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DIRECT ACTION SELF-HELP GROUPS IN UK FLOOD RISK MANAGEMENT

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Abstract

Given an emerging social turn in Flood and Coastal Risk Management (FCRM) towards wider involvement of local communities, this thesis critically evaluates the extent to which Direct Action Self-Help (DASH) groups are, or can be, viable and an efficacious, efficient and effective means of managing and monitoring FCRM assets (and to determine what makes them so). Within this overall aim, the nature and methods of assessment of the human dimensions of FCRM assets is also addressed.

The research methods employed include a combination of semi-structured interviews and other ethnographic tools along with detailed case studies. Analytical tools employed include nVIVO textual analysis of interview transcriptions and engineering and economic analyses of the case study sites. Survey work is used to test the assessment of human dimensions on a semantic differential scale.

The emergence of DASH groups to organise work on FCRM is found to be motivated by the need to deal with increasing flood risk in the face of reduced public funding, alongside sense of stewardship and community solidarity. These groups have tended to be catalysed by a few motivated individuals and without a clearly designed structure.

There is very limited literature about DASH activity in FCRM. Examination of contextual literature has also enabled a previously unavailable conceptual framework to be developed of the different dimensions, contextual aspects and motivations for DASH activity and its support by government, which was further tested by case studies of river conveyance and sea wall management by DASH groups. Channel maintenance work by DASH groups can be effective and efficient at reducing some aspects of local fluvial flood risk for lower order flood events. Maintenance of existing sea walls by DASH groups is less efficient because of the need for significant expenditure on materials and only efficacious if the engineering is quality controlled; its longer term effectiveness is limited by sea level rise. DASH groups require nurture to be sustainable but can deliver community benefits.

Professional FCRM coordination and support of DASH activity is examined using a case study of an Environment Agency (EA) area coordinator and comparisons with alternative approaches. Support of DASH groups by FCRM professionals is essential to avoid unwise activities and involves not only controlling consents, but also in providing advice on the nature and extent to which DASH activity might be appropriate and in arranging practical support and seed-corn funding. The most effective form of DASH facilitation requires a quality and quantity of involvement that cannot readily be supplied by dispersed arrangements from a number of individuals.

This research also proposes an approach for assessing and scoring the human dimensions of engineering assets in a manner consistent with visual assessment of their engineering performance. The dimensions of Sense of Security, Accessibility/Availability and Delight/Inspiration reflect insights from key thinkers from a wide range of disciplines. The framework is verified for the FCRM context using analysis of semi-structured interviews and other ethnographic materials. Evaluation of trials in which DASH and other community groups assess human dimensions on a semantic differential scale shows the method to be workable with further development.

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Key abbreviations

APT	Asset Performance Team of the Environment Agency
DASH	Direct action self-help
EA	Environment Agency (abbreviated except in references)
FCRM	Flood and Coastal Risk Management
NEHRA	North East Hayling Residents Association
PSO	Partnership and Strategic Overview team of the Environment Agency
SHG	Self-help group

1 Introduction

“... start with the needs of those individuals and communities who have suffered flooding or are at risk”

(Michael Pitt (2008) *‘Lessons from the 2007 floods: what people need’*, p. x)

1.1 Background and context of thesis

Humans have been involved with managing coasts and rivers and exploiting their resources for thousands of years (Kay, R. & Alder, J., 2005). Civil engineering itself (as opposed to military engineering) was defined in 1818 by the founding fathers of the Institution of Civil Engineers as “the art of directing the great powers of nature to the use and convenience of man” (Watson, G., 1998, p.18). The picture was one of human dominance over natural systems, driven largely by desire to maximise production and use of resources (and hence profit) and with little attention given to ecology (including habitats), social demands or public perceptions. However, alongside these large-scale engineering works and monumental (or ‘high’) buildings (temples, cathedrals, palaces), a separate tradition of smaller-scale vernacular (or ‘low’) architecture can be identified (Day, C., 2004, p.28) better adapted to social form and tradition (as well as to local climate and materials) and exemplified in many types of ordinary dwellings around the world such as the Igloo (Gorringe, T., 2002, pp.91-92).

The structures used in Flood and Coastal Risk Management (FCRM) seem to stand at the interface between these monumental (high) and vernacular (low) traditions. High engineering can be found in the archaeological record of many ancient civilisations, epitomised most visibly in Europe by the great Roman aqueducts (Landels, J., 2000) and on the coast by the underwater walls and breakwaters of Roman ports. In more recent history, high engineering can be found in early 19th Century harbour wall and breakwater constructions, late 19th Century fully engineered sea walls for coastal defence (such as those at Blackpool) and various coastal engineering measures such as the 1851-1857 groynes introduced at Spurn Head (Crowther, J., 2006) to protect navigation channels by defending the position of the spit.

By contrast, low engineering can be found in the form of protection of rural land from erosion and flooding. From mediaeval times, land drainage and flood defence

measures in rural communities were developed and managed by that local community, with retired farm workers ('linksmen') being employed by the local community to keep drainage ditches in working order. Predecessors of the Internal Drainage Boards started to be set up from 1252 "to create a living and working environment" within low lying flood-prone areas (Caldicott and Wentlooge Levels Internal Drainage Board, 2013). This approach, frequently with significant involvement from local landowners, gathered pace in the seventeenth century, and, as with the Water Boards in the Netherlands, preceded any other form of truly local administration and paralleled the Commissions of Sewers set up in urban areas from the 13th Century onwards (Witham Fourth District Internal Drainage Board, 2013). Particular impetus was given by the Enclosure Movement whereby, through successive Acts of Parliament between 1740 to 1820, land previously managed in common was allocated to individual landowners. Common law rights of riparian owners to protect property from flooding and land from erosion became established around this time; these rights can only be invoked having obtained consent from regulatory authorities (Environment Agency, 2007b).

This mixed picture of state, local community and individual landowner action eventually led into the three phases of UK post war Flood FCRM summarised by Nye *et al.* (2011, p.289):

- Land drainage and food security phase from 1940s to 1970s
- Flood defence phase from 1980s to mid-1990s
- Flood risk management phase from mid-1990s onwards

The first two of these phases have been dominated by government investment in flood defences. As a result of a series of extreme events over the last 15 years catalogued by Nye *et al.* (2011), UK flood risk is perceived to have increased and the way it may change in the future has been extensively studied during the last 10 years. Most notably the landmark UK Foresight Future Flooding project (Evans, E. *et al.*, 2004; Thorne, C. *et al.*, 2007) set down the likely trends in flood and coastal erosion risks under different socio-economic and climate scenarios up to 2100. Rather than a future focus on flood defence, the Foresight report recommended concerted action over a

portfolio of measures across the source-pathway-receptor (S-P-R) flooding system¹. “Recognising in particular that not all floods can be prevented”, this broader portfolio of measures includes flood abatement, flood control and flood alleviation (Tunstall, S. *et al.*, 2004, p.3). A subsequent equivalent move in Europe to a portfolio approach (“adequate and coordinated measures” to reduce flood risk) has been encouraged by the introduction of European Floods Directive (Anon., 2007).

Through these phases a ‘social turn’ in FCRM can be identified in the form of a trend towards progressively increasing stakeholder engagement and ‘codelivery’ (Nye, M. *et al.*, 2011, p.289). Nye *et al.* identify three drivers of this transition, which can be adapted as follows:

1. The need to adapt to increasing flood risk arising from changes in climate.
2. The need to integrate FCRM policy with the sustainable development agenda, especially in regard to involving the public in the social (and environmental) aspects of developing policies, strategies and schemes.
3. A wider trend towards empowering communities at a local level to help themselves, currently being promoted by the present government’s Big Society agenda in the context of the need to reduce public expenditure.

An openness to consider local communities in the development of a portfolio of FCRM measures, was given particular impetus in the UK by the deaths, injuries, property damage and disruption to essential services associated with the floods of Summer 2007 and the subsequent review by Sir Michael Pitt (2008). One of the major thrusts of his report was that flood management should be more people-centred, especially in terms of providing citizens with better information, advice and help. He also promoted the idea of improved public participation and, recommended (Pitt, M., 2008, p.116) that “the Government should develop a scheme which allows and encourages local communities to invest in flood risk management measures”. This recommendation was supported by citing examples such as defences at Kilnsea (Pitt, M., 2008, p.112) which were constructed with a combination of locally-secured funds

¹ The S-P-R conceptual framework was originally developed in the UK for pollution management (Department of the Environment Transport and the Regions, Environment Agency and Institute of Environmental Health 2000), but was adapted for UK flood management (Sayers *et al.* 2002) and is now widely adopted in Europe (Samuels *et al.* 2009) for this purpose.

and those from the Local Levy raised by the Regional Flood Defence Committee. The UK government subsequently introduced a partnership funding scheme for both flood defence and coastal protection, with flexibility to seek contributions from local government, private companies and local community groups (Defra, 2011).

However, since the focus of state finance under the partnership funding scheme remains to protect “those most at risk and least able to help themselves” (Environment Agency & Defra, 2011a, p.37), smaller and less deprived local communities are often left having to find alternative ways in which to carry out or fund FCRM activity. Such a recognition led to the springing up of a number of Direct Action Self-help (DASH) groups in smaller local communities, formed with the objective of creating or maintaining local flood defences or channels. This move was not foreseen by the government or FCRM professionals at the time and remains a poorly documented subject. This thesis aims to help to fill that gap in the literature.

1.2 Aim, objectives and research questions

The overall aim therefore for this thesis is to critically evaluate the extent to which Direct Action Self-Help (DASH) groups are, or can be, viable and an efficacious, efficient and effective means of managing and monitoring FCRM assets (and to determine what makes them so).

Within this overall aim, the thesis has the following objectives:

- (1) To critically examine and evaluate the role of local community Direct Action Self-help (DASH) Groups in creating, managing and maintaining FCRM assets. The related research questions are:
 - (1.1) What has motivated the formation of viable DASH groups operating in FCRM and how are the types of activities which they undertake affected by their understanding of the problem, the organisation and leadership of the group and the different kinds of expertise and resources available to it?
 - (1.2) How efficacious, efficient and effective is FCRM asset management work by DASH groups in respect of mitigating flood risk and in delivering wider community objectives, given the scale

of the problem to be tackled and the changing circumstances under which they operate?

- (2) To critically examine and evaluate the role of government support through FCRM professionals in facilitating and sustaining involvement of DASH groups in the management of local FCRM assets. The related research questions are:
 - (2.1) To what extent are the various facilitation and support activities that have been provided to DASH groups by FCRM professionals effective in meeting the needs and aspirations of both the DASH groups and of the FCRM management organisations?
 - (2.2) How does the effectiveness of full-time facilitation of DASH groups in a particular area by a dedicated professional compare with alternatives such as no support or diversified support by many professionals?

- (3) To develop and test a framework for identifying and measuring the human dimensions of FCRM assets that are significant to DASH groups. The related research questions are:
 - (3.1) What different theoretical bases are available for assessing the human dimensions of engineering assets and can a set of common human dimensions be identified?
 - (3.2) To what extent can it be empirically verified that the common human dimensions are applicable to all FCRM assets?
 - (3.3) Can the measurement of such human dimensions by DASH groups be carried out in a credible and consistent manner?

1.3 Contribution to knowledge

This thesis makes three main contributions to knowledge

Firstly, it provides a critical evaluation of the role of FCRM DASH groups in managing river channels and estuarine flood defences with front face protection, a subject not directly addressed by previous literature, and has developed conceptual frameworks for such groups and their operational process. In providing an

understanding of how a range of current DASH groups operate, evaluating both their weaknesses and strengths, it identifies the limitations and possibilities for DASH activity as part of a portfolio of approaches to managing FCRM assets. Whilst assessments have previously been made of other kinds of voluntary action group, including in environmental and natural resources management, there is little knowledge of how DASH activity might work in the UK FCRM context and the extent to which it might be efficacious, efficient and effective.

Secondly, it provides an evaluation of the kinds of government and FCRM professional support that may be required in order for DASH activity to function together with a summary process diagram. It also assesses the effectiveness of alternative ways in which this support might be delivered. Knowledge of how to support voluntary activity generally is available in a range of contexts but there was no structured understanding of the specifics, both engineering and social, required to support DASH management of FCRM assets.

Thirdly, it identifies a set of dimensions within which the human functioning of FCRM assets may be assessed and the extent to which this can be done in an effective and consistent manner. Various frameworks in different disciplines have been developed over the centuries for understanding the human dimensions of engineering, but these frameworks had not previously been brought together into a single framework for FCRM assets that could readily be applied by community groups. The approach may also help FCRM authorities to assess the extent to which their interventions are helping to meet their policy objectives for local communities. The framework of dimensions provides DASH and other local community groups with a means of assessing the extent to which FCRM assets are meeting the needs and aspirations of their local community.

1.4 Summary of chapters

Chapter Two reviews relevant literature and develops the theoretical frameworks. Whilst there has been little directly written about the role of Direct Action Self-help (DASH) groups within UK FCRM, this chapter explores the literature that supports the objectives and research questions of this thesis, each subsection being mainly

focussed on one of the three objectives. The research objective relating to the role of government support for DASH groups is explored through examining policy and legislative drivers for supporting DASH group activity and the related questions of funding and value. The chapter then explores literature relating to local community DASH groups. It explores motivations for DASH group activity in local communities including increasing flood risk, limited funding, solidarity with the local community and an aspiration for stewardship of place. Literature around community of practice dimensions for DASH groups are then examined, including imagination, engagement and alignment, together with the FCRM assets themselves, and related questions of leadership and organisation. A framework for thinking about the groups, their activities and motivations is then constructed. In relation to the final research objective, literature that identifies different human dimensions for assets is examined and brought together, suggesting a hierarchy of three dimensions that could be used by DASH groups for assessing FCRM assets.

Chapter Three presents the selection of the research methods and their implementation. The initial investigations for research planning are described along with the challenges faced in researching a topic in an evolving situation and with limited data sources. The selection of the main research methods is first described explaining the rationale for use of a combination of semi-structured interviews and other ethnographic tools along with case studies. The deployment of each of these research methods is then described explaining the approach to the interviews and interviewees, the interview analysis methodology and the range of DASH groups contacted. The selection of case studies is then set out. These include two DASH groups, one (NEHRA) maintaining an estuarine sea wall on Hayling Island and the other (Hanneys Flood Group) maintaining a river in Oxfordshire, together with the work of a DASH group coordination officer from the EA. The methodology for the case studies and its implementation are then set out including the role of the author. Finally, the chapter describes various studies conducted to confirm the different human dimensions of FCRM assets and then to test alternative ways of assessing each dimension using a semantic differential scale.

Chapter Four focuses on assessing the viability of DASH groups and their activities within the framework identified in Chapter 2. The types of interventions and

monitoring activities in which DASH groups have been involved more generally are first identified and then the chapter moves on to describe and evaluate the viability of the approach of the two case study DASH groups to the specific FCRM issues which they faced (including the impact of my own role in one case). The DASH group framework developed in Chapter 2 from the literature is then evaluated against the evidence from the two case study groups and others identifying some strengths and weaknesses of DASH groups which emerge thereby. Thus motivations, initiation, issue understanding, membership, leadership, working meetings, risks and liabilities, wider engagement and long term/repeat action are each discussed and evaluated in turn. The chapter concludes by converting this analysis into a generic summary process for all DASH groups.

