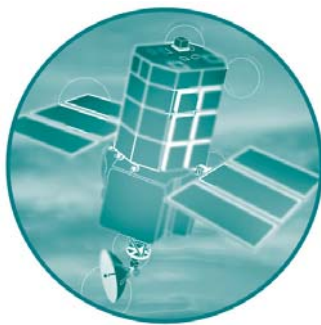


**Defra/Environment Agency
Flood and coastal erosion risk management
R&D Programme**



**Improving flood warning awareness in low probability and
medium – high consequence flood zones**

R&D Technical Report W5-024

Improving flood warning awareness in low probability and medium – high consequence flood zones

R&D Technical Report W5-024

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Statement of use

This report and supporting appendices provide us with recommendations on how to approach raising awareness of flood risk in areas where the probability is low but the consequence high. It bases its recommendations on a review of our experience in the UK and also approaches used overseas and for equivalent hazards. The information will be used to develop communication strategies for this specific audience. The reports will be of interest to anyone involved in campaigning to change behaviour on environmental issues.

Keywords

Flooding, flood warning, low probability, risk communication, communication decision model, business, residential, overseas, hazard

Research contractor

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EXECUTIVE SUMMARY

Background

Since the review of the flood events in 1998 and 2000, the need to increase public awareness of the risk of flooding has been a priority for the Environment Agency. Generally the areas targeted to increase awareness have been those communities calculated to be at the higher end of the “at risk” spectrum. Under its terms of operation, the Environment Agency is duty bound to provide a flood warning service. Low probability flood zones, where flooding consequences may be medium to high, potentially present large risks to the public and the Agency owing to a number of factors, including a false sense of security if areas are defended to any degree.

Approach to the research

This report is the culmination of a two phase R&D project to identify a series of recommendations for the Agency in developing strategies to raise awareness of flood risk in low probability medium-high consequence flood zones. A broad review of various approaches to risk communication in terms of flooding and other hazards both in the UK and elsewhere was undertaken to identify key lessons learnt. This review was taken from both literature as well as from practice, with input obtained from an array of stakeholders engaged in flood risk management and communication both within the UK, as well as from three other countries, namely The Netherlands, Australia and the United States. All of this background work is captured in more detail within the four appendices accompanying the report.

Emerging trends in risk communication to lower probability audiences

Developing communication strategies for raising awareness in audiences in low probability flood zones is a relatively “new territory”. Factors already having a significant bearing on a flood communication strategy is that awareness raising initiatives are run during “quieter periods” and as such “...focus on attempting to motivate people to deal with infrequently occurring and destructive or disruptive hazards whose nature and intensity do not lend themselves readily to mitigation by individual action”¹. Other issues identified as potentially impacting on the development of communication strategies included:

- Low probability events demand different management to more frequent low consequence events and therefore attention should be given to the types of warnings issued and preparedness expected
- Risk communication strategies are often based on a typology of risk defining which stakeholders are classified as being “at risk” or not
- Ensuring public acceptance is not simply a matter of providing simplified explanations of terminology – recognising that understanding is gained through dialogue and allows effective buy in to a process by stakeholders
- An integrated approach to risk reduction involves a range of interventions, e.g. land-use planning (both on floodplains as well as within the headwater catchment area), control of run-off, flood storage, flood warning, insurance, improving flood resistance of property and the operation and maintenance of flood defences

¹ Paton & Smith, 2001, p.47

- The technological aspects of flood risk management (modelling, planning and design) tend to focus on a system response and are able to consider a limited number of scenarios
- IT has been recognised as playing an important role in the development of disaster-prepared communities, in relation to preparedness, individual and collective mobilisation during a disaster and a capacity for post-disaster recovery and learning, thereby reducing the impact of the event by increasing a community's resilience
- The increasing need for transparency and inclusiveness in the decision-making processes owing to the broad range of stakeholders involved.

Therefore key recommendations on flood risk communication from other research suggest that:

- Be sensitive to how the effect of a potential disaster is portrayed to an audience as if the perception is of the hazard being insurmountable and emotionally threatening, it will lessen the likelihood of appropriate steps being taken. Therefore, conveying information in a manner that causes neither hostility nor denial of the messages is more likely to lead to successful up-take of the messages
- Ensure effective risk management by engaging stakeholders in the development of a communication strategy given that risk management decisions are becoming increasingly complex as they involve elements of probability, uncertainty and variability.

Key aspects to developing risk communication strategies in low probability flood zones

Key aspects that should be considered when developing risk communication strategies for low probability flood zones are identified under the following headings as captured in section 4 of the report:

- Identifying key issues from the research
- Profiling the target audience
- Defining communication objectives
- Defining and positioning the “product”
- Defining components of the message
- Identifying channels to the audience
- Identifying the communication mix.

Recommendations for flood risk communication strategies to low probability medium-high consequence areas

The overall aim of this project has been to identify recommendations for the Agency in terms of informing the development of communication strategies for communities living in low probability medium-high consequence flood zones. Given the structure of the Agency is tiered from national to local level, the recommendations for such strategy development, in our view, needs to address both aspects of the organisation, i.e. strategic and implementation.

(a) Development of a communication decision-support tool

The “local and personal face” is seen as an important component of a communication strategy. There are a number of risk communication approaches that can be used at a local level, but there is limited experience or research specific to the techniques used for low probability risks specifically for flood risk communication. Therefore experience and knowledge gained within the Agency’s Area Teams are valuable to the organisation, and should be captured and shared more formally.

The advantages such a tool could offer to the Agency includes:

- Enabling Area Teams to better understand approaches available to them
- Giving recognition to Area Teams that have been successful in using approaches and from whom lessons can be learnt
- Developing and retaining knowledge within the organisation as well as the individual / teams
- Enabling the sharing of knowledge across Areas
- With time, enabling a benchmarking of approaches in relation to overall risk communication strategy
- Enabling greater consistency in the presentation of risk messages within the overall communication strategy – another aspect of risk communication identified during the baseline study
- Allowing for specific feedback within the organisation, e.g. with the National Team able to identify options and Area Teams to feedback results.

Developing such a tool to be web-enabled, available on the Agency’s intranet would also enhance all of the above points even further.

(b) Inclusion of risk psychology in training of Area Team members

There is currently a standard three-day course run at intervals during the year to which Agency staff can attend. It is suggested that risk psychology is included as a component to this training. Alternatively, a short course or possibly training workshops could be run with Area Teams across regions as an internal campaign. Both could be undertaken in low cost terms, the advantage of the latter is that if done with teams, it would ensure an even and immediate platform of knowledge.

(c) Recommendations for further research and evaluation of approaches

The work and approaches being adopted by the Agency in relation to flood risk communication is already held up by practitioners in other countries as example of significant investment in hazard management and mitigation. However, in relation to risk communication in low probability flood zones, some further recommendations have been identified:

- Further research into groups to understand the value systems and perceptions, which are critical components in developing successful communication strategies
- Evaluation of the role that insurance can take in positively promoting awareness in low probability groups
- Evaluation of groups’ perceptions of the benefits of flood mitigation works
- Evaluation of the presentation of flood risk information in low probability flood zones, both in terms of flood maps and other supporting information

- Review of what is considered/advised as effective action by the Agency to be taken by individuals given the broad range of audiences
- Evaluation of the possible role of surveyors in informing potential home owners of flood risk and guidelines in terms of their dispensing advice on available mitigation options
- Development of greater consistency in the quantification and qualification of the significance of risk across categories, as used by a number of stakeholders, e.g. insurance industry, local authorities, the Agency, etc.
- Consideration of how the Agency positions itself when working in partnership, as there is some evidence that adopting a partnership strategy will assist the Agency in getting the right message across to individuals and communities in low probability flood zones more effectively.

In conclusion

It takes considerable time and effort to get a message across and build up awareness of a hazard. Key lessons from this study drawn across for individuals and communities in low probability high consequence flood zones have shown that the design and implementation of more effective programmes for hazard mitigation require multiple channels and partners, and involve highly targeted programmes focusing on how the information is presented.

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1. INTRODUCTION

1.1. Background to research

There are approximately 1.8 million properties and more than £200 billion worth of assets at risk of flooding from rivers and the coast in England and Wales. Add to this a density of population that is vulnerable to transport and power disruption, and the overall societal and financial rationale for improving the understanding of options to communicate flood risk to a population becomes clearer.

Since the review of the flood events in 1998 and 2000, the need to increase public awareness of the risk of flooding has been a priority for the Environment Agency. Generally the areas targeted to increase awareness have been those communities calculated to be at the higher end of the “at risk” spectrum. Under its terms of operation, the Environment Agency is duty bound to provide a flood warning service. Low probability flood zones, where flooding consequences may be medium to high, potentially present large risks to the public and the Agency owing to a number of factors, including a false sense of security if areas are defended to any degree.

Therefore there is awareness that communities at the lower end of the probability scale also need to be engaged in some form or another within a flood awareness strategy and campaign, particularly as part of the threat to life and property is that a number of these individuals and communities believe themselves to be safe. The cumulative impact of a significant and more extreme event currently poses a significant risk in terms of the potential damage and disruption it could cause to lives and property, particularly in higher density urban areas.

In addition to all this, the Foresight Report on Future Flooding, published in 2004, indicated that under any of their four future scenarios for England and Wales, localised flooding is predicted to increase up to four-fold, though they also acknowledged that there are some high levels of uncertainty surrounding the extent of this. This too, therefore, has implications for the Agency in devising effective communication strategies and setting targets to flood risk.

1.2. Outline of project programme

The Environment Agency commissioned Greenstreet Berman to assist it in determining a series of recommendations to inform the development of risk communication strategies for low probability medium-high consequence flood zones. This project had a two-part project programme and was undertaken over an 18 month period.

The first phase of work involved four components of research, and a series of interim reports on the findings were submitted to the Agency Project Team for comment. These four individual components of research were collated for the Project Team and have been attached as separate appendices to this report. They have also been identified as clear steps in the project programme shown in Table 1 below.

The aim of the first phase was to consider current knowledge and experience in low probability risk communication, both specific to flood risk as well as other natural hazards. This was to support the second phase of the project which involved identifying

recommendations for developing communication strategies for low probability flood zones.

Table 1: Breakdown of two-phase project programme

Phase	Task areas
Phase 1	Review of flood risk awareness literature
	UK expert interviews and case studies
	Overseas experience of flood risk communication
	Review of experience of equivalent hazard risk communication
Phase 2	Review of English case study areas
	Lessons learnt and recommendations for a communication strategy
	Identifying possible decision-support for communication options
	Identifying key recommendations

1.3. Approach and methodology

Phase 1 involved a review of approaches to communicating low probability risks, both in other hazards as well as in relation to flood risk communication. Initially literature reviews, primarily based on internet searches, were undertaken which included:

- A review on flood risk awareness and communication to the public, particularly in relation to low probability risk
- A brief review of awareness and response to some equivalent natural and human-made hazards.

Following on from these reviews, an interview proforma was designed and used to carry out semi-structured telephone interviews with a number of stakeholders engaged in flood risk communication in Australia, the USA and The Netherlands. Additionally, the proforma was used to interview a number of Agency and other stakeholders engaged in the realm of flood risk communication in England and Wales, such as community representatives, academics, insurers and emergency planners, by telephone.

Additionally, four low flood risk areas in England were identified by the Agency to be used as case studies for the project. This was owing to these areas having had some events run by the Area Teams that had targeted communities with a low probability of flooding. The survey was done by telephone with residents randomly selected from the areas. A sample was taken from both residents and businesses in all four areas, and there was a weighting applied. The aim of the survey is to gain some insight into how the community perceives their flood risk and determine if there was any memory of what has been communicated to them in the last three years.

1.4. Overview of this report

This report includes the main findings from the review undertaken during phase 1 of the project, and the key recommendations for developing communication strategies, as an outcome of phase 2. The appendices to this report are contained in a separate document, and can be referenced if further information is required.

2. SUMMARY OF PHASE 1 REVIEW

The main elements emerging from the various components of Phase 1 are summarised below. This is based on the background technical notes that were developed which are included in this report as appendices (available as a separate document).

2.1. Some literature on flood risk awareness and risk communication

This initial piece of work was carried out to provide some useful background information to the project team by describing the range and scope of available literature, providing an overview of emerging themes in the area of flood risk awareness and main sources of information as well as presenting short descriptions of identified case studies².

The background review covered such aspects as:

- Defining “at risk” in terms of terminology used, perceptions of risks including flooding, and risk communication and hazard differentiation
- Identifying some key research findings from UK and other organisations
- An overview of four areas where the Agency has carried out flood awareness activities in the last three years in the communities where there is a low probability of flooding, namely in some London boroughs (Community Action Network); Nottingham, Bath and Burnham-on-Sea.

Some of the elements relating to flooding that impact on risk communication, included:

- The probability of flooding is not uniform
- Incomplete, and in some cases, inaccurate information
- Different levels and understanding of risk
- The perception of a government agency varies within a population.

