Take up of property-level flood protection: An exploratory study in Worcester, UK

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Abstract

Significant numbers of homes within the UK are at risk of flooding. 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. This study sought to establish why property-level flood protection is needed and secondly assess the extent of take up using Worcester as the study area. An exploratory questionnaire survey was conducted to achieve these objectives. After consultation of available literature it was established that the introduction of PLFP protection provided numerous benefits including limiting the health & psychological effects flooding poses, the direct financial benefits and also the possible influence on gaining flood insurance. Despite the benefits and the recognition given to PLFP by the government it was found that the overall take up of the measures was low, findings which were further backed up by data collected in the study area of Worcester with only 23% of the sample having introduced PLFP measures. Reasoning for the low take up numbers typically included; unawareness of the measures, low risk of flood event, installation costs and inability to introduce due to tenancy. Age was noted as a significant impacting factor in the study area with none of the respondents under 25 suggesting they had "a good amount of knowledge of PLFP measures" even when they claimed their properties to be at risk of flooding. Guidance and support is especially recommended to those who are unable to manage their own flood risk for e.g. social housing/rental tenants.

Keywords: Adaptation, Flood risk, Incentives, Property-level flood protection, Resilience

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 (Environment Agency, 2009a). Of those properties not all will benefit from community-level protection schemes as it is impossible and uneconomical to protect all from flood events through such schemes (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.

Currently despite the well documented availability of Property-Level Flood Protection (PLFP) measures by the Department for Environment Food and Rural Affairs (Defra) and the Environment 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".

With the addition that researches forecast an increase in extreme weather events for the UK and an increase in sea levels (Defra, 2009). It is imperative that homeowners are proactive in their approach to managing floods and are aware of the possible protection means available, to help minimise the personal detriments that may arise. This paper seeks to investigate the role of government incentives (cash or reward based) in wider uptake of property-level flood protection measures and whether such incentives will result in higher take up levels.

2. Property-level flood protection

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; PLFP measures can be utilised as an effective means of managing flood risk for existing buildings.

Further, homes benefiting from community level schemes may not however obtain 100% assurances on protection. Risks will still be present if the passive or active defences fail; recent extreme examples have occurred in Huddersfield, Worcester and South Wales where the subsequent active measures failed (ITV News, 2012). Although the probability remains unlikely

there will always remain a possibility (JBA Trust, no date). JBA Trust (No Date) went on to conclude that models suggest around 200 failures are expected per year but in reality the defences are performing much better.

Historically homeowners only reacted to a flood when it became inevitable, introducing temporary means such as sandbags and door guards (May, 2012). Sandbags proving the most sustainable option for homeowners as they are typically provided by the local authority at no cost, however past a certain point of a flood they can become largely ineffective, encompassing the need for more robust protection measures.

PLFP is primarily divided into two forms; resistant & resilient measures. "Resistant measures are those that aim to prevent flood water reaching the inside of properties (for example door guards), while resilient measures aim to minimise damage caused by floods which enter properties (for example water proof plaster) (Bowker, 2007). Some although not all PLFP measures are permanent structures installed to a home for constant protection. Temporary resistant measures used within communities at risk of flooding include air brick covers and manually sealing entry (Thurston et al, 2008).

2.1 Current Take up of Property Level Protection

Despite the well documented availability of custom property-level flood protection (Environment Agency, 2010) take up of the measures generally remains low (Harries, 2012); an interesting observation given that Defra imply that "Property-level flood protection goes to the heart of achieving many of the objectives and local actions to manage flood risk" (May, 2012). A survey conducted by Thurston et al for Defra and the EA in 2007 found that in significant areas of flood risk only 16% of households had taken active measures to limit the potential future flood damage. In a more recent study undertaken by Harries in 2012, found 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". In spite of the low take up figures a survey undertaken by Bichard & Kazmierczak in 2009 on homeowners in the Salford area of Greater Manchester, found that homeowners were willing to introduce a variety of PLFP measures. This suggests willingness to introduce measures, however given the suggested low take up numbers there seems to be some factors hindering the introduction on PLFP, factors which are considered in the next Section (Reasons for low take up).

2.2 Reasons for Low Take up

There are a number of factors determining the noticeable low take up of property level flood protection measures; "homeowners initially raised concerns over its affordability and the potential impacts on property prices" (Harries, 2012). Installing such PLFP measures as discussed above requires significant investment by the homeowner who may potentially not receive its benefits if the risk does not materialise, however the EA suggest that in the event of a significant flood the standard repairs of a property are likely to be more than the installation costs of such measures (Environment Agency, 2009a).