Chapter Five evaluates (to the extent possible with the available evidence) the efficacy efficiency and effectiveness of the work of the DASH groups, focussing mainly on the two case study sites. In each case, the efficacy of the work is evaluated in terms of the flood risk reduction achieved (and the associated quality of the engineering). Similarly, the efficiency of the work achieved is evaluated mainly using economic criteria comparing the funding and time inputs of the DASH group with alternatives/ Finally, the longer term effectiveness of the work of the DASH groups is evaluated using flood risk reduction, social and stewardship criteria developed from the DASH group model and linked back to the original motivations for the work. The longer term sustainability of the DASH groups and their activity is also explored.

Chapter Six examines and evaluates the role of FCRM professionals and organisations in supporting the potential for DASH group activity largely based around an in-depth case study examination of the effectiveness of a dedicated FCRM professional DASH group coordinator, but comparing this to the nature and effectiveness of other more distributed governance arrangements now in place since the coordinator's retirement. The effectiveness of the coordinator's role both DASH activity is examined, using as a guide elements identified out of the coordinator's job description put together into a systematic flow of activities. For each activity the effectiveness is compared with that of alternative procedures now in place. Activities assessed include the encouragement of appropriate DASH activity in local

communities, identification of the nature of these activities, and practical support, funding and consenting.

Chapter Seven starts by evaluating whether the human dimensions framework identified in Chapter Two is validated for FCRM assets by the results of the analysis of the interviews, comparing the framework with coded data from the semi-structured interviews and additional validation from the further ethnographic work. Since the aspect of reduction of risk associated with flooding and erosion is inherent in the security-order provided by FCRM assets, the main focus of the data analysis is on the dimensions of the theoretical model relating to Availability-Accessibility and Delight-Inspiration. A semantic differential scale is developed for scoring of each of the three dimensions. This scale is then tested in field trials in which DASH or other local community groups are asked to score their local assets against the scales and an evaluation presented of whether it has been possible for such groups to score the human dimensions in an effective and consistent manner.

Chapter Eight presents the conclusions of the thesis principally in relation to the aim, objectives and research questions described in Section 1.2 above, but also in relation to the methodological challenges of seeking to draw generalised conclusions from case study material and the involvement of FCRM professionals in the selected case studies. It then identifies some recommendations in relation to DASH groups emerging from the research and concludes with some future research that has been identified, both in relation to DASH groups and in relation to the identification and measurement of human dimensions of FCRM assets.

The following chapter evaluates the available literature relevant to the research aim, objectives and questions.

2 Literature review and development of theoretical frameworks

“... increase local resilience by building connections between people, between people and the ecology of their places and between people and their history”

(David W Orr. (2002) ‘The nature of design’, p.180)

Although there is no known literature about the role of DASH groups in FCRM, this chapter examines the literature which deals with the role of government support for voluntary activity, examining policy and legislative drivers and related questions of funding and value. It then explores motivations for DASH group activity and their relation to community and place and the literature around communities of practice. A framework for thinking about DASH groups, their activities and motivations is then constructed. The chapter concludes with an examination of a range of literature about the human dimensions for assets and develops a framework of thinking .

2.1 Self-help in communities

This section starts by considering participation of citizens and the state. It then goes on to explore the role of government support for self-help groups relevant to DASH groups. It examines policy and legislative drivers for supporting self-help activity together with questions of funding and value.

2.1.1 Citizen participation and the state

During the 1980-mid 1990’s ‘flood defence phase’ of FCRM identified by Nye *et al.* (2011, p.28), an emphasis on public participation and shared governance started to emerge. Kay and Alder (2005, pp.12-19), writing from an Australian perspective, identify this as a wider international trend as the tenets of sustainable development² took hold and the concept of undertaking works with multiple objectives gradually emerged. The emphasis on shared governance and public participation as a genuine two-way process was also enshrined in the Aarhus Convention (UNECE, 1998), implemented in practice in the guidance on public participation (European Communities, 2003) associated with the implementation of the Water Framework

² Sustainable development was originally defined by the Brundtland Report as that “which meets the needs of the present generation without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987, p.8). Later advocates often describe it as having three pillars (Parkin, S. *et al.*, 2003) – environment, society and economy, otherwise known as the ‘triple bottom line’, which must be met simultaneously and not as alternatives. The World Bank has a ‘four capitals’ model of sustainability (Parkin, S. *et al.*, 2003) which includes Robert Putnam’s (1995) idea of social capital.

Directive (Anon., 2000b) and in the latest version of the Directive on Environmental Impact Assessment (Anon., 2011). Articles 9 and 10 of the European Floods Directive (Anon., 2007) further reinforced the specific rights of the public to access flood risk assessment maps and plans and of interested parties to be actively involved in the production, review and updating of the flood risk management plans.

The appropriate level of citizen participation, however, remains an open question and discussion often revolves around the need to find a “middle ground between the individualism of the market and the collectivism of the state” (Day, G., 2006b, p.204). Amitai Etzioni developed an approach or philosophy of ‘communitarianism’ (see e.g. Etzioni, A., 1995, 1997) building on the ‘community lost’ discourse explained earlier (Valentine, G., 2001b, p.129). Communitarianism looked to recover an ‘authentic’ commitment to core social values (Day, G., 2006b, p.205) and resonated at the time with the rights and responsibilities emphasis of the Third Way politics of New Labour (Giddens, A., 1998) . Whilst communitarianism has been criticised for being nostalgic (Valentine, G., 2001b), oppressive (Young, I. M., 1990) and unclear about the meaning of ‘community’ (Day, G., 2006b, pp.206-8; Low, M., 1999), its significance was in the promotion of the strengthening of identifiable existing communities through voluntary work (Silk, J., 1999, p.6). Thus community was seen as “providing a base for community action and mobilisation” (Silk, J., 1999, p.10) which should be supported by government policies and grants (Valentine, G., 2001b, p.130).

Robert Putnam was critical of what he saw as the social divisiveness of the communitarianism movement (Putnam, R., 2000, p.361) but still wrote of the need to regain lost ‘social capital’ in American society (Putnam, R., 1995, 2000). Social capital is a difficult concept to tie down (Field, J., 2003), but can be viewed as “features of social organisation such as networks, norms and social trust that facilitate coordination and cooperation for mutual benefit” (Putnam, R., 1995, p.66). Putnam *et al.* (2005) argued for the need to ‘reweave’ social webs through “the efforts of dedicated social leaders” and by the creation of “new spaces for recognition, reconnection, conversation and debate” (Putnam, R. *et al.*, 2005, p.294). Subsequent research based on Putnam’s paradigm has found that volunteers play a key role in the formation of social capital, “by creating new organisations and services ... in developing bonding and intra-community links ... in mediating between professional

and lay networks ...[and]... in developing bridging links with other organisations and communities of interest” (Onyx, J. *et al.*, 2003, p.59).³

When Sherry Arnstein (1969) originally proposed her ladder of citizen participation⁴ (see Figure 2-1), she argued that it is possible to conceive forms of participation which are not genuine, being either symbolic or even at worst manipulative. On the other hand, the “top” of Sherry Arnstein’s (1969) ladder of citizen participation is not necessarily the best place to be, as it may imply (Carr, A., 2002)(Carr, A., 2002)(Carr, A., 2002)(Carr, A., 2002)(Carr, A., 2002)(Carr, A., 2002)(Carr, A., 2002)(Carr, A., 2002) a degree of abrogation of responsibility by government (including failure to provide support and/or funding where appropriate). Indeed, as mentioned earlier Smith (2000, p.72) cites a number of studies and theorists in making the case that government failure to meet an unsatisfied demand is a strong driver for the formation of a volunteer group. This, and the associated fallout for the vulnerable in society, may be one of the main dangers (Williams, R., 2011) in the otherwise laudable idea of the current UK prime minister, David Cameron, to seek for a resurgence of Big Society as opposed to Big Government.

8	Citizen control (or self-governance)	Degrees of citizen power (or participation)
7	Delegated power	
6	Partnership (or co-operation)	
5	Placation	Degrees of tokenism (or symbolic participation)
4	Consultation	
3	Informing	
2	Therapy	Levels of non-participation “contrived to substitute for genuine participation”
1	Manipulation	

Figure 2-1 Sherry Arnstein’s ladder of citizen participation (after Arnstein, 1969)

³ Psychological surveys of Obst and White (2007) similarly conclude that the ability to choose whether or not to join a community (which would be applicable to volunteers in DASH groups) tended to strengthen the observed Sense of Community Index.

⁴ The nature of genuine participation has been the subject of some debate. Finger-Stich & Finger (2003, p.23) describe it as being “the voluntary involvement of people who individually or through organised groups deliberate about their respective knowledge, interests and values while collaboratively defining issues, developing solutions, and taking or influencing decisions.”

The dominance of Arnstein’s ladder in discussions about citizen participation in routine policy and even project discourses (see e.g. Bush, I. G. *et al.*, 2005), with its assumption of a power struggle between citizens and controlling institutions has been challenged by Collins and Ison (2009). Reaching the top of the ladder where citizens revert to self-management may just be a symptom of ‘neglect’ (Choguill, M., 1996) or ‘abrogation of responsibility’ (Carr, A., 2002, p.105) by the state, as there is a big difference between empowerment (state supporting) and self-management (no state involvement at all). In any event, Collins and Ison (2009) argue that privileging the aim of pure citizen control is too narrow a perspective to adopt, especially when tested in the arena of climate change adaptation where the issues and solutions are complex. Furthermore, as Tritter and McCallum (2006, p.165) point out, Arnstein’s model does not acknowledge that some users may not wish to be involved, at least at some of the higher levels, or may want to jump on and off the ladder. Collins and Ison (2009) argue instead for a social learning paradigm, where level of participation is not the sole goal and which is able to accommodate a range of roles, relationships, practices and even agendas. Collins and Ison (2009, p.369) effectively re-characterise Arnstein’s ladder in terms of a nested set of approaches (Figure 2-2) in which each successive ‘rung’ embraces rather than supersedes the previous one and in which social learning rather than partnership or self-governance is seen as the most comprehensive approach.

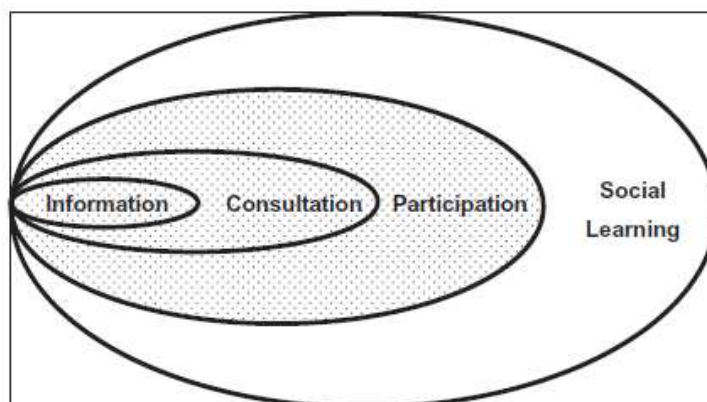


Figure 2-2 A conceptual framing of social learning in which information, consultation and participation may be necessary, but not sufficient, to improve complex situations (Collins, K. & Ison, R., 2009, p.369)

2.1.2 Policy and legislative support for public participation in FCRM

The most recent UK government sustainable development strategy (HM Government, 2005) included five principles including promoting participative governance and the wellbeing of individuals and communities and had priorities for action for sustainable communities (as well as for sustainable consumption and production, for climate change and energy and for natural resource protection and environmental enhancement). The policy on ‘sustainable communities’ is expressed in terms of action at a local level to “give communities more power and say in the decisions that affect them; and working in partnership at the right level to get things done” (HM Government, 2005, p.17) . The translation of these sustainable development principles, including public participation, into FCRM was addressed by Wade *et al.* (2006) and has emerged in increasingly stronger form in successive statements of UK FCRM policy, the latest England-only version of which (Environment Agency & Defra, 2011b) even has the phrase ‘empowering communities’ within its title and has ‘community focus and partnership working’ and ‘sustainability’ amongst its guiding principles. In recent years, EA practice is also seeking to live up to these principles by initiatives such as “Building Trust with Communities” and the appointment of Community Engagement officers (see e.g. Speller, G. & Twigger-Ross, C., 2005).

Development of such policies can be seen in the context of long tradition of a voluntary or ‘third sector’ in the UK, recognized by previous governments (Department for Communities and Local Government, 2008; HM Treasury, 2002) and now by David Cameron’s Big Society (Williams, R., 2011). National organisations such as Volunteering England (now within the National Council for Voluntary Organisations) had been set up to promote volunteering generally and increase the quality, quantity, impact and accessibility of volunteering throughout England. Research supported by the Commission for Volunteering (Ockenden, N., 2007) established the considerable extent of the existing volunteer base (estimated as the equivalent of a million full-time workers in the UK). However, most research and data collection relates to formal volunteer involving organisation and does not really consider the impact of what Smith (2000, p.12) calls the ‘dark matter’ of informal volunteer-led grassroots groups which in the USA may outnumber tax-registered paid-staff non-profit organisations (equivalent to UK charities) by a factor of between 5 or

10 to 1. Ockenden & Hutin (2008, p.11) cite an estimate by MacGillivray *et al.* (2001) that there could be as many as 600,000 to 900,000 ‘micro social enterprises’ (i.e. volunteer-led groups) in the UK.

UK government support is evident for local community groups across England to take specific action on climate change and sustainability issues.⁵ The flourishing of the rivers trusts in the UK from volunteers with a passion to clean up rivers and coasts and improve habitats is one example of this in practice (The Rivers Trust, 2011). However, within FCRM, the most recognised areas for voluntary or citizen involvement have not been for self-help groups but in deliberative engagement on the form of schemes and in development of flood plans for extreme events with the associated appointment of flood wardens (Environment Agency, 2010a).

Another aspect of government funded support for self-help activity is the provision of government funded-facilitators for self-help groups. The Australian environmental management volunteer group experience captured by Carr (2002, pp72-5, 117-120) indicates that in a volunteer group there is a leadership role for government-funded facilitators as well as volunteer facilitators. Many of the groups researched by Carr (2002) had both. As part of the current EU STARFLOOD project, Tapsell (2015) has identified that resource and time input with UK communities is needed by authorities/National Flood Forum to support the initiation of flood action groups, but once they learn more about their own flood risk and how to cope with it (once local capacity is built) then these groups can function with much less support, or even none. The government-funded facilitator may have to play a dual role and accept that “at one and the same time, she or he may be perceived as a bureaucrat paid (big money) to further government policy on environmental issues and a local member of the community hired to promote group development” (Carr, A., 2002, p.117). The most effective and accepted facilitators focus on their roles of facilitating and consulting and avoid being controlling or directive (Carr, A., 2002, p.118).

⁵ For example in 2006 Defra launched a programme entitled ‘Every Action Counts’ www.everyactioncounts.org.uk

2.1.3 Funding and benefit issues

Whilst post-war flood defence and coast protection works have been largely publicly funded out of central government funds, the availability and distribution of limited UK government resources for investment in FCRM has become an increasing problem (see e.g. Grant, L. & Chisholm, A., 2015). Simply meeting economic benefit-cost criteria in FCRM has for some time been insufficient justification for investment with an additional ‘priority scoring system’ having been in place since 1997 to effectively ration funding. The criteria within this including ministerial priority and urgency were seen as flawed and a progressively broader suite of Outcome Measures were slowly introduced which sought to better meet government policies and goals across the people-planet-profit dimensions of sustainable FCRM (Johnson, C. *et al.*, 2007). However, as Johnson *et al.* (2007, p.387) pointed out, in some cases the system could lead to local-level injustices and could only be fixed by a combined focus on non-structural measures and the introduction of local-level funding.