It is broadly recognised and accepted that the public is not a homogenous group and the factors distinguishing one group from another can occur along many dimensions. To ensure effective flood risk communication, it is important to identify what factors segment "the public", as the context of "... risk perception is socially constructed. An individual's behaviours are driven by perceptions or beliefs about risks rather than technical risk estimates provided by experts"³.

In terms of ensuring effective messages of risk, the literature points to:

- Making the risk relevant by tailoring it to the audience: which involves identifying the key characteristics of the audience, e.g. perceptions, worries, current awareness of risks, what information sources they attend to, what are the resources available, and in what context do you give the message, e.g. language, local norms, etc.
- Getting the information to the audience: which means identifying and selecting appropriate sources, methods and content of the communication
- Specifying achievable actions to deal with the risk: this should be within available resources

² The full background document can be found in Appendix I of this report.

³ Frewer, 1997

- Reinforcing of the message via multiple sources: which involves using communication as a social process, ensuring consistency of message across all sources, and the use of known and trusted sources.

Some factors presenting a challenge to creating awareness of low probability events:

- Difficulty to create and maintain awareness and preparedness
- Perception of engineering flood protection schemes means the message “doesn’t apply to me”
- Typically the message is that the risk is managed, but not completely
- Focus is often on warnings and preparedness
- What is the most cost effective way to manage the risk?

The BMRB “at risk” survey (2003) stated "...awareness of flood risk and the Environment Agency role is lower in areas without warning systems". There was also an indication that though 57% of those surveyed claimed that they "would act to mitigate" only 5% actually do (BMRB “at risk” survey, 2002). What this indicates is that a change in behaviour requires an attitude change, but that an attitude change does not automatically lead to a change in behaviour. There is some consensus amongst a number of UK and international stakeholders interviewed, that possibly one of the most effective tools / means by which to bring about a change in personal behaviour *and* attitude is through flood insurance.

2.2. UK experience of awareness-raising

This area of work of Phase 1 consisted of two parts⁴.

2.2.1. Interviews with UK experts and practitioners

In the first part of the review, a series of semi-structured telephone interviews were conducted with an array of Agency staff, practitioners, academics, community representatives and other stakeholders that are involved in flood risk communication. The aim was to get their views on what they consider to be effective approaches to communicating such risk, and where possible to consider this in relation to communities in low flood-risk areas. The interview structure was very similar to the one used for interviews conducted with practitioners within the three case study countries (see section 2.3 below as well as Appendix II).

The series of questions put to the interviewees covered a number of elements including:

- What measures of public flood awareness are used
- Types of guidelines used in flood communication
- What types of issues need to be taken into consideration in flood risk communication based on experience, highlighting possible improvements
- Identifying what preferred methods there are for raising and maintaining awareness
- The level of experience in using various methods to communicate risk
- What is the impression of the perceived impact of an information source and channel on the message
- What is the perceived impact of flood insurance

⁴ The full background review document can be found in Appendix II of this report.

- What have been the perceived impacts of changes with the Agency on the ability to carry out flood risk communication?

Generally, there is limited experience of communicating low probability flood risk to residents and businesses, though there are a few examples of focused short-term initiatives that have been run in recent years at local area level by Agency staff and local organisations. These have not been evaluated previously in any strategic manner.

There were a number of issues identified by the interviewees that they believe need to be considered when developing strategies which included:

- The need to define a strategic approach to risk communication
- Risk maps are seen as important tools to reach the individual, but there is a need to include natural and other hazards
- Using multiple channels to reach individuals ensures a greater opportunity to convey a message
- The Agency appears to have two camps when it comes to flood risk – engineers and social scientists
- There needs to be greater feedback from the grassroots of the Agency back up to the national team to help inform strategy, identify priority areas, ensure consistency, among other elements
- A toolkit approach to risk communication will create flexibility to make different audience needs
- Resourcing is an important element within the Agency which needs to be aligned with its strategic values and the targets it sets
- The challenge to flood risk awareness is the apparent "lack of a market" as the public do not see themselves to be at risk, and therefore the message is not heard
- Differences in targeting rural and urban populations
- Communication can mean many things – an issue of dissemination supported by dialogue
- The opportunity to link activities within the Agency in raising the profile about flood risk
- Language of risk – how to make it meaningful and understandable to an individual
- Effective management of stakeholders can assist the Agency in meeting its targets.

2.2.2. Telephone survey of four case study areas in England

This component involved a pilot telephone survey covering four areas in low probability flood zones in England. These areas were selected by the Agency as they were examples where various awareness activities had been undertaken by the Area Teams over the last three years. These activities had not been previously evaluated. The survey sought responses from both residents and businesses in the four case study areas, and the numbers from each area were weighted relative to the population at risk with the greatest number taken in London and the least in Burnham-on-Sea. The actual numbers surveyed are shown in Table 2 below.

Table 2: Number of residents and businesses surveyed by telephone in the four areas

Area	London	Nottingham	Bath	Burnham-on-Sea	Total
No. of residents surveyed	87	59	42	36	224
No. of businesses surveyed	22	16	12	10	60
Total	109	75	54	46	284

The survey aimed to give a qualitative understanding of the mental models of flooding and the process of flood management that people held in the different areas and the relative effectiveness of the flood risk communication activities that had taken place in each area.

The survey was a pilot process from which key points could be identified. The emerging elements identified from the residents' survey pointed to:

- Most respondents do not perceive themselves to be at risk of flooding
- More women think they are at risk of being burgled or having a fire than being flooded
- There is not much memory of any Agency campaigns undertaken in the areas, even in instances where respondents were prompted with slogans
- If alterations have been undertaken at properties to mitigate flood damage, it appears more likely to have been done by elderly residents (i.e. 65 years or older)
- There appears not to be much distinction in the types of actions that might be taken in the event of a flood by either a man or a woman
- A number of respondents would expect, that should they be flooded, it would be as a result of bad weather and / or a river bursting its banks
- A higher proportion of those surveyed owned rather than rented property⁵
- In all areas it appears that only a small proportion of those surveyed were relatively new to the area, having lived in the area for less than 5 years
- The proportion of those respondents to have experienced a flood were in the Bath and Burnham-on-Sea areas
- Perceived ways of finding out about a flood differed between the areas, with the London and Bath respondents stated they would realise predominantly by observation, whereas Nottingham and Burnham-on-Sea respondents would expect a flood warden or sirens to inform them
- A number of respondents across all areas cited moving possessions to a higher level as an action they would take in the event a flood was occurring.

On the basis of this small survey of businesses, the following key points emerged:

- There were a higher number of tenants than owners of property
- A number of those surveyed had been working in the areas for 11 years or more
- Failure of flood defences is not perceived to be a risk for flooding, though other engineering factors were, e.g. sewers and drains backing up and water mains bursting
- There was some variation in perception of how businesses would be alerted to flooding

⁵ This however indicates that listed phone numbers are more likely to be property owners and therefore tenants are more likely to be "invisible" in such surveys. It is anticipated that in reality there might be a higher proportion of tenants in the three urban areas surveyed than is otherwise indicated by responses.

- Most often respondents cited taking action would involve moving important items to a higher level and using sandbags
- In the London and Nottingham areas respondents were not sure where they would find out information other than from the general media, whereas Bath and Burnham-on-Sea respondents tended to cite Floodline for more information
- Even businesses that had not experienced a flood believed that they were at some risk of flooding compared to that of burglary, but this risk was greatly reduced when compared to that of fire
- Insurance is seen to be a means of taking action against flooding
- More respondents could recall campaigns in the Nottingham area than elsewhere.

2.3. Overseas experience of flood risk communication

Three countries were identified through discussion with the Agency in order to draw on approaches and experiences adopted. These countries were Australia, the USA and The Netherlands, and the varying approaches to flood risk communicating are briefly described from literature and interviews conducted with practitioners in each country. Initially some key background literature was identified and reviewed, which assisted in the development of the interview schedule as well as serving to identify appropriate interviewees from each of these countries⁶.

In addressing the approaches adopted by these three case study countries, relative differences and similarities amongst them are identified. Findings from the interviews conducted include:

- Recommendations on best practice approaches
- Perceived relative effectiveness of different methods and sources of flood risk communications
- Factors that affect flood risk communications
- Examples of flood risks communications
- Role of flood insurance in raising awareness and mitigation activities
- Key actions interviewees saw as improving flood risk awareness
- Impact of flood risk management organisation as communicator of flood risk information and requirements for action.

The main aspects of the case study countries are summarised in Table 3 below.

⁶ The full background review document can be found in Appendix III of this report.

Table 3: Summary of key elements of case study countries

Country	The Netherlands	USA	Australia
Status of flooding	Major natural hazard	Major natural hazard	Major natural hazard
Management strategy	<ul style="list-style-type: none"> National policies implemented by municipalities Long history of flood protection 1:500 = high risk populations Aiming to reduce government liability 	<ul style="list-style-type: none"> From federal (FEMA) to state to local government Approach varies amongst states Local implementation but federal funding 	<ul style="list-style-type: none"> National policy to state to local organisations State can overrule local decisions Focus on high risk groups New South Wales considered as "world leader" in flood plain management
Awareness	<ul style="list-style-type: none"> General low awareness of flood risk partly owing to highly visible protection leaving the public to feel safe First national campaign started to address awareness issues 	<ul style="list-style-type: none"> Aiming to create "disaster resilient communities" Aiming to reduce federal disaster relief payments 	<ul style="list-style-type: none"> Focus on creating "prepared communities" to reduce dependency
Insurance	Government covers damages in cases of disasters	Federal flood insurance programme	No residential flood insurance available but desired
Interviewees	4 – all from national policy bodies, two of which involved in the national campaign	5 – of which two were from the Houston area, two are well-respected academics in disaster prevention and management and one from FEMA's outreach programme	5 – of which three work in NSW, one in the state of Victoria and another at the national hazard monitoring and communications section in the meteorological bureau

Some key and consistent elements emerging from the interviews were:

- National governments are seeking ways in which to reduce their financial exposure to flood compensation
- National policy frameworks are enacted by smaller more locally based organisations
- There is much interest to successful approaches to public risk communication campaigns
- To date there is limited evaluation of communication campaigns undertaken.

General points relative to the experiences in these countries for what to consider when defining a flood risk communication strategy include:

- Communication must be designed with the local context in mind, which therefore requires the identification of:
 - Different audiences and their social contexts
 - Physical and risk contexts
 - Credible information sources
- Inform about risk includes what to do to mitigate it as well as other enabling actions
- Get information into the properties at risk
- Keep telling people – consistently, over time
- Tell other property stakeholders.

Methods of communication that are considered effective include:

- Active public participation
- Presentation of information in pictures, photographs or graphs
- Physical prompts in immediate areas
- Use of flood anniversaries
- School-based education activities
- Local and national messages
- Use of appropriate and credible sources
- Legislation
- Internet.

Risk communication case study: Earthquake campaign in the USA

This case study was identified as a successful campaign where they used:

- Coloured maps showing impact zones
- "10% chance in 20 years" showed a percentage probability in personally meaningful time frames
- "It could happen tomorrow" was included to also indicate its immediacy and relevancy
- Clear actions that should be taken in the event of an earthquake.

In identifying what key factors should be considered when developing a campaign, interviewees suggested the following:

- Recency of flooding
- Visibility of flood defences
- Population characteristics
- Flood source – though in some instances this was considered a minor factor.

A number of ways have been tried by practitioners in the case study countries to communicate flood risk. Some of the specific ways in which messages have been targeted include:

- Identifying vulnerable groups, though also recognising that it's not always clear what the criteria for a vulnerable group are
- Second language speakers within the community mean that you need to target other family members and friends, e.g. use community leaders
- Ethnic groups – need to consult to know who this includes and therefore who it reaches
- Time of day availability, e.g. commuters.

Overall, the findings from the interviews were broadly in line with the findings from the literature. The main aspects emerging from the discussions included:

- Tailored communications are key but demand an understanding of the audiences and their contexts
- It is important to recognise and engage with the "public's" perspective of the issues, e.g. "my home is flooding" is not the same as an engineer's perspective of "minimising damage to this area"
- The need to use credible sources for the dissemination of information
- Transmit consistent messages over a range of media and organisations over time
- Message content should indicate "you are at risk, reduce it by doing ..."

2.4. Risk communication of equivalent hazards

This was top-level review of literature that was carried out to provide useful background information describing hazards that can be viewed as comparable to flooding in some way and how the communications have been carried out to raise public awareness of them. This review was not intended to be a comprehensive review of the literature of the area⁷. The hazards were selected on the basis that they related to flooding and included natural and human-made:

- Earthquakes
- Tsunami
- Cyclones
- Radon
- Volcanoes
- Bushfires
- Vaccines
- Seat belts.

Risk communication case study: Defra's radon awareness campaign

A campaign to warn residents in areas of the West Country about the risk of radon in homes has shown a number of similarities to the types of issues faced by the Agency in conveying low probability flood risk.