Homeowners surveyed in the 2008 Defra study by Thurston et al (2008) had the tendency to either underestimate or deny the risk of flooding. Typically property owners are often guilty of switching the responsibility of flooding onto their respective local authorities or governing bodies (Harries, 2012). The two prior statements however provide an unclear representation of the "typical homeowners" response to flooding or flood management, as a survey conducted by Kazmierczak & Bichard (2010), suggests; "the field of homeowners surveyed generally felt they were responsible for protecting their homes from flooding. Ultimately the underlying factor is that citizens are positioned as active individuals responsible for knowing and mitigating their own flood risk (Butler et al 2011), in spite of this Defra still recognises the need for the EA to utilise their position in the area and promote, provide advice and encourage the use of property-level flood protection (DEFRA 2012).

A study was undertaken by Bichard & Kazmierczak (2009) on homeowners in a given area, with the aim of establishing who homeowners believe are responsible for property level flood protection; homeowners or the government. The results indicate a near 50-50 split between government responsibility and homeowners. This analysis by Bichard & Kazmierczak (2009) coupled with the mixed views from the prior statements of Kazmierczak & Bichard (2010), Harries (2012) and Thurston et al (2008) suggest the question of who is responsible for PLFP and the subsequent installation costs as being a key impacting factor for the low take up of PLFP measures.

3. Research method

3.1 Study Area

To achieve the objectives and the overall aim of this research project a county has been selected for study that has significant flooding history. Worcestershire was selected as the subject area; the county is particularly vulnerable to flooding incidents due to its geography (Worcestershire partnership, No Date). Since 1998 Worcestershire has been subject to four major flooding events according to Defra, the most significant being the summer floods of July 2007. Pershore college in the county recorded the total rainfall over a 48 hour period as 157.7mm (Met Office, 2014), four times the typical amount for July as a whole (EA, 2007). Subsequently around 4,500 homes were damaged within the region (Evesham Journal, 2014). The EA estimated the likelihood of the summer floods occurring again in any given year at 2 – 4.9% resulting in a flood return period of 21- 50 years the highest estimate return period given.

The county is also expected to be subject to significant growth. Under the South Worcestershire Development Plan a further 6,200 dwellings are proposed by the year 2030 (SW Development Plan, Dec 2014). Further increasing the possibility of flood damage, JBA consulting indicated in 2012 that of the selected 177 sites set to house the provision of dwellings; 91 are susceptible to surface water flooding 9 are included within the EA's flood zone 2 (Medium risk between 0.1% - 1% annual probability of river flooding) and 15 were determined to be in EA's flood zone 3 (High risk 1%≥ annual probability) (JBA Consulting, 2012).

3.2 Data Collection Method

An exploratory study was undertaken to investigate the uptake of property-level flood protection within the case study area selected. The technique utilised for gathering primary data within this research 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). One of the constraints of this project is the tight window for data collection and analysis/discussions, the questionnaire allows for efficiency in terms of time and data processing, questionnaires are also seen as 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 G 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 & Kazmierczak (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.

The survey was distributed in two ways; the Primary distribution method of the questionnaire's was a physical door to door approach, either filling out on the spot or collecting on a given date. In total this approach yielded (31) responses from (45) distributions; resulting in a response rate of (68%). The second method used to complement the prior approach involved the development of an online version using Google forms, a link was then uploaded to two Facebook pages 1) National Flood Forum & 2) Flood Group UK. The response from the members of the pages was low (8) possibly due to the limited number of members from the required specific target area (Worcestershire) being analysed. Both methods subsequently provided a total sample size of 39.

4. Findings and analysis

4.1 Information about respondents

82% (32) of the respondents were the owners of the property they were residing in, subsequently 18% (7) of those surveyed were living in homes under rental agreements or social housing provisions.

The ages of the respondents varied though the bulk of homeowners surveyed lay between the age groups of 41 – 55 and 55 or over equating to 33% and 31% of the sample respectively, 26% were between the age of 26 – 40 and only 10% were under the age of 25. Exact numbers are provided in the Figure-1 below.