Whilst the emergence of DASH-type action in the monitoring and management of flood risk management assets as an alternative to part or wholly funding flood risk management measures has been slow to take off (see e.g. Russell, B. *et al.*, 2009), there has been greater appetite for bringing volunteers into the mix in the related area of environmental monitoring. Conrad and Hilchey (2011) point out in relation to the ‘citizen science’ of community based environmental monitoring, that the engagement of these expertises in the governance of the issue offers time and money saving benefits to government. Ockenden (2007) identifies the value for money associated with low-level state funding support for volunteer groups, citing a study of eight volunteer-involving organisations across Europe, including three in the UK, which reported an average return of £3 to £8 for every £1 spent. Potentially, ‘seed-corn’ financial support for DASH group activity in FCRM might also therefore represent value for money.

2.1.4 Conclusion: self-help in communities

It may be concluded from the literature that there is evidence of a context which is encouraging the growth of self-help activity in communities, identifying its value both in direct outcomes but also in helping to build and sustain social capital. This growth is however dependent on a kind of symbiotic relationship between the state and DASH

type groups: some benefit to society can be offered by a DASH group, but the DASH group will in turn require some level of financial and practical support from the state. Partnership with the state in some form of alliance rather than unregulated self-governance appears to be suggested.

2.2 Direct Action Self-Help groups

This section explores literature for motivations for DASH group activity in local communities including increasing flood risk, limited funding, solidarity with the local community and an aspiration for stewardship of place. Community of practice dimensions for DASH groups are then examined, including imagination, engagement and alignment, together with the FCRM assets themselves, and related questions of leadership and organisation. A framework for thinking about DASH groups, their activities and motivations is then identified.

2.2.1 Motivations

To assess what might motivate the emergence of DASH groups, this section considers the motivations for volunteering generally and more particularly for local community-based groups. These motivations are in addition to any effect arising from government support discussed in the previous section.

For many years (Smith, D. H., 2000) a rather ‘flat-earth’ picture was held of the nature of volunteering, which focussed on the ‘non-profit’ paradigm of unpaid work or service motivated largely by altruism, with volunteers often working for large voluntary or third-sector organisations which may have paid managers. Rochester *et al.* (2010, pp 10-16) identify two other main paradigms including the serious leisure paradigm associated with arts culture sports and recreation and the ‘civil society’ paradigm of activism motivated by self-help and mutual aid and associated with grass-roots associations, local community groups and DASH groups. In practice, as Rochester *et al.* (2010) acknowledge, the paradigms are somewhat overlapping and although altruism pervades these other paradigms as well, it is a modified altruism (Smith, D. H., 2000, p.18) “involving a significant mixture of self-serving and other serving dispositions”.

Motivations for volunteering have been examined both theoretically and empirically. Empirically, notable large scale surveys include the 1995 MIDUS survey of 3032 English-speaking adults in the United States (Einolf, C. & Chambré, S., 2011) and the 2006/7 UK national survey of 2075 individuals in connection with volunteering and charitable giving (Low, N. *et al.*, 2007). Einolf and Chambré (2011) used previous empirical evidence to identify the main factors influencing whether a person will volunteer as being their individual characteristics (including both altruistic and egoistic motives), their resources (mainly available time) and three social factors: context, integration (the extent to which individuals are already linked to others) and the nature of their pre-existing social roles. They then tested these against the MIDUS data and found that each theoretical perspective was statistically independent and explained a substantial amount of the variation on volunteering. A comparison of the Einolf and Chambré (2011) perspectives with the reasons for volunteering summarised by Low *et al.* (2007) for the 2006/7 UK survey indicates that these perspectives also hold true in the UK.

This empirical work seems to have identified a mixture of pragmatic and values-based motivations. Robert Bellah (1985) argued that responsible citizens need to be motivated by values-based “habits of the heart” that were taken for granted by the American founding fathers. Rochester *et al.* (2010) identify that the main values which motivate voluntary activity in society are: altruism or beneficence, solidarity, reciprocity and equity or social justice. Apart from resource availability, this list seems to include most of the individual inclination and social factors identified by Einolf and Chambré (2011).

Smith’s (2000) analysis of USA grassroots associations identifies that motivational factors include both ideologies and ‘incentives’. The ideologies he cites mainly relate to the achievement of the grass roots associations’ goals and can be viewed in Einolf and Chambré’s terms as a mixture of contextual factors and personal altruism. The incentives seem to relate to a mixture of social factors (sociability and service of others in the group) and egoistic individual characteristics (desire to learn, experience personal growth and gaining prestige to protect against negative feelings). Many of these can be seen to link back to the theory of motivation developed by psychologist Abraham Maslow (1943, 1954). Maslow proposed a hierarchy of human needs (Figure

2-3). His idea was that basic human needs had to be met before ‘higher’ needs such as personality growth could be met. His ideas have been extensively challenged over the years because of the restricted case study methodology used to derive them, a questioning of whether satisfying lower needs helps the higher needs to emerge and uncertainty over the details of what he meant by self-actualisation. However, his idea remains intuitively accurate that “we do have a difficult time reaching the heights of experience if we are preoccupied with attaining the base essentials of life” (Neher, 1991, p.109). Thus the elements of the hierarchy remain potentially useful.

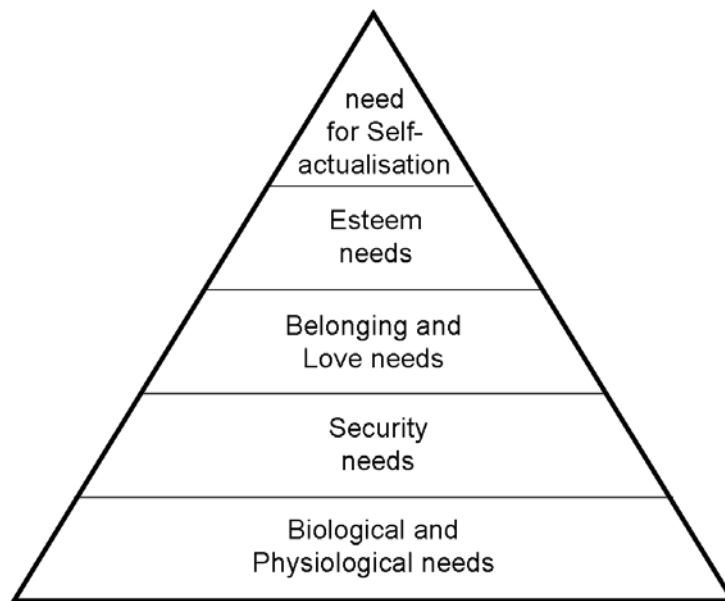


Figure 2-3 Maslow’s hierarchy of needs. Lower parts of the hierarchy must be satisfied before higher parts

Transposing this broader literature into its potential application in the FCRM field, it is possible to identify three main groups of potential motivations: self-serving dispositions (Smith, 2000) in this case related to personal or family exposure to flood and coastal risk, aspirations to serve and be accepted by the local community and altruism expressed in terms of self-fulfilment via stewardship of the FCRM assets and the related local environment. These motivations are mapped onto Maslow’s hierarchy in Figure 2-4.⁶ The next two sections explore the stewardship and belonging motivations further, including how they relate to the contested concepts of ‘place’ and ‘community’.

⁶ Environmental psychology literature also supports this broad spread of motivations , suggesting that environmental concerns, ecological world views and perceptions of environmental risks and preferred management strategies are important to people and that there is a relation between core personal values and “environmental, altruistic and egoistic concerns” with “values being more predictive of environmental behaviours than more specific related concepts” (Steg, L. *et al.*, 2013, pp.148-150)

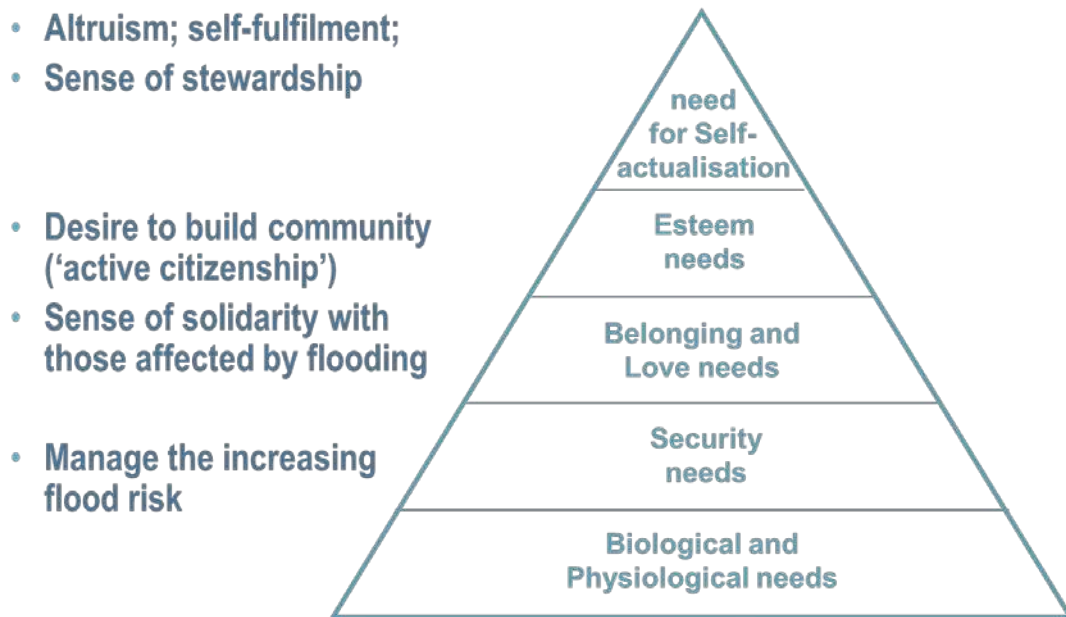


Figure 2-4 Motivations for involvement in DASH groups set against Maslow's needs hierarchy

Stewardship of place

'Stewardship' is a widely used adjective to describe the motivation of groups (e.g. in Australia) who volunteer in environmental catchment care. Anna Carr (2002, p.15) identifies a number of definitions of stewardship which include concepts of 'caring for', a commitment to 'active earth keeping' akin to a custodial or guardianship role. Margaret Gooch (2005) in a detailed study of the experiences of catchment volunteers identifies the universality of the idea of developing and maintaining a strong identity with the physical location where they are active and that this identification enables volunteers to cultivate shared values, beliefs and interests, which in turn are built up over a period of time through collective experiences (see also Gooch, M., 2002, 2004).

Thus, as argued by Bruno Latour (2005, p.84), places and physical structures are not just a backdrop to social relations or "an inert environment in which things happen" (Inge, J., 2003, p.4) or a 'locale' which acts as a container of community (Creswell, T., 2004, p.7, citing Agnew (1987)). Citing Agnew (1987). Instead, those who spend time in places, associate them with individually perceived meanings, known and

experienced, as well as with public records and consensus expressions of the quality of that place (Relph, E., 1976, pp. 61-62)⁷. Following Heidegger, they are associated with our ‘how-being’ and are related to our ‘being-there’ (*dasein*) and dwelling (*bauen*) in a specific space and time context (see Inge, J., 2003, p. 19; Inwood, M., 1997, pp.16-18). Yi-Fu Tuan even wrote of *topophilia*, a love of place based on “some real encounter with the colour, odour – the mood – of a place” (Tuan, Y.-F., 1972, p.535)⁸. More practically, people cannot live disembodied lives (Coates, T., 2010, p.30) and “place and locality matter not least because these are where people reside and in which notions of community, belonging and character are invested.” (Macdonald, S. *et al.*, 2005, p.597).

Identity and belonging to ‘community’

The second key motivation identified in the volunteer literature is that of belonging both to the volunteer group and, in the context of place-based volunteering, to the wider local community from which the volunteers come. This represents another aspect of Gooch’s (2005) motivator of developing and maintaining identity. However there is an interaction with place in creating this sense of belonging. McMillan & Chavis (1986, p.15), in their classic research on the concept of the “psychological sense of community” first postulated by Seymour Sarason (1974), found that included amongst the various features tending to interact with one another in a self-reinforcing way that helped people to ‘belong’ to a community were the boundaries and common symbol system associated with physical features of place (McMillan, D. & Chavis, D., 1986, p.15).⁹ This is therefore consistent with the ideas postulated by Antony Cohen

⁷ Extreme perspectives of this can be seen on the one hand in the writings of David Harvey who associates sense of place with a need for authentic roots in history and a clear sense of boundaries around a place separating it from the world outside Creswell (2004, p. 72) and on the other Doreen Massey (1997) who views this as a reactionary perspective and argues for a ‘progressive sense of place’ marked by place as process, place as defined by linkages to the outside, place as site of multiple identities and histories and a uniqueness of place defined by its interactions.

⁸ Places may also have potentially negative constraining connotations. For example, they are conceptually part of Marx’s ‘infrastructure’ that is determinative of social relations (Johnston, R. *et al.*, 2000, p.395). Anthony Giddens identified the potential agency of ‘non-human resources’ (see e.g. Giddens, A., 1979; Sewell, W., 1992) as part of his ‘structuration’ theory. Similarly in Actor-Network-Theory developed by Bruno Latour (2005) and others (see e.g. Callon, M., 1986; Law, J., 2004) it has been suggested that places and objects may, albeit intermittently, “authorise, allow, afford, encourage, permit, suggest, influence, block, render possible, forbid, etc” human action and social relations (Latour, B., 2005, p.75).

⁹ Subsequent psychologist authors have tried to measure the Psychological Sense of Community (or Sense of Community Index - SCI), researching and debating types of multi-dimensional construct, with weightings applied to the various components (see e.g. Peterson, N. *et al.*, 2006; Puddifoot, J., 1995,

(1985) in which he argues that people now construct their whole concept of community symbolically, “making it a resource and repository of *meaning*, and a referent of their *identity*” (Cohen, A. P., 1985, p.118).

Community is now a widely contested concept (Day, G., 2006b; Delanty, G., 2003; Valentine, G., 2001b)¹⁰, but Cohen built on the widespread ‘community lost’ discourse (Wellman, B., 1979) about “the diminution of the geographical bases of community boundaries” (Cohen, A. P., 1985, p.117). This discourse was started by Frederick Tönnies in 1877 (Tönnies, F., 1957), who spoke about “the dissolution [by industrialisation] of the small rooted communities [*Gemeinschaft*]¹¹ which human beings have lived in for millennia, and their replacement by the anonymous city” (Gorringe, T., 2002, p.164) in which relations are by ‘association’ *Gesellschaft*, based on individual self-interest and contract (see Day, G., 2006b; Gorringe, T., 2002).¹²

Modern ideas about community now include ideas such as virtual communities facilitated by communications technology (see Webber, M., 1963, p.23) which no longer rely on physical proximity within a bounded space. Delanty (2003, p.2). However, many of the more recent definitions and studies of the concept of community, such as the extended historical reviews and analyses by Gerard Delanty (2003) and Graham Day (2006b), still find identity and belonging as pervasive facets of the idea of community¹³, not necessarily “because of nostalgia for something that has been lost, but because the question of belonging has become more acute” (Delanty, G., 2003, p.193). Richard Sennett (1998, p. 138) comments that “one of the unintended consequences of modern capitalism is that it has strengthened the value of place, arousing a longing for community. All the emotional conditions ... in the

1996) and contesting whether any universally applicable framework applies or whether only location-specific models are reasonable (see e.g. Tartaglia, S., 2006).