Defra ran a campaign to raise awareness of the risk of radon in homes, involving the National Radiological Protection Board's risk maps, and provided an introduction and a set of actions residents could take to reduce their risk. They also provided a good practice guide to local authorities.

Though free testing was offered to residents, the number taking up this opportunity was small. Interestingly, even in cases where high Radon levels were detected, suggesting that action should be taken by the resident, the number doing so was very low. Overall the reasoning stated by residents of this low level of action was as a result of their wanting better guidance on costs of taking action and measures to reduce their fear of falling victims to "cowboy" builders.

In reviewing the challenges from these hazard communications:

- Complex and multi-strand approaches seem to work best
- Limited success because the risk is not seen to be urgent, however, there is a recognition of the audiences of the risk and that it's an important one

⁷ The full background review document can be found in Appendix IV of this report.

- It is someone else's responsibility to protect and mitigate.

2.5. Summary of key findings from Phase 1

Based on the information gathered during Phase 1 the following key findings emerged.

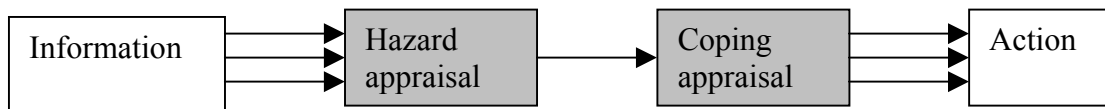
2.5.1. Agreement between practitioners and theory on how persuade people to respond to risk communications

The key message coming from both the overseas and UK practitioners interviewed and the reviewed literature on risk communication is that to persuade people to take note and respond appropriately, a risk communication strategy has to:

- Make the risk **personally relevant** to individuals that receive the communication
- Show that the described risk is a threat that **requires action** by the receiving individuals
- Inform individuals of the **action they need to take** to manage the risk
- Make it **easy to perform** the required action.

This means tailoring information and identifying action, which is also seen as being done best when there is on-going local consultation and collaborative working⁸. People act when the hazard is perceived as real to them and can be effectively dealt with in some way.

Figure 1: Risk appraisal model according to Lazarus (1996)



An approach such as this clearly shows what it is communications on flood risk have to achieve, and where and why communications and other actions can fail to produce the desired results. Figure 1 above states the response made to risk information when received by an individual.

2.5.2. Challenges for effective communication of low probability flood risk Human Biases

A repeated message from the overseas interviews and the literature was that there were a number of difficulties in people correctly understanding low probability information. These include a number of human information processing biases, which tend to create misunderstandings, and therefore result in individuals responding inappropriately to low probability risk information.

Individuals were also described as being influenced in how they received and interpreted flood risk communication by a wide range of factors, given that risk is “a social construct”. General factors that were discussed, as influencing all types of flood risk communications included:

- Timing of last flood event
- Visibility of flood protection

⁸ A model and description of how threat information is appraised and the appropriateness of action judged is shown in the Flood communication literature review in section 3.2.3 in Appendix I.

- Various characteristics of the audience population such as age, turnover, density, degree of community, range of risks affecting them, property ownership, socio-economic status, level of education, first language and media usage.

Other factors were described as being more or less influential depending on the specific means or content of the communication. Suggestions as to how to maximise the effectiveness of different means of communication were also described by interviewees. There is a large amount of literature on how to try and avoid these issues, for example through different presentations of information, on which the Agency can draw.

“Expert” v “lay” risk judgements

Another related issue is the different perspectives “experts” and “the public” have on risks and their costs. Expert judgements of risk are generally based on probabilities and economic implications of events occurring⁹. The public’s views tend to relate less to probabilities and more to the fear / unknowns and uncertainties of a threat, its perceived fairness, and the perceived costs which are emotional and social to individuals and their communities as well as economic¹⁰. Risk communication is found to be more meaningful if it presents the risk in the terms in which individuals consider them, rather than in more abstract “expert” terms. There is evidence that this approach is increasingly being adopted in the UK as experts are now being required to formally include social aspects of the impacts of risks, taking into account public concerns relating to a hazard¹¹.

Lay view of flood events

Individuals in low probability flood zones generally do not perceive floods as a major, death-causing hazard. They are not seen as dreaded events with unknown implications, so there is a tendency to under react rather than overreact to information put out to them. Research suggests people have a poor understanding of the impact and the longer term effects a major (extreme) flood event could have on them and their local community. It also suggests that people’s ideas on the cause of a flood event, how it would unfold and where and what information and help would be available to them, can be quite different to the reality.

Placing risk in context of other known risks which need managing

International and UK interviewees stressed success when getting people to consider flood risk in the context of other risks in their environment. Such an approach is seen to be valuable as it allows people to be made aware of a risk while keeping it proportionate to other threats that have to be dealt with in their area. This approach has been used in local forums involving members of the public, interest groups and local government bodies to agree a management plan for an area that addresses all local hazards.

2.5.3. Need for consistent on-going, multi-pronged communications over time to maintain effect

Interviewees stressed the importance of maintaining the communications, with consistent messages over time across different sources to keep them effective¹². It was also argued that local campaigns are reliant to some degree on national campaigns as

⁹ see Appendix I section 3.1.1

¹⁰ see Appendix I section 3.1.3

¹¹ see Appendix I section 3.1.2 and 3.3 – Defra guidelines

¹² see Appendix A section 2.5.2 and Appendix C sections 5.2.5 and 5.2.7

national campaigns are about general awareness and creating a profile for an issue, whilst local campaigns are about making the issue specific and personal. It is therefore important that these two campaigns work together / are aligned.

Credibility and trust of sources

Communications will be attended to and believed differently depending on the source that transmits them and their perceived credibility to speak on the issue authoritatively and the trustworthiness of the source. The perceived trust and credibility will vary between individuals depending on their personal beliefs, experiences and cultural norms¹³.

Overseas and UK interviewees generally felt that communicating via local organisations and opinion leaders was effective, in some instances even the most effective, as it enables better tailoring of information to an area. It also increases the credibility of the information being transmitted¹⁴.

A potential issue however, is how people will respond if they perceive they are being told they are now responsible for managing a risk that they thought they were paying for the management of through their local and national taxes. This was identified as a particular issue by Dutch interviewees, who have just embarked on a national publicity campaign to inform the population that the government will not guarantee to prevent floods through flood defences. There is a dilemma as to what to communicate to the public if flood defences were breached the event would be so catastrophic there is little that residents can do to mitigate its effects¹⁵. This might also be the case for some low probability zones in England and Wales.

Expected communication sources pre and during flood events

The findings of the pilot survey, interviews and previous research suggest that people often do not seek or expect information on flooding from the Agency, looking instead to local government, emergency services, Floodline or the local water utility company. There is some discussion as to how Floodline is perceived by the public and whether there is an association with the Agency. Future communication strategies will need to address the most relevant source from which to transmit flood information and the transmission channels to be used, considering both how affected populations choose to seek information, and how it can be supplied under flood conditions¹⁶.

2.5.4. Debate about the most cost effective way to reduce damage in a flood event and the role of flood risk communication of lower probability groups

Focus communications on other stakeholders and not just the public

Some interviewees discussed whether trying to maintain low risk populations in a state of awareness and preparedness over time was the most effective way of reducing the impact of a flood event¹⁷. The question about such an approach was raised in relation to

¹³ see Appendix A section 3.1.3

¹⁴ see Appendix C section 5.3.8

¹⁵ See Appendix C section 4.1.2 and 5.7.8

¹⁶ see Appendix A section 4.1 on the JMP flood analysis report – Thames Valley Flooding in Jan 2003 - for an example of what information sources were sought vs. what were supplied, and how they coped in a flood event

¹⁷ see Appendix C section 5.7.8

ensuring effectiveness, although it could be very resource-intensive. It was suggested therefore that a more effective alternative might be to focus resources on improving responses to floods in other ways e.g. inter-organisational responses, emergency warning systems, flood prediction systems, etc.

Another strategy that could also be adopted independent of the above debate is in the area of targeted communications to land development professionals with the purpose of increasing / improving flood protection measures in planning and property development. This could also be extended into the property sale / purchase process through surveyors and mortgage lenders demanding information and mitigation actions in particular circumstances where there is a risk. Some developments in this area are occurring through increased involvement of key groups such as the insurance industry and mortgage lenders.

Possible roles for insurance

This was seen as having both advantages and disadvantages. In the UK, it is effectively compulsory for property owners with mortgages in low probability areas to have flood insurance on residential properties. In all other instances, it is optional. There has been a debate over the last few years about the provision of affordable flood insurance in high probability areas, though the insurance industry is not saying it will withdraw flood insurance cover. It is evident that the insurance industry is taking a greater interest in this area and engaging more actively with the government on issues of flood protection and areas of future development, e.g. in the southeast.

In the overseas interviews, in high probability areas insurance was found to actually encourage risky behaviours as people felt they would receive full financial compensation. This could be compared to other areas where people were not able to obtain flood insurance at the higher end of the “at risk” scale and were found to be more likely to take mitigation action. In both Australia and the US one of the aims of flood awareness communication was to encourage people to take out flood insurance¹⁸. In the case study survey, in many responses from both residents and businesses, taking out flood insurance was seen to be a means of preparing for a flood.

2.5.5. Clarifying what low probability flood risk communication aims to achieve

Interviewees questioned what the aim of communicating with individuals in low probability zones was – that is, was it to raise awareness of the residual risk and individuals’ personal responsibility for managing it, to get immediate mitigation action, to raise awareness of sources of warnings and what they meant in the event of a flood, or to increase community or individual preparedness for a flood event? In addition, it was asked who is the intended audiences and what are they expected to do with the information they are given?

The Agency’s flood risk communication strategies are developed in relation to various internal and external targets for communication activities as part of a 10 year Defra investment strategy for the flood warning service. External targets include informing residents about the warnings they will receive in a flood event (77% of England and

¹⁸ See Appendix C section 5.6 for more detailed discussion of the perceived impact of insurance in the three overseas countries surveyed, and Appendix B sections 3.3.9 and 3.5.9

Wales having “appropriate warning services” in place and known of by 2007) and ensuring they take ‘effective action’ in the event of a flood (75% by 2007). These different targets clearly address different areas of action by the Agency, and require measures to evaluate whether the targets have been met by the communication activities.

The aims of any communication activities will have to be clearly identified, which would include defining how the impact of the communication can be measured in order to identify if the aims have been achieved. Evaluations of communication activities and measurement of flood risk awareness were not the norm in the three case study countries. This was seen as a problem by most overseas interviewees, as it meant that there was little knowledge on which to build communication activities (see Country profiles in Appendix III section 4). The Agency's work in England and Wales was described as “leading” by two overseas interviewees, in its structured approach to flood risk communication with use of the BMRB survey. The Netherlands is unusual in that a new, national campaign being rolled out is influenced by whether they are achieving their target levels of audience awareness¹⁹.

There is a need to consider and address in the communication strategy peoples' likely responses to the information being communicated. In particular, if there is likely to be a clash between peoples' expectations that “the state” ensures that flood risks for an area are managed and that in the event of a major flood those individuals effected are compensated. Communicating this could lead to increased demands for organisational/government action to protect areas to higher levels rather than individuals acting to protect their properties.

In addition to targets based on levels of awareness, knowledge and action in individuals, the Agency has aims to “prepare communities” by:

- Improving community awareness of flood risk
- Improving community response during an emergency
- Improving community preparedness.

This will overall assist in developing a level of “resilience” to a flood event within the community.

2.5.6. A toolkit approach to ensure effectiveness

Effective communication of flood risk will require a good understanding of the views, beliefs and expectations of the audience, to ensure that the communication is meaningful and relevant to them and also the ways in which people interpret probabilistic information. There is already some expertise and experience in engaging with the public at the higher end of the "at risk" scale that has been built up within the Agency and other organisations. Arguably, it is not a matter of starting from scratch but rather a question of developing and refining current methods and tools already in use.

Flood maps

Flood maps, as a graphical representation of risk, are seen as being an effective tool enabling an individual to physically locate themselves and their activities in relation to different levels of risk. Arguably their effectiveness could be further increased, e.g. by

¹⁹ See Appendix C section 4.1.4

changing the labels attached to the maps, making the time frames more immediate (examples / further explanation on what is meant re the time frames) not using solid lines to mark boundaries, etc. and emphasising the potential immediacy of the event. A concern with flood maps is that people could see the risk boundaries as fixed, rather than the “indicative levels” they are supposed to represent.

Multiple channels ensures greater opportunity

In a number of interviews it was conceded that though successes at raising or maintaining awareness in flood risk have been achieved in some areas with some populations, these approaches could not be generically applied across England and Wales. Many respondents suggested that the Agency should adopt a comprehensive approach to risk communication in order to enable flexibility in communicating a message to numerous audiences and that it was not a matter of an approach of “one size fits all”.

