More targeted flood warnings: A Review

Improving Institutional and Social Responses to Flooding

Science Report: SC060019 - Work Package 1b

Environment Agency

defra
Department for Environment
Food and Rural Affairs

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It's our job to make sure that air, land and water are looked after by everyone in today's society, so that tomorrow's generations inherit a cleaner, healthier world.

Our work includes tackling flooding and pollution incidents, reducing industry's impacts on the environment, cleaning up rivers, coastal waters and contaminated land, and improving wildlife habitats.

This report is the result of research commissioned and funded by the Environment Agency's Science Programme.

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- **Delivering information, advice, tools and techniques**, by making appropriate products available to our policy and operations staff.

Steve Killeen

Head of Science

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1 Introduction

The aim of this work package, Work Package 1 (WP1), is '*to produce flood warnings that work, so that they are more targeted, matched to the perceptions and behaviours of different social groupings, including vulnerable communities'*.

Currently the flood warning system is not reaching enough people at risk, and more specifically that it is not reaching people who are most vulnerable over the flood incident cycle. In addition, there is a recognition that one size of flood warning will not "fit all", both in terms of the characteristics of the flood (such as rapid response versus slow onset) and in terms of differences within populations.

The overall aim of this work package could equally be expressed by one of the 'priorities for action' of the UN Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters. This aims to help '*develop early warning systems that are people cantered, in particular systems whose warnings are timely and understandable to those at risk, which take into account the demographic, gender, cultural and livelihood characteristics of the target audiences, including guidance on how to act upon warnings, and that support effective operations by disaster managers and other decision-makers'*.

This report is structured in five main sections, with separate contributions from the project's team of researchers as follows:

- Introduction and background to flood warnings.

- A review of the contextual factors of a flood event that are relevant to targeting flood warnings: the characteristics of a flood, the area where the event takes place and the social groups affected (Amalia Fernandez-Bilbao and Clare Twigger-Ross).

- A review of the risk perception and communication literature as related to flood warning (Gordon Walker, Elham Kashefi and Hugh Deeming)

- A overview of the "values mode" approach to segmenting the population (Chris Rose)

- A review of how the "value mode" approach to segmenting the population might be used for flood warning (Pat Dade)

The sections remain quite separate we envisage that the integration between these bodies of knowledge and perspectives will occur through the development of proposals for flood warning. A brief summary of the work presented here together with some suggestions as to implications for flood warnings is presented in the sister document to this document **Improving Institutional and Social Responses to Flooding – Interim Report WP1, 2 and 5.**

1.1 The need to target flood warnings

A key finding of recent research is that despite investment in improvements to warning systems, only a minority of those affected by a flood receive an official flood warning of any kind (Tunstall *et al.*, 2006b). Based on the proportion of flooded properties that received a warning prior to flooding found in post flood events commissioned by the Environment Agency and other recent surveys, it appears that the percentage of people that receive a warning is currently unlikely to be more than 40 per cent (Tunstall *et al.*, 2006a).

The need for more accurate and location-specific warnings has also been identified by Fielding *et al.* (2007) and in interviews conducted with Environment Agency personnel (Thrush *et al.,* 2005) which show that there is an awareness of the need of tailoring flood warnings to a geographical area and to the needs of the community.

There is also a growing awareness that communities and vulnerable[1] groups are not homogeneous (see Thrush *et al.*, 2005; Shaw *et al.*, 2005; Tapsell *et al.*, 2005). Different groups of people may need different warnings, and different types of warnings may be needed for different catchments or flood types. The type of area, rural versus urban, is another factor as it may determine the type of catchment and flood (Balmforth *et al.*, 2006) but also the socio-economic composition of the population (Twigger-Ross, 2005). Different events, catchments and social groups form different flood scenarios which may render some communication channels unsuitable (Briscombe *et al.*, 2005). For instance, some ethnic groups show a dislike of telephones mainly due to their lack of fluency in English (Robertson, 2005). Flooding of steep catchments such as Boscastle, Devon may not allow enough time to provide a warning; for people travelling in their cars messages broadcast by radio or SMS seem more appropriate than other options.

These and other factors have been identified in recent work (Tapsell *et al.*, 2005 and Fielding *et al.*, 2007) as 'barriers' to the success of flood warnings, both in terms of communication but also in terms of actions undertaken by those who receive the warning. Barriers to communication include (Tapsell *et al.*, 2005, p.6):

- the particular characteristics of the local catchment,

- the composition and density of the resident population,

- local structures of governance,

- the existence of local agents or opinion leaders (such as community leaders);

- the level of provision of information technologies.

Barriers to action may include (Fielding *et al.*, 2007):

- individual characteristics such as old age, disability or physical frailty,

- characteristics of the home, for example single storey homes,

- characteristics of the flood and/or flood warning.

Shaw *et al.* (2005) identify other factors as key in developing flood awareness that may also be relevant to targeting flood warnings. These include:

- recency of flooding, if there has not been a recent event the likelihood is that there will be lower awareness of flood risk

- visibility of flood defences, as they may eliminate the perception of flood risk

- population characteristics

- flood source.

Having prior flood awareness and/or experience is consistently highlighted (see Tapsell *et al.*, 2005) as a key factor in adopting flood warning technologies and also in responding to

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[1] Twigger-Ross and Scrase (2006) summarise various definitions of vulnerability as '*a function of susceptibility to loss and capacity to recover (resilience)*'. In addition, the term is used here to refer to those who are vulnerable in terms of receiving, understanding and/or acting upon a flood warning.

warnings. Fielding *et al.* (2007) found that those with prior experience of flooding displayed greater awareness and understanding of the Environment Agency's Flood Warning Codes than those without previous flood experience. This has also implications for areas where there is a low awareness/ probability/ experience of flooding but potentially high consequences (Shaw *et al.*, 2005).

As well as targeting flood warnings to a locality, event and in terms of dissemination method, the message must also be relevant; for example, actions appropriate in a slow-rising situation may not be so in fast-rising waters.

More specific and informative warning messages were associated with greater savings and more detailed location specific warnings were also requested in focus groups conducted as part of recent research that focused on the economic benefits of flood warnings (Tunstall *et al.*, 2006a).

The literature reviewed by Shaw *et al.,* (2005, p.3) gives the following pointers to ensure effective risk messages:

- 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

- 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.

It is clear that the current approach to flood warning needs to be examined to see what extent it can and does consider these issues of difference. In particular, it will be important to understand what the key variables might be in terms of needing to provide different types of flood warning.

1.2   Background to flood warnings

This section has been adapted from the Making Space for Water consultation background paper on flood warning and forecasting, available from http://www.defra.gov.uk/environ/fcd/policy/strategy.htm . Accessed: 05/03/07

Flood warning[2] is the provision of advance warning of conditions that are likely to cause flooding to property and a potential risk to life. The main purpose of flood warning is to save life by allowing people, support and emergency services time to prepare for flooding. The secondary purpose is to reduce the effects and damage of flooding. This might include moving property to a safer location such as upstairs or putting in place temporary measures to prevent floodwater entering properties, such as flood boards or sandbags. In addition,

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[2] As defined in the *Making Space for Water* consultation background paper on flood warning and forecasting, available from http://www.defra.gov.uk/environ/fcd/policy/strategy.htm. Accessed: 05/03/07.

flood warning informs operating authorities who need to take action, such as closing floodgates or other control structures in advance of flooding conditions.

In 1996 MAFF (Ministry for Agriculture, Food and Fisheries) issued a Ministerial Directive to the Environment Agency giving them powers to issue flood warnings directly to the public. Prior to this their powers only related to the establishing of flood warning monitoring and forecasting systems and the public warning was undertaken by the police and in some cases local authorities. In 2004 the Ministerial Directive was superseded by the Civil Contingencies Act that requires the EA to "maintain arrangements to warn the public of emergencies" relating to flooding.

The existing warning service provided by the Environment Agency applies only to flooding from rivers and the sea. Some parts of the country provide a nominal groundwater flood warning service. There is no obligation on water companies to provide warnings of flooding from sewers or drains.

The degree of advance warning that can be provided is critical to the amount of action that can be taken to prevent damage. However the ability to provide a minimum of 2 hours - the standard currently used in England and Wales for river flooding, can vary considerably due to the geography of an area, the intensity of the rainfall and the type of weather systems causing the rain.

Four processes are involved in flood warning: detection, forecasting, warning, response.

1.2.1 Detection

This involves the monitoring of rainfall conditions from networks of rain gauges and weather radar and river levels. For the advance prediction of rainfall it also involves the use of meteorological observation networks and forecasting. Tide levels, wind conditions, pressure and other variables are required for sea warning and to provide advance forecasts of these, complex prediction systems are required that use global weather models.

1.2.2 Forecasting

River flood forecasting is the conversion of measured water levels and predicted/actual rainfall gathered at the detection stage to a forecast of future water levels through time. This is not a precise science and forecasting systems in use are relatively unsophisticated in the way that they can handle the complex variations that can affect the propagation of a flood. More sophisticated systems can and are being developed, although the likelihood of them meeting the expectation for precise prediction of the timing and depth of all floods at multiple different locations is low. The forecasting stage also involves determining the extent and depth of flooding at different locations and the effect that this will have for different areas of property at risk.

The lead-time of forecasts ahead of flooding is an important factor and will depend largely on the position of the flood-risk area from the head of the river. In the headwaters floods can propagate almost as soon as the rain falls or within a few hours. This allows little time to detect, issue and act on warnings and provision of reliable forecasts on small streams will be impractical in many cases. Further down a catchment there is more time to detect and forecasting will be more reliable for floods that take 6-12 hours to propagate. Floods on the largest rivers in England and Wales, such as the Severn and the Thames, can take several days to reach lowland areas. Forecasting for these areas is already good in many cases and

getting significant improvements in warning information should be possible. It is also the case that most of the larger urban areas at risk of flooding are on the middle to lower reaches of rivers so the prospect to provide warnings where the consequences are greatest is good.

On the coast the cause of flooding is usually from high tides and wave overtopping defences, either natural or built. High tides are predictable years in advance, but on their own seldom cause flooding. Flooding on the coast is usually a combination of high tide, storm surge and waves. The prediction of tides is dependent on historic records and the Department for Environment, Food and Rural Affairs (Defra) funds the UK Tide Gauge Network that measures and archives sea levels around the UK coast. Storm surges are caused by atmospheric conditions and wind action and are usually accompanied by strong winds that cause severe waves. Defra funds the Met Office to provide daily forecasts of surge and wave conditions that are used by the Environment Agency, in combination with tide levels and local knowledge, to provide coastal flood warnings.

1.2.3   Warning

Warning is the process of taking a forecast of flooding in an area and disseminating a message to those affected, advising them of the likely timing and severity. In order to do this it is necessary to have information of property addresses and a means of contacting those affected on a 24-hour basis.

Radio and television are now used extensively as a means of issuing general warnings although direct contact through the use of personal telephone calls are an important medium for communication particularly where advance-warning times are short. In recent events the Internet has become an additional source of information for flood risk residents to obtain information about warnings but this does require active participation of recipients.

In areas of particular risk, the Environment Agency can send a warning message direct to people at home or at work by telephone, fax or pager using the Flood Warnings Direct (FWD) Service. The system is programmed to send warning messages automatically to a list of contact numbers and can send several hundred messages simultaneously. All types of telephone can receive these messages, including mobile phones[3].

Some Environment Agency offices use Flood Wardens to alert the local community when a flood warning is issued. The flood warden is contacted directly by the Environment Agency, and passes the information on to neighbours. Public address, loudhailer or siren systems are used in many flood risk areas to warn the public that a flood warning has been issued in their area. This is particularly valuable in urban areas, where there is a need to alert large numbers of people as quickly as possible[4].

The warnings provided by the Environment Agency can be grouped in three types of dissemination method (Tapsell *et al.*, 2005, p.42):

- **Individual warnings**: methods that deliver a warning to an individual such as a phone call, pager, fax, flood warden, knock on door, text message.

- **Community warnings**: methods that deliver a warning to a community or group of people, such as sirens, loudhailers.

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[3] http://www.environment-agency.gov.uk/subjects/flood/826674/882909/167259/167270/?lang=_e
[4] Ibid.

- **Broadcast warnings**: warnings disseminated using broadcast methods and not delivered to an individual or community, such as Floodline, the internet, ceefax/teletext, TV, radio.

In addition, those at risk of flooding can also obtain information through personal networks and/or direct observation, for example by checking river levels (Parker and Handmer, 1998). Informal warning systems which draw on local knowledge and expertise are often in place in areas where no official warnings are provided or operate in parallel with official systems (Messner *et al.*, 2006).

> '*Such unofficial informal warnings have the advantage of being tailored to the community that receives them and being based on strong local networks and personal observation (Parker and Handmer, 1998). In practice, where both exist, there are often interactions between formal and informal warning, so that the informal system may serve to amplify the official one or may be in conflict with it (Van Duin and Bezuyen, 2000). A key factor in designing successful flood warning systems is to seek to meld together the best aspects of any unofficial warning system which may be in place (thereby hopefully gaining the cooperation and ownership of local flood plain occupants) with an official system (Parker, 2004).*' (Messner *et al.*, 2006, p134)

1.2.4   Response

Response covers not only the response by emergency services and others to provide assistance in flood events, but also the response by the at-risk community to move property, valuables and themselves out of harms way in a flood. The response by the public has in the past been underestimated as an important issue but more recently has been understood by the Environment Agency as a critical stage.

General public awareness of the risk of flooding and the consequences and how to deal with it has been very low. Public awareness campaigns have been undertaken by the Environment Agency since 1996 to engage people to understand the risk that flooding poses and what they can do to help themselves. Properties in areas at higher risk of flooding and where a flood warning service is provided are sent information by mail each year. Opinion surveys indicate that public awareness of flooding is high after winters where there has been considerable flooding reported in the media but falls off significantly even after one dry year.

1.2.5   Measuring the success of the flood warning process

The Environment Agency assess the success of flood warning using a series of factors that were adapted from a model of the economic benefits of flood warnings developed by the Flood Hazard Research Centre (FHRC) (see Tunstall et al., (2006a) for a detailed explanation of the model):

- **Coverage** -the area over which flood forecasting systems are available and dissemination systems are in place to deliver a warning. The Environment Agency is seeking to achieve 80 per cent coverage of areas at risk by 2010.

- **Reliability** - the ability of the technical systems to successfully forecast and deliver warnings to risk areas, accurately and reliably. The Environment Agency is seeking to achieve 80 per cent reliability by 2010.

- **Availability of population at risk to receive a warning** - people are not going to be available to receive warnings in all circumstances such as being on

holiday, at work or temporarily away. Improved dissemination and awareness will increase this but there will always be a percentage not available. The Environment Agency is seeking to achieve 80 per cent availability by 2010.

- **Ability of population at risk** - householders will not always be able to react and take effective action if they are elderly, infirm, young or cannot understand a warning due to language or other difficulties. Support from emergency services, neighbours or relatives can improve this but this is dependent on other factors in the chain. The Environment Agency is seeking to achieve 85 per cent ability by 2010.