¹⁰ (Hillery, G., 1955) identified at least 94 definitions of ‘community’ and Bell & Newby (1971) “almost despaired of it as a useful sociological term” (Rose, G., 1990, p.425). However as (Day, G., 2006b, p.245) points out there seems little point in “lamenting the confusions and obscurities which surround the notion of community, when it is being put to work so intensively and determinedly by the members of society”. Indeed in the FCRM context, the idea of community is well embodied in policy documents (see e.g. Environment Agency & Defra, 2011a).

¹¹ Whatever Tönnies original intentions, *Gemeinschaft* became progressively associated with the ‘rural idyll’ (see e.g. Neal, S. & Walters, S., 2008)

¹² Community studies during the first half of the 20th century (Valentine, G., 2001b, pp. 106-111) revisited in the last decade or so (Charles, N. & Crow, G., 2012) with the aim of examining social change have typically still found a “loss of community and family solidarity” narrative emerging in both urban and rural close-knit face-to-face communities (Charles, N., 2012, p.452).

¹³ Thomas Bender (1982, pp.7-8) declares: “There is a ‘we-ness’ in a community; one is a member.”

workplace ... impel people to look for some other sense of attachment and depth.” Valentine (2001b, pp112-115) summarises the features which can encourage this sense of *belonging* as including proximity, territory, social homogeneity and time.

The literature therefore suggests that both the concepts of stewardship and belonging are important when thinking about what motivates people to engage with local communities including DASH groups. Diane Warburton (1998, p.17) conveniently summarises that [neighbourhood] community has two elements: “one to do with relationships between people, and one to do with relationships between people and the place in which they are located. It is to do with a common feeling based on sharing a place which creates a particular type of [caring] relationship.”¹⁴

2.2.2 Dimensions of community and DASH groups

When thinking about DASH groups, it is important to recognise that there may be at least two communities involved. One is the local neighbourhood community which may be exposed to flood risk and the other is the ‘community of practice’ of the DASH group itself. Communities of practice are defined by Wenger, McDermott & Snider (2002, p.4) as “groups of people who share a concern, a set of problems or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis.” This section considers how thinking about both types of community may be related.

Ruth Liepins’ (2000) rural studies analysis of community identifies three dimensions of focus to community: spaces and structures, practices and meanings with people involved in all three. Importantly, similar dimensions (spatial, social and mental) were also identified by Tracey Coates (2010) when working with flooded communities. These dimensions may be compared with Etienne Wenger’s (1998) non-mutually-exclusive ‘modes of belonging’ of communities of practice (Wenger, E., 1998, p.182). The spaces and structures, practices and meanings discussed by Liepins (2000) and

¹⁴ Ruth Liepins (2000) also notes that “‘community’ and ‘place’ are two concepts that are constantly intertwined in highly complicated ways. Communities may not be primarily identified according to their coincidence with particular places ... Nevertheless, communities involve social relations that occur transiently or continually in both places and spaces.”

Coates (2010) are in fact a way of viewing modes of belonging¹⁵. Wenger (1998, p.173) suggests a different triad of modes of belonging: engagement, imagination and alignment. The similarities and differences between these modes of belonging are now discussed.

Firstly, Liepins' (2000, p.32) *community spaces and structures* are understood to include "the physical sites of schools and halls and bridges where people gather in their practice of 'community'." Coates (2010) identifies spatial aspects as being particularly traceable during flooding of communities, exposing local attachments and the importance of the role of the locality in community life. In the context of DASH groups, spaces and structures include both the physical assets for which a group might take responsibility and the ever-changing nature of the coastal and riverine 'place' in which the assets are situated. Wenger (1998) does not separately identify spaces and structures as an element of communities of practice, probably viewing it as a contextual element to thinking and practice. However in the context of DASH groups activities, the *FCRM assets* themselves must surely remain an important dimension.

Liepins (2000, p.31) *community practices* are seen as including "the range of formal and informal ways people conduct their economic and social life." In the context of flooded communities, Coates (2010) identifies the way that connections and activities between individuals that become exposed during a flooding incident, along the lines of Robert Putnam's (1995, 2000) 'social capital' networks, with some informal DASH activity even being evident. In the context of DASH groups, practices are more restricted to those activities, discussions and meetings related to the practices of asset management, although, since the majority of the members of the DASH groups are likely to be linked to the local community, the wider community member interactions may well have an influence on the group. Wenger's (1998) idea of *engagement* is close to the idea of community practices, but according to Wenger also embraces 'relationships', 'interactions' and 'shared histories of learning'. It is acknowledged by Wenger (1998, p.174) to be very close to a 'specifiable' community of practice.¹⁶

¹⁵ Drawing on Heidegger (see e.g. Inwood, M., 1997), 'modes of belonging' could alternatively be described as dimensions of 'being there'

¹⁶ In the context of trying to capture the relationship between DASH group members and with FCRM professionals, *partnership* (as used in the professional context) might be an alternative term to capture these various aspects of Wenger's term *engagement*.

Community meanings are seen by Liepins (2000, p.31) as covering “widely held beliefs, shared interests, and some forms of social connection.” Coates (2010) identifies the way similar meanings in flooded communities are reinforced by the shared experience of flooding. These expressions are likely to embody implicitly or explicitly those aspects about the present or potential future FCRM assets and their linkage to the place which are valued actually or symbolically (Cohen, A. P., 1985), an aspect which is explored further in Section 2.4. Wenger’s (1998, p.174) term for this idea of shared meanings is *imagination*, which sees various images: ‘possibilities’, ‘the world’, ‘the past and the future’, and ‘ourselves’.

The final dimension of communities of practice according to Wenger is *alignment* (Wenger, E., 1998, p.174). This element seems to be specific to communities of practice as it is not identified by Liepins or Coates and is about lining up with and becoming part of something bigger (Wenger, E., 1998, p.180). Summarizing, his idea (coming from the business context) seems to be partly about coordination (linking together of small communities of practice into a larger discursive network), partly about magnification of ideas through ‘coordinated enterprises’ and partly about compliance with policy or regulation.

The literature therefore suggests that dimensions of imagination, engagement and alignment might be important to DASH groups combined with the physicality of the community places and structures (in this case the FCRM assets).

2.2.3 Development and sustainability of DASH groups

Direct action self-help is by definition situated within some form of local community or neighbourhood. However, a community of practice of DASH group volunteers also needs to develop. Writing of a lifetime of experience in working with various groups¹⁷, Scott Peck (1990) argues that such ‘intentional communities’ can be designed. Smith (2000) carried out comprehensive research and analysis on such groups in the USA, which he termed Grassroots Associations¹⁸ and defines them (Smith 2000, p.ix) as “significantly autonomous, formal non-profit groups that use the associational form or structure, that are volunteer run and composed essentially of

¹⁷ Motivated by a range of factors such as religious faith, ecological lifestyle, or support on an issue of common importance (e.g. alcohol addiction).

¹⁸ Smith (2000, p.ix) sees them as one just form of non-profit group

volunteers as analytical members, and that have a relatively small local scope (i.e. locally based).” Smith (2000) also identifies differences between grassroots associations and equivalent voluntary groups with paid staff. For grassroots associations, he identifies an informal recruitment process, generally low professionalism and low external funding, and the evening and the weekend timing of the group’s necessarily intermittent activities (Smith, D. H., 2000, p.147). Ockenden and Hutin (2008, pp.15-21) note positive aspects of such groups as being a clear structure, high levels of commitment, a blurring between the group’s activities and social life in the local community and a strong belief in the value of volunteering and a presumption against paid staff.

Wenger *et al.* (2002, p.68) point out that communities of practice are “not born in their final state, but go through a natural cycle of birth, growth and death”. They identify five stages of community development (Figure 2-5): potential, coalescing, maturing, stewardship and transformation.¹⁹ These stages are very similar to those identified by Bruce Tuckman (1965) for teams or small groups: ‘forming’, ‘storming’, ‘norming’ and ‘performing’. There seems to be good equivalence between the four stages of Tuckman and the first four of Wenger’s.

Smith (2000, pp.181-192) found that most grassroots associations were short-lived, but factors which helped longer term survival were size (the number of members), growth of territorial scope, cooperation with other external groups, attracting external resources (mainly funding), incentivising membership and being able to develop a wider repertoire of strategies and tactics. Older groups also often showed evidence of having survived de-radicalisation (e.g. with the loss of the founder) and goal displacement.

¹⁹ Peck (1990, pp.86-106) similarly identifies stages of his ‘designed’ communities as: pseudo-community (superficial mutual pleasantness), chaos (conflicts of personal views), emptiness (abandonment of personal expectations, preconceptions and solutions) before eventually reaching a final stage of genuine openness, sharing, helping and belonging. Peck (1990) also discusses the later phases of a community under the topic of community maintenance and confirms, as Wenger’s graph (Figure 2-5) indicates, that such groups have their ups and downs in energy and stability.

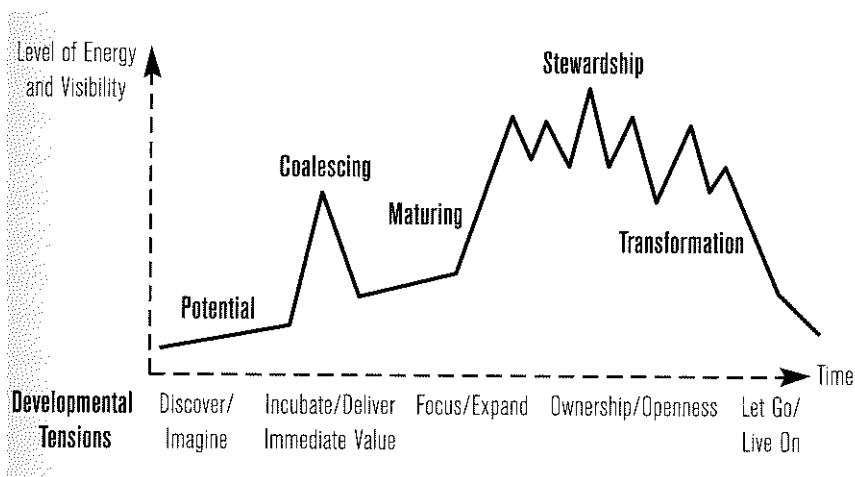


Figure 2-5 Stages of community development (Wenger *et al.*, 2002, p69)
 ('The jagged line represents the level of energy and stability that the community typically presents over time')

Peck identifies the issues that have to be dealt with if constructed community is to be maintained (in Wenger's words 'stewarded') as being: size, structure, authority, inclusivity, intensity, commitment, individuality, task definition and ritual. Wenger *et al.* (2002, pp.51-63) have also identified key principles for cultivating and maintaining communities of practice. The first principle, "design for evolution (start simply and add features as they become obvious)", obviously includes decisions about Peck's (1990) items of size, structure and authority. Wenger's next two principles, "open a dialogue between inside and outside perspectives" and "invite different levels of participation", touch on Peck's questions of commitment (particularly for the core team or committee) but also on questions of inclusivity. Wenger's identified need to "develop both public and private community spaces (physical and organisational, not forgetting transitions)" recognises the importance of taking account of participants individuality. His "focus on value" emphasises the need to have a clear task definition. Wenger's final two principles of "combining familiarity and excitement" and "creating a rhythm for the community" (e.g. in terms of pattern of meetings, events, etc.) is all about recognising the importance of varying the intensity of interaction and allowing elements of simple ritual to be embodied.

Wenger (2001) also encourages practical support and validation for the activities of individual communities of practice through networking with other groups. Wenger *et al.* (2002, p.127) suggest networking arrangements should employ a ‘fractal structure’ of links between small and large local groups and regional groups. Such networking is supported by Smith’s (2000) analysis of research on US grassroots associations, suggesting that more collaborative groups were less likely to die out than those which were more introverted. They also tended to “have more resources and be more effective in goal attainment because collaborative relationships with other groups/organisations can be viewed as resources in themselves” (Smith, 2000, p. 142).

2.2.4 DASH group leadership

‘Leadership’ rather than ‘management’ is identified by Smith (2000, p.149) as the appropriate term to describe the role of leaders of grassroots associations, noting that most in-group leadership is voluntary (see also Carr, A., 2002, p.72) and elected by the group (Smith, D. H., 2000, p.152). This phenomenon, observed in the UK (Ockenden, N. & Hutin, M., 2008), Australia (Carr, A., 2002)(Carr, A., 2002)(Carr, A., 2002)(Carr, A., 2002)(Carr, A., 2002)(Carr, A., 2002)(Carr, A., 2002)(Carr, A., 2002) and the USA (Smith, D. H., 2000), contrasts with an ‘irresistible’ trend of emerging professionalization of management in larger charities (Rochester, C. *et al.*, 2010, p.149)

Early leaders of DASH groups are often ‘founders’ of the group who then convince others to “act as if the group exists” (Smith, D. H., 2000, p.71). Otherwise they emerge through volunteering to do a needed task or via election or through some existing position in the community (Smith, D. H., 2000, p.155), often “stepping into” the role as being the most suitable and willing person (Ockenden, N. & Hutin, M., 2008, p.7). Typically (see Wenger *et al.*, 2002, pp. 80-82) they will enjoy being with other citizen volunteers and professionals, network to keep up to date with developments and work together with the others with a strong sense of personal identity and worthwhileness of their contribution. But they will often also be driven by a sense of belonging (or wanting to belong), and wanting to enhance their personal reputation and gain an increased ‘profile’ in the community.

Whilst coordinators/leaders may be amateur and often eschew formal training, they may have prior professional expertise relevant to the aims of the group (Smith, D. H., 2000, pp. 154-5) and do need an adequate level of technical knowledge to fulfil their role (Wenger, E. *et al.*, 2002, p.83). They tend not to formally ‘supervise’ the activities of other volunteers in the group but focus on motivating them by treating them with due consideration and appreciation (Smith, D. H., 2000, pp.159-160). They have a critical ‘external-facing role’ (Ockenden, N. & Hutin, M., 2008, pp.7-8), particularly with their local FCRM organisation, and require skills such as communication/networking, diplomacy and lobbying, and being able focus both on both public space (e.g. meetings and web discussions) and private space (connecting individuals and involvement in informal discussions) (Wenger, E. *et al.*, 2002, p.83)

The coordinator/leader, with any supporting committee, tends to lead the decision-making process, often driven on by “the strength of the leader’s personality and the effective influence of one person’s vision” (Ockenden, N. & Hutin, M., 2008, p.9) but still receiving a large measure of support from the wider group and local community. Indeed Wenger *et al.* (2002, p.83) point out that “coordinators are crucial to a community’s success, and weak coordinators can significantly limit a community’s effectiveness”. It is thus vital that they have sufficient time to fulfil their role. In interviews of local community-based volunteer-led groups in the UK, Ockenden & Hutin (2008, p.9) found that lack of time or overburdening of the leader were rarely problems, but this was in stark contrast to the experience of natural resource management groups in Australia (Carr, 2002).

2.2.5 Knowledge, skills and expertise of DASH group membership

This section explores the literature relating to the range of knowledge, skills and expertise which a community group such as a DASH group engaged in the maintenance and management of FCRM assets might be in a position to bring in a general sense to Wenger’s (1998) dimensions of engagement and imagination discussed in Section 2.2.2 above.