3. REVIEW OF ENGLISH CASE STUDIES FROM PHASE 2

A pilot survey was made in four areas in England of both residents and businesses. The areas were chosen in discussion with the Environment Agency to reflect communities which are at risk in terms of low probability. All of the areas are currently defended from flooding to some degree. In these four areas different approaches to engaging with the communities have been tried by Area Teams, though these initiatives have not been rigorously applied and are limited in scale.

3.1. Method used in the survey

Telephone interviews were made with residents and businesses in the four case study areas during summer 2004. The telephone numbers were obtained based on postcodes within the survey areas.

The target numbers of residents and businesses were set for the project team in discussion with the Environment Agency. The small numbers in this pilot survey were to identify headline issues, rather than being a comprehensive survey along the lines of those already undertaken annually by the Agency. The numbers surveyed in each case study area were weighted to approximately mirror their population size. Therefore the greatest proportion of responses was collected from the London case study area and the least from Burnham-on-Sea. No other filters / criteria were used.

Residents were phoned in the early evenings in an attempt to capture the widest possible cross-section of the community. The telephone interviews lasted approximately 15 minutes and consisted of ten questions (see Appendix II). Interviewees were asked how they might find out about a flood event that might affect them, to where they might seek further information and what actions they would take. Some further questions related to any specific activities that had been carried out within the various case study areas that had been identified by the Area Teams.

Some limitations to this approach include, amongst other:

- Survey bias even if there is the guarantee of anonymity
- No filters were used to control for responses, e.g. age groups, etc. in the survey as agreed with the Agency
- Postcodes used to identify low probability zones can be deceptive as respondents may not be at risk owing to topographical features
- Tenants are more likely to be unlisted and therefore less likely to be captured in the survey.

3.2. Review of findings of resident and business responses

The tables below present the approaches adopted by the area offices in terms of communication to those residents within the low probability zones at risk and the responses received in the survey.

The first three tables summarise the responses from residents, whilst the subsequent four tables address those businesses surveyed. The analysis of what seemed to work in terms of these four communities is presented after the tables for both residents and businesses.

3.2.1. Residential survey results

Table 4: Description of case study areas and residential respondents surveyed

Area	Agency Region	Nature of flood risk	Last flood event in area	No. of residents surveyed	No. male	No. female	Geographical backgrounds recorded in survey	Average age of interviewee (range from <20 yrs to >65 yrs)	No. with previous flood experience	Majority perception of flooding risk ²⁰	Property owned	Property rented	No. lived in property for 5 or more yrs	Lived in area for 5 or more yrs	Average no. years lived in area
London (6 boroughs)	Thames	Fluvial (hidden rivers)	?	87	43 (49%)	44 (51%)	High diversity, with one-third white British	50-65 yrs	15 (17%)	Very unlikely	51 (59%)	34 ²¹ (39%)	71 (82%)	78 (90%)	21-30 yrs
Nottingham	Midlands	Fluvial	2000	59	29 (49%)	30 (51%)	Very low diversity, with less than 10% not white British	50-65 yrs	10 (17%)	Very unlikely	45 (76%)	11 ²² (19%)	45 (76%)	50 (85%)	21-30 yrs
Bath	South West	Fluvial	1968	42	20 (48%)	22 (52%)	Very low diversity, with less than 5% not white British	>65 yrs	18 (43%)	Very unlikely	28 (67%)	12 ²³ (29%)	34 (81%)	36 (86%)	31-40 yrs
Burnham-on-Sea	South West	Coastal	1981	36	12 (33%)	24 (67%)	No diversity, only white British respondents	>65 yrs	13 (36%)	Very unlikely	32 (89%)	2 ²⁴ (1%)	23 (64%)	30 (83%)	21-30 yrs

²⁰ Respondents were asked to qualify their perception – with results ranging from “never to possible” and including others, such as “had thought of it but unsure” to “hadn’t thought of it and unsure”

²¹ One respondent refused to answer whether they owned or rented the property, and a further respondent did not know

²² Three respondents did not know whether the property was owned or rented

²³ Two respondents did not know whether the property was owned or rented

²⁴ Two respondents did not know whether the property was owned or rented

Quick review

Characteristics of respondents within samples:

- The area where the highest level of diversity of origin was recorded, was in the London area; whilst the area where there was greatest homogeneity recorded was Burnham-on-Sea
- A higher proportion of respondents owned their properties in the areas surveyed, though this may be as a result of the survey method
- The average time for respondents having lived in the area was 21-30 years, which may be linked to the fact that there was a higher proportion owning property rather than renting.
- Similarly, a high proportion of those surveyed had lived in that property for 5 years or more²⁵.

Awareness of flood events:

- All areas were consistent with respondents believing that they are “very unlikely” to be flooded
- The highest proportion of respondents having had previous experience of flooding, either directly or indirectly through family/friends, was in Bath – this may be a result of many factors including the average period of time lived in the area respondents gave being 31-40 years and the flood event of 1968, as well as the average age of respondents being greater than 65 years.

²⁵ This was somewhat unexpected for the London area.

Table 5: Comparison between residential responses and communication activities carried out by Area Teams

Area	Communication mix used by Agency staff	No. aware of general slogans & area initiatives	No. gave other response	With prompting no. who couldn't remember any	Activities by Area Offices
London (6 boroughs)	“Floodline” Community Action Network (CAN) Ad on bus shelter	4 (5%) 2 (2%) 1 (1%)	9 ²⁶ (10%)	73 (84%)	Setting up partnerships with local community leaders Involvement of communication consultancy
Nottingham	“Be prepared for flooding” “Floodline” Riverside festival - Trailer at local festival, active distribution of leaflets	3 (5%) 5 (9%) 2 (3%)	6 ²⁷ (10%)	45 (76%)	Previous research has been made of this area – no further initiatives at time of research Have engaged support from local radio station
Bath	Ad on bus shelter & double-decker bus	2 (5%)	5 ²⁸ (12%)	35 (83%)	Working with Bath & NE Somerset Emergency Planning Dept to establish flood warden schemes Consultants engaged to identify appropriate methods of warning
Burnham-on-Sea	“Be prepared for flooding” Launch of Draft Major Incident Plan (single large event)	1 (3%) 3 (8%)	4 ²⁹ (11%)	30 (83%)	Development & launch of local Draft Emergency Plan

²⁶ Most remembered receiving leaflets

²⁷ Most remembered receiving cards from the Agency, whilst the others spoke of leaflets

²⁸ All remembered receiving some leaflets

²⁹ Varied responses

Quick review

- In all the areas there was a high proportion of respondents who couldn't remember any key events of local Agency staff and there seemed to be limited awareness / recollection of national campaigns, typically “Floodline” and “Be prepared for flooding”
- Even with prompting, a high proportion of respondents didn't recognise the (national) slogans or local initiatives
- Nottingham appeared to be slight exception in that there were a greater proportion of respondents overall who were aware of local / national initiatives, though the numbers are still very low
- A small proportion of respondents gave other responses, the majority of which referred to leaflets that they remembered having received.

Table 6: Comparison of residential responses against services provided by Area Teams / Environment Agency

Area	Flood warning service available	Respondents top 3 expected means of finding out about a flood	Don't know	Respondents top 3 choices for more information	Don't know	Perceived effective action in event of a flood	Don't know	Won't affect me
London (6 boroughs)	No direct flood warning service is available	Observation/local knowledge = 33 (38%) TV warning = 19 (22%) Contacted by friend or neighbour = 10 (12%)	20 (23%)	Other sources ³⁰ = 42 (48%) TV = 12 (14%) Floodline = (8%)	29 (33%)	Get advice/assistance from authorities = 27 (31%) Move possessions upstairs = 26 (30%) Get out of house = 18 (21%) Use sandbags = 18 (21%)	12 (14%)	7 (8%)
Nottingham	Loud hailer warning service (12 hour warning lead time)	Observation/local knowledge = 13 (22%) Radio warning = 9 (15%) Warnings on local radio = 8 (14%) Warnings on local TV = 8 (14%)	8 (14%)	Floodline = 28 (47%) Other sources ³¹ = 10 (17%) Radio = 4 (7%) TV = 4 (7%)	11 (19%)	Move possessions upstairs = 37 (63%) Use sandbags = 13 (22%) Move yourself/family upstairs = 12 (20%)	5 (9%)	2 (3%)
Bath	Loud hailer warning service	Observation/local knowledge = 27 (64%) TV warnings = 11 (26%) Mail drop = 5 (12%) Other neighbourhood scheme = 5 (12%) Warnings on national radio = 5 (12%) Warnings on local radio = 5 (12%)	1 (2%)	Floodline = 16 (38%) Other sources ³² = 15 (36%) Radio = 8 (19%) TV = 8 (19%)	6 (14%)	Move possessions upstairs = 23 (55%) Use sandbags = 12 (29%) Other sources = (26%)	0 (0%)	15 (36%)

³⁰ Majority of respondents cited local council or authorities

³¹ Varied responds including local council, fire brigade, water supplier, amongst others

³² Varied responses, though 3 of which made reference to flood warden

Area	Flood warning service available	Respondents top 3 expected means of finding out about a flood	Don't know	Respondents top 3 choices for more information	Don't know	Perceived effective action in event of a flood	Don't know	Won't affect me
Burnham-on-Sea	Loud hailer warning service AVM ³³ (with limited capabilities)	Warnings on local TV = 13 (36%) Radio warnings = 13 (14%) Observation/local knowledge = 7 (19%) TV warnings = 7 (19%)	7 (19%)	Other sources ³⁴ = 22 (61%) TV = 4 (11%) Floodline = 3 (8%)	7 (19%)	Move yourself/family upstairs = 10 (28%) Use sandbags = 10 (28%) Move possessions upstairs = 8 (22%)	2 (6%)	0

³³ Activated Voice Messaging

³⁴ A number of respondents spoke of the local council (5), emergency services or the Environment Agency as options

Quick review

London:

- Responses given appear to be consistent with there being no direct flood warning service available
- At least a fifth of respondents aren't aware of how they might expect to find out about a possible flood
- Half respondents expected either local knowledge / observation or being contacted by family or friends or neighbours as being a means of finding out about a flood
- TV appears to have a perceived role in relation to warning (a fifth of respondents) and as a source of further information
- There seems to be a fairly large expectation of the role of authorities, e.g. local council, as they were seen by a relatively high proportion of respondents as being a source for further information as well as providing assistance in a flood event
- There seems to be a mixture of attitudes as to what behaviour would be adopted in a flood event, with a fifth indicating that they would leave the house, whilst another third would seek assistance / advice from authorities.

Nottingham:

- A very low proportion (5%) identified that they would expect to know of a flood by siren / loud hailer, which is the current service offered in the area
- Media warnings, whether local or national radio or local TV, were the predominant expected means of finding out about a flood cited by respondents
- Majority of respondents identified Floodline as a source for further information, though other sources, such as the local council, emergency services, along with media sources were also identified
- Responses were in line with what action the Agency would want residents to take in a flood event, with a very low proportion stating that they would not know what to do.

Bath:

- No connections made directly to services offered by the Agency, i.e. loud hailer warning
- Most respondents (64%) identified that they would expect to find out about a flood as a result of local knowledge or observation
- Other responses were very mixed in terms of how warnings might be received, e.g. other neighbourhood schemes, leaflets, etc., and not really reflecting the current loud hailer warning service
- There was a high proportion identifying Floodline as a source for further information
- TV and radio were identified consistently as a medium likely for receiving warnings as well as a source for further information
- A third of respondents believe that they would not be affected by a flood event – as a result of survey method using post codes and the hilly topography of Bath, this can't be interpreted any particular way
- Not one respondent didn't know what to do in the event of a flood, and generally respondents cited taking appropriate actions.
- Only one respondent didn't know how they might find out about a flood – the lowest response rate in all the areas surveyed.

Burnham-on-Sea:

- No connections made directly to services offered by the Agency, i.e. loud hailer or AVM
- Media sources were the predominant sources cited for warning about a flood, though there was also a fair proportion, as in all the other areas, citing local knowledge / observation
- A fifth of respondents didn't know how they might receive a warning or how they would find out more information about the flood
- Responses were in line with what action the Agency would want residents to take in a flood event, with a very low proportion stating that they would not know what to do
- All respondents thought a flood might affect them.