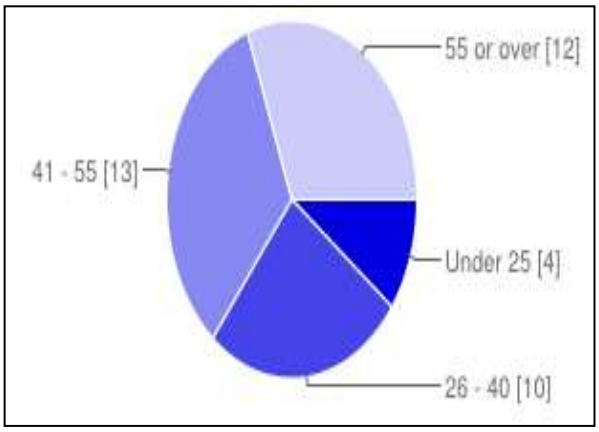

Figure 1 - Age-wise distribution of respondents

4.2 Flood Risk Experience and Acceptance

Of the homes surveyed 54% (21) had been previously flooded internally, leaving 18 of the properties not having experienced internal flooding, however some of the respondents noted that flooding of gardens, garages and outbuildings had previously occurred. In addition one respondent had experienced flooding of a cellar/basement but detailed its cause to be non-fluvial but the rise of the water table in the area. The majority of respondents 78% (30) suggested that their properties were currently at risk of flooding as illustrated in Figure 2. This can be expected given the probabilities of flooding in certain areas of Worcestershire. The remainder of the sample although in perceived areas of flood risk either benefited from surrounding high ground elevating their properties or community-level protection schemes.

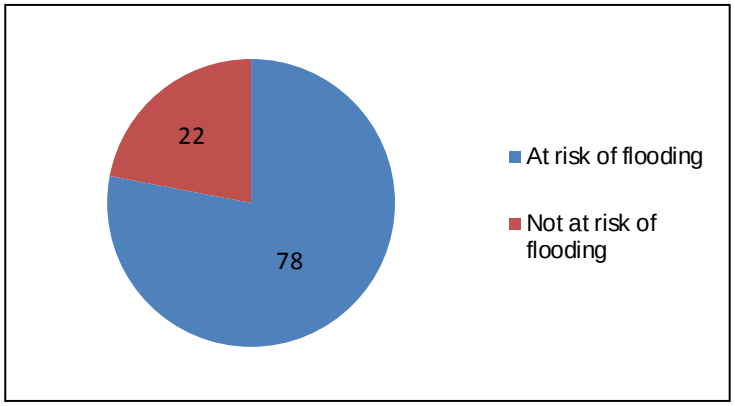

Figure 2 – Perceived flood risk

Roughly only a quarter of the respondents (9) benefit from a form of community-level flood protection either a permanent asset or an active procedure such as temporary flood barriers. Over half of the homeowners surveyed (21) were not covered by any community level scheme. The number given for non-coverage of community protection (21) is likely to be more as the remaining respondents (9) were unsure if they benefited from any such protection. In the scenario where residents are unsure if community schemes are present; the likelihood is that any such schemes will not be present as they are often well known and publicised.

Interestingly 3 of the respondents, who benefit from a community-level protection scheme, did however provide additional information regarding its failure to protect and subsequent flooding

due to breakdown. The homeowners were all from the same area benefiting from the community protection in the form of a pumping station, one of the respondents provided the following information on the situation; "Currently covered by a community pumping station which stops the brook flooding by pumping back into river, it is however constantly being attended to for maintenance. Pumping station in 2013 broke down and the brook came into the street again flooding many of my neighbours. Although the EA recognise that failures are a possibility, it is suggested that community alleviation and adaptation measures provide 98% protection certainty in the event of a flood (JBA Trust, no date).

Of the 30 respondents who deemed their homes to be at risk of flooding, over one third suggested that the property they reside in had never to which they were aware been flooded internally. Homeowners in the area are clearly recognising the potential risk of a flood even if they have not personally experienced an event. One possible explanation for the views of these homeowners is that they may have witnessed the effects of floods i.e. financial, psychological etc. within close proximity to their homes, exacerbating their concern of an event occurring.