The literature in the area of citizen understanding of ‘expert matters’ such as science and engineering comes from very different perspectives and has been particularly polarised in the area of environmental science, for example in regard to the

geographical, technological and moral opposition to forms of waste disposal (Gerrard, S., 2000, pp.445-7). O’Riordan (2000, p.2) characterises the problem in terms of scientists “who see their culture threatened by a wave of populist criticism” versus environmental activists who argue that scientific studies are limited by only addressing those phenomena where cause and effect are reasonably clear.²⁰ Even in the context of FCRM, where more of a consensus focussed on mitigating flood and coastal erosion risk might be expected, significant environmental issues remain such as the impact of habitat degradation, loss and conversion and (over-) exploitation of natural resources including offshore sand and gravels (see e.g. Kay, R. & Alder, J., 2005, pp.22-3). Furthermore, in FCRM there is also a wide range of views and perceptions by the various interested publics on the appropriateness of various types of intervention²¹. Prioritising use of public funds in an acceptable manner therefore remains a challenge in delivering effective FCRM governance (see e.g. Green, C., 2011). A key issue for DASH group members will therefore be to combine their existing expertise and skills with development of an appropriate level of knowledge of FCRM asset systems and management frameworks.

DASH members may hold different types of existing knowledge even though they might not necessarily be able to articulate this knowledge. Michael Polanyi famously said that “we know more than we can tell” and thus established the idea of tacit knowledge (Polanyi 1966, p.4) (Polanyi, 1966, p.4); the task of distinguishing tacit from explicit knowledge has continued ever since. Nonaka *et al.* (2005, pp.24-5) identify explicit knowledge as that which can be expressed in formal and systematic language and shared in the form of data, scientific formulae, specifications, manuals and suchlike. Donald Schön (1983) describes this knowledge as ‘espoused theories’ that are formally seen by a profession to guide action and encompass the formal philosophy of the profession and ‘theories in use’ that represent the patterns learned

²⁰ This is epitomised by the debate between Brian Wynne and Harry Collins, which is touched upon later. Wynne broadly argues against a normative view of scientific truth and for more social negotiation (see e.g. Irwin, A. & Wynne, B., 1996; Wynne, B., 1996). In contrast, Collins, whilst rejecting narrowly framed scientific propositioning or scientific fundamentalism, embraces a centrality to the scientific paradigm in our culture against a ‘modernistic’ labelling by Wynne. Collins and Evans (2007) also argue for greater clarity in describing different types of expertise rather than an expertise ‘free-for all’ epitomised for him by the citizen science approaches.

²¹ For example, as evidenced by the debate about the need or otherwise for dredging of rivers which followed the flooding of the Somerset Levels in the winter of 2013-14

and developed in the day-to-day work of the professional and which characterise the real behaviour of professionals.

In contrast, tacit knowledge includes subjective insights, intuitions and hunches and is highly personal, hard to formalise and difficult to communicate and rooted in action, procedures, routines, commitment, ideals, values and emotions (Nonaka *et al.* 2005, pp.24-5). Schon (1983) describes such knowledge as “theories in use” and Brookfield (1995, cited in Moon, J., 1999, p.40) describes this tacit knowledge as “intuitively based activities” that are “privately developed, proven ways of performing that are contextually idiosyncratic and unmentioned in textbooks of professional practice.”

Harry Collins subsequently further developed ideas of the categories of, and distinctions between, tacit and explicit knowledge (Collins 2010) in the face of a general challenge over the extent to which scientific knowledge should be privileged over other forms of knowledge and expertise and a push by authors such as Brian Wynne (1996) and Alan Irwin (1996) to escape from the “hegemony of the rationalist deference to science and experts” (Weston, J., 2004, p.321). Collins and Evans (2007) differentiate between various types of tacit and explicit knowledge in a ‘periodic table of expertises’ (Collins and Evans 2007, p.14), reproduced for convenience in Figure 2-6.

Ubiquitous expertises					
Dispositions	Interactive ability				
	Reflective ability				
Specialist expertises	Ubiquitous tacit knowledge			Specialist tacit knowledge	
	Beer-mat knowledge	Popular understanding	Primary source knowledge	Interactional expertise	Contributory expertise
	Polimorphic				Mimeomorphic
Meta-expertises	External (Transmuted expertises)		Internal (Non-transmuted expertises)		
	Ubiquitous discrimination	Local discrimination	Technical connoisseurship	Downward discrimination	Referred expertise
Meta-criteria	Credentials	Experience	Track record		

Figure 2-6 Periodic table of expertises (Collins and Evans, 2007, p.14)

In the context of this vigorous debate, it is in fact Wynne’s (1996) analysis of the issues with regard to Cumbrian farmers and the controversy over the source (Sellafield vs Chernobyl) of much higher than average levels of radiation in their fields and the re-interpretation of this analysis by (Collins, H. & Evans, R., 2007, pp.48-52) that has helped to provide useful clarity about ideas of expertise. Wynne describes the farmers as having ‘lay expertise’ in this situation, but Collins, whilst acknowledging farmers as ‘uncertified experts’ (a term he prefers to ‘lay experts’), says that they have two kinds of more specific expertise. Firstly, they had what he defines as ‘contributory expertise’ i.e. they had specific local knowledge of the ecology of sheep on fells which seemed to have been unrecognised by the MoD scientists. Secondly, they had ‘local discrimination’ based on ‘long experience’ not to take “the nuclear industries pronouncements concerning [local] radioactive contamination” at face value (Collins, H. & Evans, R., 2007, p.49). Both of these types of expertise seem directly relevant to FCRM, for example in relation to identification of actual local processes occurring during severe flood events.

Several of the other key concepts about knowledge expertise and skills which Collins and his colleagues have developed will provide a useful framework for thinking about FCRM DASH activity in subsequent chapters. Firstly, whether a skill is ubiquitous or specialist may be dependent on the social context. For example, Collins and Evans (2007, p.16) cite a 2005 post Katrina suggestion from Wiebe Bijker that “the Dutch population as a whole had sufficient expertise in dam-building to contribute to public debates about new projects in contrast to what everyone agreed was a low level of expertise in the working of levees among the general population of Louisiana.”

Secondly, a useful distinction can be made (Collins and Evans 2007, p.27, Collins 2010, pp.86-171) between mimeomorphic actions (masterable bodily skills, which cannot be described, such as balancing on a bike) and the associated somatic tacit knowledge on the one hand and polymorphic actions (such as negotiating traffic which require understanding and working with social conventions) and the associated collective tacit knowledge on the other. Schön embraces both with the term ‘artistry’ which he defines as “the competence by which professionals handle the indeterminate zones of practice ... an exercise of intelligence, a kind of knowing ... not inherently mysterious; it is rigorous in its own terms” (Schön, D., 1987, p.13). Schon acknowledges that ‘artistry’ cannot be taught in a professional schools and therefore is open to anyone (implicitly including DASH group members) who will learn it. Richard Sennett (2009b) uses an alternative expression of ‘craftsmanship’ to describe such skills. Such craftsmanship is notable by its ability to localise, question and open up a potential situation. It is imbued with pragmatism, a culture of accepting simpler, more ‘honest’ ways of doing things and with an element of pride in the resulting craftwork (Sennett, R., 2009b, pp. 286-296).

Thirdly, whilst DASH group members might not have the contributory expertise of full-blown experts, they might well have ‘interactional expertise’ (see Figure 2-6) and be able to absorb or ‘enculturate’ themselves sufficiently in the domain of FCRM to be able to become effective in asset management, so long as they possess the dispositions of interactive ability (e.g. interpersonal skills) and reflective ability. Finally, some DASH group members might be able to bring *referred expertise* – expertise transferable from one situation to another.

Conrad and Hilchey (2011) point out in relation to the ‘citizen science’ of community based environmental monitoring, that the engagement of such expertises promotes “environmental democracy, generation of social capital [see discussion in Section 2.2.1 above] ..., increased scientific literacy and inclusion in local issues” (Conrad, C. & Hilchey, K., 2011, p.283-4). Similarly Anna Lawrence (2006) in a study of voluntary biological monitoring found that those involved can “enhance the information base for environmental management; change participants through education about scientific practice and ecological change; lead to changes in life direction or group organisation; and influence decision makers” (Lawrence, A., 2006, p.279).

2.2.6 Engagement: expertise into action

Given the expertise of those who might be involved in DASH groups discussed in the previous section, this section moves on to examine how the literature suggests such a group might usefully make use of such knowledge and skills in their engagement to address local FCRM asset management issues.

Brown and Duguid (1991, cited in Boud, D. *et al.*, 2006) suggest that communities of practice were ‘discovered’ in the 1990s “when it was observed that learning takes place through informal social interaction anchored in the context of problem solving” (Boud, D. *et al.*, 2006, p.71). Brown & Duguid go on to highlight the way joint action can help “a shared repertoire” to develop between professionals and everyone involved in the community. This might also be described as a group culture and is closely linked to Schramm’s (1973) concept of shared fields of experience. Four modes of knowledge type conversion within a group are identified by Nonaka *et al.* (2005, pp.26-30):

- Socialisation (tacit to tacit knowledge), which occurs in hands-on learning and in informal social meetings and would probably be the mode by which one volunteer might learn Collins (2010) somatic tacit knowledge from each other.
- Externalisation (tacit to explicit) which is the crystallisation of what Collins would call *relational* tacit knowledge “allowing it to be shared by others” (Nonaka, I. *et al.*, 2005, p.27)
- Combination (explicit to explicit), a systematic process involving acquisition and integration of knowledge and its subsequent synthesis, processing and

dissemination (Nonaka, I. *et al.*, 2005, p.27). A ‘how-to’ guide for FCRM DASH groups does not exist at present but groups could draw on resources prepared for conservation volunteers²²

- Internalisation (explicit to tacit), a ‘learning by doing’ process by which “explicit knowledge ... is converted into tacit knowledge by [personal experience of] individuals.” (Nonaka *et al.*. 2005, p.28).

Wenger *et al.* (2002, pp.9-10) draw out the practical importance of social knowledge generated within groups. Wenger does not use Nonaka’s terminology but does identify an interaction in the learning process of a community of practice between participation (acting and interacting with one another) and reification – a process of making concrete the ideas tacitly being developed during participation (Wenger, E., 1998, p.62-3).

In a FCRM context, the processes of knowledge and expertise acquisition and conversion can all be seen to take place within the classic Plan-Do-Check-Act experiential learning cycle (Deming, W. E., 1986) originally developed for manufacturing industry but now also associated with the infrastructure asset management (British Standards Institute, 2008) adopted by most of the major utility and transport infrastructure organisations in the UK, including the Environment Agency (2011b) across the life cycle of their assets. Kolb & Fry (1975), based on earlier work by Dewey, Lewin and Piaget, developed a version of the general experiential learning cycle shown in Figure 2-7 in which the learning process is seen as being able to begin at any point in the continuous cycle and in which the role of *reflection* on observation and practice, whether before, during or after action, is seen by many authors such as Schön (1983) and Cowan (1998) to be crucial.

²² Examples of handbooks and manuals potentially relevant to DASH groups include those produced by the British Trust for Conservation Volunteers (BTCV) for volunteer management of waterways and wetlands (Brooks, A. & Agate, E., 2001b) and of sand dunes (Brooks, A. & Agate, E., 2001a) and that published by the US Ocean Conservancy and Environmental Protection Agency on estuary monitoring (Ohrel, R. & Register, K., 2002)

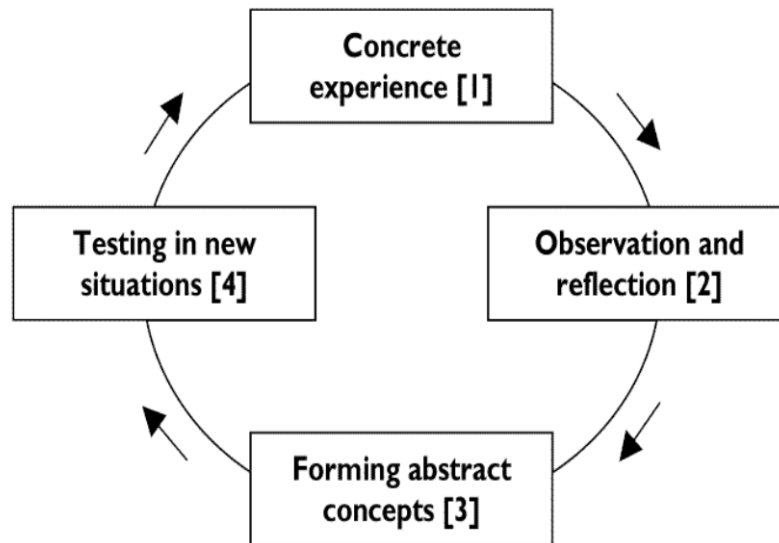


Figure 2-7 Experiential learning cycle of Kolb and Fry (1975)

In geotechnical engineering the so-called ‘observational method’ developed by Peck (1969) allowed more efficient engineering design than might otherwise have been possible based on more conservative initial assumptions about ground behaviour. In a similar but more artisan way, it is possible that DASH group ‘designs’ and craftsmanship, especially in the case of ‘messy’ repair situations, may evolve during the process of being implemented. Experience from engineering in developing countries, which has potential analogy with the craft-based work of DASH groups, suggests that such an evolution will probably take place. For example Frankland *et al.* (2012) write of the progressive development of traditional concrete sandbag walls in the Pacific island of Kiribati by improving the cross-sectional design of the wall and the quality and consistency of the concrete mix.

The Kiribati sand wall example also draws out the importance of differentiating between those items of the asset design which can and probably should be socially negotiated by a DASH group and those which need expert engineering and scientific input. A study by Khwaja (2004) of community infrastructure projects in northern Pakistan found that “increased community participation in non-technical decisions improved outcomes of projects, measured by the degree to which the projects were maintained several years after implementation. However, increased community participation in technical decision-making – those requiring information of expertise that the community is at a disadvantage to provide – actually seemed to be detrimental to project success” (Mulligan *et al.*, 2011, p.36). However, whilst Mulligan *et al.*

(2011) endorsed that view from their experience in developing country projects in Nigeria and Bangladesh, they did not reject all forms of contributory expertise available from a local community. Indeed they recognised, echoing some of the themes of Sennett (2009a), that the engineer must “come with the humility to integrate their own professional knowledge with the widespread and subtle skills of [local] artisanal trades and to recognise the central importance of local ‘know-how’ in project delivery” (Mulligan, J. *et al.*, 2011, p.38) and in so doing the external expert should “ensure that the process of knowledge transfer is in fact a process of knowledge exchange” (Mulligan, J. *et al.*, 2011, p.43).

2.2.7 Alignment: DASH groups and the bigger picture

Wenger’s (1998) dimension of *alignment* suggests the need to consider how wider frameworks of policy and dominant physical process trajectories might limit the potential for DASH groups in FCRM field.