3.2.2. Business survey results

Table 7: Description of case study areas and business respondents in the surveyed areas

Area	Agency Region	Nature of flood risk	No. of businesses surveyed	No. with previous flood experience	No. with insurance for flood damage & disruption	No. with insurance for flood damage only	No. with no insurance or don't know	Property owned	Property rented	Don't know whether property rented or owned	No. operating in property for more than 5 yrs	Operating in area for more than 5 yrs	Average no. years operating in area
London (6 boroughs)	Thames	Fluvial (hidden rivers)	22	2 (9%)	8 (38%)	0 (0%)	14 (64%)	2	17	3	10 (45%)	17 (77%)	11-20 yrs
Nottingham	Midlands	Fluvial	16	2 (13%)	1 (6%)	6 (38%)	9 (56%)	3	11	2	9 (56%)	10 (63%)	6-10 yrs
Bath	South West	Fluvial	12	1 (8%)	10 (83%)	0 (0%)	2 (17%)	3	9	0	6 (50%)	9 (75%)	6-10 yrs
Burnham-on-Sea	South West	Coastal	10	2 (20%)	9 (90%)	0 (0%)	1 (10%)	9	1	0	7 (70%)	9 (90%)	6-10 yrs

Table 8: Type of properties captured in survey

Area	Corner shop	Ware house	Retail outlet	Office	Factory	Restau-rant	Other
London (6 boroughs)	2	6	4	5	2	0	3
Nottingham	2	1	2	5	0	1	5
Bath	0	0	1	5	0	2	4
Burnham-on-Sea	2	0	3	4	0	0	1

Quick review

Characteristics of respondents within samples:

- There was a mix of business types captured in all the surveyed areas, ranging from corner shops, offices, retail outlets, etc.
- A relatively high proportion of businesses in all areas have been operating out of the same premises or within the area for more than 5 years, with businesses in London averaging 11-20 years in the area
- The greater proportion of properties were rented in the London, Nottingham and Bath areas, whilst the reverse was true of Burnham-on-Sea

Awareness of flood events:

- The highest proportion of respondents with previous flood experience were recorded in Burnham-on-Sea, though there were a consistent number recorded in all areas

Insurance:

- Nottingham was the only area where respondents with insurance were predominantly only insured for flood damage, i.e. not including insurance for disruption
- The higher numbers of businesses either without insurance or uncertain of their coverage is for the London and Nottingham areas.

Table 9: Comparison between business responses and communication activities of Agency surveyed area offices

Area	Communication initiatives / campaigns used by Area Teams (both national & local) as recognised by respondents	Recognition of general slogans & area initiatives	With prompting no. who couldn't remember any	Activities by Area Offices
London	Community Action Network (CAN)	5 (23%)	17 (77%)	Setting up partnerships with local community leaders Involvement of communication consultancy
Nottingham	Riverside festival - Trailer at local festival, active distribution of leaflets Display boards at local supermarkets	6 (38%) 1 (6%)	9 (56%)	Previous research has been made of this area – no further initiatives at time of research
Bath	Ad on bus shelter & double-decker bus	1 (8%)	11 (92%)	Working with Bath & NE Somerset Emergency Planning Dept to establish flood warden schemes
Burnham-on-Sea	None	N/a	10 (100%)	Input into the development of local Draft Emergency Plan

Quick review

- Relatively better levels of recognition in the London and Nottingham areas of local Agency initiatives when compared to the other two areas
- In the Bath and Burnham-on-Sea areas there is almost no recognition of the Agency – it appears that in these areas Agency Area Teams have been part of a number of stakeholders engaged in local/regional initiatives, e.g. drafting of local emergency plans.

Table 10: Comparison of business responses against services provided by Area Teams / Environment Agency

Area	Flood warning service available	Respondents top (3) expected means of finding out about a flood	Don't know	Respondents top (3) choices for more information	Don't know	Respondents perceived effective action in event of a flood	Don't know	Wouldn't happen here
London (6 boroughs)	No direct flood warning service is available	Observation = 6 (27%) Contacted by neighbour, family or friends = 3 (14%) TV = 3 (14%)	7 (32%)	Other sources ³⁵ = 10 (45%) Websites (including EA) = 4 (18%) Radio = 2 (9%)	7 (32%)	Move equipment, etc. upstairs = 11 (50%) Other ³⁶ = 4 (18%)	6 (27%)	1 (5%)
Nottingham	Loud hailer warning service (12 hour warning lead time)	Observation = 7 (44%) Local radio = 5 (31%) Other sources ³⁷ = 5 (31%) TV = 2 (13%)	1 (6%)	Other sources ³⁸ = 5 (31%) Radio = 4 (25%) Warnings on Agency website = 4 (25%)	4 (25%)	Get/use sandbags = 7 (44%) Evacuate/close building = 7 (44%) Move equipment, etc. upstairs = 6 (38%)	2 (13%)	1 (6%)
Bath	Loud hailer warning service	Observation = 11 (91%) Radio warnings = 4 (34%) Floodline = 2 (17%) TV = 2 (17%)	0	Floodline = 8 (67%) Warnings on Agency website = 3 (25%) Other sources = 2 (17%)	0	Move equipment, etc. upstairs = 8 (67%) Get/use sandbags = 6 (50%) Other ³⁹ = 5 (42%)	0	0
Burnham-on-Sea	Loud hailer warning service AVM (with limited capabilities)	TV warnings = 4 (40%) Floodline = 2 (20%) National radio = 2 (20%)	0	Floodline = 7 (70%) Warnings on Agency website = 2 (20%)	1 (10%)	Get/ use sandbags = 9 (90%) Move equipment, etc. upstairs = 7 (70%) Get advice/assistance from authorities = 4 (40%)	0	0

³⁵ These included local council, insurers, yellow pages, water board and the Environment Agency

³⁶ Most referred to making documents / stock / equipment safe

³⁷ Varied number of responses

³⁸ Responses varied from local council, Environment Agency, fire brigade and owner of property

³⁹ Varied responses included making sure staff were safe, moving equipment / stock / electrics, amongst others

Quick review

London:

- Most respondents would expect to find out about a flood by observation or contact with others, e.g. family, friends or neighbours
- A relatively high proportion didn't know how they might find out about a flood or where they would go for further information
- Main media sources, e.g. radio and TV, did not feature strongly in responses for either warnings or information
- Varied sources would be used to find out more information, ranging from local council, water board, yellow pages, insurers to various websites, including the Environment Agency's (though none mentioned Floodline specifically)
- Most responses regarding action in the event of a flood were appropriate, though again a significant proportion (one-third) wouldn't know what to do.

Nottingham:

- No connections made directly to services offered by the Agency, i.e. loud hailer warning
- Radio featured as a relatively consistent response to finding out about a flood as well as further information on it
- Various other sources were stated by respondents in terms of both receiving warnings as well as getting further information
- Most responses regarding action in the event of a flood were appropriate, with only small proportion that wouldn't know what to do.

Bath: Relative

- No connections made directly to services offered by the Agency, i.e. loud hailer warning
- There was a large number relying on observation for warning, though a relatively high proportion overall would expect to find out from media sources, i.e. radio or TV
- A significant proportion of respondents identified either Floodline or the Agency's website as a source for further information
- Most respondents cited appropriate actions in the event of a flood
- In no instance to these three questions did any respondent indicate that they didn't know.

Burnham-on-Sea:

- No connections made directly to services offered by the Agency, i.e. loud hailer warning
- Media sources, TV and radio, were seen as the main means of finding out about a flood
- All respondents, bar one which didn't know, cited either Floodline or the Environment Agency website for finding out more information
- All respondents cited appropriate actions in the event of a flood, though a relative proportion cited getting advice / assistance from authorities, which was unlike the other three areas surveyed.

3.3. What appears to be working & what doesn't?

Some general points emerging from both the business and residential surveys include:

- The Environment Agency is seen as a source of information and advice (i.e. the Agency is not there necessarily to save communities from potential disasters and flooding)
- There is a relatively good general understanding in all areas of the necessary steps to take in the event of a flood, which can be built upon further, e.g. reduced premiums for proactive measures being put in place
- A significant number of respondents did not recognise national Agency services / messages, e.g. "Floodline" or "Be prepared for flooding"
- A large number of respondents relied on local knowledge / observation to determine the relevance of information to themselves
- Media sources are anticipated to play a relatively large role in the provision of warnings and information
- There appears to be a limited knowledge of services currently made available by the Environment Agency to these communities.

3.3.1. Residents – what appears to be working?

Nottingham appears to be the most successful in understanding its target audience and getting a message across. A relatively significant proportion (one-third) surveyed related receiving a warning through the radio, though only a few identified the warning in terms of the current service offered by the Agency, i.e. loud hailer. In addition, there is knowledge of where to go for more information directly and it's the area that shows a relatively better recognition of Floodline. This may be as result of it being the area to most recently experience a flood event. The area staff have used a few channels / communication mix to reach their audience which have been low cost. In one instance there was also an immediate value added with some lessons learnt, i.e. building links with the local radio station and using display boards at a supermarket. Overall this makes Nottingham a possible case study for other areas in terms of what lessons have been learnt. It also makes it an area on which further initiatives can be built and monitored.

In all the areas surveyed it must be noted that the responses given in terms of what actions should be taken overall were consistent with what the Agency would suggest. There also appears to be some, if varying, levels of personal knowledge or previous experience of a flood event in all of the areas surveyed.

3.3.2. Residents – where do the challenges lie?

In the London area, there appears to be some divergent views within the community on what to do in the event of a flood, i.e. move possessions upstairs whereas a fifth would leave the house. There appears to also be higher reliance of support being given by authorities than identified in the other surveyed areas. Additionally, the sources of warnings and further information seem to cut across a number of possible channels / sources, which gives a fairly unclear picture in this context.

In Bath, there was the highest perceived level of certainty from respondents that they would not be affected by a flood event, though this could also be as a result of topography in relation to the post codes used to identify the low probability areas. Almost half of those surveyed in this area have some personal knowledge of a flood event, e.g. personally or through family or friends. Residents seem to have identified a

number of possible sources for further information on a flood with a relatively good proportion referring to Floodline. However, there was no link made between the type of service offered by the area office, i.e. loud hailer, and the type of warning as a resident they might expect, i.e. observation or TV warning. There appeared to be better consistency in responses regarding further information sources, with Floodline being cited, as well as a few (3) references being made to flood wardens in terms of other sources.

Bath and Burnham-on-Sea Area Teams have been working in collaboration with other stakeholders, e.g. emergency planners. It appears that this might be a cause for some confusion as there were divergent views on where residents would look for possible warnings. Interesting this divergence might be considered less of an obstacle in terms of where people would seek further information, though there appeared to a consistency across all the areas in relation to the predominant range of choices made, i.e. Floodline, TV and other sources. Radio featured consistently only in the responses of Nottingham and Bath.

3.3.3. Businesses – what appears to be working?

There is some consistency within the responses, which shows that in all areas there is the basic understanding of the potential flood risk and what actions they would take in the event that one happened. There also appears to be a similarity in terms of respondents' most common choices for seeking further information, i.e. with Floodline and using the Environment Agency website featuring across all the areas.

There seems to be parallels between the responses given for the London and Nottingham areas, and also between the Bath and Burnham-on-Sea areas. Radio again featured strongest in Nottingham both as a means of warning as well as providing more information.

3.3.4. Businesses – where do the challenges lie?

No connections were made in any of the areas where there are currently flood warning services available, e.g. AVM or loud hailers. There also appears to be a high proportion of respondents who rely on observation / local knowledge in terms of establishing a flood risk. The area which indicated a relatively less clear identification of a warning was the London area.

There are a few challenges that face the Agency in relation to businesses, in that they can be as varied a target audience as residents, e.g. a small family-owned corner-shop or a large employer with formal systems and procedures that may be either part of the public or private sector. Typically small and medium sized enterprises (SMEs) are the most difficult to reach, though this may vary depending on various factors, e.g. active trade associations, other local networks, etc.

Though this is pilot survey and the numbers are small relative the populations at risk in these communities, it appears that in all of the areas surveyed, there are lessons to be learnt in that can be valuable to raising awareness in residents and businesses alike. There appears to be some recognition of communication channels to identify further information in the event of a flood and a sense that in most areas there is consistency in what actions / behaviour would be adopted by people. However, there appears to be a difficulty in identifying appropriate ways in which warnings can be or “currently are”

issued to such populations, particularly for those at risk where the lead time is very short, e.g. 2 hours or less. This raises questions as what the overall target for such audiences is, and to what level of investment / resources are to be made available to achieve such targets within these communities.

4. KEY ASPECTS TO CONSIDER WHEN DEVELOPING LOW-PROBABILITY RISK COMMUNICATION STRATEGIES

The Environment Agency, in its Flood Risk Management 2003-2008 Strategy has recognised that its task to reduce flood risk needs a change in mindset from that of defending against flooding to one of managing flooding events. Flooding will continue or be an increasing risk as a result of inappropriate development and the impact of climate change. There is recognition too that though the physical risk to people living and working in flood-prone areas can be reduced, there are still serious social and emotional costs associated with flood events (for those affected by flooding).

The Environment Agency, along with various other stakeholders, recognises that the task of reducing flood risk and managing flood events will also need to involve residents and businesses in areas that are at risk of flooding at the lower end of the probability scale. In a number of instances, the areas at risk are those behind defences. In other areas, a significant flood event may occur as a result of increasing risks due to climate change. Such areas and those people and businesses living and operating in them therefore are an audience of flood risk communication that will also need to be taken into account when developing awareness raising strategies.

