 1 in 6 properties in England are at risk of flooding equating to around 5.2 million properties (non-business) (Environment Agency, 2009a). Of the 5.2 Million properties at risk the Environment Agency estimated that 2.4 million are at risk of coastal and or river flooding, the remainder are susceptible to surface water flooding (Environment Agency, 2009). These numbers are likely to increase according to Bennett O et al (2014) for a number of given reasons;

- Climate change, ultimately leading to rise in sea levels and changes in rainfall patterns.
- Ageing drainage and flood defence infrastructure.
- Increased number of buildings in flood prone areas.
- Reduction of permeable areas due to increased paving's associated with infrastructure and buildings, increases surface water runoff.

Along with the increase in precipitation rates we must also consider the impact of sea level rise. DEFRA has estimated that in London a projected rise of 18cm will be present in the 2040's followed by an increase to 36cm by the 2080's (Defra, 2009). Again there is a given direct correlation between sea level rise and flooding probabilities (Met Office, 2011); in repeat as a consequence the number of homes at risk of flooding will ultimately increase.

It is however also worth noting that; increased rainfall rates and sea level rise are not the only key determinants of flooding events, we must also consider the impact of short intense rain outbursts. Montford A (2014) detailed that "floods are not only caused by extended periods of rainfall, they can also be caused by short intense cloudbursts". So effectively an increase in the intensity of rainfall is just as important as changes in the overall totals. Intensity events which are according to the UKCP09, 2014 (UK Climate Projections) set to increase in frequency. Consideration must also be given to the infrastructure supporting storm water flow, Wedawatta et al (2012) detail that; factors such as inadequate drainage and river banks can also contribute to the increased hazard of flooding.

Given the projections by the UKCP09 (2014) & Met Office (2011) and the established links between precipitation & sea level rise to flooding events, there is clear evidence to suggest UK flooding will increase in frequency. This factor only furthers why there is a need for homeowners to introduce PLFP measures to their properties, subsequently expressing the need for government incentives/grants to potentially increase utilization numbers.

Based on the UK climate projections undertaken by Defra in 2009, winter precipitation rates are set to rise up to 16% by the 2080's. As a consequence given the established direct link between precipitation and flooding (Met Office, 2011) we can assume the number of properties at risk will increase.

2.1 Community Level Protection Cannot Protect All

Community Level flood protection schemes are often the first line of defence against flooding (Wedawatta et al, 2012), mainly due to their ability to protect high numbers of homes and the 99% performance security suggested by the EA (Environment Agency, 2009a). Typical forms include active defences i.e. barriers, pumps and gates or passive defences such as embankments, walls and overflow channels (Nicholls, 2007).

The EA do however recognise that even with increased investment on community schemes; around 500,000 properties will still be left at high risk of flooding by 2035 (Environment agency 2009b), as it is impossible & uneconomical to reduce all flood risk or defend against all possible floods (Environment Agency, 2009a). To combat the underlying factor that not all homes are able to benefit from community level protection Wedawatta et al (2012) suggests that; PLFP measures can be utilised as an effective means of managing flood risk for existing buildings.

3. Incentive Models

3.1 Previous Property Level Flood Protection Schemes

Between March 2009 & May 2011 a PLFP grant scheme was available for certain homeowners in England. Introduced by DEFRA the scheme worth a reported £5.6 Million and was introduced to help protect properties in high areas of flood risk that did not benefit from community level defences (Environment Agency, 2013). The scheme required local authorities to apply for funding off the EA and then subsequently decide which properties should receive support and the extent of any such support. Indecently 1,109 properties in 63 communities were protected under the scheme with average financial support of approximately £4,900 excluding survey costs and admin requirements (JBA, 2012).

JBA consulting undertook a review on behalf of DEFRA in 2012, to summarise the effectiveness of the property level flood protection scheme, the following benefits were suggested;

- High levels of participation
- Promotes communities supporting each other
- Excellent community emergency plans developed
- Positive feedback following telephone feedback
- Should encourage wider take up
- Enhanced the knowledge of excellent products available

The study by JBA 2012 did however highlight a few limitations/future considerations;

- The installations at the time of writing the report had not been tested by a flood event.
- Administration proved to be time consuming
- Schemes need more time
- Initial awareness was low

The Environment Agency (2012) went on to define the scheme as very successful having provided property level protection measures to many communities. However the EA then emphasized that more needs to be done to increase the general awareness and confidence of such resilient & resistant measures.