- **Effectiveness of action taken** - the degree to which action taken either saves life or reduces the damage to property. This depends on the receiver of a warning taking it seriously and actually doing something to protect themselves and their property. To be most effective the receiver would need to understand the nature of the risk and to have thought through a course of action that would result in damage reduction. Flood proofing of property could increase effectiveness considerably if it makes action simpler or quicker. The Environment Agency is seeking to achieve 85 per cent effectiveness by 2010.

2 Review of flood, people and area characteristics relevant to flood warnings

Amalia Fernández-Bilbao[5] and Clare Twigger-Ross[6]

In order to provide a basis on which to target both the method and the content of flood warnings, the characteristics of a flood event, the area where it occurs and the population affected which are relevant to flood warnings need to be explored. The objective of this review is to provide an overview of different types of flood risk (*consequences and effects)*, based on the following characteristics:

- Flood type, such as slow rising, rapid onset. This will include looking at flooding from a variety of sources such as fluvial, tidal, groundwater

- Social/ community characteristics such as mobility and social variables such as deprivation indices. This may also consider other ways of segmenting the population.

- Area characteristics such as urban/rural, building type

This characterisation of flood risk into area, event and people has been used in the "Flood Risks to People" project (Defra/Environment Agency FD2317, FD2321, Risk to People Project Phase 1 and 2) and also within the Floodsite Task 10 project (www.floodsite.net) and builds on the Vulnerability policy development work (Twigger-Ross and Scrase, 2006). Similarly, Messner *et al.,* (2006, p.133) state that the potential for reducing the adverse impacts of flooding through flood warnings and actions undertaken following a warning would depend on three contextual elements:

- the nature and characteristics of the flood events and the catchment within which they occur;

- the characteristics and degree of development of the flood warning systems in place;

- the characteristics, experience, beliefs and attitudes of the public and professional agencies who have to respond appropriately to the warning in a particular event.

This approach is also consistent with recent vulnerability work: vulnerability can be defined in terms of biophysical considerations such as location, building design and personal attributes of people at risk (Twigger-Ross and Scrase, 2006).

These characteristics may act as barriers to communication or action and may affect the:

- ability to provide a warning, such as in flash-flood situations or sewer flooding;

- method of communication;

- message and expected response;

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[5] Collingwood Environmental Planning
[6] Ibid.

- timing of warning; where flood warnings cannot be issued, focus on awareness or emergency services.

This review focuses primarily on recent research commissioned by the Environment Agency and Defra in order to summarise current knowledge related to flood warnings in the UK but also to avoid duplication of efforts.

2.1   Flood characteristics

This section looks at the following characteristics of a flood event:

- source and/or flood type;

- catchment type and speed of onset;

- other characteristics such as depth, velocity and timing.

These characteristics are likely to be relevant to different aspects of flood warnings; the source of flooding and the catchment type will determine whether it is possible to issue a flood warning at all and also the time available for a warning or lead time.

Depth and velocity, speed of onset and duration will also affect the potential damages caused by the flood (Messner *et al.*, 2006) in terms of damage to property and risk to life. These characteristics should influence the content of the warning and the response sought; for example, where an event is potentially life-threatening, evacuation will have priority over, for instance, moving furniture (Messner *et al.*, 2006).

2.2   Source of flooding/flood type

Flooding can occur from one of several sources or a combination of sources: coastal, river, localised or pluvial[7], groundwater and sewer flooding. The source of the flooding will determine first of all whether a warning is issued, currently Environment Agency issues warnings for river, tidal and in some areas groundwater flooding. In Carlisle 2005, surface flooding preceded river flooding in some areas and some people received a warning after (surface) floodwaters had entered their homes. Understandably, the source of flooding is a matter of indifference to those affected by it (Messner *et al.*, 2006).

Secondly, different types of flood have different lead or response times, i.e. time available for a warning. In some cases, the lead time is not enough to issue a flood warning. River flooding arises as a result of rainfall and there is normally a significant lag time between the peak of the rainfall and the peak of the flood. This lag time is smaller in steep upland catchments than in larger flat lowland catchments. In the case of pluvial flooding, the lag time between the peak of rainfall and the flood peak is very small and flood warnings are unattainable in most cases (Balmforth *et al.*, 2006). It is possible to predict tidal surges many hours in advance permitting coastal flood warnings to be issued. Coastal flooding generally occurs at high tide so communities may have some knowledge of when flooding may occur and can be warned in advance (Ramsbottom, 2003).

Issuing flood warnings in urban areas presents particular challenges as flooding can occur from several sources, particularly as a result of extreme rainfall events (Balmforth *et al.*,

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7 This term refers to flooding from direct run-off from land or urban areas
(http://statistics.defra.gov.uk/esg/reports/housing/appendd.pdf) during or following rainfall.

2006). This was the case in Carlisle where flooding occurred from a range of sources including underground springs, drains, culverts and sewers and rivers (Environment Agency, 2005). The interactions of the different flood sources and the transmission of water through urban areas is complex and makes predictions of urban flooding difficult and uncertain (Balmforth *et al.*, 2006).

No warnings can be issued for sewer flooding which can occur as a result of the existing sewer system being unable to cope with excessive flows, or due to blockages in pipes. Sewer flooding can occur outside the building when the sewer is full and overflows occur at manholes or drains in gardens. Internal flooding occurs when sewage overflows inside of the building from toilets and drains. Basement flats are particularly prone to sewer flooding, due to lying low relative to the depth of the public sewer[8].

Sewer flooding is an upsetting experience for those affected (Research by Design, 2004) and also presents considerable risk as both local residents and emergency services may be exposed to the many chemical and microbiological agents present in sewage (Bridges, 2003). Sewer flooding can also affect a significant number of homes: of the 11,000 homes affected by the autumn 2000 floods, around 14 per cent were flooded with sewerage (1,500 homes) (Environment Agency, 2001, cited in ABI, 2004). Understanding how the Environment Agency could prepare people for sewer flooding is a new challenge.

2.3   Speed of onset/type of catchment

The speed of onset determines the time available for warning or 'response time' for particular river catchments. In large river catchments the response time is relatively long and so is the available warning time. In small steep catchments, the response time is relatively short and there is often very little available warning time (Ramsbottom, 2003).

The Environment Agency tries to provide a flood warning for areas where two hours or more of warning time is available. Thus some areas do not have a flood warning system because the available warning time is too short. Flash flooding may occur in these areas where the warning time is less than two hours (Ramsbottom *et al.*, 2003). As issuing warnings for all areas is not possible other alternatives such as awareness rising and evacuation plans need to be in place. The Environment Agency is currently investigating adequate flood prevention measures for 'rapid response' catchments.

Fast rising floodwaters, associated with small steep catchments or small urban catchments (rapid response) are potentially more dangerous than in larger, flatter catchments e.g. Boscastle. Fast rising waters can also occur as a result of breach or overtopping of a flood defence (Ramsbottom, 2003). Two main types of catchments where fatalities occurred were identified in an investigation of the 2002 flash floods in the South of France (Ruin *et al.*, 2008): small catchments (less than 20 km2) responsible for the majority of the deaths, especially of people driving their car during the event and large ones (more than 1000 km2) mainly responsible for fatalities inside houses. Warning in the sense of providing information two or more hours ahead is not a viable model for these catchments.

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[8] Thames Water 'Sewer flooding' www.thameswater.co.uk Accessed 03/01/07
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2.4   Depth and velocity

These characteristics of a flood depend on the size of the flood and catchment characteristics. Deep and/or fast flowing waters are particularly dangerous: there is a risk of falling down manholes and drains when wading in deep or fast flowing waters. The risk of building collapse or being hit by debris is also understandably higher in those situations. Driving in flood waters is also dangerous: cars become unstable when water depths exceed 0.3/ 0.4 m although large emergency vehicles can operate in depths of up to 1 m (Ramsbottom, 2003).

Rate of rise and velocity have thus implications for flood warnings; for example, for slow rising over several hours, the best response may be to move belongings and people upstairs. Fast rising or fast flowing waters can cause damage to buildings, but also increased risk from driving (a large number of flood related casualties happen in cars), evacuation may therefore be more appropriate.

2.5   Timing of the flood

The timing of the flood can be a critical factor in determining the scale of the impact. This is illustrated by McEwen *et al.,* (2002), the 1998 Easter floods occurred just before the Easter weekend, at the start of the caravan season when many summer residents had not arrived. If the event had occurred one day later, the potential for loss would have been significantly higher.

The implication from a warnings point of view is that some areas receive visitors during the weekend or holidays. These visitors may not be familiar with the area and in any case will probably not be registered to receive a flood warning. Additional methods of issuing a warning may be necessary, e.g. warn hotel or camping sites owners, restaurants, etc. Different warnings methods may be more appropriate needed during the night, for instance flood wardens or sirens. However, in some areas and big cities such as London, sirens are a habitual sound which may not lead to action.

2.6   Social/community characteristics

Recent research (see Thrush *et al.*, 2005; Tapsell *et al.*, 2005; Shaw *et al.*, 2005) emphasises that 'the public' or 'communities' are not homogeneous groups and this has implications for warnings/risk communications: '*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"* (Shaw *et al.*, 2005, p.3) and what type of warning is suited to different publics, both in terms of the message but also the media used.

At risk communities comprise people of different ages, gender, socio-economic groups and ethnicity, and often also non-English speakers, people with disabilities, including visual and/or hearing difficulties (Tapsell *et al.*, 2005). For instance, second language speakers within the community mean that other family members, friends or community leaders should be targeted when communicating flood risk (Shaw *et al.*, 2005).

2.6.1 Hard to reach[9] and vulnerable groups

Those groups which are hard to reach from a warnings point of view often suffer the greatest consequences during a flood and find it hard to recover. By issuing warnings that target these groups we would also be increasing their resilience to flooding.

Literature on disasters and hazards reviewed by Tapsell *et al.*, (2005) suggests that certain groups within populations are more exposed to disasters, suffer a higher impact from those disasters and have a reduced capacity to recover. These groups include women, the elderly, ethnic groups, lower socio-economic groups and those new to an area.

The literature also suggests that '*those people who are already socially disadvantaged in some way within societies who are particularly vulnerable in terms of being aware of flood warnings, in their ability to receive a flood warning, and in reacting appropriately to flood warnings*' (Tapsell *et al.*, 2005, p25). This is consistent with recent research by Tunstall *et al.* (2006b) which found that low-income households were less likely to receive a warning. Higher income households are often more aware of and are better able to afford a wider range of technologies, such as access to the internet (Tapsell *et al.*, 2005).

A key issue for the dissemination and success of flood warnings is the diversity of needs within the 'at-risk' population. 'Hard to reach' groups are a particular concern; these include those with visual or hearing impairments, reduced mobility, ethnic minority and the elderly (Tapsell *et al.*, 2005). Shaw *et al.* (2005) provide a list to help identify 'hard to reach' groups:

- 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 or unfamiliarity with area and customs;

- poor local economic production and employment opportunities;

- untested response and recovery capability of services or individuals;

- fragile social structure;

- individuals and communities not involved in or aware of planning processes; no or ineffective mitigation strategies.

Some groups accumulate several characteristics that make them particularly vulnerable to flooding: for example tourists because their lack of knowledge of the area and also may not speak the language. A classic example is the Big Thompson (US) flash floods in 1976 which caused 144 fatalities, many of which were tourists. People that climbed the side of the canyon survived whereas many of those who attempted to escape in cars or stayed inside buildings died (Grundfest *et al.*, 1978).

The 2002 floods in the Gard department (South of France) caused 24 fatalities. The victims were mostly elderly and/or disabled, nine of which died in their houses and drivers, five of which were drivers (Ruin *et al.*, 2008). Another five casualties were tourists and campers which indicates vulnerability of these groups (Huet *et al.*, 2003, cited in Ruin *et al.*, 2008).

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[9] [9] 'Hard to reach' from a flood warning point of view after Tapsell *et al.* (2005) and Shaw *et al.* (2005).

Another example are some ethnic populations which account for a very small percentage of the at risk population but because of the tendency of communities to live clustered together often in the poorest areas. The extended family system prevalent in some ethnic communities, e.g. Asian means that many households have both young children and elderly people under the same roof which increases their vulnerability (Robertson, 2005) and thus the importance of ensuring that these groups receive an adequate warning.

Other categories found to be vulnerable in responding to a flood warning included '*people new to an area or not previously flooded. Those who live alone were reportedly more vulnerable partly because they found it difficult or impossible to save furniture or other items and partly because anxiety levels were reported as being greater if not shared; this category included single parents with dependent children. Single householders were said to be even more at risk where there was no local network of family or friends*' (Thrush *et al.*, 2005, p.29).

The lists of 'hard to reach' or vulnerable people (above) are not exhaustive; for instance, Fielding *et al.* (2007) found that middle-aged women were more likely than any other group to take no action on receiving a flood warning.

The 'hard to reach' groups form a large minority within the population at risk of flooding; Tapsell *et al.* (2005) cite an Environment Agency survey which found that one in five (19 per cent) of the UK at-risk population have physical, hearing, visual, learning or other difficulties.

2.6.2   Awareness of flood risk and flood experience

The impact of flood risk awareness and flood experience is consistently signalled by recent research (see Tapsell *et al.*, 2005; McCarthy *et al.*, 2006; Tunstall *et al.*, 2006a) as a key factor that influences the willingness to adopt flood warning technologies and other forms of preventative measures and also respond to warnings. Tapsell *et al.* (2005, p50) found that '*previous experience of flooding can be the dominant factor which reduces an individual's willingness to adopt flood warning technology altogether*'. Pre-flood hazard awareness and preparedness have been found to be important determinants in willingness and ability to understand flood warnings and respond effectively (McEwen *et al.*, 2002). Fielding *et al.* (2007) found that those who had been flooded had more awareness and understanding of the Environment Agency's flood warning codes than those without experience. Additionally, those with flooding experience used additional methods to assess flood risks, for example by checking river levels. These findings are consistent with those of Thrush *et al.* (2005).

Awareness of flood risk is not only determined by flood experience and may be related to other social characteristics, for instance, Walker *et al.,* (2006) found that those in the lower socio-economic groups had lower flood risk awareness.

Cultural beliefs and values should also be considered; for example, some religions have a fatalistic approach to hazards and see them as acts of God, which may affect their response (Sue Tapsell, personal communication).

Communities in low probability areas pose a particular problem as they often believe themselves to be safe. There is '*generally limited experience within the Environment Agency of communicating low probability flood risk to residents and businesses*' (Shaw *et al.*, 2005). If there is no prior awareness, there is a risk that people will not heed warnings or know what to do upon receiving one.