How such a broad grouping of stakeholders might be catered for in communication strategies is reviewed in this section in relation to a number of aspects including:

- Identifying key issues from research
- Profiling target audience(s)
- Defining communication objectives
- Defining and position the “product”
- Defining components of the message
- Defining channels to the audience
- Defining the communication mix.

Key factors and recommendations for risk communication strategies for low probability stakeholders that are identified in this section are taken from the baseline review of UK and international research and expertise, that was conducted during Phase 1 of this research project. Additional input has also been provided by the members of the Agency’s Project Board.

4.1. Key issues identified from research

Individuals typically do not view floods as highly “dreaded” events, and therefore are not considered to be potentially lethal. In terms of the decision-making process regarding the mitigation of impact of the hazard, such as in the purchase of insurance, it has been shown that people have substantial misperceptions of low probabilities hazards such as flooding. Additionally, they tend to distort information given to them about the probabilities and have great difficulty in considering them within the longer-term. Therefore, individuals in most instances, see no value in putting in place mitigation measures for low probability hazards such as earthquakes and floods – tending to focus attention and resources on hazards that are seen as more immediate and/or threatening.

4.1.1. Factors to consider in changing attitudes to risk (longer term)

Risk perceptions, and therefore risk awareness, are driven by a number of factors. Personal judgments are a complex combination of physical, as well as broader psychological and sociological characteristics, including:

- Individual attitudes and beliefs
- Wider social and cultural values
- Information – which may be both accurate as well as inaccurate
- Existence of uncertainties in the evaluation of a hazard, and the individual’s ability to deal with it
- Role and credibility of institutions tasked with the management and communication of the risk.

Therefore, general research into risk communication shows that risk messages are more successful if they focus on actions and not the “why”, and therefore are:

- Framed to make them immediate/relevant to their audience
- Personalise the actions that the “reader” can take to lessen the effect of the hazard
- Ensure no barriers to taking action.

Research looking to understand how to get people to react to risk messages emphasises that:

- The risk has to be seen as having a high enough probability of occurring to be significant to the individual
- The impact of the risk could be significant to the individual (such that they would not want it to happen and therefore will react)
- People need to know how they can act to effectively deal with the hazard.

4.1.2. Factors to consider in changing behaviour (short term)

Risk communication strategies need to be seen as part of a social change process – where they aim to get across messages to audiences that they are vulnerable to a certain risk, which demands a level of acceptance of the risk within the audience as well as the actions to be taken. Given the complex combination of factors that act to create an individual’s perception of a risk, risk communications need to be sensitive to the basis of those perceptions in order to effectively change them. This is particularly true when seeking to move individuals from a “no risk” perception to a more realistic position when the event probability is still relatively small.

Therefore, risk communication strategies need to take into consideration a number of other functions, including:

- Ensuring that information to enable / inform appropriate risk-reducing behaviour is available and accessible
- Encouraging changes in knowledge, attitudes and opinions about a risk
- Creating trust and confidence in risk decision-making processes and risk management bodies
- Engaging stakeholders in dialogue (two-way communication) which is open and ongoing to allow for decision-making that reflects broad social values
- Ensuring regulators, experts and other stakeholders discuss all issues relevant to the decision-making process for a particular risk.

4.1.3. Experiences drawn from risk awareness in equivalent hazards

Overall, though there is much literature on risk, risk communication, uncertainty along with risk management, there is limited research directly on communicating low-probability flood risk. From the research undertaken on equivalent hazards, there is evidence that what seems to work best are complex and multi-strand approaches that combine institutional frameworks with individual incentives. However, it is worth pointing out that there seems to be no organisation has been able to achieve the level of response they would like.

Hazard champions

There is some discussion in the literature about individual response being affected by the response of friends, neighbours or others of a similar setting, e.g. one director to another, etc. that supports the use of “local hazard champions”.

In this way, it is also worth considering whether creating awareness and take up of flood prevention measures is rather more a question of a culture change programme rather than a risk management one. Conventional culture change models involve a series of steps that:

- Start with demonstrating the need for change
- Generating a shared vision
- Working with the converted to deliver early “wins”
- Spreading involvement and gradually changing behavioural norms, etc.

Forcing accurate (transparent) awareness of risk levels within communities

There are also some examples of community level certification schemes for hazards, such as earthquakes in the US, which allows the tracking of community level readiness by a central authority. By setting standards for determining different levels of action, it gives a clear outline of what constitutes preparedness, and allows for a combination of measures to put in place.

In New Zealand’s Waikato Region the levels of awareness and preparedness of a range of natural hazards, including volcanic, are monitored and the results are published online. In Australia, bushfire awareness and preparedness in communities is based around the use of Asset Protection Zones. Each zone is addressed one at a time to bring about awareness raising and expertise to help identify property risks and audit/advice on mitigation measures. Special funding has been set up to do this, and various events run in parallel, e.g. fire danger days.

Radon case study – removing barriers to action

The radon case study⁴⁰ illustrated how important it is for people to get a clear understanding of their level of risk and what it is that they should do. Recognising that a fear of property blight for those houses labelled as being “at risk” was leading to an avoidance of testing, a series of measures have been put in place, e.g. radon bonds in house purchases, guidance for surveyors, etc., to ensure that those house-owners who have not done a risk assessment are at a disadvantage.

Information packs alone were insufficient in raising awareness and preparedness. Four attitudes to the risk were identified as creating the barrier:

⁴⁰ See Appendix 4, section 6

- Health concerns
- Property pragmatism
- Rebuttals of “policy scepticism”
- “Disbelief”.

Better guidance on costs and measures, e.g. with clear independent advice, such as from a crime prevention officer, approved/recognised contractors, etc., is a way of overcoming home owners fearful of being “ripped off” by builders who have an incentive to exaggerate the level of protection required. From the review of other hazards, it appears that a necessary component for improved uptake of advice is to provide information on suppliers of fittings and fixtures that can be used in the home alongside information on the hazard.

4.2. Profiling target audience – what determines the audience at risk?

4.2.1. Careful use of a risk typology

People can become vulnerable to a flood event as a result of other factors apart from residing in an area defined to be “at risk”, e.g. as a result of being at their work location or commuting through a flooded area – 7 August 2002 a major flood occurred in central London at rush hour as a result of pluvial flooding combined with poor/aging drainage systems. It caused major disruption to businesses and commuters alike. Therefore, what this example shows is that adopting a typology of risk which defines those stakeholders that are “at risk” or not, is not the only way to identify an audience.

4.2.2. Recognising a complex stakeholder map

Campaigns being undertaken at local level do need to recognise that their areas will include both residents (and will need to consider temporary residents such as tourists, students and commuters) as well as businesses.

Residents

Communities within the low probability flood zones can vary demographically. Recognising that an important factor in getting a message heard by an audience involves identifying their specific values and needs, necessitates identifying the make-up of the target areas before initiating any campaigns. Such information can be relatively easily accessed, e.g. from census data, etc.

Businesses

The business community can be sub-divided into small and medium sized enterprises (SMEs), where there may be 1-250 employees, to large firms and multinationals (employing more than 250). Business organisations are often well structured and are important in a community. They can therefore be seen as partners in stimulating individual hazard awareness, e.g. compare to health and safety initiatives. It has been shown by research that the majority of small businesses who experienced a flood never reopened or stopped trading⁴¹. Additionally, small shops may serve a particular community and therefore the consequences of flooding could be significant.

⁴¹ A survey was undertaken by AXA and referenced in an article by Crichton, 2003, on flood risk and insurance in England and Wales.

Additionally, large portions of the property market are rented, both to residents as well as businesses. What are the incentives for landlords to take precautionary measures, given that tenants are unlikely to invest in anything significant as they can move out, are covered by insurance, etc. This is a similar issue in the context of leasehold properties. Attempting to reach tenants, and possibly leasehold occupants, it may be easier to use “indirect” channels such as the property owners or agents managing tenants.

Local government

In Australia, the value of linking emergency services, local councils and those communicating the risk of flooding has been recognised as having an impact on the overall effectiveness of tasks being carried out. What this means for the emergency services and councils is that though those within the zones of rarer and more severe floods cannot always be easily identified, and the level and locations at which flooding will occur can only be guessed, these gaps nonetheless can be identified and relatively easily filled.

4.2.3. Identifying hard-to-reach groups

There are a number of factors that can make people more vulnerable to not appreciating a possible hazard, which can also indicate high consequence groups. Therefore constructing a checklist to use to assess the audience could include the following:

- Special needs/health groups
- Frail/critical physical infrastructure
- Poverty
- Groups with no or insufficient English language
- Lack of appreciation of environmental cues owing to different backgrounds/unfamiliarity with area and customs
- Poor local economic production and employment opportunities
- Untested response and recovery capability of services or individuals
- Fragile social structure
- Stakeholders and communities not involved in/or aware of planning processes; no or ineffective mitigation strategies.

It is important to note that the Agency already has a number of sources of information for the points above, which can quickly be built into a strategy, including:

- Thames Region’s GIS diversity maps
- BMRB survey data, e.g. 35% in Thames Barrier survey not first language English speakers
- Use of census data to reference local information and perceptions of communicators about audience characteristics which could be wrong or misleading
- Identified NGOs and community groups in various regions.

Suggestions have been made for identifying/defining and evaluating this low probability audience rather than simply relying on blanket messaging to achieve results.

In Australia, a vulnerable community within a target market for flood risk communication strategy was sub-divided into 4 categories, as shown in Table 11. The advantage of such a strategy is that it allows the risk message to be tailored to the various audiences’ information needs, and also allows for insight into what the potential demands will be in the event of a major flood.

Table 11: Sub-categories developed of a vulnerable community⁴²

Target group	Audience definition	Communication attributes
Vulnerable community	Individuals concerned from a personal or community perspective about the effect on personal safety or property	They want accurate information from their council about the flood risk as they may want to sell or rebuild their properties. They will also require an exchange of information so they can make decisions about their own risk management.
	Individuals who may be less concerned, but who are still likely to get upset if they are not informed about the risk	They still need to be communicated with and given the opportunity and assistance to become involved in community education issues, to increase their self-efficacy.
	Individuals who, while concerned about the potential flood threat, may not see the flood risk as a significant or immediate concern	An important concept is to reinforce the concept of “reassurance” that there are plans in place and agencies that can assist them during a flood event. This group will need additional assistance during a major flood event.
	Individuals who may not be concerned about the issue or give it a high priority	This group may feel confident about their ability to cope or to be given assistance by the government if a flood should occur. They may also lack the emotional, intellectual or physical ability to cope with the threat of a major flood, or alternatively have an overly optimistic view of their ability to survive a major flood event. During a significant event, these people are best reached through messages aimed at increasing their ability to carry out specific actions.
Project partners	Comprise government and NGOs directly involved in communicating with the public	It is critical when communicating to the public that they have a common approach and tone of message
Influencers	Individuals and organisations directly affected by the communication strategy and who may potentially affect its effectiveness	Stakeholders have a responsibility to convey accurate information to their constituents
Emergency workers	People identified as working in member organisations in the flood	They provide assistance to affected communities during the flood event and reassure the public that they will

⁴² As taken from Bell & Shaw, 2000

	affected areas	be looked after
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4.3. Defining communication objectives

There are a range of factors that can influence the defining of communication objectives. External drivers include:

- Raising awareness in order to save lives and property
- Getting the best possible information to people
- Giving guidance without being prescriptive
- Improving and extending relationships with stakeholders, e.g. Association of British Insurers (ABI) or National Flood Forum (NFF)
- Improving policy development by taking on board other stakeholders, e.g. local government, insurance industry, etc.

Internal drivers can include amongst others:

- Meeting corporate targets
- Motivating employees, Area Managers and Directors

Flood risk communication objectives need to be flexible to the various types of physical catchment areas and the types of risk faced, which can include:

- Lead time for warnings, e.g. Nottingham has 12 hours, whereas there is less than 2 hours for areas on the Severn River
- Type of flood risk, e.g. fluvial, pluvial, groundwater or coastal
- Whether defences are in place, and if so, to what extent, e.g. on the fringe or in the middle – and people’s awareness of defences.

The Environment Agency already sees the role of risk communication as a means of achieving more effective risk management. In doing communication the Agency has to ensure:

- Public awareness campaigns focus on raising awareness of flood risk and preparedness for it (how to live with it and be prepared)
- Communications need to be clear in order to influence other stakeholders, e.g. government, industry, partnering organisations as well as the public on how to reduce and manage the risk of flooding
- Communication needs to be consistent and channelled to the needs of the stakeholders, e.g. professional partners, the public, etc. – this demands understanding of stakeholders which is based on information fed back to ensure this
- Recognition that successful communication needs time and resources.

4.4. Defining and positioning the “product”

Raising awareness of flood risks is one aspect of the work undertaken by the Environment Agency. Similarly, providing flood warnings is one aspect of many services made available to the public. In relation to the flood warning service some particular points were identified as being perceived to have a negative impact on raising awareness:

- Internal uncertainty about using new slogans for the national campaign each year
- Issues of consistency in messages put out by Area Teams
- Impact of re-organisation in terms of relationships within communities, etc.