Geopolitically, the importance of hydraulic and geomorphological spatial relationships have been widely discussed elsewhere and are now well embedded within industry guidance (see e.g. CIRIA, 2013; Rogers, J. *et al.*, 2010), reinforced over the last decade or so by the advent of Shoreline Management Planning and Catchment Flood Management Planning (see e.g. Defra, 2006; Evans, E. *et al.*, 2001). On the coast, action is limited by agreed policy options, such as ‘hold the line’, ‘no active intervention’ and the often controversial ‘managed realignment’²³. Local communities are generally aware of Shoreline Management Plans (SMPs) through the consultation processes, particularly if managed realignment is being considered (see e.g. Nicholson-Cole, S. & O’Riordan, T., 2009). As a result coastal DASH groups seeking to maintain existing coastal defences have the potential not only to be in conflict with politicians and professionals but also with processes such as eroding shorelines and rising water levels. Environment Agency (2011a) guidance makes recommendations to FCRM authorities as to how to assess sea level changes and increases in river discharges, but gauging the importance of the resulting assessments and taking action will depend on what Neil Adger and his co-researchers calls their ‘adaptive capacity’

²³ Managed realignment involves the abandonment of some parts of the coast and retreat to high ground or a new defended line.

and this, as well as exposure and sensitivity, will affect their resulting vulnerability (Paavola, J. *et al.*, 2006, p.273).²⁴

What may become evident, however, is that strategies such as repairing existing defences may only be a temporary solution and more radical options may be required. For example, on the coast, Linham and Nicholls (2012) set out a range of adaptation response measures to coastal changes such as sea level rise and changes in wave and storm climates; these measures recognise that accommodation includes measures such as protection of buildings from flooding and retreating defence lines, buildings and even whole communities. Thus immediate targets for DASH group activity such as repair or maintenance of existing FCRM assets might eventually have to give way to a longer-term vision consistent with the long-term development of the physical coastal systems. According to Wilby and Keenan (2012) adaptive responses where the selected management option at any time depends on the actual changes rather than the predicted ones are gaining traction for highly engineered situations and where a clear set of options and outcomes can be articulated. However this “depends on systematic monitoring with periodic review” (Wilby, R. & Keenan, R., 2012, p.23) in which the DASH groups would need to engage with their local FCRM authority. O’Brien (2012) notes that sometimes the option of deliberately transforming systems and society needs to be considered and that there “remains a fine line and considerable tension between accommodating change and consciously creating alternatives” (O'Brien, K., 2012, p.673).

A final aspect to note of alignment of communities of practice encouraged by Wenger (2001) is practical support and validation for their activities through networking with other groups, but this aspect has already been discussed in Section 2.2.3.

2.2.8 Conclusion: conceptual framework for DASH groups

Drawing together the strands from the literature discussed in this and the preceding section, the conceptual framework shown in

Figure 2-8 has been developed to represent an idealised FCRM DASH group.

²⁴ Their vulnerability is not just a question of the relative affluence and physical resources in the local community, but on a whole host of other factors including “dependence on risky activities and sources of income such as agriculture or fishing” (Paavola, J. & Adger, N., 2006, p.605).



Figure 2-8 Conceptual model for DASH groups in FCRM

In the central circle of Figure 2-8 lies the developing DASH group with its leader and members and their associated knowledge, skills and expertise (see Sections 2.2.3, 2.2.4 and 2.2.5 above) . The points of the star represent the dimensions of the group: *imagination, engagement, alignment* and the *FCRM assets* themselves . These dimensions were developed from the literature discussed in Section 2.2.2, with further details on the dimensions of engagement and alignment discussed in Sections 2.2.6 and 2.2.7. Around the star the outer circle represents the context within which the DASH group is situated. Within this can be identified the following elements: a world of *physical change* in which flood risk may be increasing, the *place* and the *local community* within which the DASH group is situated and the *wider policies, plans and activities* of government and non-government organisations both professional and voluntary. Each of these elements of context is located nearest to the dimensions of the DASH group with which they are most closely associated. So, considering each of the dimensions in turn, the following may be noted in Figure 2-8:

- the FCRM assets lie as a feature of the place and local community and form one part of the community spaces and structures;
- the Imagination of the DASH group, which is going to be about the past and the future, and about possibilities arising with and without direct action, lies within the context of both the local community vision for their place and the challenges of future physical change including climate change (e.g. sea level rise), morphological change and asset deterioration²⁵;
- the Engagement of the DASH group, representing its relationships, interactions, practices and shared histories of learning lies within the tensions of the aspirations of the local community and a broad range of wider policies plans and activities and the individuals and organisations involved, including landowners and FCRM professionals
- the Alignment of the group lies between the constraints of both the physical change taking place in the wider natural and man-made environment and the wider policies plans and activities. The latter might include Shoreline Management Plans or Catchment Flood Management Plans. Such alignment is important to avoid wasted work by the group and adverse impacts on others, ideally with a vision to follow the sustainability principle of “Think global; act local” (see.e.g.Barash, D., 2002 p. 547; Ellul, J., 2006).

Whilst each of the contextual elements can be seen as constraints, they would ideally also offer potential motivations for action; these are shown in the blue triangles pointing towards the DASH group. In the top right, a part of the wider policies plans and activities of government organisations involved in FCRM includes the aspect of limited availability of public support and funding (Section 2.1.3). This motivator can be viewed both in two ways: negatively, in that the lack of conventional full public funding for FCRM works may motivate DASH activity to commence, but also positively in that that advice and seed-corn funding from public (or other) sources may help to trigger commencement of DASH activity. The remaining motivators are those already identified and discussed in Section 2.2.1 and are associated with each of the remaining contextual elements: physical change and increasing flood risk becomes a directly perceived motivator, particularly after catalytic flood events; the desire for identity and belonging is linked to the local community; and finally the geography and

²⁵ Here imagination diverges from the Ruth Liepins (2000) typical social science emphasis on capturing or expressing the essence of community as a social construct

environment of the place offers DASH group members a motivation for stewardship not just of the physical FCRM assets but also of the environment in which they are situated.

2.3 Human dimensions of flood and coastal protection assets

This section examines and brings together literature on different human dimensions for assets and uses this to suggest a hierarchy of three dimensions that could be used by DASH groups for assessing FCRM assets.

2.3.1 Introduction

Use of systems-based approaches (Gouldby, B. *et al.*, 2008; Hall, J. *et al.*, 2006; Hall, J. *et al.*, 2003) for analysing and managing stocks of engineering infrastructure assets has drawn attention to the need for an improved understanding of engineering performance and the reliability of engineered components, such as flood defences (Simm, J. *et al.*, 2008; Simm, J. *et al.*, 2006), and the need to understand their strengths and weaknesses as part of an overall system. The characterisation of the performance of engineering assets is often supported by some form of simple scoring system (Hooper, R. *et al.*, 2009, p.73-76) to grade the structural condition of their assets, such as the five point visual inspection scale (Table 2-1) used by the EA (Environment Agency, 2006; Flikweert, J. & Simm, J., 2008). Such scales are used to capture deterioration in asset condition and improvements delivered by management action and are potentially simple enough to be used by DASH groups.

Table 2-1 EA asset condition grade scale

Grade	Rating	Description
1	Very Good	Cosmetic defects that will have no effect on performance
2	Good	Minor defects that will not reduce the overall performance of the asset
3	Fair	Defects that could reduce performance of the asset
4	Poor	Defects that would significantly reduce the performance of the asset. Further investigation needed.
5	Very Poor	Severe defects resulting in complete performance failure

This approach to asset management has, perhaps rightly, focussed largely on the engineering functionality of assets, with little attention given to date to other aspects. However, as the science associated with managing asset systems matures and the pressure for public involvement grows (as discussed in the previous section), there is potentially more scope to consider the social functioning or human dimensions of such systems. Indeed the Institution of Civil Engineers (2004, Rule 3) requires “all members [to] have full regard for the public interest, particularly in relation to matters of health and safety, and in relation to the well-being of future generations”²⁶ and this suggests that ways should be explored to assess the human dimensions of assets

This then prompts the research questions already identified as to whether DASH groups could monitor such human dimensions of FCRM assets as they relate to their local community, and if so whether assessment methods can be identified that are straightforward to apply and give reliable results.

2.3.2 Approaches to assessing human dimensions

This next section therefore considers how human needs might be assessed in a general sense and then how engineered structures and systems such as FCRM assets might contribute towards meeting these needs. It examines approaches to these questions by authors from a range of different disciplines and then seeks to synthesise the emergent ideas.

²⁶ Similarly the American Society of Civil Engineers (ASCE, 2009, 1st cannon) requires “engineers [to] hold paramount the safety, health and welfare of the public and [to] strive to comply with the principles of sustainable development in the performance of their professional duties.”

Impacts approach

One approach to assessing human dimensions which is close to current engineering practice is to view the human dimensions of engineering assets in terms of *impacts* (positive or negative). An impact can be described as “the change in a ... parameter over a specified period and within a defined area, resulting from a particular activity compared with the situation which would have occurred had the activity not been initiated” (Wathern, P., 1988, p.7). Within this general description, social impacts can be defined as “the intended and unintended consequences on the human environment of planned interventions (policies programs, plans, projects) and any social change processes invoked by those interventions” (Vanclay, F., 2002, p.190). Lists and categories of social impacts have been developed by various authors, a recent authoritative list having been outlined (see Box 2-1) by the International Association of Impact Assessment (2003). This approach has proved attractive in the field of flood risk management, the IAIA list of social impacts being adopted in the Appraisal Summary Table approach (Environment Agency, 2010b) recommended for assessment of engineering scheme options.

Box 2-1 International Association of Impact Assessment (IAIA) categories of human impacts

1. *way of life* – that is, how people live, work, play and interact with one another on a day-to-day basis;
2. *culture* – that is, people’s shared beliefs, customs, values and language or dialect;
3. *community* – its cohesion, stability, character, services and facilities;
4. *political systems* – the extent to which people are able to participate in decisions that affect their lives, the level of democratisation that is taking place, and the resources provided for this purpose;
5. *health and wellbeing* – health is a state of complete physical, mental, social and spiritual wellbeing and not merely the absence of disease or infirmity;
6. *personal and property rights* – particularly whether people are economically affected, or experience personal disadvantage which may include a violation of their civil liberties;
7. *fears and aspirations* – people’s perceptions about their safety, their fears about the future of their community, and their aspirations for their future and the future of their children;
plus
8. the *eco-system services* provided by their environment – the quality of the air and water people use; the availability and quality of the food they eat; the level of hazard or risk, dust and noise they are exposed to; the adequacy of sanitation, their physical safety, and their access to and control over resources.

There is a difficulty with the concept of an *impact* because it addresses the *change* in a human dimension (brought about by an intervention) rather than the total value of that

dimension relevant to the discussion in this chapter. Nonetheless, the *categories* of impacts in Box 2-1 remain helpful to a consideration of the range of possible human dimensions.

The categories in Box 2-1 can also be compared with other lists of human dimensions that have been drawn up by authors with an interest in the metrics of social justice. John Rawls (1971) introduced the concept of social primary goods – “people’s holdings of, or prospects of holding, external goods” (Robeyns, I. & Brighouse, H., 2010, p.2). Examples of these (Rawls, J., 2001, pp. 58-61) include: basic liberties (freedom of thought and liberty of conscience, etc), freedom of movement and free choice of occupation, powers and prerogatives of offices of responsibility, income and wealth and a social basis for self-respect. Amartya Sen (1985) argued that, rather than thinking about people’s holdings of primary goods given that human needs vary considerably with factors such as health, age, climatic conditions, location and temperament, the equality principle of distributive justice amongst citizens (Miller, D., 1999) is better served by focusing on *capabilities*. Capabilities are the various combinations of *functionings* that a person can achieve (Sen, A., 1993, p.40) and this concept has been extended by Martha Nussbaum (2000; 2006), into a list of central human capabilities (Box 2-2) which has been influential internationally, assisting the UNDP in defining a Human Development Index.

Box 2-2 Martha Nussbaum’s (2000, 2006) Central Human Capabilities summarised

1. *Life* – ability to live a life of normal length and at least minimum quality.
2. *Bodily Health*, including reproductive health, adequate nourishment and shelter.
3. *Bodily Integrity*, including freedom of movement; security against violent assault; sexual satisfaction and choice.
4. *Senses, Imagination, and Thought*, including ability to imagine, think, reason, be creative and experience pleasure – supported by an adequate education, protected by guarantees of freedom of expression and being able to avoid non-beneficial pain.
5. *Emotions*, including being able to love, grieve, and experience longing, gratitude, and justified anger without one's emotional development being blighted by fear and anxiety.
6. *Practical Reason*, including being able to form a conception of the good and to engage in critical reflection about the planning of one's life, protected by liberty of conscience and religious observance.
7. *Affiliation*.
 - 7.1 Being able to engage in various forms of social interaction protected by freedom of assembly and political speech.
 - 7.2 Being able to be treated as a dignified being having self-respect and not being discriminated against on the basis of race, sex, sexual orientation, ethnicity, caste, religion, national origin and species.
8. *Other Species*. Being able to live with concern for and in relation to animals, plants, and the world of nature.
9. *Play*. Being able to laugh, to play, to enjoy recreational activities.
10. *Control over one's Environment*.
 - 10.1 *Political*. Being able to participate effectively in political choices that govern one's life;
 - 10.2 *Material*. Being able, on an equal basis with others, to hold property, to seek employment and to be free from unwarranted search and seizure.

Ranking the importance or priority of the various human dimensions in these lists of human capabilities discussed is often not given much attention. This may imply either that the authors do not believe they can be ranked or that, in individual cases, scaling factors will be developed by some form of consensual process to weight or rank the scores of the various human dimensions (Bisset, R., 1988, p.49). One approach that might assist in structuring the dimensions is Maslow's (1943, 1954) hierarchy of needs, already discussed in Section 2.2.1.

Architectural approach

The equivalent starting point for thinking about human dimensions in regard to buildings and architecture is use of the architectural principles of Vitruvius: *firmitas*, *utilitas*, and *venustas*. These are often remembered in the translation of Sir Henry Wotton (1568 - 1639) as “firmness, commodity and delight”, or in more modern language as strength, utility, and beauty (Gwilt, J., 2007)²⁷. Although Western architects have challenged Vitruvius's threefold characterization, particularly during the period 1910 to 1960, there has been a renewed recognition since about 1965 that “there can be an independent quality of delight in architecture and that the most esteemed architecture endeavours to produce the greatest pleasure for the price, with function and durability being satisfied as well” (Roth, L., 2007, p.67).

Vitruvius's threefold characterisation is as relevant for engineering assets and structures (i.e. infrastructure) as it is for buildings. Major bridges are notable in the way they attract architectural attention (Blockley, D., 2010) and even more modest engineered structures can be affected by the issues of utility and delight. As an example, Cruickshank *et al.* (2005), in an examination of the development of the sea defences associated with a new high quality coastal housing scheme, discuss the interplay between the more engineering (*firmitas*) aims on which a coastal engineer might typically focus and the more architectural (*utilitas* and *venustas*) requirements on which the architect might focus (Table 2-2).

²⁷ Gwilt (2007) translates Vitruvius thus: “Strength arises from carrying down the foundations to a good solid bottom, and from making a proper choice of materials without parsimony. Utility arises from a judicious distribution of the parts, so that their purposes be duly answered, and that each have its proper situation. Beauty is produced by the pleasing appearance and good taste of the whole, and by the dimensions of all the parts being duly proportioned to each other.”

Table 2-2 Example requirements for waterfront developments (after Cruickshank *et al.*, 2005)

Architectural (<i>utilitas/venustas</i>) aims	Engineering (<i>firmitas</i>) aims
Providing free and inviting access and egress to the beach	Preventing wave and overtopping ingress into the development
Ensuring sightlines to the sea were maintained	
Ensuring close contact with the sea without large level changes	
Using soft landscaping to improve the aesthetics	Using resilient materials that will stand up to the design conditions.