However, prior experience of flooding does not guarantee that people will be aware of the risk. Robertson (2005, p57) argues that '*whilst experience normally leads to heightened risk*

perception, when it is tempered by the affective emotional response of feeling safe and the long intervals between floods, the perception of risk is reduced. The feeling that there are many more important things to worry about led to flood risk being attenuated. The view of white society as obsessed with worrying about trivial risks may be linked to the vulnerable socio-economic status of the communities. In a parallel to Maslow's (1954) hierarchy of needs the communities have a hierarchy of worries, they are struggling to achieve basic economic and security requirements and cannot afford the luxury of worrying about "silly little things". McEwen *et al.* (2002) also found that caravan park owners/mangers and residents had limited expectations that extreme flooding would recur. However, another interpretation of this is that they are reluctant to admit the risk of flooding for fear of losing trade (Sue Tapsell, personal communication)

More deprived communities tend to have lower levels of social capital which includes networks or connections among individuals. International research has shown that low levels of social capital are related to reduced coping capacity in the aftermath of flooding (Walker *et al.*, 2006). Tunstall *et al.* (2006a) also found that some disadvantaged groups were less likely to obtain help during a flood: *'It may be that older people, the disabled and those living alone are less linked into local support networks than others around them and therefore may get overlooked when it comes to neighbourly help. In both surveys, households with children under ten years of age were more likely to be helped by neighbours and friends than other households. It is possible that these families received help from neighbours and friends not because of their need but because of their greater connections to local social networks as compared with other needy groups'.*

Lack of social networks may also affect whether some people receive a warning, for instance from a friend or a neighbour, but also whether or not they act upon it as seeking confirmation that a threat is real happens before response to a warning (Mileti and Peek 2000). Moreover *'a message disseminated or endorsed by a trusted community leader and passed on through the social networks can play an important part in altering risk perceptions within the groups.'* (Scherer and Cho, 2003, cited in Robertson, 2005, p58).

2.7 Area characteristics

Area characteristics may include whether an area is urban or rural, or it is an exposed or vulnerable location such as a caravan park or a hospital and the type of buildings.

Urban areas have high density populations which has an impact on the number of people that need to be warned. There is also the issue of more basement flats, the presence of non-English speakers and the nature of urban flooding which as discussed earlier can have different sources and it is difficult to predict. A recent example of urban flooding is Carlisle.

Urban areas are often characterised as low probability/ high consequence in terms of flood risk, that is, low probability of flooding but potentially catastrophic consequences because of the density of the population. Awareness of flood risk in urban areas is also usually low and there are communities who do not know they are at risk of flooding (Twigger-Ross, 2005).

The type of building and characteristics of properties can sometimes explain poor response on receipt of a warning; for instance, small properties or single storey ones which may offer little storage space and no upper floors where to move people and property out of the way of a flood (Thrush *et al.*, 2005). Basement properties, car parks, low rise commercial and industrial properties, bungalows, mobile homes, busy roads, parks, single storey schools, campsites, are considered 'high risk' buildings in the 'Risk to Life work' (HR Wallingford *et al.*, 2005).

Caravan parks are considered a highly exposed floodplain use and their residents have specific requirements in terms of flood warnings, particularly as their residents may have limited knowledge of the area and may not be aware of flood risk. Caravan parks are often located in floodplain environments that have lower land costs and high aesthetic and recreational value (McEwen *et al.*, 2002). There are several examples of loss of life in campsites: for example, in 1996 an intense storm occurred over the Arás catchment near Biescas in the central Pyrenees. Eighty-seven people were killed as a result of the subsequent flood of a campsite (White *et al.*, 1997). Five of the 24 victims of the 2002 floods in the South of France were tourists or campers (Ruin *et al.*, 2008). As well as vulnerability of the location, nowhere to seek refuge , the presence of tourists with limited knowledge of the area may be another factor to explain loss of life.

3 Risk Communication and Risk Perception Review

Gordon Walker[10], Elham Kashefi[11] and Hugh Deeming[12]

3.1 The changing context for risk communication

Flood warnings, as specific examples of risk communications, are being carried out in the UK against the backdrop of changes in demographic patterns, communication practices and norms, and awareness of and expectations about risks. If flood warning is to be carried out in effective ways that are robust for the future as well as the present day, these ongoing dynamics need to be factored into the development process. As will be emphasized it is crucial for any form of risk communication that questions of context are understood and integrated. Some key elements of change that are relevant to flood risk, vulnerability and communication about flooding are:

The UK population is ageing. Over a 30-year period (1971-2001), the proportion of people aged 65 and over has risen by three per cent while the proportion of people under 16 has fallen by six per cent. Even greater increases were seen over this period for people aged 85 and over.[13] The proportion of people aged over 65 is projected to increase from 16 per cent in 2004 to 23 per cent by 2031.[14] At the same time, many of the older population will be living on their own (60 per cent of women aged 75 and over who live in private households lived alone in 2002, compared with 29 per cent of men of the same age)[15].

The UK population is becoming more multicultural and multiethnic with ongoing patterns of migration as a result of both asylum seeking and economic migration from other parts of an expanding European Union. Since 2004, when the labour markets were opened to new EU states, the British Isles has seen the biggest wave of economic migration, with Poles being the largest single group (Salt and Millar 2006). In 2005, there were over one and half million foreign migrants working in the UK (Salt and Millar 2006). Patterns of change are differentiated across the UK, some remaining relatively static in social and demographic terms, others far less so.

Income inequalities are continuing to widen. In 2004-5, overall 16 per cent of the population in Great Britain lived in low-income households,[16] while the figure was about 40 per cent for people from ethnic minorities.[17] The figures for absolute amounts that households have gained over the past decade after allowing for inflation show that the higher the household income, the bigger the increase they have experienced. For example, the poorest have seen an increase of £10 a week, whereas the richest have seen an increase of £320 a week. "*As a result, three-quarters of the increase in income over the last decade has gone to households with above average incomes, and a third has gone to households in the richest tenth*" (Palmer *et al.,* 2006).

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[10] Lancaster University
[11] Ibid.
[12] Ibid.
[13] http://www.statistics.gov.uk/cci/nugget.asp?ID=949
[14] http://www.statistics.gov.uk/cci/nugget.asp?id=1352
[15] http://www.statistics.gov.uk/cci/nugget.asp?id=1265
[16] http://www.statistics.gov.uk/cci/nugget.asp?id=333
[17] http://www.poverty.org.uk/summary/key%20facts.shtml

Innovations and diffusion of communication technologies are continuing. The everyday use of mobile phones and the internet are radically changing the speed, frequency, currency and availability of multiple sources of information. The media is increasingly having to re-evaluate established methods of working and communicating. Some people are caught up in the wave of change in communication expectations, whilst others are being left out. For example, 51 per cent of adults with an income of £10,400 or less have never used the internet, and only 57 per cent of all households in Great Britain are able to access the internet from home (ONS, 2006). For the over-65s, 82 per cent are said to have never used the internet, let alone have access at home (ONS, 2006).

Established and new risks continue to be public and policy concerns. Messages about established and new risks are continually being received, in particular through the media – terrorism, transport safety, gun crime, climate change to name but a few - and other forms of warning about specific hazards and how to respond to these are being issued, received and interpreted. The public expectation that the government and other public and private institutions will act reasonably, responsibly and effectively to protect their safety is still firmly in place – although counter-discourses about overprotection and the nanny state argue the need for individuals to make their own risk judgments and decide on their own protective actions. Trust in the capacity of public institutions to manage risks has been challenged through a number of public controversies.

3.2　Risk communication research and practice

Risk communication research and practice has been explicitly developed over the last 25 years (although it clearly has a much longer 'unlabelled' history). Risk communication has been pursued and investigated in a diversity of policy and interest areas each concerned with different types of risk. This militates against making simple generalisation of findings and identification of best practice from across the literature as a whole. Examples of key risk areas in which communication practice has been researched include:

- natural hazards (flooding, earthquake, landslide, volcano, tsunami);

- technological risks (chemical, nuclear, biological);

- health risks (resulting from different lifestyles and behaviours, and from treatments, operations, drug side-effects and so on);

- transport risks (road safety, driving behaviour, airplane procedures);

- food-related and consumer risks (BSE, avian flu, salmonella and others).

Understanding the context and setting in which risk communication is being practised and researched is important for then interpreting and utilising research findings and learning from practice. For the five areas of risk communication activity listed above there are, for example, key differences in the:

- nature of the risk (severity, immediacy, frequency, ubiquity);

- motives for risk communication (see next section);

- degree to which behaviour change is or isn't being sought;

- timing and timescale of communication;

- institutions who are seeking to communicate;

- who is being communicated with;

- mechanisms of communication;

- assignment of responsibilities for risks and blame when things 'go wrong'.

It is now widely accepted that 'risk' is not one consistent and agreed phenomenon which can be measured, assessed and communicated in universal terms. For example, Slovic (2003) has written of risk assessment as an inherently subjective process, an exercise in power, where "*danger is real but risk is socially constructed*".

The field of risk perception research overlaps with risk communication research and directly predated and informed it. As with risk communication, the field of interest for risk perception research is broad and wide ranging and research findings and conclusions need to be carefully evaluated. There are different approaches to researching risk perceptions which shape the type of conclusions and insights that are produced. There is continuum ranging from micro-level psychological studies, often conducted in laboratories and/or via psychometric questionnaires (for example looking at the relevance of individual personality characteristics, world outlook, beliefs and attitudes, or dynamics of decision-making on risk perception) through to macro-level studies which focus on the uncertain nature of scientific knowledge and information, and the political nature of institutional responses to hazards.

Social scientists have increasingly argued that there are problems with studying individuals 'out of context' in isolation from social, economic and political factors that impact on perception, decision making and courses of action. In this review we have concentrated on literature and evidence that has been produced by more contextual research, investigating how people have responded to risk communications in particularly settings, rather than that which has treated risk in more abstract terms.

3.3   Multiple roles of risk communication

Risk communication has multiple roles shifting with the context and in particular the motives of those doing the communication. Within a particular area of interest, there can be multiple and sometimes conflicting roles at work – these can be implicit in much writing about risk communication rather than clearly identified and elaborated (Sandmann 2006). Within the broad area of risk of 'disasters' (of natural or technological origin) there are four key roles that risk communication can serve:

- *Raise public awareness and encourage protective behaviour before disaster events.* Much of the focus of communication around natural hazards is on raising public awareness and developing a heightened level of community preparedness and resilience before disaster events (Mileti *et al.,* 2004).

- *Educate people on how to behave during disaster events.* The need for prior education on protective behaviour has been increasingly stressed within disaster preparedness and mitigation activities. This is reflected in the requirements for public information laid down in European directives on the management of major chemical accident hazards and nuclear risks (Walker *et al.,* 1999).

- *Reassure the public about risks and reduce concerns.* While some strategies focus on raising awareness of potential threats, others are looking to do exactly the opposite. For technological risks, there is a long history of attempts to minimise risk and reassure public anxieties, extending back to the early days of public concerns over the risks from nuclear power (Royal Society, 1992).

- *Warn and alert the public of impending or current disaster events.* There is an important and long-established role for warning systems across all hazard types.

For flooding each of these roles or objectives for risk communication can be relevant and exercised at different times and in different contexts. The intention to provide reassurance and diminish concerns is perhaps less obviously central, although there can be explicit and implicit reassurance in messages about institutional capacities and competences to manage and respond to flood situations; and after floods there can be a need to reassure, for example about health concerns from pollution. In raising awareness about flooding there is a need to balance with the possibility of making people 'excessively' anxious and stressed as a result.

Roles 1, 2 and 4 are all interconnected e.g. a high level of general awareness about flood risk, may improve understanding and reception of messages about what to do during a flood event; which may then enhance (from the flood managers perspective) responses to flood warnings when floods do occur. In this respect it is important not to consider the time-specific actual enactment of a flood warning in complete isolation from the longer term processes of awareness raising and education (see Section 6 below).

3.4   Models of risk communication

Traditionally risk managers, including those involved in flood management, have tended to have a simplistic view of how risk communication objectives can be achieved (Parker and Handmer 1998), based upon a straightforward signal-transmission-receipt model of information transfer. In this model the focus is on the communication initiative itself - the leaflet, the warning system, the advertising campaign. There is assumption at work, which assumes that people will respond to the information and the physical characteristics of the risk in a straightforward manner (Cvetkovich and Earle 1992).

However, what the body of risk communication research has shown is that we are dealing with a far more complex situation in which the notion that information once provided, is received, 'inwardly digested' and acted upon in a straightforward manner is naive and unrealistic. In the context of flood warnings, Parker and Handmer (1998) note that:

> '*prediction agencies have often simply assumed that their forecasts are conveyed to those at risk, that local needs are met and that appropriate adaptive behaviour ensues. There is little evidence that this has been the case*'.

Most researchers therefore now work with a far more complex model. Here 'official' risk communication information is filtered, evaluated, interpreted and set alongside other sources of information which people draw from their own experiences, their immediate senses, their everyday discussion with friends and family in their particular social world and from the media. The *social* context of risk communication is significant, that is, the social space in which technical information about risks are 'received', understood, interpreted and acted on such as social networks, economic resources, history of relations between communicator and recipient, and their respective ideologies (Johnson 1987).

A wide range of research has concluded that specific risk communication initiatives have to be placed in the context of other communications and that there is a complex interaction between the characteristics of the message and sender and those of the audience (Mileti *et al.* 1992, Mileti and Peek 2000, Rohrmann 1998). For example a conclusion from Mileti and Peek's (2000) research on warnings of a nuclear power accident was that:

'Public response to risk communication is not the simple result of being informed about the risk, but instead is the result of a somewhat complex yet understandable set of social psychological intervening factors.'

A further development in risk communication perspectives has been to reject the narrow conception of the public simply as potential victims of disaster events, who need to be managed and educated by expert institutions. A broader conception recognises that people, as individuals and collectively as communities, have expertise and resources to bring to the process of disaster management decision-making, to the establishment of emergency preparedness and to the enactment of disaster response (Cvetkovich and Earle 1992). The implications for risk communication from this broader conception of the public are considerable, implying a more *collaborative relationship* between the disaster management community and members of the public and a *two-way* rather than only one-way process of communication. This is already reflected in a range of initiatives taken up by the Environment Agency (e.g. Richardson *et al.* 2003) as part of an emerging policy rationale to encourage citizens to be "initiators and creators of alternative schemes rather than be expected to be mere receptors of experts' plans" (Speller 2005), to accept their share of the responsibility and to take an active role in risk management at the local level.

3.5 Conclusions of risk communication research

Whilst, for the reasons already outlined, it is necessary to guard against the appropriation of checklists of risk communication 'best practice', it is possible to synthesise some key conclusions from risk communication research – conclusions which can be applied to specific contexts of disaster and flood risk management. Incorporating more complex models of communication four key conclusions are:

Risk communications are not 'passively' received; they are filtered, actively interpreted and evaluated in a social context.

The communication of risk information does not necessarily produce the intended or expected understanding or response. In the case of disaster warning messages, research has repeatedly shown that rather than producing an immediate protective response, initial warning messages set off an intervening process of perception formation, interpretation and search for confirmation that the threat is real (Mileti and Peek 2000). Psychological studies have considered the gap between expert risk analysis on the one hand, and public perceptions of risk and consequent action / inaction on the other. A variety of factors have been identified as affecting perception of risk information and how the public may form judgments about particular risks. For example, risk perceptions are known to be influenced by the occurrence of catastrophic or high profile events, regardless of scientific evidence which downplays their likelihood (Slovic *et al.* 1982; Wharton 1992; Margolis 1996). Similarly, if a *recent* incident can be recalled, then it is more likely to perceive as a high probability event (Sunstein 1999). Analytical or rational decision-making about risk is now also known to be affected by *emotions* towards the risk, such as fear, dread or worry (Slovic *et al.* 2002). These studies, and others, have shown that risk perception is affected by memory, personal experience, emotional state and other factors and that risk information is not received in an 'untainted', objective, value-free way.