3.2 Current Property Level Flood Protection Schemes

At the time of compiling this paper there was only one grant/incentive available for application with regard to PLFP measures. The "Repair & Renew" scheme allows homeowners to apply for grants of up to £5,000 via their local authority, however only homes that were internally affected by flooding between 1st April 2013 & 31st March 2014 are applicable. The grants which are available are intended only to fund measures which improve the property's resilience or resistance to flooding, beyond repairs that would normally be covered by insurance (Gov UK, 2015).

The National Flood Forum (2013) expressed that the grants would be a really useful contribution to those people currently suffering the effects of flooding and also drew to mention; that reinstatement and new protection given to homes really does lower the properties risk of flooding. Otherwise homeowners could well be less protected than they think they are.

Clearly the current repair and renew scheme differs from the programme introduced in 2009 which potentially allowed any property at high risk of flooding not covered by a community protection

scheme to receive support. The current grant scheme however only focuses on those directly impacted by flooding; which is of upmost importance to restore livelihoods and increase future flood confidence of homeowners, unfortunately there are likely to be considerable numbers of properties not flooded between the specific time frame, which will now have no access to grants or support incentives.

4. Research method

The technique utilised for gathering primary data was a questionnaire survey. With the confidence that a survey questionnaire allows collection of large amounts of data in an economical way (Saunders et al, 2009). The questionnaire supports efficiency in terms of time and data processing; questionnaires are also seen to be faster than other respective collection methods. (Dornyei et al, 2010).

Professional research studies have also recognised the suitability of questionnaires in capturing public perceptions of flood risk and or damage, for example research reported in a journal paper by Wedawatta et al 2014; examined the effects of flooding on small businesses. Although the targeted subjects were different, the principles with respect to property level flood protection were similar. A further study completed by Bichard et al (2009) also harnessed the use of questionnaire surveys to test homeowner's attitudes towards flood risk, further justifying the selection of the technique for use within this project.

5. Reflection on findings

Roughly 5.2 million properties are at risk of flooding in the UK either; costal, fluvial or surface water; numbers which are predicted to increase given the future weather trends & the established link between precipitation/sea level rise and flooding. Also most importantly not all of those homes are protectable by community level protection schemes, as it is impossible and ultimately uneconomical. PLFP measures therefore provide unprotected homeowners with an effective means of managing their own flood risk.

Given that the modern communities are part of complex interconnected systems, cascading effects of flooding can be significant. Whilst this is specially the case with infrastructure systems, it can also apply to households. For e.g. a home being affected by flooding could cause short or long term stress and trauma on flood victims, requiring support from health services. Further, this may affect the place of work of the flood victims due to absence, reduced productivity which in turn can create further ripple effects on the place of work. Adapting homes through property-level flood protection therefore can prevent/reduce such cascading effects.

Unfortunately In spite of the expressed success & high participation rates (93%) of the 2009-2011 Defra property level grant scheme no such scheme is currently available to property owners. Only homes flooded between 1st April 2013 & 31st March 2014 are eligible for flood support of up to £5,000. It is however worth noting that in the study area of Worcestershire homeowners still introduced PLFP without support, however based on the current take up numbers; homeowners in the area were more likely to introduce PLFP means were grants or incentives available.

The majority of property owners in the study area suggested they would be willing to introduce PLFP measures were future grants or incentives available. Roughly two thirds of those respondents claimed that any of the incentives or grants listed would increase their willingness to introduce, leading to suggest that non-monetary incentives such as shopping vouchers or 25% of the installation would satisfy their willingness to introduce. Of the remaining respondents 7 would be influenced if 50% of the installation costs were covered and 4 would only introduce if the full installation costs were granted. The past 2009 – 2011grant scheme typically supported by covering 50% of the installation costs, resultantly if a similar support model was introduced findings from this study suggest 85% of homeowners willing to introduce protection measures would be supported. However if Non-monetary incentives were introduced consideration would have to be given to their value to the homeowner. There however seems a mismatch between this acceptability of incentives and awareness of such methods. A majority of the sample were not aware of previous/current incentives available for increasing flood protection of their properties. This suggests that any future incentive scheme will have to be better communicated among the flood victims/at-risk residents.

Given the budget constraints on incentivising flood adaptation at a wider scale, a scheme similar to that of 'Green Deal' implemented by the government to facilitate improving energy saving in homes can be recommended as an effective way of continuing incentivising flood adaptation. Such a scheme is likely to sustain the positive impact of incentives on flood adaptation whilst keeping the

burden on the public pocket to a minimum. This will require active and significant involvement from the stakeholders like the insurance industry.

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