- Repositioning / branding of “Floodline”.

Greater emphasis needs to be made on identifying and keeping in mind who the “customer” is, which is varied, e.g. local government, hard-to-reach communities, etc.

In terms of what is being communicated about flood risk, the aims of raising awareness can be made in terms of the following table.

Approaches to flood mitigation	Description of approaches	Examples of mitigation measures	Factors	Awareness challenges
Flood modification	Aims to avoid loss by keeping water away from development, usually structure measures aimed at modifying the flow of flood water.	Levees Dams Diversions and channels Flood gates Detention basins	Structural Significant costs Immediate	Levee paradox
Property modification	Aims to avoid or minimise loss by keeping development away from flood water using regulations, design or materials	Zoning and land use planning Voluntary purchase or acquisition Building regulations House raising Other flood proofing	Structural & non-structural Immediate-longer term High costs	Property blight
Response modification	Aims to modify behaviour through communication strategies; this approach recognises people’s reactions can have an effect on the level of loss that then occurs.	Information and education programmes Preparedness (planning for emergency) Forecasts and warning systems Emergency services response	Longer term Low to high-cost	Community blight

It has been suggested that there needs to be greater co-ordination within the Agency to ensure a more holistic risk management approach, i.e. before building defences alert the community to the need for plans, etc. as part of a consultation process. Though this raises issues around resource demand, it also raises the nature of the relationship the Agency has with local authorities.

4.5. Components of the message

4.5.1. How do you convey risk?

Risk terms such as 1:100 or 1% risk of flooding in any year (time factor included) are becoming more standardised, it is difficult for lay people to understand what that actually means to them. The nature of the flood risk needs to be given in plain English, e.g. in relation to property, lives, insurance or other risks.

In addition, sensitivity must be taken in using terms to define the risk as different interpretations can be made by different stakeholders, e.g. the use of the word “imminent” varies between the public and Agency partners.

4.5.2. Personalising the risk – making it imaginable

People are more likely to prepare themselves for a potential disaster if they regard themselves as potential victims of a disaster. Additionally, people can also be encouraged to act out of a feeling of fear, i.e. if they know that an event may result in the loss of life. However, if the potential disaster is perceived as being insurmountable and emotionally threatening it can lessen the likelihood of any adjustment being made by the individual. Therefore, focusing a communication strategy on the disruptive/ destructive nature of a hazard, loss and vulnerability can undermine an approach to encourage planning and mitigation. It is important to identify factors that are likely to facilitate individual, community and institutional action in order to bring about increased resilience.

4.5.3. Showing the benefits of taking action

As people do not tend to act if the benefits of acting do not outweigh the risks or costs, this is an important component to consider in “bring home the message”. This can be emphasised in the context of the message, as flooding is not only about water levels rising. It is also about the secondary hazards associated with flood events, e.g. (industrial) pollution and disease which are more likely to impact immediately and over the longer-term on communities and individuals. Though there is a chance that the perception of the community may be that the authorities are responsible for protecting them, communities and individuals may be more willing to invest time and effort in working with the Agency to take precautions if they realise it’s not just properties along a river that would be affected.

4.5.4. Building trust in the risk message

There is a generalised change in society towards institutions. This coupled with a growing public awareness of environmentally-based risks has led to decreasing levels of trust in government institutions that are perceived as failing in their responsibilities to safeguard the public. There are instances where communities do not respond to advice or direction from authorities and this is a possible reason for a failure to respond to a warning. Therefore, factors such as the source of the warnings, its credibility and frequency will need to be taken into consideration. In the US, universities have a higher public service profile, for instance in the issuing of warnings for earthquakes.

4.5.5. What needs to be included in a message?

In giving information about the flood risk, the following components should be addressed:

- How do you receive a warning? / How will you know if you’re at risk of flooding (need to address risk perceptions)?
- What can you do (actions)?
- Where can you find out more about flooding?
- Make a personal / local link
- Make reference to a fact sheet with supplementary information.

4.6. Channels to the audience

Low probability medium-high consequence events require different management to more frequent events. It is also necessary to reflect that it may not be possible to protect entirely against extreme events. Therefore, low probability events will require special attention in terms of warnings and preparedness that will demand a range of interventions.

However, as it has been difficult to isolate which channels have had a desired effect in raising awareness, there is some need to pilot and evaluate some techniques further to what has been achieved in this study. Nonetheless, many of the interviewees and the literature research point to no one method or set of methods being more successful than any other. Rather, it is suggested that to have a number of methods from which to select is more beneficial.

4.6.1. Low cost options

Warning systems (as a response modification measure) are seen as a relatively low cost option that have the potential to save lives and properties, which can be used to target those at risk from extreme, though not necessarily catastrophic, events.

Australian research has found that preparation and emergency planning will increase the effectiveness of the response to a flood, e.g. with sufficient warning people will be afforded time to lift and relocate valuables and therefore create significant savings. Education is seen to play a part in influencing the community to respond in an appropriate manner.

Working in partnership with organisations is also an effective way of integrating information to an audience, and there appears to be some evidence of success, e.g. including articles in local authority newsletters. Additionally, using other initiatives within an organisation as vehicles, positively strengthens risk messages. An example could be in the Environment Agency's Spotlight initiative.

4.6.2. A role for radio & TV – channels that reinforce a message

Reinforcing a message on one channel with another may be responsible for creating some awareness in the Nottingham area, where Nottingham (local) radio featured in the campaign, but the direct mail shot also made reference to the radio station. A survey undertaken by BMRB in the Thames Barrier area also indicated that local radio is recognised as a good source. There is some evidence to support an approach of mixing channels to reinforce a message, as 5,000 letters sent out "cold" to various targeted areas in north east Thames Region resulted in only 40 properties taking up the flood warning service offered by the Agency. This may also be the result of other factors, i.e. perception of property of not being at risk.

4.6.3. A role for insurance

Insurance is not seen as a flood mitigation measure by some, as it is an economic instrument that serves to transfer all or part of a loss once suffered by an individual to others who share the same risk. It's a means by which to distribute costs rather than reduce them. However, insurance is seen to present possibly the best option of a risk management measure for low probability medium-high consequence flood zones communities. It is in such communities that people are reluctant to allocate resources to mitigate an event that may not happen even though it would have significant

consequences. Additionally, insurance premiums could be used as a vehicle to raise and maintain awareness, as well as encourage through financial incentive some mitigation measures to be implemented.

Factors that would impact on both households (particularly in relation to tenancy) and businesses taking out insurance include:

- Their understanding of the risk
- The cost of insurance
- Willingness and ability to pay for mitigation measures.

However, penetration of insurance is lower for lower income groups, and there is a risk that should premiums rise, there is some likelihood that this penetration will be reduced even further in such groups/areas. Therefore there is some uncertainty as to whether this channel will act as “a carrot or a stick”, and it is suggested that further research is undertaken in this area.

4.6.4. Points to remember

Given that a number of channels will be used in conveying a risk message, it is suggested that the following components are captured within the communication strategies:

- Consistent
- Clear
- Timely
- Accurate
- Simple
- Conveys confidence in the validity
- Says what people should do
- Says how to do it (e.g. where resources/equipment is available)
- Not “explain” the flooding process.

When informing people of what actions they can take, the facilities they need to take such actions are also available. Desired actions can also be encouraged using either “carrot or stick” methods, e.g. vouchers for savings on purchases of flood products, etc.

4.7. Communication mix

4.7.1. Using a mixture of traditional and innovative channels

In one Australian example, a combination of channels has been used to increase flood knowledge and create appropriate behaviours in the event of a flood which targeted potentially-affected individuals, households, neighbourhoods, organisations and businesses. The campaign involved a series of initiatives including:

- Newspaper articles on floods and their management
- Radio interviews talking about flood management, with Q&A sessions on local radio on various flood themes
- Flood commemoration events and “weeks” reinforced with displays of historic local flood photographs, etc.
- Brochures tailored to the local community context, e.g. “FloodSafe guides” which are fold-out A3 or A4 full colour pamphlets customised to local flood problems

- An example of a household or business flood plan produced and publicised to encourage preparation
- Public meetings at which information is provided and sought from local communities
- Liaising with business organisations, e.g. Chamber of Commerce, to work with members operating in flood-prone zones
- Uncovering and countering community “myths” about flooding
- Unifying an approach to flooding with councils, government agencies and community groups.

4.7.2. What to avoid and how to do it

As initiatives enable people to come to grips with the risk of floods, i.e. through the flood status of their property, by making the risk personal, etc. the information people are receiving can be made available in various ways. The effort however can be hampered by such issues as:

- Tackling the topic piecemeal
- Being poorly resourced and not well sustained
- Using flawed techniques
- Not measuring whether there is expertise being built that allows for the task to be carried forward
- Not being received/recognised by target audiences through poor design of materials, inappropriate language, communication channels not used by audience.

Therefore, there is some indication that in order to devise effective risk communication strategies, some fundamental aspects to consider that impact on the possible success include:

- Identifying the size and composition of the community being targeted
- Defining a budget
- Comprehensive, targeted on-going and oft-repeated campaign to counteract population turnover, development of complacency between events and the gradual awareness erosion over time
- Rigorous assessment conducted post-campaigns to understand what works and what doesn't
- Consider the balance between top-down and bottom-up approaches, which will differ according to the environments.

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⁴³ See Appendix 4, section 6

⁴⁴ A survey was undertaken by AXA and referenced in an article by Crichton, 2003, on flood risk and insurance in England and Wales.

5. GENERAL RECOMMENDATIONS TO IMPROVE FLOOD RISK COMMUNICATION

It takes considerable time and effort to get a message across and build up awareness of a hazard. Key lessons from this study, drawn from individuals and communities in low probability high consequence flood zones, have shown that the design and implementation of more effective programmes for hazard mitigation require multiple channels and partners, and involve highly targeted programmes focusing on how the information is presented.

An important aspect to low probability risk communication strategies for other hazards is that the message has been opened up and made transparent. This has been achieved more successfully when partners have been involved in the issue and there has been credible supporting information provided to the public at risk. There is evidence that such a strategy is already at play within the Agency, as references have been made during interviews to the property market, e.g. number of subscribers to the property search service offered by the Agency to solicitors, involvement of the Association of British Insurers (ABI) and the Council of Mortgage Lenders (CML) in policy development, etc.

As well as needing to be multi-pronged, in terms of channels used and partners involved, the messages need to be consistent and clear, with the initial period aiming to raise awareness, using clear messages before reaching a “call for action” phase. This is an approach that is often adopted by campaign pressure groups.

5.1. Recommendations for an internal communication decision-support tool

The overall aim of this project has been to identify recommendations for the Environment Agency in terms of informing the development of a communication strategy for communities living in low probability medium-high consequence flood zones. Given that the structure of the Agency is tiered with national as well as area foci, the recommendations for such a communication strategy, in our view, need to address both aspects of the organisation if successful implementation is to be achieved. Section 3 therefore reflected the areas and lessons learnt in relation to top-level strategy development. This section looks to address some concerns / challenges in risk communication faced by Area Teams.

The “local and personal face” is seen both by international as well as UK experts and practitioners as an important component of a risk communication strategy in getting a message across. In interviews with a number of Agency staff and others, it is recognised that there is a vast number of risk communication approaches that can be used at a local level. Importantly, while there is little experience or research specific to techniques used for low probability flood risk, there is some experience of such risk messaging from other equivalent hazards, e.g. earthquakes, tsunami and fires, which were identified in Phase 1 of this project.

There are experiences within the Agency’s Area Teams (as evident from the case study areas) in relation to low probability medium to high consequence flood zones which are valuable to the organisation, and there is value in capturing and sharing such experiences more formally. There are many advantages that can result from this, such as:

- Enabling Area Teams to better understand approaches available to them
- Giving recognition to Area Teams that have been successful in using approaches and from whom lessons can be learnt
- Developing and retaining knowledge within the organisation as well as the individual / teams
- Enabling the sharing of knowledge across Areas
- With time, enabling a benchmarking of approaches in relation to overall risk communication strategy
- Enabling greater consistency in the presentation of risk messages within the overall communication strategy – another aspect of risk communication identified during the baseline study
- Allowing for specific feedback within the organisation, e.g. with the National Team able to identify options and Area Teams to feedback results.

5.1.1. Key concepts in determining possible communication options

During the baseline review a number of different concepts in relation to raising flood risk awareness have been identified. These are briefly outlined below:

- Potential resource requirements from the Area Team particularly in relation to staff time and finances
- Possible impact of approach and measures / indicators of success
- Links to other parts of the organisation, e.g. national strategy, flood engineering, etc.
- Target audience characteristics, e.g. socio-economic grouping, resident, business, etc.