Trust in the source of communication and the credibility of the communication medium are crucial in influencing how risk communications are received.

Communication without trust and credibility is likely to have very little impact (Renn and Levine 1991, Fischhoff 1998; William and Noyes 2007)) particularly where people are being asked to, for example, evacuate an area at risk or pay for expensive hazard protection measures. Lofstedt (2003) argues that trust is the 'most important component of risk communication' with the existence of trust/distrust relating to three core criteria of fairness, competence and efficiency. Trust in the context of risk communication has been defined as "a person's expectation that other individuals and institutions in a social relationship can be *relied on in ways that are competent, caring and predictable*" (Botterill and Mazur, 2004, quoting Beckwith *et al.*, 1999). Perception that an event was the result of managerial incompetence, and may therefore signal the risk of future failures, has been identified as a determinant of distrust and of a critical public response (Freudenburg, 1993). Similarly, where disaster warnings have been issued without the threat then being realised (the 'cry wolf' syndrome), research has shown that only by openly explaining why mistakes were made can trust in future warnings be maintained (Mileti and Peek, 2000). Conversely, high levels of trust in those responsible for managing a hazard have been associated with lower levels of perceived risk and an increased perception of safety (Fitchen *et al.,* 1987).

There is growing evidence of declining trust in public institutions and scientific experts in the UK (Petts and Leach, 2000; Trettin and Musham, 2000; Parliamentary Office, 2001; Garvin, 2001). Lack of trust is believed to be partly due to disagreements between experts and scientists themselves and partly because scientific assessments keep changing (Hood *et al.* 2001). This lack of trust clearly impacts on how people engage and interact with risk information they receive from those sources.

There are multiple publics to be communicated with, differentiated in all sorts of ways, for example by culture, age, ethnicity, knowledge, awareness, disability, experience and so on.

Whilst the term 'the public' is widely used, research has shown that it should not be considered as a homogenous mass, but rather as many overlapping and different social groups each with particular risk information needs, concerns and evaluations (Walker, 1999). Different publics respond to risk communications in different ways (Drabek, 2001), with a range of social, psychological and situational factors.

Risk communication takes place between different publics or parts of the community in an informal way, beyond the formal instigation or control of risk managers.

A range of research projects has identified the significant role that unofficial or informal communication and warning systems can play (Walker *et al.* 1999, Handmer 2001, Drabek 1998). These may emerge where no formal communication mechanisms have been put in place, but also exist alongside and in competition with formal channels. In the latter situations the informal may be of more significance than the formal in shaping the ways in which people respond to hazards and threats (Parker and Handmer 1998; Dow and Cutter, 2000). For example, Mileti and Fitzpatrick (1992), in an analysis of public responses to earthquake hazard information, argued that informal networks of social cues and interaction with other people had a central role in providing multiple reinforcing sources of risk messages.

3.6   Hazard warnings and behaviour

There is a specific body of research focused on hazard warnings and behaviour. Much of this work has been undertaken in the US, where multiple forms of risk are experienced and warnings for floods, hurricanes, tornados and avalanches are regularly issued. As stressed

earlier, whilst these are all forms of 'natural hazard' they are also different forms of risks, with varying characteristics of severity, frequency, ubiquity, controllability etc…. Whilst therefore considering the 'hazard warning' literature as a whole is useful and relevant, differences between risks and context (the US is different from the UK in many ways) also need to be taken in account.

Reviewing the literature two models of the process of responding to a warning have been put forward. Lindell and Perry (1992) identify a generalised four-stage process in which those at risk in turn ask four questions:

1. Risk identification: Does the threat exist?

2. Risk assessment: Is protection needed?

3. Risk reduction: Is protection feasible?

4. Protective response: What action to take?

Mileti and Sorensen (1990) have a more sophisticated sequential model of six steps:

1. Hearing the warning

2. Understanding the contents of the warning message

3. Believing the warning is credible and accurate

4. Personalizing the warning to oneself

5. Confirming that the warning is true and others are taking heed

6. Responding by taking a protective action

A review by Sorenson in 2000 identifies the key findings of this body of work in the US – much of which has focused on decisions of whether or not to evacuate and take shelter. Table 2, summarizes key factors identified as affecting responses to hazard warnings. Whilst the extent of the list of factors in Table 2 is striking, and highlights the complex ways in which responses to warnings may be shaped, the specific relationships need to be treated with caution - the column 'level of empirical support' indicates the need for caution, but more fundamentally the summarised form of this table does not distinguish between the types of hazards, settings or places that are involved and different research approaches may have been taken across the studies that have been drawn on.

Sorenson (2000) also identifies *six myths* held by emergency planners in the US which he believes impede the development of effective warning systems:

- Myth 1: The public panics if given information about an impending disaster

- Myth 2: People will be overwhelmed with too much information

- Myth 3: People will not respond if there has already been a false alarm

- Myth 4: One spokesperson from one source is what the public needs

- Myth 5: People take action as soon as they hear a warning

- Myth 6: People will always follow recommendations given in warnings

TABLE 2. Major Factors Covarying with Warning Response

Factor (1)	Response due to factor increase (2)	Level of empirical support (3)
Physical cues	Increases	High
Social cues	Increases	High
Perceived risk	Increases	Moderate
Knowledge of hazard	Increases	High
Experience with hazard	Mixed	High
Education	Increases	High
Family planning	Increases	Low
Fatalistic beliefs	Decreases	Low
Resource level	Increases	Moderate
Family united	Increases	High
Family size	Increases	Moderate
Kin relations (number)	Increases	High
Community involvement	Increases	High
Ethnic group member	Decreases	High
Age	Mixed	High
Socioeconomic status	Increases	High
Being female versus male	Increases	Moderate
Having children	Increases	Moderate
Channel: Electronic	Mixed	Low
Media	Mixed	Low
Siren	Decreases	Low
Personal warning versus impersonal	Increases	High
Proximity to threat	Increases	Low
Message specificity	Increases	High
Number of channels	Increases	Low
Frequency	Increases	High
Message consistency	Increases	High
Message certainty	Increases	High
Source credibility	Decreases	High
Fear of looting	Decreases	Moderate
Time to impact	Decreases	Moderate
Source familiarity	Increases	High

Source: Mileti and Sorenson (1990) quoted in Sorenson (2000)

What is clear from the research evidence is that there is no 'objective' process which guides how members of the public react to a warning message – people may move through the six steps identified by Mileti and Sorenson in different ways. Even though the same message may be heard, different people may reach a different conclusion over what they hear dependent on their perceptions and what they believe to be true (Mileti and Sorensen, 1990). An individual's risk perception can affect his/her response to a warning in a variety of ways. Drabek has, for example, found that women are much more likely to display greater

adaptive response to warnings than men, despite the fact that women are generally less hazard aware (Drabek, 2000). An optimistic bias of perception can mean that an individual doesn't personalise the warning information effectively. Under this bias, people would be aware of the hazard but would feel that it will affect others more than themselves (Spittal *et al.*, 2005; Klein and Weinstein, 1997).

Perceptions built through the *availability* of information, such as prior experience with a hazard, can result in effective actions being taken to reduce damage; for example, communities which suffer regular flooding can develop a 'disaster sub-culture', whereby upon receipt of a warning the community will act together to ensure that each others' property is protected from inundation (Parker and Handmer, 1998). Availability can, however, also be limiting in developing a response strategy, being built upon the experience of a sequence of irreproducible events rather than through the analysis of a set of independent observations as would be required by the laws of probability (Berstein, 1996).

The experience of 'false' alarms or 'near misses' can be beneficial in developing response strategies and in familiarising the public with what could be expected of them (Gruntfest and Carsell 2000); however, they can also ingrain poor responsive practice. Trial and error learning, the evolutionary process whereby people naturally learn to repeat the actions that invoke positive results and shy away from those that impact negatively, takes no account of near misses; for example. if an individual has experienced a number of floods which didn't quite rise above his/her home's doorstep then the natural tendency will be to respond as though the next flood won't rise any higher either. Therefore, precautions will only be taken relevant to this level of threat; near misses in this sense train people to be prepared for the worst 'not' happening (Messner and Meyer 2006; King 2000).

The elderly and the disabled need to be considered explicitly in warning strategies during emergency situations. These social groups, although by no means homogeneous entities, may or may not be able to hear and personalise messages effectively. Additionally, their ability to respond appropriately is more likely to be constrained by their physical condition. The elderly and others can be socially isolated within a population and therefore may not receive warnings or may not receive them in a fashion timely enough to elicit an effective response (Drabek, 2000).

Thrush *et al.* (2005) identified children caring for dependent adults as being particularly vulnerable during emergencies. In a more traditional family context, however, research suggests that it is much more likely that adults will evacuate hazardous areas if children are present (Peek and Fothergill, 2006). Families will also tend to delay an evacuation decision in order that all kin members are gathered (Drabek, 2000), but a male household member may stay behind to protect a family's assets despite the severity of a hazard prediction (Rodriguez *et al.*, 2006).

Although some myths suggest that people will panic in emergencies, that looting will occur and that the public will be helpless and dependent on the authorities, there is strong evidence to suggest that this is not the case (Helsloot and Ruitenberg, 2004). Disaster situations have repeatedly been found to elicit more pro-social than anti-social behaviour; Rodriguez (2006), for instance, documents the emergence of a number of informal groups who took it upon themselves to carry out rescue and recovery duties in their neighbourhood in the aftermath of Hurricane Katrina. In relation to looting, Barsky *et al.* (2006) blames the way in which the media frames appropriating behaviour (taking property owned by another to use for emergency purposes) as theft (dependent on the ethnicity of the appropriator) and that it should be acknowledged that it is more normal for criminal activity during a disaster to actually reduce relative to pre-existing levels.

The role of *pre-event awareness raising and education* and how that shapes responses to actual hazard events is not entirely agreed. Many commentaries see it as essential to improving responses to warning messages. However, Mileti *et al.* (2004) state that:

"*Although many of the principles known about how to effectively communicate hazard to the public apply to both education and warning, they are different…There is also only a limited relationship between them. Public response to warnings is much more the result of the information that people have access to during the warning period than anything else, including pre-event public education. Prior public education can "prime" people for response in some future warning, for example, by educating people about the location of evacuation shelters.*"

A number of studies of the public reception of risk communication information provided under the Seveso Directive requirements have found only partial recall of guidance provided on how to behave in the event of an accident, with local people making judgements about the worth of the information they receive, their need to retain it and in some cases actively questioning and criticising the instructions given (Walker *et al.,* 1998; Jupp and Irwin, 1989; Wynne, 1990). For example, after a night-time explosion at a refinery in France many local residents got up and walked towards the refinery to see what was happening, despite having received guidance that they should stay indoors. Residents later observed that staying indoors would have given them little protection as their windows had already been shattered by the explosion blast (Lalo, 2000). Similar patterns of separation between individual views and behaviour and official guidance have been observed across different natural hazards (Turner, 1995; Penning Rowsell *et al.,* 2000; Dow and Cutter, 2000; Mileti and O'Brien, 1992; Whitehead *et al.,* 2000; Dibben and Chester, 1999).

The research insights on responses from the research hazard warning literatures have generated a range of recommendations as to how hazard warning messages should be designed and carried out to become more effective

Drabek (2000) suggests seven factors which need to be considered when delivering a warning message. These in a more practical way pick up on various of the points reviewed above:

Credibility: if there are doubts about the credibility of source then the message will be ignored.

An official source: people are less likely to respond if the source is perceived as unofficial or if the source is regarded as untrustworthy (Fordham & Ketteridge, 1995). In order to enhance the trustworthiness of messages it is suggested that agreement between multiple official agencies over the severity of the situation should be conveyed to the public.

Clarity: Warnings must be worded in clear understandable language without the use of jargon.

Consistency: The message, or messages, should be consistent; inconsistencies, such as different message sources giving different estimates of the response time available, produce confusion and could encourage people to ignore the message.

Precision: The message should be specific in detail e.g. a road name spelt wrongly can neutralise the warning effect.

Repetition: multiple messages will evoke more timely responses.

> **Confirmation:** research over the past decades has found that the first thing a person does upon receipt of a message, wherever it comes from, is not to respond to it but to seek to confirm the message's authenticity and the appropriateness of the actions for which it calls

In order to address the need for confirmation, many warning systems now incorporate both direct and indirect communication measures (Parker, 2004). *Direct measures*, such as a local warden or an automated voice messaging service, give explicit information directly to anybody present in the predicted impact zone. *Indirect measures*, such as national or local news media act to reinforce the salience of any direct warning received. Indirect messages also have the potential for an extra benefit.

Despite the fact that these messages are heard by many people who do not need and who are not expected to take responsive action, in the modern era of widely dispersed social networks it has been noted that the decisions of those at risk have been influenced by friends and relatives who live out of the area but who have heard the message and encouraged the person to take the threat seriously (Drabek, 2000). If complied with, these factors can reduce the publics' reticence to respond because even though their attention span is known to be short in relation to advertising media, during the run up to a hazard event people are 'information hungry' and the inclusion of all relevant information in a well structured official message will reduce the potential for individuals to seek confirmation from unofficial sources (Mileti and Sorensen, 1990).

4 Value modes strategies applicable to 'flood issues'

Chris Rose[18]

A wide range of profound social and psychological communications issues arise in evaluating and analysing, preparing for, mitigating, avoiding, warning of, dealing with and recovering from floods. These include responses to

- the unknown
- identity, belonging community
- loss (emotional, social, physical)
- fear, anger or powerlessness
- trust and power held by others
- dilemmas and decision-making
- perceiving, judging and planning or not
- the past and the future
- forces beyond our control
- problems of cooperation or coordination
- comprehension and conceptualisation of components of 'risk'
- sense of place and personal location
- sense of agency, competence, capacity.

As such, floods raise non-technical communication challenges which have nothing much to do with water or engineering, or even economic costs and benefits. Instead, these factors are to do with people, rather than floods themselves. So to understand how best to deal with these in communications strategies for the Environment Agency, we need to start with people.

The above list, though probably far from exhaustive, comprises factors which can be readily observed in accounts of flood events, reports of consultations and anecdotal accounts of the work of the Agency and others in the field. These factors clearly operate at a deeper psychological level than 'opinions' or 'attitudes', indeed they also operate below or behind the level of behaviours. 'Value Modes' is one tool for, mapping and understanding such factors, in the form of associated psychological needs or values which drive behaviours.

It is well established that information cannot[19] be used to drive behaviour change, and the basis of most qualitative research strategies used in commercial applications (such as retail)

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[18] Campaign Strategy
[19] In 'value mode' terms there is one group where this may in fact happen – the 'concerned ethicals', but they represent only a small section of the population and this would apply only to certain types of information.

is that stated opinions tend to be moulded by actual behaviours, not the other way around. In other words we adopt views which explain or are consonant with our behaviour, even if the topic appears to be one of simple fact. The reasons we do this are multi-faceted and may include maintaining our self-image, but all boil down to being driven by values.