4.3 Awareness of Property-Level Flood Protection

Respondents were asked to detail their knowledge of property level flood protection measures. In summary of the 39 homeowners surveyed 21% (8) expressed that they had no knowledge or minimal knowledge of the available measures. 46% (18) of homeowners suggested they had vague knowledge of the available measures. Taken together, majority of respondents (67%) suggested they had vague or minimal knowledge of the available measures. 28% (11) of the respondents stated that they had a good amount of knowledge of the measures. Only 5% (2) of the respondents suggested that they had a very good knowledge of available measures. Generally those who mentioned that they had good or very good knowledge were those homeowners who had installed measures of protection or had previously experienced a flood event and potentially researched available options. Findings in the Worcestershire area with regards to knowledge of PLFP measures were similar to that of study by Bichard & Kazmierczak 2009 which detailed that knowledge of PLFP was generally low. The period between this study (2015) and the report 2009 begs the question of; if enough is being done to raise the awareness of PLFP measures by the relevant stakeholders.

Only two of the respondents below the age of 40 claimed to have good knowledge of property level flood protection, the remaining 12 of the sample suggested they had minimal or vague knowledge of the measures. Furthermore none of the respondents under the age of 25 detailed that they had a good knowledge, findings which are made more significant when all of those respondents felt the properties they were residing in are at risk of flooding. Findings in the Worcestershire area lead to suggest that younger homeowners or tenants generally have less knowledge of PLFP than those over the age of 40. Whilst the smaller sample size hinders this being generalised across the region / country, this suggests that more information has to be provided to these age groups regarding PLFP and highlight its importance in managing flood risk.

4.4 Uptake of Property-Level Flood Protection

In total 23% (9) of the sample had introduced a form of personal property level flood protection to their homes. The remaining 77% of the respondents (30) had not introduced any measures to personally protect their homes; the questionnaire included a question which aimed to understand why such measures had not been utilised.

Of those homeowners who deem their property to be at risk of flooding (29) one third had introduced PLFP measures to try and reduce any future flood damage. In theory you would expect to see an increase in uptake figures for those who had previously been flooded (21) however again only 33% of the homes had protection measures installed. A similar percentage of introductions were obtained in a study by Harries 2012, however within the report it was also documented that only 8% of homeowners who had never been flooded introduced such means. Although over two thirds of the sample suggested their homes were at risk of flooding but still currently remain unprotected, the take up figures are much greater than reported in other similar studies such as Thurston et al 2007 who observed that only 16% of the sample admit to having introduced such means of protection.

Responses of survey participants with regard to reasons for non-installation are presented in Figure 3: Reasons for Non-Installation of Protection Measures. Respondents could provide multiple reasons for non-installation. In summary the three main influences for non- installation were; 1) Installation costs with 30% of the respondents highlighting it as an issue 2) Unawareness of the measures suggested by 25% of the sample, finally 3) low risk of flood event expressed as a reason by 20% of the respondents. As indicated along with the three main influences for non-installation a fair number of respondents 18% (7) would not be able to introduce such means of protection due to the ownership of the property.

If the nine respondents are removed who feel their property is “at low risk of a flood event”, the majority of the remaining homeowners detailed that unawareness of the measures, installation costs and inability to alter due to ownership were the key factors for not introducing PLFP measures. Other reasons included property aesthetics (2) covered by community scheme (4) effort levels required (1) and one home surveyed was a listed building so no alterations to the building fabric was possible. The reasoning’s observed in this study holds both similarities and differences to that found in other projects. The similarities being the concern over installation costs and the general low awareness of the protection measures available detailed by both Harries 2012 & Thurston et al 2007. However neither of the reports draws to the issue of protecting rental or housing association properties. Nearly a quarter of those who believe they are at risk of flooding are unable to introduce any means of PLFP due to their housing agreements.