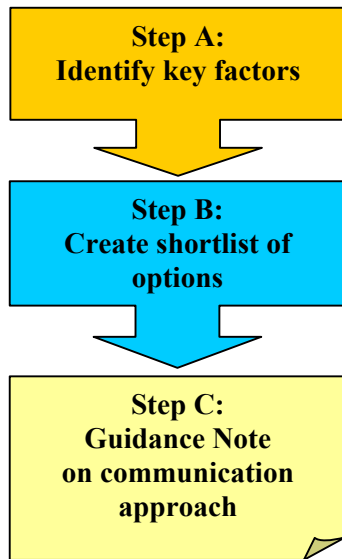
These key concepts can be used to drive understanding of the decision process that Area Teams face and the information they require in order to identify suitable risk communication approaches.

From these general criteria, a decision tree for Area staff could be identified to help in identifying and assessing what possible approaches to communication are available. Once a list of possible approaches has been identified, a framework assessing communication approaches will also facilitate a review of the approach and allow updates to procedures to be made. The possibility of making this a web-based tool set would potentially increase access and help ensure the timeliness of information across the Agency.

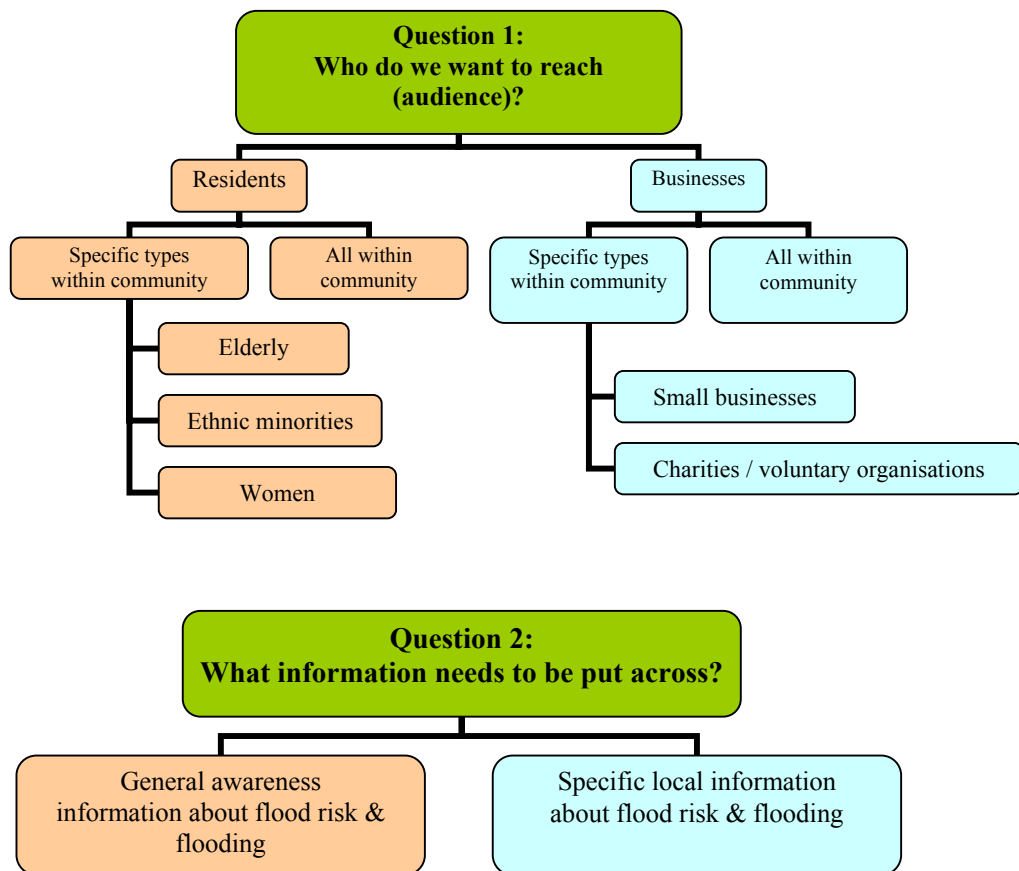
5.1.2. What would the communication decision-support model look like?

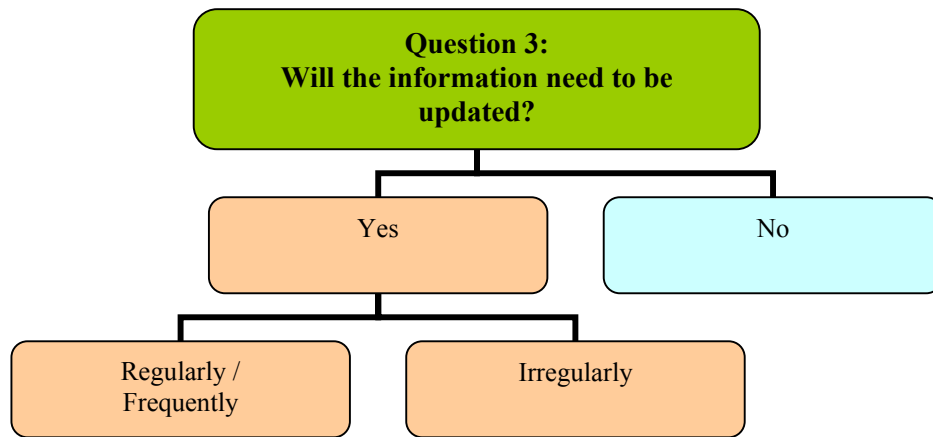
The figure below gives an example of a decision-support model. This example offers a three-step process that looks to refine a search to identify a shortlist of options. This is not a complete product, but an initial stage concept that would need further development and refinement if it were to be considered a practical option for the Agency to invest in.

Figure 2: Communication decision-support model



Step A would use a series of questions to identify the key components that would need to be addressed by the communication approach. The series of questions could include a top-level question with a set of sub-questions as appropriate, and as shown below:





Step C: The user can review the different approaches given in the shortlist by opening up the guidance notes. Each approach would have its own guidance note. These guidance notes would be concise reviews of the approach that would take into consideration a common set of criteria against which the decision-maker is likely to weigh up the options. This could include such aspects as:

- Where this approach has been successful, e.g. specific Area Team with contact referenced
- Resource requirements for set-up and implementation
- The likely forms of communication, e.g. telephone, meetings, etc.
- How to identify any key local issues
- Advantages and limitations of the approach
- Points to remember when using the approach
- Ways to measure / track impact.

The guidance note template outlined in Step C could be used by Area Teams at two levels, i.e. both to review and identify possible approaches, as well as part of a post-event review to record an approach used. This will ensure that techniques and approaches are identified, as well as allowing for learning and sharing of information within the team as well as across the organisation. By creating a communication log record in Areas, as well as generally, the Regional and National teams will be able to review approaches, from which they will be able to determine which approaches are more commonly adopted, what works and what does not. This will help facilitate and improve the level of feedback from Area Teams up the organisation, whilst also building an effective library of flood risk communication resources.

Table 12: Possible criteria and sub-categorises to support decisions on risk communication for Area Teams

Measure of approach	Decision factors				
How much staff time is needed to set up?	Less than 1 day (<8 hours)	1 day (8 hours)	2 days	3-5 days	More than 5 days (>40 hours)
How many staff does it need to run?	1 person	2 persons	3 persons	4-5 people	More than 5 people
Should you speak to / inform other parts of the Agency?	Regional Communication Team	National Communication Team	Engineering sections	Other Area Teams	Other (to be specified)
How long will the event / initiative last?	1/2 day (2-4 hours)	1 day (8 hours)	2-3 days	1 week (40 hrs)	More than 1 week
What level of interaction will be needed?	None	Telephone	Formal meeting	Informal meeting / workshop	Face-to-face (one-on-one)

Table 13: Suggested outline for a risk communication decision-support tool

Activity 1		Stand at other local events Example: Riverside Festival in Nottingham (Area Team Contact Details)				
#	Measure of approach	Decision factors				
a.	Estimate of staff time to set up	< 8 hours	8 hours (1 day)	1-2 days	3-5 days	More than 40 hours (5 days)
b.	Estimate of staff needed to run	1 person	2 persons	3 persons	Up to 5 people	More than 5 people
c.	Co-ordination with other parts of the Agency	Regional Communication Team	National Communication Team	Engineering sections	Other programmes	Other Area Teams
d.	Estimate of duration of event / initiative	Few hours (1/2 day)	1 day (8hrs)	Few days (2-3 days)	1 week (40 hrs)	More than 1 week
e.	Estimated level of personal interaction	None	Telephone	Formal meeting	Informal meeting / workshop	Face-to-face (one-on-one)
f.	Estimated target audience	Local authorities & other formal /institutional stakeholders	Residents	Businesses	Hard-To-Reach	Other: (specify)
g.	Key local issues to be sensitive to	<ul style="list-style-type: none"> ○ When was the last flood event? ○ Has there been any organised community activity in relation to flooding? 				
h.	Other considerations	<ul style="list-style-type: none"> ○ There may be a fee to hire the stand space ○ Possibility of attending in partnership with other organisation, e.g. community group 				
i.	Advantages	<ul style="list-style-type: none"> ○ Standard materials, e.g. leaflets, posters, etc. can be used on the stand ○ Draw attention to any local initiatives and partnerships ○ Get to know other actors in the local community who may not be involved with flood / environmental issues ○ Create an identity within the community 				
j.	Points to remember	<ul style="list-style-type: none"> ○ Need to organise logistics of getting materials to and from location ○ Successful attendance may be weather-dependent if it is an outdoor event ○ Think of innovative ways to get people to stop at the stand, e.g. attractive play objects for children bring their parents within talking distance 				
k.	Measure / indicator(s) of success	<ul style="list-style-type: none"> ○ Numbers of visitors who engaged with staff on topic ○ Numbers of leaflets taken from stand 				
l.	Limitations to approach	<ul style="list-style-type: none"> ○ Limited ability to immediately identify those at any type of risk of flooding, therefore making specific targeting of information difficult 				

Other possible tools from the case study areas that can be developed include, amongst others:

- Display boards at supermarkets
- Community Action Networks.

5.2. Other recommendations for further research

It is already the case that the approach taken by the Agency in relation to creating awareness of flood risk, particularly in relation to the mapping of it as a communication tool to the general public, is held up by practitioners in other countries as example of a significant investment in hazard management and mitigation.

The area of risk communication relative to low probability is still being shaped and some gaps still exist. Therefore in relation to flood risk communication to such flood zones and communities in them, some recommendations for further work have been identified and expanded on briefly below:

- Role of insurance in promoting awareness in low probability groups: Given that the insurance community has become more engaged in the debate around flood risk management, an opportunity may exist to evaluate the role insurance can play in raising awareness as well as what potential barriers it might face, e.g. low penetration of insurance in the lower socio-economic groups, students, small businesses, etc.
- Further research into low probability groups to understand the value systems and perceptions, which are critical to successful communication strategies. It is currently unclear as to whether there is limited understanding of the concept of low probability or whether it is a matter of having more urgent concerns, e.g. feeding or clothing children, etc. By better understanding the target audience, information being put out to the public can be specific to their needs and where they will be exposed to it, and will listen (credible source). Too much information can result in confusion of message or jeopardises losing the message among other competing messages. Within urban settings, the target audience is likely to be relatively diverse, and this too presents a challenge to “getting the message heard”, which lends supports the need for further evaluation.
- It is unclear whether people believe that flood mitigation by the Agency and Local Authorities works, which is an aspect of the risk communication strategy that will have to be considered.
- Review of the presentation of flood risk information to those within the low probability flood zones, both in terms of flood maps and other supporting information, particularly in relation to what information is available on the web. IT is recognised as a critical step in the development of disaster-resilient communities which embody preparedness, individual and collective mobilisation during a disaster and a capacity for post-disaster recovery and learning. Looking for learning points from international experience, in Australia a high level of information is accessible on the internet, e.g. levels

at river gauges are “visible” to the public and other partners, such as emergency services, councils, etc. in real-time. This has led to improved transparency and accessibility of information, which has been identified as an important component for low probability risk communication strategy. But it is only meaningful when individuals know important levels for them, and this type of approach has only been done in high risk areas.

- Inclusion of risk psychology in training of Area Teams: There is currently a 3-day course which Environment Agency staff attends which is run at intervals during any year. Alternatively, it could be a short course / training workshop that is run with Area Teams across the Regions as an internal campaign. This would create an even and immediate platform within the teams, and could be rolled out as a low-cost option.
- Consideration of how to position the Agency when working in partnership, as there is some evidence that such a strategy will assist the Agency in getting the message across to individuals and communities in low probability flood zones
- Review of what is considered / advised as effective action by the Agency to be taken by individuals in advance of a flood warning given the broad range of audiences
- The possible role and guidelines for surveyors in informing potential home owners of the flood risk and available mitigation options
- Greater consistency among various stakeholders, e.g. insurance industry, local authorities, the Agency, etc. engaged in the quantification and qualification of the significance of at risk categories.
- Using global warming and climate change as a vehicle for raising awareness generally of flood risk in the UK.