The utility of the Value Modes system is that it enables us to 'map' such values in ways which:

- are consistent across time and space (such as between groups, communities, countries, with a database built over decades);

- can segment the population into a number of (normally three or 12) sub-groups;

- can be correlated to varying degrees of confidence with demographics or socio-economics, including behaviour-based data such as the MOSAIC system[20];

- apply to individuals, relationships or group dynamics;

- are psychogeographically dynamic – the way any one of the 12 or three segments affects the rest is well established;

- are temporally or developmentally dynamic – the tendency for individuals to move one way through Value Modes is known, while institutions tend to move in the opposite direction

- produce quantitative results.

Value Modes analysis is useful in planning strategy, particularly where the aim is to change or reinforce behaviour, for example in purchasing, or in social interaction, which could be attending events or responding to flood warning systems, or taking action in response to a flood. It may come into play after or before other segmentations, such as behaviour based or economically based systems. In terms of changing or reinforcing behaviour it is more useful than knowing existing behaviours because it deals with the causes of behaviour, and it is more useful than asking 'opinions' because these are often largely driven by behaviours.

The present Value Modes system, run by CDSM (Cultural Dynamics Strategy and Marketing) draws on a database of responses from some tens of thousands of people to over 5,000 questions. These questions are asked in a number of different forms and cycles to eliminate, so far as possible, cognitive effects generated by the process of asking. From these, some 394 questions are used to create the (UK) value modes map, a statistical representation in map form (see below) on which three main 'Maslowian segments' are identified. Within these, four value modes or sub groups are identified (see below). Each 'dot' on the map represents a cluster of five to six statistically linked questions, forming a total of 70 attributes.

The origins of the clusters used in the map go back to social value groups and other previous segmentations looking at needs below the level of behaviours, which were found to broadly correlate with Maslow's Hierarchy of Needs: SD (sustenance or security-driven), OD (esteem-driven or outer-directed), and ID (inner-directed) groups or life stages. CDSM has developed the system to identify how people may move, as their life changes, across the map. As social processes occur, the dots on the map move. For example since the 1970s, 'ozone friendly', which represents concern for 'environment', has been observed to shift from the extreme bottom right of the map (a place strongly associated with IDs), to almost the

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[20] Value Modes typology is broadly not found to correlate with some psychological measures such as the factor system of MBTI – reflecting the fact that although it is a usable, useful segmentation it does not mean that everyone 'in a box' is the same in interest, personality or behaviour

centre (where it is a norm, something shared as a value by all groups but no longer controversial or particularly remarkable because it is so widely accepted). Thus, the social picture depicted on the map is itself dynamic over time.

A feature of the map is that 50 per cent of the data – and 50 per cent of the people – lie in the central half of the map. These attributes are the most normal, hence uncontroversial and least likely to form part of any social discourse prolonged by strong disagreement. It also means that the six groups which occupy this part of the map are relatively similar to one another in many respects. People here will tend to have less strongly held views, be less 'bothered' by life in general (and for example, be less likely to vote), and because they are 'mushier' in terms of values, be less useful to engage in a communications strategy. These groups are generally led in terms of aspirations or reflexes arising from values, by the adjacent groups on the outside of the map. It is the outer six groups who are generally most worthwhile targeting in communications, because the others on the inside will follow them.

Similarly, the inner-directed segment (termed 'pioneers' by CDSM) covers the innovators of society: they start new behaviours, embrace change, try out new things, set up organisations, start initiatives. If these look like they might succeed, they are taken up by the prospectors or the ODs (outer-directed). However while the behaviours are the same, the motivations are different. For example, pioneers may be doing something new because of ethical reasons or simply because it's fun. Prospectors will be doing it because it brings esteem from others or confirms self-esteem: it may be cool, fashionable or clever. In brand development terms, prospectors are the 'early adopters' following pioneer innovators.

Once the other two groups have adopted a behaviour, the security-driven (SD) group, termed 'settlers' by CDSM, may follow suit. The behaviour is then 'normal' (everyone does it, in so far as it is going to be adopted).

So Value Modes create a map of motivations but they are also dynamic. Communications or marketing strategies can make use of several different dynamics.

- Pioneers lead, prospectors follow and finally settlers adopt new behaviours.

- These behaviours are adopted for different reasons and only if the right rewards or stimuli are present. You cannot get a prospector to adopt behaviours for pioneer reasons, for example (so for instance, campaigners or politicians who are dogmatic about why something is done will not be as successful as those who allow people to join in a behaviour for different reasons).

- People move from settler to prospector to pioneer – this is the basic path of change noted by Maslow. Typically, a person ends up in the same Maslowian segment or one away from where their parents were (we have never tested this in terms of the 12 value modes, but can assume they could be up to four modes on from parents).

- Organisations move from pioneer to prospector to settler, because they are almost invariably started by pioneers on their own terms. Pioneers are risk-takers and prospectors are not (though they may gamble). The uptake curve then comes into play and the institution is colonised by prospectors. Without their influence and success-seeking culture, it is unlikely to grow. Eventually the settlers join and apply a brake on change, which they generally dislike.

- The value modes course open to individuals is to move from 'roots' to 'smooth sailing', to 'brave new world', to 'certainty first', to 'golden dreamer', to 'happy follower', to 'now people', to 'tomorrow people', to 'transitional', to 'concerned ethical', to 'transcender'.

- This course weaves in and out of tension and acceptance: tension because there are conflicting needs within someone or a conflict with the world, or acceptance because the world seems ok, the feel they 'fit' with it.   Tension modes lie on the outside of the map: roots, brave new world, golden dreamers, now people, concerned ethicals, transcenders.   Acceptance modes lie around the centre: smooth sailing, certainty first, happy followers, tomorrow people, transitionals, flexible individuals.

- Many of the value modes have affinities to each other, mostly to neighbouring areas on the map, although the course which links them is often longer: in relationships and social interactions, Value Modes can reach across like neighbours over the garden fence, and get along.

- Within a value mode, any two individuals are likely to be at different places. To some they may seem similar but to others they look very different, reflecting the priorities set by needs and drivers around them. This is revealed in the Higgins Test which maps any two individuals on the map in a detailed 1,000 x 1,000 grid.

- Because people may agree about a behaviour (such as environmental protection) but not about why it is right, there is an ever-present potential for a "log-jam of violent agreement". This is an inherent risk in government attempts to stimulate a national debate, or, for example, in consultations.

4.1   Basic strategies

1.   Locomotive

Anything new has to start with the pioneers. To get uptake by the prospectors, some sort of 'success bridge' is needed. This can be endorsement by an esteemed person; adoption by an esteemed (premium) brand; communication via an esteemed channel (popular TV programme); winning rewards (such as a prize); or acknowledgement in the media that this is 'the new thing'.

Do the flood-related needs of the Environment Agency require any new behaviour?

2.   Matching motivations by segment/value mode for specific actions

Propositions can lead to particular behaviours if they are targeted at people by matching the values in the proposition to the values that the group holds. For example, joining local action on flood preparation might appeal to prospectors if it involves being lauded/rewarded, to settlers if it protects tradition, identity or guaranteed belonging, and to pioneers if it benefits the whole community.

Some advertising campaigns - NTL and Levis are examples - have sold identical products with differentiated 'pitches' on this basis. This can be done on a face-to-face, door-to-door basis or via other channels, and could also be applied to flood issues/mechanisms, for example by emphasising the continuity of local identity and 'learning lessons from the past' to settlers; by doing it better for you, your property and your family for prospectors; and making an ethically driven contribution for pioneers.

Channel segmentation can be used to reinforce this. National newspapers segment quite strongly along Maslowian segment lines, and some social venues do so as well, because people like to socialise with people like themselves. Golf clubs and country clubs are likely to attract prospectors, whereas locally defined clubs and societies are likely to be trusted by settlers. Pioneers are likely to be over-represented amongst users of new networks.

These approaches will generally be more successful if the product or action sought is also differentiated. For example, a community flood scheme could be designed to have three different roles suited to settlers, prospectors and pioneers, with differentiated benefits.

3. Communication segmentation to avoid log-jamming in iterations

Where a party initiates a debate with the intention of reaching a consensus on a way forward, the log-jam of violent agreement is a perennial hazard even if participants agree on the proposed action.

The best way to avoid this is to organise the process so that like-discusses-with-like, and to avoid emphasising why action needs to be taken. A further nuance is to avoid those value modes which tend to antagonize one another coming into debate. For example, 'now people' (a prominent prospector group) are often put off an action if it is advocated by 'concerned ethicals' (the second pioneer group), who they see as finger-wagging and do-gooders.

Equally, 'brave new world' (a settler mode) will debate at length with 'concerned ethicals' because both agree on the need for rules in society. However, they are never likely to reach an agreement on a proposition as a whole, because they have opposite views on the type of rules that are appropriate (punitive, disciplinarian, and facilitative, ethical, respectively). Any consultation which engenders such a debate will generate plenty of talking, but is unlikely to reach an overall consensus.

Channel design and careful choice of messengers are important to avoid these problems.

4. 'Fifty per cent or less' communication strategies

Because half the population lie in the 'mushy centre' and half around the 'strongly different' outside of the map, a communications strategy should usually be designed to only deal with the external 50 per cent. This has obvious cost-effective advantages, but is only possible if value modes mapping is used as a benchmark segmentation.

In many cases it will be possible to focus more tightly, depending on what the user intends to achieve. For example in a recent project with Bedfordshire Police, we used value modes to identify a sub-group of women as the best prospects for a particular 'fear of crime' measure. The evidence base (British Crime Survey) showed that older (over 50) and younger (under 25) women were disproportionately fearful compared with the rest of the population. A significant part of the older group was known from the national demographics of value modes to be settlers. These were discounted on the grounds of being automatically fearful of anything and the most difficult to change (the 'acquiescence' attribute). Examining the 394 question value modes database, we found that it contained an identical question to the fear of crime measure being used, and were able to confirm a match with the demographics (older and younger women had disproportionate fear in both samples). The value modes database question also showed that a huge proportion was made up just two female groups, younger 'now people' and older 'golden dreamers' (both prospectors). These were identified at postcode level (by cross matching with MOSAIC) and recruited (confirming for value mode) into groups for research to identify and design interventions specific to them.

This illustrates why research from the evidence base which talks about 'people' or 'individuals' is unlikely to inform good strategies. People are motivationally very different but in ways which are nevertheless manageable.

Two other basic strategies should be mentioned: the Higgins Test and Balanced Team Dynamics, though neither is strongly relevant to the Environment Agency's external flood work. In the first, the map is effectively redrawn to show two individuals what they look like to each other, in value terms. This is mainly useful in relationship issues, both personal and managerial, where there is sustained one-to-one contact. In the second, it is possible to map the dynamics of any team (it has been done for Arsenal football team and a number of management teams) to identify their needs. This can be applied to leadership and communication within an organisation. A pioneer leader, for example, must express his or her vision in prospector terms, if the managers responsible for implementation are themselves prospectors. Unless they can meet their needs (values) by taking action on the vision, they are unlikely to do so willingly or productively. Work on this tool is underway with the Henley Centre.

4.2 Other flood-related issues

It will be apparent that with 70 attributes representing almost 394 values questions, the map and the values profile of each mode is a rich seam of knowledge that can apply to many, if not all, of the list of factors noted at the start of this section.

4.3 Interpretation of risk and allied issues

The Environment Agency often speaks about 'risk' and it has engaged in a wholesale change in the way it pursues its task (adopting flood risk management). There is a considerable literature on 'perception' of risk, for example debating whether there is a true or right understanding of risk, whether audiences need to be educated about what that is, or whether other strategies should be used to gain agreement without risk being 'properly understood'.

However if looked at through a lens of values then it becomes clear that the segments have some inbuilt characteristics which will tend to guide how they relate to any proposition which ventures into risk territory. This is especially true of the likelihood component of risk, and the basis of understanding or prediction. Settlers, for example, are generally dependent on their relationship with the rest of society. They expect others in authority to lead, and to know the right thing to do. This is almost a definition of settler leadership (with discipline being used to ensure compliance with the right direction).

It may be that settlers were a large proportion of those who stayed behind in New Orleans. Many reportedly had the ability to leave but did not; they were waiting for leadership that failed to come.

At the polar opposite, pioneers tend to assume that people should make their own decisions, and that there is no right answer. Furthermore, they are happy with the idea that some things cannot be known. Indeed, that makes them interesting.

On top of this, pioneers and some prospectors may be attracted to extreme weather and sensation whereas settlers will not – because it is a threat.

The default settler mode in terms of threat is to want it eliminated (that is, eliminate all possibility of a flood). Flood defence and the many dimensions that go with it, is a typical settler idea. But settlers now make up only 20 per cent of our society (until recent decades they were the majority). If it is not possible to eliminate a threat, settlers may flip to saying "we will all die then" and "there's nothing we can do about it". That, of course, is a recipe for disengagement.

Similarly, settlers tend not to make plans for possible threats. Given their belief that threats are all around, this may seem paradoxical. However, it flows from their desire to simplify life and keep it manageable, coupled with the idea that it is someone else's responsibility.

Prospectors will also want a 'right answer' and may view anyone who expresses uncertainty about an eventuality as incompetent. In the case of scientists, prospector scientists may tend, especially in public arenas, to over-state "what science tells us", and the prospector reflexes of much of the media will also tend to reinforce this by converting the grey of probabilities into an either/or, will it or won't it. This in turn may be further coded or magnified by politicians or officials who may elide uncertainty or incertitude (no basis for probability) into no evidence of a specific outcome, that is, it will not take place. This is very common in public debates over disease, and leads to massive lurches in government communication, for example from "the risk is theoretical" [meaning non-existent] and "there is no risk from this outbreak of bird flu in chickens to the public" [because of assumptions about non-mutation or contact] to "x per cent of people may get it". This pattern actually occurred with new variant CJD. That, of course, leads to distrust.

Another feature of prospectors is that they lead very busy lives. They are busy trying to succeed. Until they have achieved the esteem of others and self-esteem, they have little time for anything else. So they are likely to respond to issues which do not present an immediate opportunity to succeed, or an imminent threat to success, with a refusal to engage. One strategy to gain their attention is to convert an issue into these terms, where possible. Otherwise, there is a constant problem that warnings about possible threats are ignored because prospectors are too busy to pay attention. This can be misread as them not understanding, but any consequent attempts to correct their apparent lack of understanding with information are likely to fail, and may even cause them to take active measures to avoid the messenger.

This brief review reveals the number of value issues which will impact upon flood-related communications. We now consider a few specific questions in more detail.