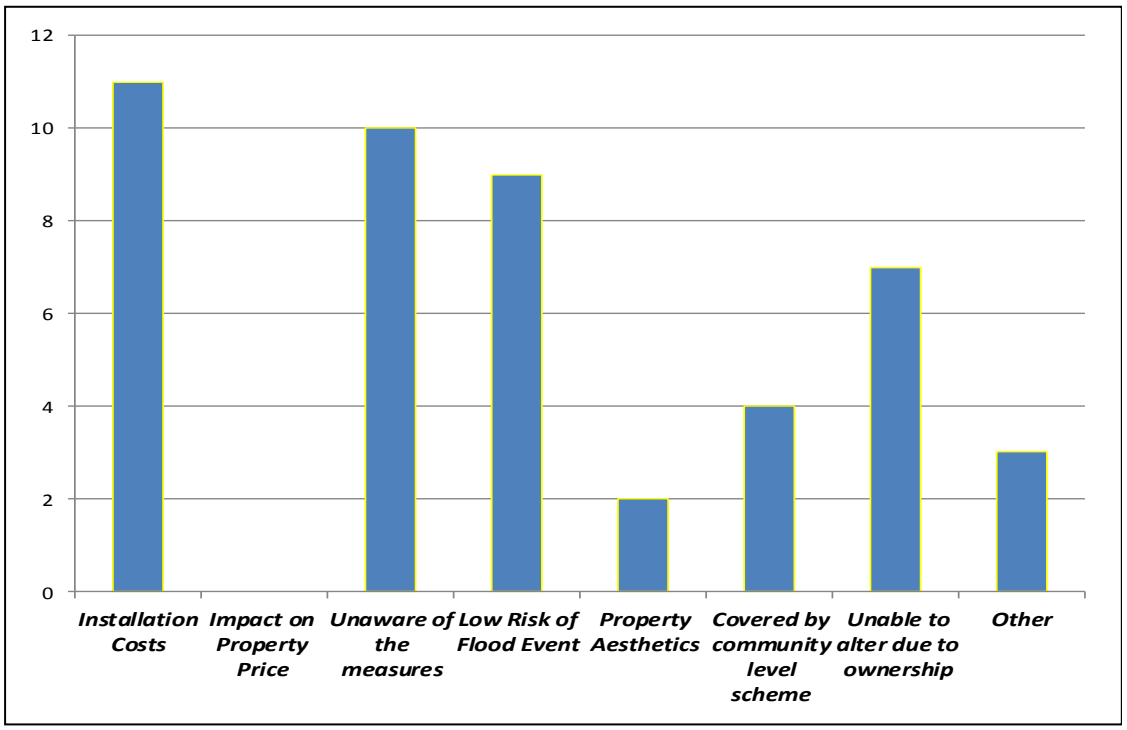

Figure 3 – Reasons for non-installation of protection measures

Of the total sample 7 of the respondents did not own the property they were residing in; they were living under either under tenancy agreements or social housing provisions. Of the seven homes surveyed 5 of them had previously been flooded and all importantly; all 7 tenants suggested the properties they were living were at risk of flooding. Given the apparent risk none of the properties had any means of property level flood protection installed although one was covered by a community level scheme. All seven respondents claimed they would be unable to alter the property without agreement with owners; subsequently protecting the properties was out of their hands. Six of the seven respondents stated that they would be happy for protection to be introduced and in one case the tenant stated that they would be willing to partly fund if permission was granted. The one tenant covered by the community level protection scheme had previously requested that protection was installed however the response from the homeowner was that "he will not provide any funding for protection cause of the community pump installed"

Clearly there is an apparent need for support and advice to both tenants and landlords/housing associations with respect to property-level flood protection measures. The fact that all seven of the tenants feel their homes are at risk of flooding but no such protection is present is of concern. Bichard & Kazmierczak (2009) did undertake some primary research on both landlords and other property owners i.e. councils or associations and found that; in most cases landlords and association managers were in favour of preparing homes for the effects of climate change, however most were concerned about the cost of any such works. Most were though interested in the possibility of rewards for undertaking any works. The possible introduction of incentives

and or grants therefore has the potential to increase the likelihood of landlords and other owners introducing PLFP measures to properties.

5. Conclusion

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 and the established link between precipitation/sea level rise and flooding. 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.

Despite the well documented availability of PLFP measures and suggestions from Defra that PLFP goes to the heart of achieving many of the actions to manage flood risk, take up still remains low. An observation drawn from available literature which was further backed up by the findings in the primary research within this study, with 33% of homeowners who deemed themselves to be at risk of flooding introducing means of protection. Only one of the nine homeowners with protection installed had not previously been flooded, suggesting that flood experience has a major influence on the introduction of PLFP. Typical reasoning amongst others regarding the low take numbers included; concern over the cost of installation, unawareness of the measures, low risk of flood event and unable to alter property due to ownership.

Both the primary research and available literature suggest that generally the knowledge of PLFP is low. Within the study area over two thirds of the respondents detailed having vague or minimal knowledge of the means of protection. Age was found to be an impacting factor on the knowledge of PLFP means with only two of the respondents under the age of 40 expressing a good amount of knowledge, furthered by the observation that none of the respondents under age of 25 had even a good amount of knowledge of PLFP even though they deemed their homes to be at risk of flooding. Guidance and support is recommended to those who are unable to manage their own flood risk i.e. social housing/rental tenants.

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