2.3.3 Combining approaches into a framework

Making links between the various impacts and architectural frameworks discussed in the previous section is not straightforward, but some parallels can be drawn out if the exercise is attempted. Table 2-3 shows a loose mapping or comparison of the dimensions identified by the various authors discussed above. These are placed in the columns and reordered so that there is a measure of horizontal equivalence to facilitate the identification of any commonalities or grouping categories. Although there are few exact matches, at the bottom of Table 2-3, Vitruvius’ ‘firmness’ is seen to map readily onto Maslow’s basic needs and human security and to Nussbaum’s first three capabilities. At the top of Table 2-3 there are also strong connections between the

Table 2-3 Social criteria from different authors/disciplines loosely matched

Vitruvius’s principles	Maslow’s Needs	Nussbaum’s human capabilities¹	IAIA’s social impacts²	Gorringe’s Spatiality
<i>Architecture</i>	<i>Psychology</i>	<i>Philosophy</i>	<i>Impact Assessment</i>	<i>Theology</i>
Delight (<i>venustas</i>)	Self-actualisation	Senses, imagination and thought (4) Practical reason (6)	Aspirations (8b) Culture (2) Way of life (1)	Imagination/ Inspiration
Commodity (<i>utilitas</i>)	Esteem Belonging and love	Play (9) Emotions (5) Affiliation (7) Control over one’s environment (10)	Community (3) Political systems (4)	Justice
Firmness (<i>firmitas</i>)	Security Biological and physical	Bodily integrity (3) Bodily health (2) Life (1)	Personal and property rights (6) Health and wellbeing (5) Fears (8a)	Order
		Other species (8)	Environment (9)	
Notes				
1. Numbering of capabilities in this column is from Box 2-2				
2. Numbering of social impacts in this column is from Box 2-1				

principle of delight, Maslow's self-actualisation and the comparable items in the Nussbaum and IAIA schedules. In the middle ground area of *utilitas* it is harder to see exact parallels and this may be because Vitruvius's principle of utility may not be the fundamental concept when considering human needs for belonging, love and esteem.

As a further input, the final column of Table 2-3 includes the simple spatiality outlined by Gorringer (2002). Gorringer brings together human needs and engineering and argues (Gorringer, T., 2002, pp.48-49) for a "mapping of spatiality", using keywords of Imagination, Order and Justice. Evaluating his mapping, it seems to both embrace and resonate with the various insights described above. Firstly, the idea of Order captures both the Vitruvian principle of strength (*firmitas*) but also the human needs of security of life, health and property²⁸. The concept of order can operate at a range of scales and embraces issues of spatial hierarchies / interrelationships seen to be important by writers in as diverse a set of disciplines as architecture (Alexander, C., 2004), built environment (Bartuska, T. J., 2007) and philosophy (Inwood, M., 1997). Secondly, the idea of Imagination or Inspiration is roughly equivalent to the Vitruvian principle of delight (*venustas*) and the higher cultural/aspirational human needs described by Maslow as self-actualisation. It also embraces the way that sympathetic engineering in a natural environment has inspired artists, poets and writers. Finally, loosely corresponding to Maslow's middle ground, the idea of Justice perhaps provides a link between the utility of Vitruvius and the belonging, love and esteem needs identified by Maslow and the other writers. The built environment should be the place "where social justice is, quite literally, made concrete" (Gorringer, T., 2002, p.49) so that people feel they belong and are not alienated. There are strong resonances here with the discussion in Sections 2.2.1 and 2.2.2 about the importance of the idea of 'belonging' to both communities and places.

These various ideas about the human dimensions of assets are brought together in Figure 2-9 in a Maslow-inspired hierarchical framework (Maslow 1943, 1954). The adoption of a hierarchy in the framework can be justified given that the basic purpose of infrastructure is to ensure security of supply of the more basic needs, such as food,

²⁸ Note that Vitruvian physical *firmitas* and human security (as defined above) differs from the production and maintenance of *social* order which has historically been the central question in the social sciences (Cook, K. *et al.*, 2005, p.1)

water, shelter and clothing. Engineering assets and systems must therefore be considered as only delivering value in terms of commodity and delight once they have first been arranged or ordered to deliver their basic *firmitas* or ‘security’ function. Thus in Figure 2-9 the sense of order and security falls naturally into the lowest tier and delight / inspiration into the top tier. However finding the best term for something that brings together the ideas of day-to-day structural utility with belonging, esteem needs through the idea of citizens being justly provided with what they deserve is extremely difficult. The way out of this conundrum was to reduce the concept down to its pragmatic components:

- (a) accessibility of the assets (if people cannot access them they cannot use them they feel excluded or alienated and cannot gain any sense of ownership) and
- (b) useability or fitness for (day-to-day non FCRM) purposes, in line with the Vitruvian term *utilitas*.

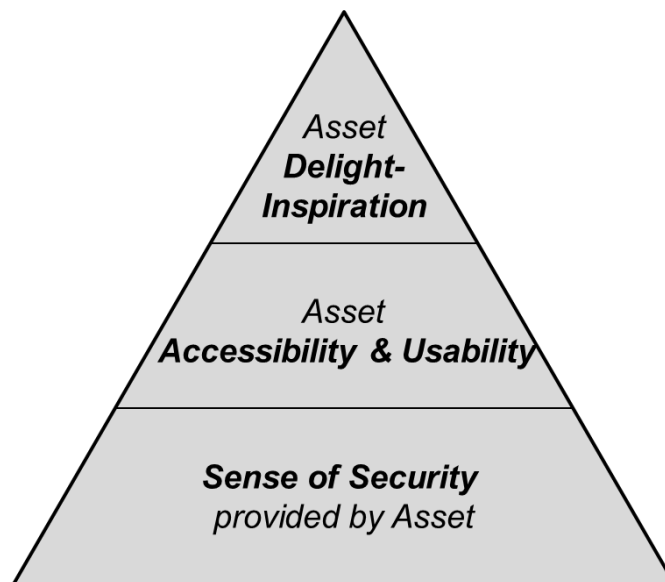


Figure 2-9 Maslow-based hierarchical framework for human dimensions of FCRM assets

This model and the foregoing discussion reinforces the concept established in Section 2.2 that a local community of people will to some degree be linked to the ‘place’ in which it exists and thus to the engineering systems and structures (e.g. the sea defences of a coastal town) which form part of that place. As identified by architectural and built environment writers, such as Alexander *et al.* (1978) , this is particularly the case if these systems and structures provide features that are readily

accessible and useable by the public²⁹. Such features which open the possibility to people of feeling that they belong in a place and indeed that the FCRM assets belongs to them, meeting and going beyond provision of minimum requirements, such as those of the Disability Discrimination Act (Anon., 1995).

A number of empirical survey-based studies over the years specifically related to FCRM reinforce the fact that such dimensions exist and can be valued using some kind of monetary or semantic differential scale (Osgood, C. *et al.*, 1975; Osgood, C. *et al.*, 1957). This is because the existence of any of the dimensions is likely to be a matter of degree. For example, whereas political scientist Wolfers (1952, p.485) defined security as “the absence of threats to acquired values”, ‘security’ might better be characterised as *the degree of* absence of threats to acquired values (cf. Baldwin, D., 1997, p.13).

Examples of assessments of FCRM features which are consistent with the Maslow-style framework include the survey-based work of House & Sangster (1999) on the features associated with river corridor management and of Tunstall & Penning-Rowell (1998) on beach experiences and values. Similarly “systematic and structured group work” led to the identification of “physical and emotional community descriptors for an ideal river environment” during the EU SMURF urban river restoration project (Petts, J., 2007, p.307). Furthermore, the willingness to pay (contingent valuation) methods recommended in benefit-evaluation guidance such as the Middlesex University Multi-Coloured Manual (Penning-Rowell, E. *et al.*, 2013) indicate that, if required, it is possible to provide some kind of proxy economic valuation to features to value their social worth. On the other hand, apart from the willingness-to-pay approach not providing a means of condition grading which is simple and consistent with the engineering visual assessments mentioned in the introduction to Section 2.3, it is not straightforward to split an overall willingness-to-pay at a particular location into the various human dimensions identified here.

²⁹ Accessibility features might include pedestrian walkways and road crossings, cycle paths. Useability features might include places to sit or rest, public ‘outdoor rooms’ providing shade and shelter, facilities for children (e.g. adventure places), disabled, pets,

Chapter 7 will evaluate whether the Maslow-style framework in Figure 2-9 is supported by field work and whether it can be applied in a credible and consistent manner using a semantic differential scale consistent with the Environment Agency's engineering condition assessment approach discussed earlier (see Section 2.3.1 and Table 2-1). In the meantime it is worth noting that there are connections between the identified human dimensions and the motivations for DASH work discussed in Section 2.2.1 and summarised in Figure 2-8. This is perhaps unsurprising because of the link that has been made in both cases to Maslow's concepts. Thus (see Figure 2-8) the sense of safety dimension is linked to the DASH motivation of trying to do something to deal with the increasing flood risk and the delight/inspiration dimension can be linked to motivation of stewardship of place. Any link between the accessibility and availability dimension and the identify and belonging motivation is less obvious, but if both the human dimension and the DASH motivation are seen to be linked to the local community, an indirect connection can be seen.

2.3.4 Conclusions on human dimensions

A range of theoretical bases for assessing the human dimensions of engineering assets have been examined including literature on impact assessment, human needs (psychology) and human capabilities (philosophy), architecture and theology. A Maslow-inspired framework has been generated of three human dimensions: sense of security; accessibility and useability and delight-inspiration. Strong connections have been identified between these dimensions and the motivations which influence DASH groups.

2.4 Conclusions: literature review

This chapter has confirmed the importance in a current policy and governance trends of wider partnership with and empowerment of local communities as part of FCRM, pressurised to some extent by lack of public funding. Although there little literature about DASH activity in FCRM, examination of contextual literature has also enabled a previously unavailable conceptual framework (Figure 2-8) to be developed of the different dimensions, contextual aspects and motivations for DASH activity and its support by government, which this thesis will now seek to test (Chapters 4 to 6). Three key human dimensions of engineered structures and systems have also been

synthesised from the literature and this thesis will now explore the applicability of these dimensions to FCRM assets (Chapter 7).

The next chapter describes the research methodology adopted for the research and the links with the theoretical frameworks identified in this chapter.

3 Research Methodology and Deployment

“...during the research design process you will make important decisions about theoretical and empirical context, methods practicalities and ethics that largely determine the conduct and outcomes of your research project. Yet ... there needs to be flexibility in the research process which allows researchers to modify their decisions and so respond to unforeseen events and opportunities.”

(Gill Valentine (2001a) ‘At the drawing board: developing a research design’, p.52)

This Chapter explains the choice of the overall research approach and specific methods, including semi-structured interviews and a case study approach. It then outlines how the selected methods have been deployed, including a justification for, and description of, the case studies selected and the approach used to confirm and test the human dimensions framework for FCRM assets.

The chapter starts (Section 3.1) with a brief summary of some preliminary investigations carried out to identify and confirm the research design and to start to investigate in connection with research question 1.1 the nature of DASH group activity. Section 3.2 then describes the selection of the methodologies and their relation to the research questions set out at Section 1.2:

- Semi-structured interviews with both FCRM professionals and with citizens involved with FCRM assets, including those involved in DASH activity. These were aimed at addressing the following research questions:
 - (1.1) on the motivations, activities, organisation, leadership and expertise of DASH groups
 - (2.1) on the facilitation and support of DASH groups by FCRM professionals
 - (3.2) on the empirical verification of human dimensions for FCRM assets
- Other ethnographic work related to (3.2) the empirical verification of human dimensions of FCRM assets
- Detailed case study work with two DASH groups and an EA officer responsible for DASH group coordination, using diaries, interviews, participant observation, participatory action research (in one case), surveys and engineering and economic analysis. All these were aimed at addressing the following research questions:

- (1.1) on the motivations, activities, organisation, leadership and expertise of DASH groups (further information)
- (1.2) on the efficacy, efficiency and effectiveness of FCRM DASH groups
- (2.1) on the facilitation and support of DASH groups by a FCRM professional
- (2.2) on the comparison of approaches for FCRM professional support
- Survey work to address research question (3.3) on the measurement of the human dimensions

The remainder of the chapter then describes the details of these methodologies and their deployment, including justification of the approach adopted.

3.1 Preliminary investigations to assist in research design

Preliminary investigations, carried out early in the research concurrently with literature review, comprised of informal discussions with volunteers, FCRM professionals and academics. The focus of these early enquiries (conducted in the period 2005 to 2007) was mainly directed towards the research question (1.1):

“What has motivated the formation of viable DASH groups operating in FCRM and how are the types of activities which they undertake affected by their understanding of the problem, the organisation and leadership of the group and the different kinds of expertise and resources available to it?”

At the beginning of the research no DASH groups had positively been identified. A key issue for the research was whether DASH groups should be expected to emerge at all in FCRM, when so many other issues were absorbing the interest and energies of communities (e.g. education, health, managing crime). The focus of the investigations with local communities was therefore to engage with any relevant volunteers and volunteering organisations who potentially might be interested in DASH activity. In particular, discussions were held with members of volunteer organisations during the period June 2006 to February 2007 as shown in Box 3-1.

Box 3-1 Early interviews with members of volunteer groups

- (i) A local group lobbying for government funding of protection to the coastal cliffs to avoid consequent loss of their homes to the sea
- (ii) A charitable trust which used volunteers to carry out environmental land management works in a river flood plain, but did not carry out works in the river itself
- (iii) A professional coordinator for an Area of Outstanding Natural Beauty, who worked with local communities and charities to provide seed-corn funding or other support works in villages and the countryside, such as managing footpaths and habitats, surveys of habitats and coastal archaeology, and beach cleaning.
- (iv) A member of staff from the National Flood Forum.

The interview with the AONB coordinator emphasised the importance of key community activists who then motivated others to be involved. The interview with the staff member from the National Flood Forum identified that most of their registered self-help groups were lobbying groups. A few of the groups (Carlisle, Bewdley) were identified as having an element of direct action, but this was more focussed on support of the vulnerable, identification of local flooding routes and encouraging individuals to introduce flood resistance and resilience measures into their homes.

During the same period preliminary meetings and discussions were also held with various professionals (see Box 3-2 for details). By early 2007, very few DASH groups had actually been identified and any value that they might offer had not been widely recognised. However, as active retired people had been found to be engaged in DASH activity in other areas of community life or environmental management and had expressed concerns about the impact of flooding and coastal erosion on property, assets and livelihoods, the professionals contacted (Box 3-2) thought it likely that DASH activity in FCRM would emerge.

Box 3-2 Early interviews with FCRM professionals

- (a) An independent advisor to Defra/EA FCRM joint research programme, Sustainable Asset Management theme. He made suggestions on the scope of research and personnel to contact.
- (b) The Secretary to the Coastal Groups. He provided suggestions on potential pilot locations for volunteering activities which led to initial contact with one group.
- (c) Two Defra officers. They discussed the significance of various research and development and policy making activities being conducted under Defra's Making Space for Water policy programme, articulated some barriers to delivering stakeholder benefits and suggested some contacts to explore.
- (d) Members of the EA Social Science team (discussions during the course of various professional meetings). They indicated support for the research being undertaken
- (e) A coastal manager. He described various ways his team was working with the local community and the related approach of a local society using volunteers to monitor shingle beach flora.

3.2 Selection of methodologies

A wide variety of research approaches could have been considered for this research, but since very few DASH groups or DASH-like activity had been identified in FCRM, formal questionnaires and statistically-based approaches were thought to be too constraining and unlikely to yield the evidence needed. The early work had also suggested that the level of interest from professionals in the topic in 2007-2008 was low. As a result the prospects of obtaining extensive information and statistics from surveys of professionals about the existence of groups and their performance were

poor. However, there remains the possibility that a formal survey at this time could have drawn out a wider range of groups.