Figure 4.1: Value mode attributes base map
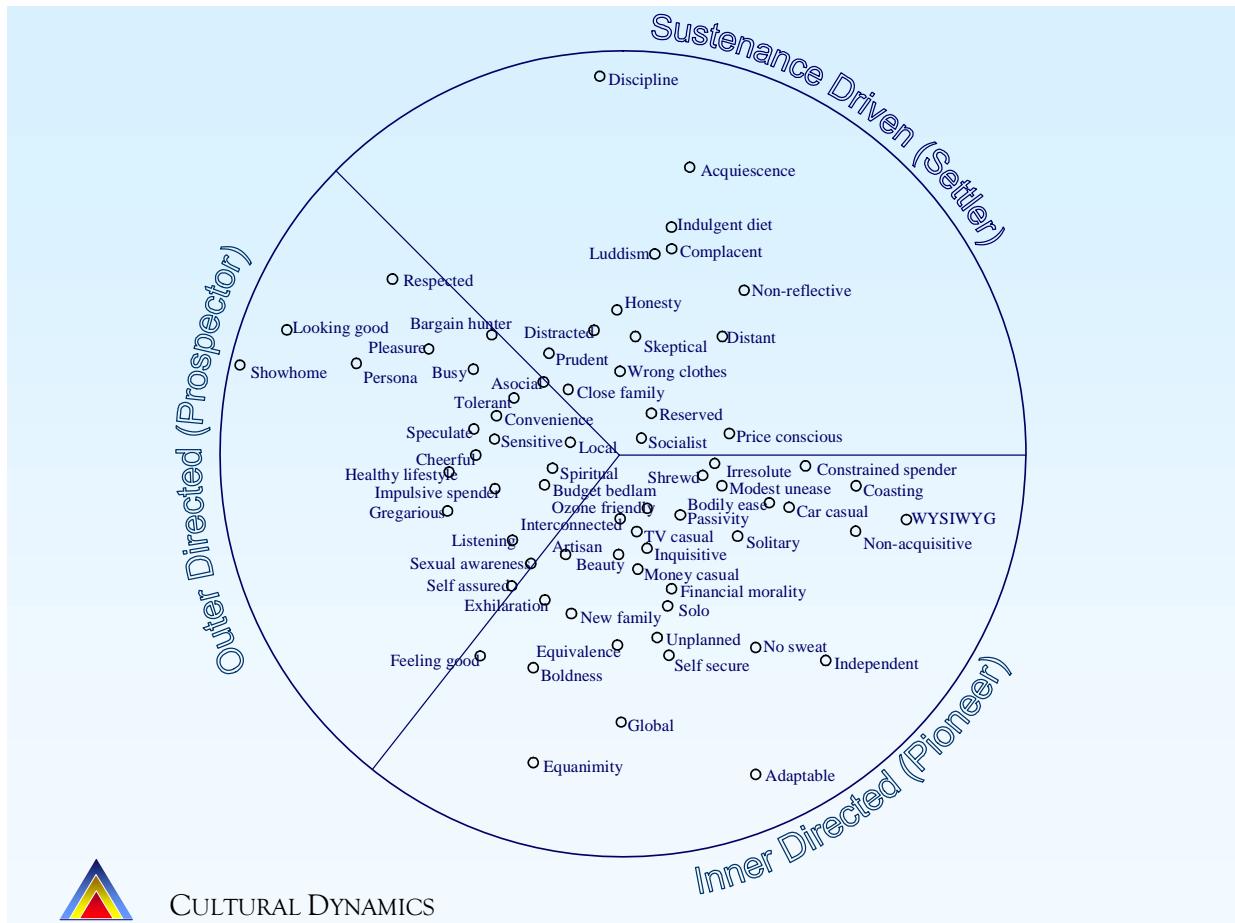
Figure 4.2: Value Modes (12 within the three Maslowian segments)

The Value Modes Space
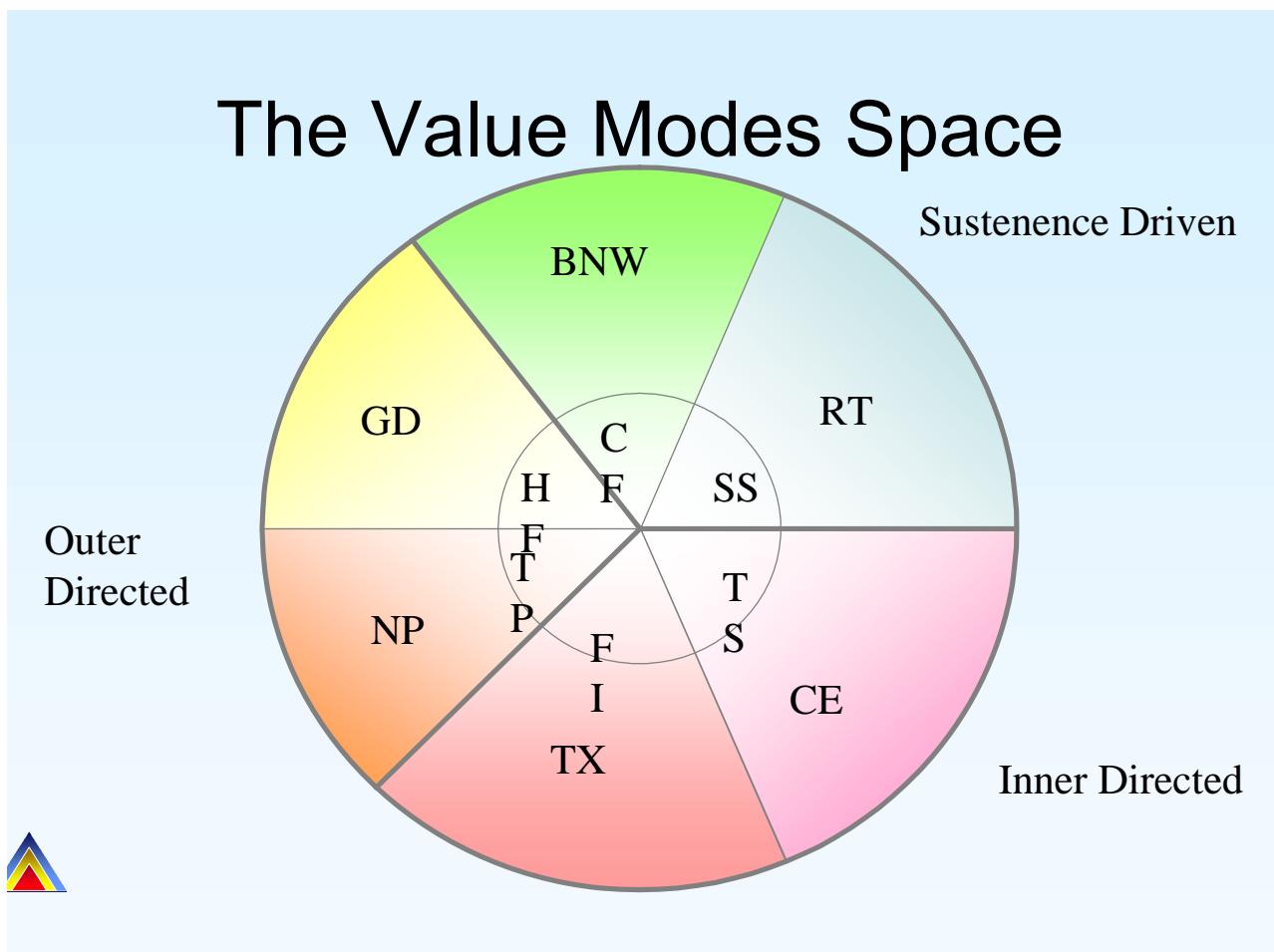
RT Roots
SS Smooth sailing
BNW Brave new world
CF Certainty first
GD Golden dreamers
HF Happy followers
NP Now people
TP Tomorrow people
TS Transitionals
CE Concerned ethicals
FI Flexible individuals
TX Transcenders

(descriptions at www.cultdyn.co.uk plus self-test)

Dynamics of Personal Change

CULTURAL DYNAMICS

PENETRATION

Inner Directed · Outer Directed · Sustenance Driven

Innovators · Early Adopters · Mature

TIME
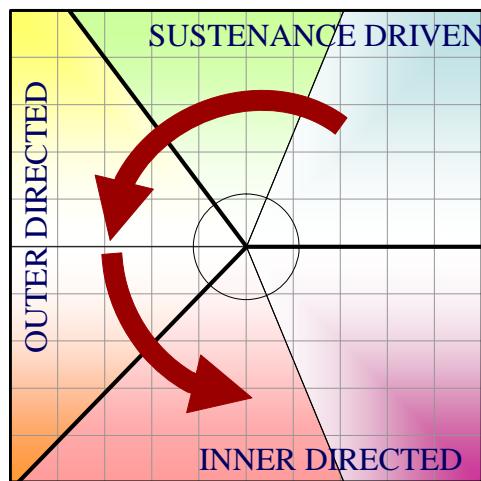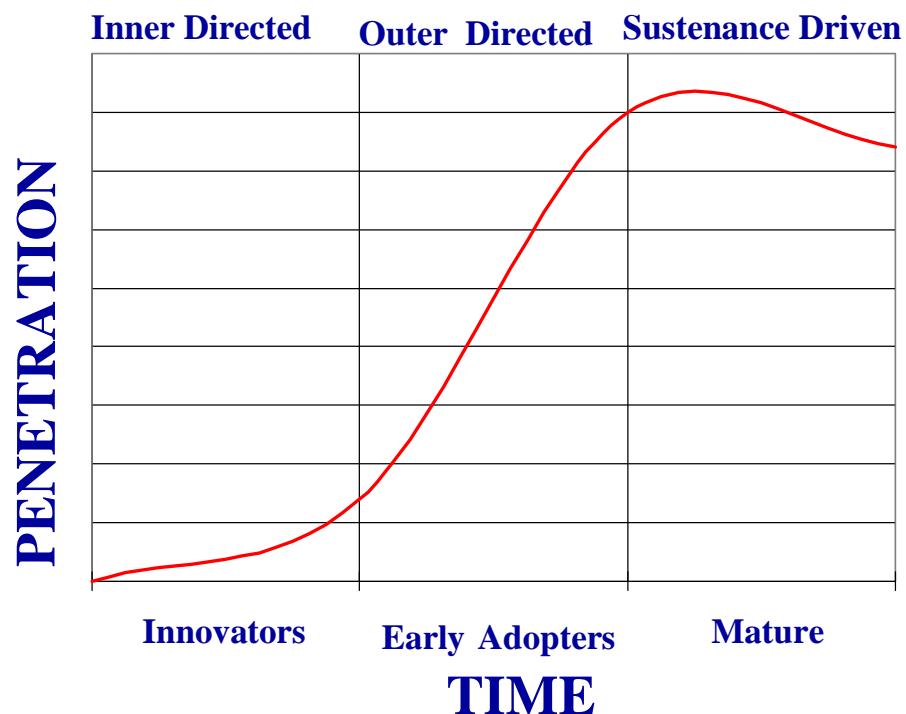
CULTURAL DYNAMICS

5 Use of value modes to create behaviour change in people living in flood risk areas

Pat Dade[21]

5.1 Introduction

A review of many reports and comments from Environment Agency researchers suggests that value mode data can help the Environment Agency create better messaging and calls for behaviour change.

Illustrations of the way value modes can help, set out below, draw on qualitative research on the victims of floods in 1998 and 2000[22]. By going back to the primary source, we can gain further insights into the findings from these focus groups.

As expected, many of the findings have been acted upon, but there is still a major hole in the ability of the Environment Agency to deliver messages that create behaviour change at even the most basic level.

Current reports acknowledge this hole but tend to phrase it in terms of neighbourhoods not being 'homogenous in make-up' and more research needing to be done.

While true, this way of looking at populations embeds a basic misapprehension about the way communications can when applied to 'the public' involved in emergency situations. This may be especially true of low probability, high-impact events like flooding.

5.2 Active and passive stakeholders

In "expecting the unexpected" situation the Environment Agency is one of many "Active Stakeholders" – that is, public and volunteer organizations charged with, or which have volunteered for, providing assistance to communities and individuals before, during or after a flood event. These active stakeholders have been charged with, or assumed responsibility to think about and prepare for "best practice" at each stage of the flood event.

The role of communications that change or reinforce behaviour is different within in this community of active stakeholders from the more numerous "Passive Stakeholders".

Passive Stakeholders are defined here as those people who are adversely affected by the flood event: the householders whose homes are flooded and even those friends and family who will provide support for the individuals and families who have been affected by the event.

This section concentrates on this large number of passive stakeholders and the insights value mode analysis can provide.

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[21] Campaign Strategy Limited
[22] *The health effects of the 1998 Easter flooding in Banbury and Kidlington* and *The health and social effects of the June 2000 flooding in the North East,* both reports to the Environment Agency.

Historically the Environment Agency has attempted to communicate and inform the Passive Stakeholder and track the success of the communications in terms of numbers of people who perform a behaviour that can be measured, e.g. fill in and return a form to the EA, or sign up to a phone helpline. A variety of approaches have been used and the current system has been producing historically good returns. The challenge is to build on this greater response rate and achieve not only greater numbers of responses in the future but also gain a deeper understanding of the dynamics of "acceptance of the call to action" within the mailer and use this provide even more robust communications in the future.

The same understanding of basic behaviour change communications can be used in other projects that form various parts of the overall strategy of the Environment Agency

5.3   Insights from Environment Agency focus groups

The primary source for this analysis was focus groups of 'victims' (more about this below) of the flood event – their expectations, their experiences, their behaviours at various stages of the event, and their feelings during and after the event.

It is only by understanding these past situations, "rational" behaviours and emotional "feelings" that we can begin to change or reinforce those behaviours and feelings in future flood situations.

The focus groups were not conducted with knowledge of value modes and indeed made little reference to psychological orientations as influencers or mediators of either behaviour or feelings. This lack of incorporation of psychology into the research or findings and recommendations may simply reflect the fields of expertise of the facilitators/research organizations employed. However, looking back from 2007 it means the Environment Agency has a less clear picture of motivations and behaviours to draw on in designing better communication strategies.

The Values Modes database can be used to help illuminate what the people in the focus groups were "really saying", in ways that even the respondents themselves would not have been aware of.

The following themes can be drawn from the many statements of respondents, in a variety of contexts explored by the researchers.

- The flood triggers PTSD (post traumatic stress disorder) in many of those affected. Even those not affected to this degree experience emotions that temporarily inhibit positive behaviours. There are symptoms of these states.

- Symptoms include: a sense of powerlessness during the event that continues afterwards; a sense of not being understood; a sense of isolation; a loss of place; a sense of confusion about life in general, especially at work; an emotional draining even after initial positive behaviour and feelings; a sense of fatalism leading to a failure to take action to change a negative situation.

- The flood can initiate these feelings and resulting behaviours, but can also reinforce or exacerbate existing conditions or orientations.

- These feelings and emotions seem to be unexpected by the respondents.

- The nature of these feelings and emotions encompasses a range of onset of the emotions, depth of emotions and length of time it takes to recover.

These are recognized in the literature and to some degree are already used to provide post event activity direction by the Active Stakeholders.

The key to pre-flood event behaviour change is to inform and prepare for the flood event – raising real issues, identifying credible positive behaviours, and giving power to the people affected to take charge of their lives during and after the flood event.

Much of the literature has centred around 'hard' and measurable deliverables that can be easily costed and incorporated into budgets and schedules. Much of this is based on the philosophy of prevention and/or planned fast reaction by active stakeholders.

'Softer' deliverables include:

- empowering or causing passive stakeholders to react healthily to a high impact/low probability event, and to come out of the event with a loss of a house but not the loss of a home;

- retaining the identity that comes with a person's home;

- leaving the event with a greater trust in others;

- emerging from the extended period of grieving and rebuilding of homes and identities with a greater sense of community.

These factors have not so far been built into communications designed to deliver on the expectations of stakeholders. Such expectations are themselves created by the sum of the Environment Agency's communications on floods.

The Environment Agency may not have the remit to do this, and it seems to be the source of some concern within the Agency that it is being charged with this goal through default and practice, by both the Active and Passive Stakeholders.

The fact is that *all* active stakeholders are seen by passive stakeholders to be somehow responsible for providing this orientation to their activities, dealing with issues such as emotional recovery, identity, sense of place, trust and community.

This expectation applies not only to the Environment Agency but also to public bodies such as the emergency services, councils and the regional authorities. It encompasses commercial organizations like insurance companies, banks, lenders of all sorts and the builders and retailers who aid in the rebuilding of homes and lives. The Environment Agency is part of this social and commercial mix that makes up the 'active stakeholder world' in the minds of the passive stakeholders.

5.4 Foundation of value mode insights

The Environment Agency recognizes the need for further research to define the lack of homogeneity within communities, although this is usually defined in terms of gender, income, ethnicity and so on, but not psychology. It is usually these categories that have been defined, and measured, in other studies.

There is nothing in the Environment Agency's literature to indicate that 'motivation' has been taken into account in understanding behaviour and emotions of people confronted with a flood event. Psychology and motivation do not seem to have been studied, measured or controlled for in strategies or communications.

The following brief insights are designed to illustrate a life orientation in terms of demographics (age/gender/socio-economic group) and values – the Maslow groups and/or value modes. This methodology enables decision-makers to use the data in a way that is cognizant of their present data or perceptions (invariably expressed in

demographic terms) and connect to a body of research that measures the value systems of individuals, communities and cultures.

This paper builds on some of the insights gained in the focus groups, which comprised people who had experienced a flood event, and proposes ways to connect those insights with possible credible communications to people like or unlike them.

5.5 Illustration with a hypothetical communication

Here we take a simple hypothetical communication and explore how it might be 'seen' by different psychological groups (Maslowian at the 3 – level and Value Modes at the 12 – level within those).

Hypothetical Communication

Headline -

Be Prepared, The Environment Agency Guide to Protect your Home and Family .....[+ something to do with a topical concern]

(The communication should be designed to provide a believable set of behaviours that people can use to protect themselves from the effect of floods, and come from a credible source – the Environment Agency)

A basic "rational assumption" in organizations of all types is that their target audiences for communications react to the communications in a normal/ rational manner and respond sensibly to the message.

This is true to an extent. The limiting factor to this assumption is that decision makers often are not consciously aware that other "rationalities" exist, and that these range from "somewhat" to "very" different to their own, or, they ignore this reality.

Values Mode research illustrates the different rationalities in relation to a wide range of situations and issues.

For example it is natural for some people to actively *see possibilities* in most situations, while some others are more likely to *passively adjust* to most situations.

The active set of people are more likely have a question-oriented approach to life and have given thought to many different possible situations, i.e. theirs is a world of possibilities and "what ifs".

The people who on the other hand, are more likely to passively accept- the-facts-as-they-are have an approach to life that is more fatalistic in orientation.

Such 'orientation to life' has been measured and correlated with a variety of other factors and presents decision makers and communicators with a template which can be used to develop more powerful and differentiated strategies and communications.

In the illustration below, people who agree with the statement 'Is it important to see the possibilities in a situation?' are different from the population as a whole in ways that are

shown on the attribute map. Red (hot) means that the people who agree with the statement strongly correlate with espousal of the named attribute. Blue (cold) means that the people who agree with the statement strongly correlate with rejection of the named attribute. Yellow means that people who agree with the statement espouse the attribute, but to a lesser degree than those in red. So this shows, in red, those who most see possibilities (for the detailed attribute legend in full, see later maps).
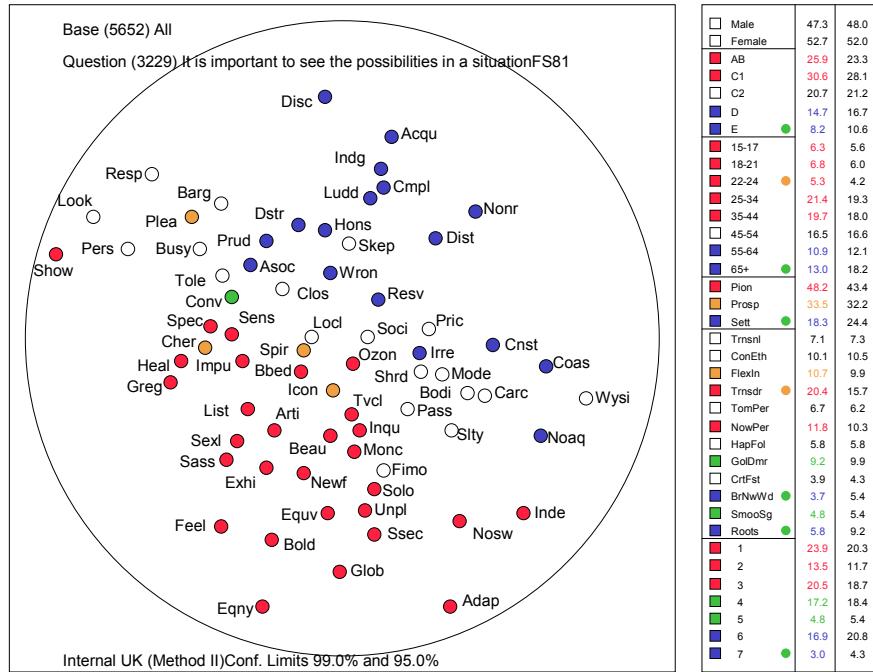
5.6 Pioneer-prospector: The effect of many possibilities

Over 57 per cent of the British population now have a fundamentally questioning orientation to life[23] and will look at any communication that promises a new way of looking at future behaviours as another source of information to think about, to run internal "what ifs" on, if not necessarily to use as a guide when a flood event happens.

Because of this orientation, the event is perceived as possible but so are many others. Additionally, awareness of the many other possible events is not accompanied by a feedback mechanism seeking their action. Consequently, the Environment Agency "call to action" will probably have little effect, subsumed as it is in a rain of information about other possibilities. To work, the call to action must operate outside the immediate information content: it must connect to something else in the values set of the recipient.

So what else do we know about this life orientation and the people that espouse it? They are more likely to be under 45-years old and more upmarket. Older, more downmarket people are under-represented in this life orientation.

What this immediately tells decision-makers and communicators is that sending this type of message into areas of risk that have this type of profile will be less successful, just on the law of averages, than another form of communication that is more targeted at their immediate wants and desires.

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[23] As recently as ten years ago, this was a relatively small minority orientation. This change has profound implications for institutions which themselves change slowly and adapt their communications slowly.

That takes us to the next level of insight.

The Maslow groups – the best strategic planning level method to use – divides the population into three different groups according to their values, beliefs and motivations. The results for this show that one Maslow group indexes higher on this orientation, one indexes much lower than expected and one is about average in espousing this approach to life.

Maslow group	Index
Inner-directed (pioneers)	114
Outer-directed (prospectors)	104
Sustenance-driven (settlers)	75

This confirms that that younger upmarket[24] profile is matched by a more confident and self-secure group of individuals and not by those driven by the need for safety, security and belonging.

The very words used in the opening communication, "Be prepared" and "Protect", do not resonate with this group's life orientation. While they may read the communication and even think about it, they will (usually subconsciously, but at times in conscious dialogue with others) take the communication and build on the information contained in it to come to their own personal scenarios, their own "what ifs". In other words, they use it for their own purposes and are not committed to further action.

The data is capable of being taken to another level: the value mode level. This level is more appropriate for targeted communications once the other demographic, and possibly geo-demographic, variables are controlled for.

Two (prospector) value modes, one in the inner-directed (pioneer) group and one in the outer-directed group, are those most likely to have this orientation.

Values mode	Index
Transcender (inner-directed)	130
Now people (outer-directed)	115

As these two groups make up over 25 per cent of the UK population, they are a natural target for many forms of communication. The Environment Agency needs to break through the clutter of information aimed at them if they are to have any chance of changing or reinforcing their flood event preparation attitudes and behaviours. The above example of a probable communications headline is now clearly seen as unlikely to appeal to this large group of the population.

Methods and tools are available to help determine the Maslow group and value mode probabilities within geographical areas, and are also connected to other data sources that give more lifestyle details to flesh out pictures for decision-makers and communicators.

The robustness of the value mode research lies in the fact that it asks almost 400 value/life orientation questions of the respondents, thus providing additional insights into most questions.

The question 'Is it important to adjust to the facts as they are?' was posed as part of a three-part question which also allowed respondents to say "don't know". The analysis

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[24] Note that younger and upmarket are correlated with the inner and outer-directed motivations but being young or upmarket is not causal, so those demographics do not substitute for a value analysis or segmentation, and particularly do not read across into motivations.

below gives a clear picture of those that answered that they "didn't look for possibilities in any situation" but that for them it was "important to adjust to the facts as they are".

Base (5652) All

Question (1576) It is important to adjust to the facts as they areFS82

Chart labels: Disc, Acqu, Indg, Resp, Barg, Ludd, Cmpl, Nonr, Look, Dstr, Plea, Hons, Prud, Skep, Dist, Pers, Busy, Asoc, Wron, Show, Tole, Clos, Resv, Conv, Spec, Sens, Locl, Soci, Pric, Cher, Spir, Ozon, Irre, Cnst, Heal, Impu, Bbed, Shrd, Mode, Coas, Greg, Icon, Bodi, Carc, Wysi, List, Arti, Tvcl, Pass, Inqu, Slty, Noaq, Sexl, Beau, Monc, Sass, Fimo, Exhi, Newf, Solo, Inde, Feel, Equv, Unpl, Nosw, Bold, Ssec, Glob, Eqny, Adap

Internal UK (Method II)Conf. Limits 99.0% and 95.0%

Male	50.6	48.0
Female	49.4	52.0
AB	20.9	23.3
C1	25.3	28.1
C2	21.4	21.2
D	19.0	16.7
E	13.4	10.6
15-17	4.3	5.6
18-21	4.8	6.0
22-24	2.1	4.2
25-34	14.7	19.3
35-44	15.9	18.0
45-54	17.6	16.6
55-64	14.7	12.1
65+	26.1	18.2
Pion	37.2	43.4
Prosp	30.3	32.2
Sett	32.4	24.4
Trnsnl	7.2	7.3
ConEth	10.7	10.5
FlexIn	9.0	9.9
Trnsdr	10.4	15.7
TomPer	5.0	6.2
NowPer	8.6	10.3
HapFol	6.3	5.8
GolDmr	10.5	9.9
CrtFst	4.7	4.3
BrNwWd	7.5	5.4
SmooSg	6.4	5.4
Roots	13.8	9.2
1	15.4	20.3
2	10.1	11.7
3	15.2	18.7
4	20.3	18.4
5	6.7	5.4
6	27.2	20.8
7	4.9	4.3

It can be seen that this (the 'passives') is are thus a smaller group of the population: in fact, only about 28 per cent of the population chose this option.

With the remaining 15 per cent of the population replying "don't know", a picture emerges of a majority population that is curious and inquiring, wanting to run most information through their own set of scenarios and "what ifs". They are more likely to be willing to read anything new that that will add colour and depth to these scenarios, but will seldom respond to standard calls to action, as they have already got "their use" out of information.

Before moving onto what we need to do is needed to break this orientation, we look more closely at people who are more passive in their use of information and to life in general.

5.7 Settlers: The effect of fatalism

At first glance, it is easy to see the demographics are inversely related to the more active group. This group is older and more downmarket. But are they different in their values/life orientation as well?

The strategic level Maslow groups provide the immediate answer.

Maslow group	Index
Inner-directed (pioneers)	86
Outer-directed (prospectors)	94
Sustenance-driven (settlers)	133

This profile shows that the Maslow group with the most limited horizons, not wanting to look to the future, not wanting to explore new possibilities and preferring to stick to the

tried and tested approach to life is most likely to say they think it is important to "adjust to the facts as they are". They feel and behave in a manner that maintains or protects their thoughts and behaviour.

This group is *more* likely to have a *positive orientation* to the words in the communication "Be Prepared" and "Protect", but they are *more passive* in their attitudes and behaviours and less likely to *respond* to anything! To overcome their inertia, the communicators must break through the basic *passive* orientation of the sustenance-driven settler.

This orientation is further confirmed by a value mode analysis. Two value modes – both sustenance-driven – index higher than any of the other 12 modes.

Value mode	Index
Roots (sustenance-driven)	150
Brave new world (sustenance-driven)	139

Both of these modes are driven by the need for basic safety and security in life.

On the face of it, these modes would seem an ideal target for messages oriented around "protection" and "preparedness". Whilst it is true that settlers are in synch with this message, the difficulty is that they are also the most likely to do nothing about it.

These settlers have the most fatalistic approach to life of all value modes. They are the ones most likely to believe that planning is a waste of time because good or bad fortune is just a matter of luck. This is why they appear apathetic and unwilling to respond to rational appeals to their own self-interest. In truth they are not apathetic at all, but actively deny that they have any power over their own lives. Any appeal based on a message that they have the power to change their life is a basic mismatch.

5.8   The Next Step – Creating strategies and messages with values mode research

Once decision makers and communicators are able to analyse the types of messages that are most likely, and least likely, to resonate with the values or life orientations of target audiences in specific geographical areas and flood event probabilities, they need to start making decisions about how to maximize the use of the data and minimize the probability of off-target messaging.

The first rule that needs to be laid out is that often the settler (sustenance driven), whether they are physically able or disabled, are most likely to respond to an active stakeholder on a face-to-face basis rather than a mailshot or another form of second and third party communication.

The implication is that if a target area is determined to have a high probability of containing Sustenance Driven people then effective channels of communication are more likely to involve direct contact between the Environment Agency and the local population, or through partnerships with other active shareholders who provide the direct contact with the individuals and communities within the probable flood area.

The following insights into the minds of the 3 Maslow Groups can be applied to communications and strategies through any channel of communication.

To get to the true heart of communication, the decision maker and communicator needs to go to the next level of data and information contained in the value mode

database – the level of the 70 attributes – and use multiple attributes to create powerful platforms of communication to change or reinforce behaviour.

The maps used to illustrate the attributes and their relationship to each other, both in positive and negative correlations, are shown at the strategic Maslow Group level only. The methodology can produce similar maps for every Values Mode as well.

The data for the maps is derived from the database and thus is able to produce a map for any variable/response contained in the database. Variables for all the standard demographics can be produced as well. Every question and statement can produce a map of its own that shows the value systems of the respondents in terms of attributes.

The figure below shows maps of the three Maslow groups and the attributes on which they score higher or lower than the national average – the basis for understanding the hot and cold buttons on which to build a platform for strategy and communications.
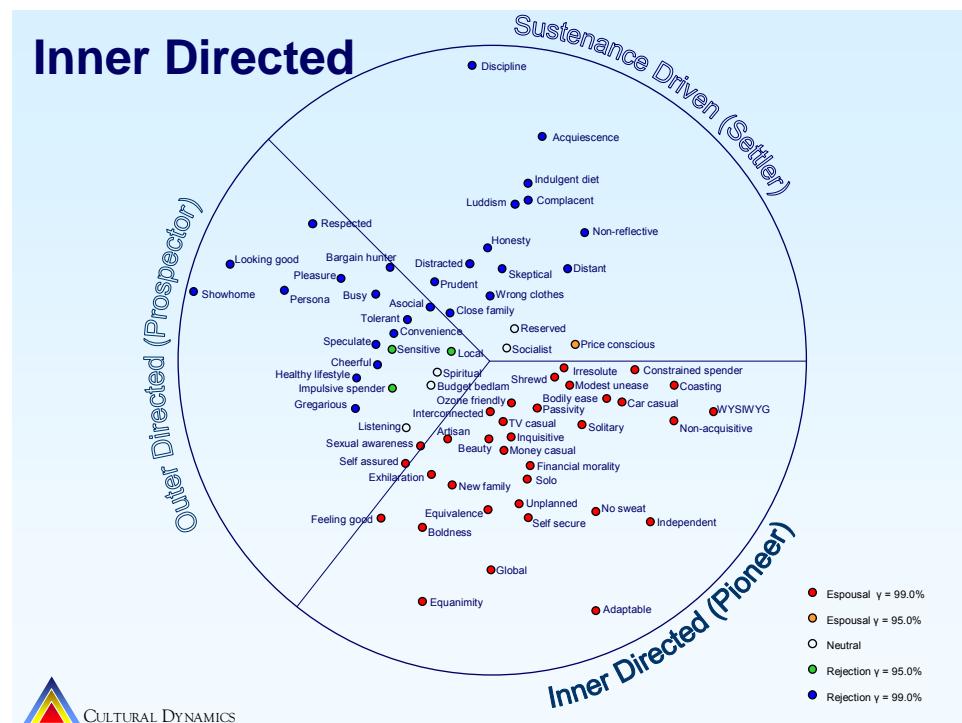
5.9   Pioneers

For inner-directed pioneers, those most likely to see possibilities in any situation, their orientation is created by high scores on attributes like 'adaptable' and 'self-secure' and 'no sweat'. For them life is a game to be played and enjoyed, as measured and portrayed in 'equanimity'.

To trigger a response, decision-makers and communicators must begin with the deep understanding that comes from this portrayal.

In a flood event situation these people will be like most others and think "safety and security first" and react in a way that takes them out of harms way.

Once the event is over however, the period of recovery and development of a new and different reality in their lives, homes, work and relationships of all types begins.

In their own eyes, these people will not see themselves as 'victims of a tragedy'. They will more likely see themselves as unwilling participants in a crisis situation. They will tend to think that as empowered people they can find a way to overcome the damage to the fabric of their homes and the disruption of old patterns of behaviour to their lives. They will know that they and their neighbours are all "in the same boat" and that often the best way of moving forward is not by yourself but with the creating or sharing of resources with others; that at times they will lead the way, and that at other times others may have the resources they need. They will see that issues may be recognized as sometimes more about coordination rather than conquering.

For them, any message that implies the crisis is anything other than a challenge which demands both time to recover and discovery new things, is missing the reality of life. These are most likely to be the people who judge themselves as successful. *Show them how successful people react in times of deep crisis*...breakthrough the clutter of marketing speak.

For Pioneers, facts and figures that spin the story of "prepare, protect and little damage done with the proper preparation" are likely to be perceived as so much marketing and PR shoved out by agencies and organizations to satisfy some business objective. These people understand the information game and may well be involved in it themselves.

The key to reaching them is to give the true stories, not just the facts: stories of people involved in situations that could be termed crisis but who, through their own efforts turned it into an opportunity to build a new life and a new way of seeing and being in their communities...the inside story. The inside, with feelings, emotions and behaviours coming together in a way that had been beyond comprehension before the event.

The "how to" messages contained in the communications will stick with them in terms of the story of real people in real situations of stress. That is how they will remember the key messages the EA needs to get across. They will not just be ticking a box and returning a mailing device, they will be acknowledging a new frame of reference if and when a flood event occurs.

It is unlikely that this group of people will suffer the PTSD symptoms as much as other groups. That isn't to say they don't suffer at all, but they do have an emotional resilience more robust than the other groups. The framing of the messaging needs to be something like: *'this is a natural occurrence which millions of people have experienced before … now you live in a place also likely to experience it … although it is not the most enjoyable experience, it is a real experience and something which gives the opportunity to come out of with a deeper sense of yourself'.*

Theirs is the conception of a crisis as both threat and opportunity. That is the kind of messaging which will "make sense" to them.
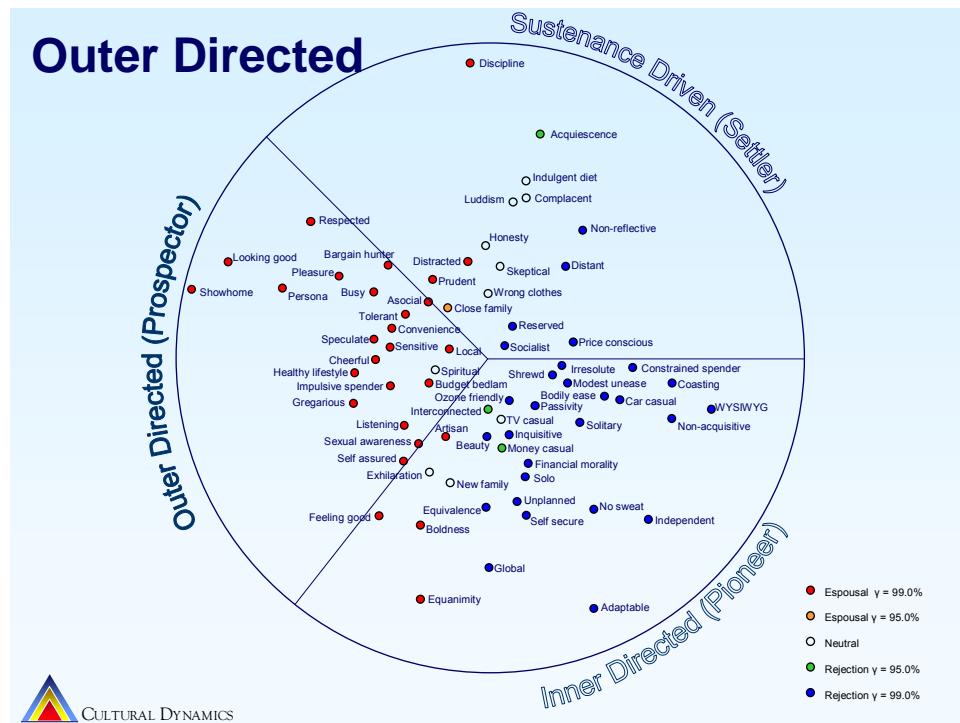
5.10   Prospectors

The outer directed prospectors are about average in the number of people who think it is important to see the possibilities in any situation. But it can be seen that they are a very different group of people in terms of the Attributes they espouse.

What this means is they will agree with the inner-directed on this approach to life, but for different reasons, because they have a different set of values that drives their attitudes and behaviours. While they may be as satisfied with their life as the inner directed, measured by the "equanimity" attribute, the life that they are satisfied with is very different from the inner directeds. notice that the three attributes mentioned in the inner directeds approach to life – adaptable, self secure, and no sweat – are no longer attributes that are highly scored (red) but are now attributes on which the outer directeds score lower than average (blue).

The outer directeds are driven by the need for esteem from others and then their own self esteem, and as a result give credence to external signs of success. They notice behaviour patterns that signal success as a model of behaviour to which others want to aspire.

Attributes that they score highly on include 'show home', 'pleasure' and 'looking good' Any communication or strategy targeted at the outer-directed that doesn't include some measure of these attributes stands a good chance of not being read or accepted in terms of leading to the desired behaviour change.

Advertisers and communicators are masters at making a connection with these people, thus making it harder for the Environment Agency to break out of the "worthy but boring" box to which any message about preparing for emergencies will be assigned.

The Environment Agency's communications plan must acknowledge that the outer-directed prospectors are looking for any chance to improve their position in the perceptions of others. Having their home flooded, the dirt and detritus that is left when the flood waters recede, the smell and the filth are the kind of facts they don't want to know about...unless it is more likely to happen to others and not to them. Living in an

area of danger means that their home has a probability of being destroyed is something they don't want to think about...unless the event, with all of its inevitable disruption, is framed in the terms of a model they aspire to.

Messaging to this group can be quite creative, but not too creative. It can also tap into cultural references that reframe the flood experience in terms of common tropes. An example may be a theme of "when the going gets tough, the tough get going"; or a link with a common phrase associated with high performance in a field like sporting achievement like "Just Do It", or "Be the One", i.e. everyone faces challenges but only a few succeed – and *it is the one who raises their game when the chips are all to play for, who succeeds*. This is the kind of messaging that gets their hearts beating, that breaks through the clutter:

Flood? Bring it on! Watch me be the first and the best to get my life back together. Thanks to the EA I have the skill and the know how to begin the task, and I keep up on the latest information about being the first to know.

With frames like this forming their impressions of the Environment Agency and flood events, this group will have a positive approach after the first shock of the flooding. They will fall back onto attributes they share with the inner-directed like 'self–assurance' and 'feeling good' to create a newer, better house than they had before.

It is this positive frame that prevents the symptoms of isolation, powerlessness, loss of place and loss of self identity which is identified in the literature. Without this frame these propsectors are just as likely, in some cases more likely, to see themselves as victims of a fate that confiscated their show homes, their biggest symbol of status to the peers and family. They will then fall into the psychological hole of anomie and hopelessness exemplified by some respondents in the focus groups.
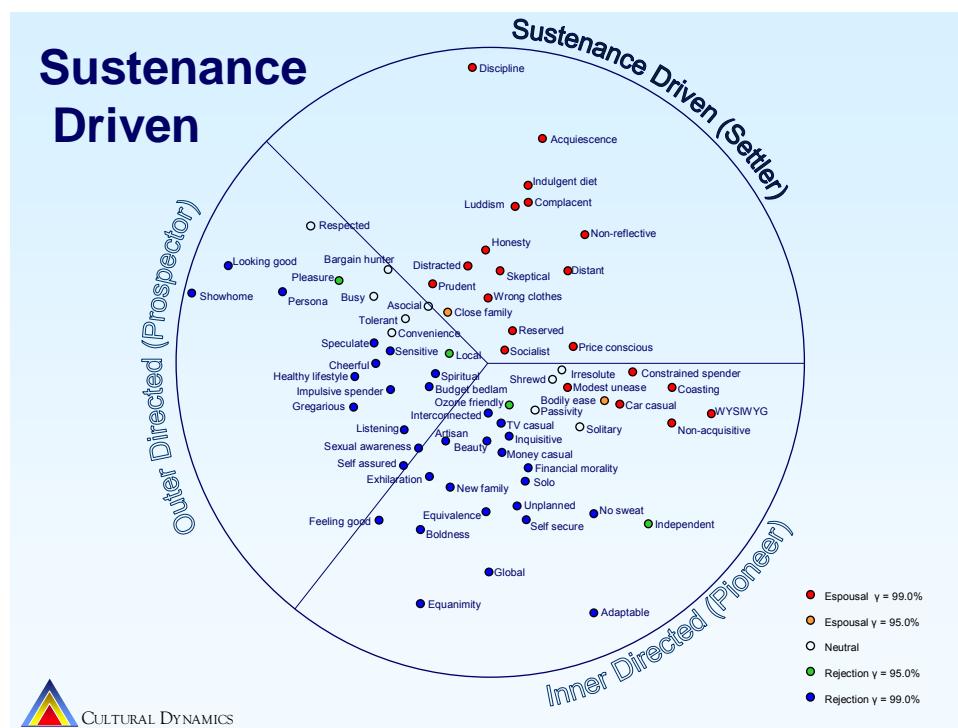
5.11   Settlers

Settlers are most likely to reject the statement that it is important to see the possibilities in any situation; instead, they may aim to just (passively) adjust to the facts as they are.

Messages that work for the (pioneer) inner and (prospector) outer-directed groups are unlikely to resonate with this group.

These are people of little to no aspiration in a material sense – WYSIWG (what you see is what you get) and 'non-acquisitive' - which they share with the inner-directed. But whereas the inner-directed score highly on these attributes and also on 'self-secure' and 'equanimity' – indicating that they are happy with what they have and don't need more – the sustenance-driven score poorly on these attributes, indicating that they are not happy with their few possessions, whilst not being sure of how to obtain more.

Although this group accepts responsibilities for its actions, it doesn't accept that it has much power over what happens. Life is about being lucky or unlucky. For settlers, spending time and energy preparing for a flood event is time wasted. You can prepare all you want; it may never happen and then it is a waste of effort. If it does happen, you will get the rough end of the pineapple anyway.

Settlers fully expect the worst and it has a habit of happening to them, usually because they don't look for opportunities or plan for a successful outcome. By their very nature, settlers are the most likely to suffer when their home and neighbourhood and the support networks they depend on are disrupted by floods. They expect to suffer and will indeed tend to suffer longer than other groups. This is an example of the flood event exacerbating a current condition.

Messaging that works for settlers is more around authority figures telling them what to do when the disaster occurs and who to go to for help and advice.

The messaging should be *factual* and *prepare them for the worst*. But it doesn't have to be all doom and gloom; a positive outcome should result from *following procedures and rules* to put their house back in order.

Prepare these people for the worst, but preferably through routines which show them that cooperating with others will give them a better life than they had before.

A theme like "*It was bad; it could have been worse, but I knew where to go for aid and comfort*" is a good starting point.

In the United States, one major insurance company has used the same slogan for over 100 years: "You're in good hands with All-State" (the name of the insurance company). Images or voices of reassuring authority help deliver the message. An old example was Prudential Insurance, "as solid as the Rock of Gibraltar", which was a powerful trope when the society had many sustenance-driven people.

As mentioned previously, settlers are more likely to change their attitudes and behaviours if they are presented with messages and alternative behaviours in one-to-one settings, or very small groups of like-minded people.

5.12   Conclusion

This section was designed to address messaging to people in floodable areas and their psychological and emotional responses to a flood event. It is through an understanding of these issues that we can develop communications and strategies targeting both active and Passive Stakeholders that will initially break through information and advertising clutter to create a platform of changed expectations, attitudes and behaviours before, during and after a flood event.

The strength of this approach to strategy and messaging is that the Environment Agency can fulfil the "unofficial" role that other stakeholders are placing on the Environment Agency and, at the same time, create the conditions through which the

crisis and disruption of a flood event can lead to "healthier and stronger" individuals and communities during and after the recovery period.

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