3.2.1 Semi structured interviews

Various ethnographic research techniques (Cook, I. & Crang, M., 1995; Limb, M. & Dwyer, C., 2001) were therefore considered to address further research question (1.1) on the motivations, activities, organisation, leadership and expertise of DASH groups. Of the methods available, the most flexible one was that of semi-structured interviews. The advantages of a semi-structured interview are that it “can generate a lot of information very quickly; it enables the researcher to cover a wide variety of topics, to clarify issues raised by the participant and to follow up unanticipated themes that arise” (Valentine, G., 2001a, p.44) . All of these advantages had become apparent during the trials in the initial investigations, along with the challenges that the questions asked might not be understood by the interviewee. On the other hand, it was clear that the interviews should not be completely unstructured otherwise there was a risk that some topics might not be covered.

A further advantage of semi-structured interviews was that they would also provide the opportunity to gather some evidence to address research questions related to the other research objectives, in particular in regard to the facilitation and support activities provided by FCRM professionals (Question 2.1) and the identification of human dimensions applicable to FCRM assets (Question 3.2). However, it was recognised that the interviewing would need to be supplemented by additional research methods. The rationale for these methods – case studies for the DASH groups activity and participant observation and participatory diagramming for the human dimension studies – is now explained.

3.2.2 Additional ethnographic studies

It was recognised that there might be aspects of the human dimensions which needed to be teased out (research question 3.2) that might tacitly rather than explicitly understood (see discussion in Section 2.4.5) or were “taken so much for granted that the respondent does not think they are important or interesting” (Valentine, G., 2001a, p.44). This indeed proved to be the case as it was found difficult to get citizen members of DASH groups to express opinions about the human dimensions of the FCRM assets beyond the importance of delivering the security necessary to mitigate

flooding and coastal erosion (although this in itself was an interesting outcome). For this reason it was decided to supplement the interview material (including that gleaned from the interviewed artists) by additional ethnographic work conducted during various visits arranged to two popular sea-side towns (Bournemouth and Cromer). Two complementary approaches were adopted. One was participant observation of the interactions of citizens with FCRM assets (Cook, I., 2005; Cook, I. & Crang, M., 1995, pp. 21-35; Laurier, E., 2003). The other was participatory diagramming, used to encourage people as they passed by to indicate what they thought of the seafront (Kesby, M. *et al.*, 2005, p.149). Details of the deployment of this method are given in Section 3.5.1.

3.2.3 Case studies

To address the following research questions

- (1.2) on the efficacy, efficiency and effectiveness of the work of FCRM DASH groups,
- (2.1) & (2.2) on the effectiveness of different kinds of facilitation of DASH groups by FCRM professionals,

and to further address research question (1.1) on the motivations, activities, organisation, leadership and expertise of DASH groups, it was necessary to penetrate into the detail of the functioning of some FCRM DASH groups and their relationship with FCRM professionals. Detailed survey work was considered to this end, but this faced two significant practical constraints. Firstly, the identification of groups to evaluate had already proved problematic. Secondly, prior identification of appropriate questions was going to be very difficult without a sufficient pre-existing level of detailed understanding.

Because in-depth and participatory approach was needed in order to understand how DASH groups work in practice, a case study approach was explored. Case studies offered the possibility of securing a large amount of detail about DASH group practices and processes, albeit in relation to a particular social context (Innes, M., 2001, p.212), and thus provided “unique opportunities to understand the mechanisms that underlie empirical observations” (Rice, S., 2003, p. 226). The problem is whether the selected cases are going to be sufficiently representative and therefore the extent to which any findings from the case studies can be generalised to other similar situations.

However, the value of case studies should not be judged by their degree of representativeness but by the quality of the theoretical reasoning they generate (Rice, S., 2003, p. 226) and this puts a significant challenge back on the researcher.

To generate the necessary understanding of the DASH groups selected for the case studies would require working alongside those deeply involved. On the other hand I was constrained by the amount of time I could spend embedded in these situations. The approach therefore was to use a mixture of methods. These included making my own observations of events during the preparation for and carrying out of DASH activities and subsequently whenever I was able to attend group activities. My records would also include recording the answers to my questions from those involved, including initial and final interviews of at least one participant. This would also be supplemented by persuading key participants to make diary records of their activities and reflections on them (see Section 3.4.2).

In action research, those making diary records and reflecting on them become to some degree 'internal or community researchers' (Breitbart, M., 2003, p.164). In this case the research cannot really be defined as action research because the research objectives were not about me seeking to change the situation, but about determining how the groups operated and the efficacy efficiency and effectiveness of their actions. However, in one case (see Section 4.3.3 for details) I did offer some engineering expertise as part of the participation to assist the groups I studied. In this situation, I was not a neutral observer and therefore needed to assess the impact my actions might have had on the situations observed. This was achieved in part by re-evaluation of the case study situation after a period of time beyond the end of my involvement.

3.3 *Semi structured interviews*

3.3.1 Interviewing methodology and its deployment

Interviewee recruitment

Whilst there was ready access to professional interviewees, no really clear source for recruiting citizen interviewees involved in DASH was available and so the 'snowballing' technique (Gilbert, N., 2001, p.63; Valentine, G., 2005, p.117) was used whereby one contact was used to find another. The obvious advantage for such an

approach in a situation where there are no lists or other obvious sources – in this case of DASH groups – is that it helps to locate hidden members of the population it is desired to investigate.

Disadvantages of a snowballing approach include the fact that the first participants will have strong impact on the sample and thus that the approach contradicts many of the assumptions supporting conventional notions of random selection and representativeness. A snowballing approach also does not help to determine the sample size in relation to the total size of the overall population or to provide definitive knowledge as to whether or not the sample is an accurate reading of the target population. However, as DASH groups are quite hidden, being part of what Smith (2000, p.12) calls the ‘dark matter’ of informal volunteer-led grassroots associations, they were beyond the researcher’s ability to recruit randomly at the time. The only way of dealing with these weaknesses was to use multiple starting points and a set of initial informants that were as diverse as possible. In practice, there were so few informants or contacts that most of those identified were interviewed, although the focus was mainly on the southern half of England for the practical reason of accessibility for the researcher. Thus, although the selection or sampling of those interviewed in this research should not be seen as being statistically representative of a wider population, the aim was to provide an “illustrative” sample (Valentine, G., 2005, p.112).

Deployment of interview selection

Recruiting professionals for interview from various national and local government departments and agencies through existing contacts and publicly available information was easier than finding citizens. As initial enquiries had suggested that volunteering and DASH activity in FCRM was limited, in most cases professional contacts were used to identify the individuals concerned or a ‘chance’ encounter with some information in a magazine or newspaper. Obvious sources such as the National Flood Forum were only able to help to a limited extent because at the start of the research almost no DASH groups had formed and those that had formed were working in a very local context and had not seen the value of linking with a national organisation. For a measure of contrast, three of the interviewees were from the USA, selected on an opportunistic basis during a professional visit.

It was thought that selection of interviewees might be affected by willingness to be interviewed, but in practice only two individuals out of the nearly 50 persons that were approached for interview actually declined. Those eventually recruited as interviewees are summarised in Table 3-1. They included actual or potential volunteers and volunteer groups, professionals in both governmental and non-governmental organisations and companies. Semi-structured interviews were eventually held with 51 individuals. Of these 25 were flood risk management professionals; the remainder were leaders and citizen members of community self-help groups or volunteering charities involved in the management and maintenance of river channels and flood defences plus two artists who were discovered to be deeply interested in these issues. Note that the list of interviews in Table 3-1 includes 4 re-interviews of those that subsequently became involved in the case studies described in Section 3.4.

Table 3-1 List of interviewees

No.	Date interviewed	Interviewee description
		Professionals
3	26/02/2008	EA FCRM Technical Specialist
6	11/03/2008	Coastal Manager, maritime district council
7	28/03/2008	EA National Environmental Assessment Specialist
8	28/03/2008	EA Asset Management Engineer
10	16/06/2008	EA 'Building Trust With Communities' representative
11	25/06/2008	Coastal Manager, maritime district council
12	12/08/2008	EA senior FCRM manager
16	19/09/2008	Flood management engineer, USA
17	23/09/2008	Flood management engineer, USA
19	21/10/2008	Keith Lead EA Thames West Area liaison officer for DASH groups
20	21/10/2008	Private sector FCRM engineer
23	03/11/2008	Engineer, coastal defence contractor / manager
26	05/11/2008	Country Landowners Association representative
28	05/11/2008	Engineer, river management contractor / manager
29	02/12/2008	Coastal Manager, maritime district council
30	02/12/2008	Seafront Amenity Manager, Bournemouth Borough Council
31	02/12/2008	Coastal engineer, maritime district council
37	22/05/2009	Academic hydrologist
39	04/12/2009	Professional hydrologist
41	24/05/2010	Drainage engineer, district council
44	20/12/2010	Keith Lead (Phase 3 re-interview)
46	01/03/2011	Barry Russell, Area Flood Risk Manager, Thames West, EA (Phase 3 interview)
48	11/04/2014	Retired engineer involved in flood gate projects in SW England
49	13/08/2014	Two members of EA PSO team in West Thames
51	27/08/2014	Coastal engineer, Havant Borough Council

No.	Date interviewed	Interviewee description
		Flood/coastal action group
1	01/02/2007	National Flood Forum representative
4	10/03/2008	District Councillor, maritime district council
5	10/03/2008	Leader, coastal protection action group
14	01/09/2008	Leader, coastal protection action group
21	01/11/2008	Chair, residents (river) flood association
24	03/11/2008	Chair, residents coastal protection action group
25	03/11/2008	Chair, residents coastal flooding action group
40	05/02/2010	Chair, residents (river) flood association
		DASH group members
9	16/06/2008	Coordinator, Lymstone Parish Council DASH group
13	15/08/2008	Leader, village DASH group (inland)
15	10/09/2008	Stewart Scott, Leader, Hanneys Flood Group (inland)
22	02/11/2008	Leader, village DASH group (inland)
27	05/11/2008	Leader, village action group (coastal)
32	03/12/2008	Leader, residents flood defence group (inland)
33	12/01/2009	Judy Clark, leader North-East Hayling Residents Association (NEHRA) DASH group
42	24/10/2010	Judy Clark, leader NEHRA DASH group (2 nd interview)
43	24/10/2010	Focus group meeting of members North-East Hayling Residents Association (Phase 3 meeting)
45	Autumn 2010	6 members of the Hanneys Flood Group (interviews by EA)
47	28/01/2014	Stewart Scott, Leader, Hanneys Flood Group (2 nd interview)
50	19/08/2014	Judy Clark, leader NEHRA DASH group (3 rd interview)
		Paid coordinators in 3rd sector groups/trusts
18	23/09/2008	Coordinator, river/stream restoration association, USA
35	15/04/2009	Area Manager, Association of Rivers Trusts
36	22/05/2009	Director, river trust
		Artists
34	22/01/2009	Coastal/river artist, Yorkshire
38	25/08/2009	Coastal artist – Norfolk

Conduct of interviews

The conduct of the interviews followed well-established practice guidance for such qualitative interviewing (Burgess, R., 1982; Fielding, N. & Thomas, H., 2001; Longhurst, R., 2003; Valentine, G., 2005), making use of a previously compiled schedule of points to be raised and questions to be answered, drawn from an evaluation of the literature and the emerging theoretical frameworks for both DASH activity and the human dimensions of FCRM assets. The interview schedules are given in Appendix A.1 and include an introduction and final statement read out to ensure

that all interviews were set up and concluded on a broadly consistent basis. The version of the interview schedules in Appendix A.1 represents the eventually adopted version for most interviews and includes some adaptations made in the light of the experience of the early interviews. Whilst typically semi-structured interviews are based on a checklist of questions that can be worked through in any order, the early experiences were also useful in developing strategies for sequencing questions in the most effective manner. Interviews typically lasted about an hour (between 45 and 75 minutes) and were recorded and transcribed in their entirety for subsequent coding and analysis of emergent themes (see Section 3.2.2)

Included in the list of interviewees in Table 3-1 is a set of interviews conducted by the EA for the preparation of a video showing DASH group activity by the Hanneys Flood Group. Permission was obtained from the EA to obtain a copy of the unedited video of the interviews which was then transcribed and added into the information available. It was useful, not least because it provided information from four ordinary group members as well as the two leaders. Although some of the questioning was rather leading, the views of the respondents still came through.

Positionality

Some classical issues of positionality (Clifford, N. J. & Valentine, G. e., 2003, pp.557-8) arose in relation to the conduct of my semi-structured interviews. It was necessary to be aware of how, as an experienced engineer working in coastal engineering and flood risk management, I might be viewing and interacting with the people that were being interviewed (including such power-related issues as gender, class, job status) and also how they were viewing me (experienced professional, ill-informed outsider, etc). In the subsequent analysis, quotations from their interviews have been used to allow their voice to be heard wherever possible rather than mine (Butler, R., 2001, pp.267-271). With professional interviewees, reported difficulties with “élites and business people ... controlling access to knowledge, information and informants” (Valentine, G., 2005, p.114) did not seem apparent. Perhaps this issue did not arise in this research because the topics being researched were relatively new to most professionals and also because I was able to speak on equal terms with the professionals that were being interviewed.

Ethics

The nature of the topics being discussed meant that controversial ethical issues did not seem to arise. However, basic ethical procedures were followed (Hay, I., 2003, pp.43-4), including consent, confidentiality, cultural awareness and dissemination of results and feedback to participants. Consent for the interview to take place and for it to be recorded transcribed and analysed was always obtained before the interview commenced. Whilst some interviewees subsequently offered or agreed for their experiences and views to be more widely known, all interviews were conducted on the basis that the interview would be anonymous and the name of the interviewee would not be disclosed in any published documents. In the case of three individuals subsequently involved in the case study work (see Section 3.3), permission to disclose their names was subsequently given. Interviewees were advised that any views they expressed would be taken to be their personal view (and, for example, not that of their organisation) unless they explicitly stated otherwise.

Human dimensions aspects of interviews

During the course of the interviews, the professional interviewees seemed more ready to talk about the human dimensions of engineering assets than the citizen/DASH group interviewees. Providing professional interviewees with a list of asset types taken from the EA Condition Assessment Manual (see Appendix A.1.3) proved to be a useful prompt list although interviewees only talked about those asset types from the list with which they were familiar. The professionals were probably also relatively familiar with processes like Environmental Impact Assessment which requires them to think about broader issues than just the engineering functionality of the assets. By contrast the interviewees from self-help or DASH groups were very much focussed on the aims of their groups. Much of the interview was devoted to these topics and it seemed to be difficult to steer people into a wider direction of thinking about other aspects of assets. Perhaps this supports the Maslow-type thinking in Figure 2-9 that if concerns about human security are strong (high risk of loss or damage of property by flooding or erosion), it is difficult to get people to focus on other aspects.

Where members or leaders of DASH or other community groups were willing to speak about the non-safety /security human dimensions of assets, it was often the watercourse, sea, beach or other aspect of the water or natural environment that was

their focus, other than where they were concerned about security against flooding or erosion. To seek to compensate for this lack of information/response, two artists were included within the interviewees because of their innate ability to interpret some of these ‘softer’ dimensions.

Professionals, on the other hand, seemed to be more willing to draw on their personal experience to indicate wider human aspects. As a result, the interview material on human dimensions was rather dominated by professional views, albeit based on their understanding of how citizens interacted with the assets.

3.3.2 Analysis of semi-structured interviews

Interviews were digitally recorded, transcribed by experienced staff and checked against the original recordings by myself for errors before analysis proceeded. The latter process also enabled me to get an overall sense of the discourse and emerging themes. The resulting transcripts were then transferred into nVIVO software along with the other ethnographic material for analysis and coding. An important part of the process was to set up in advance a basic framework for the structure recognising that the eventual detailed structure would be dictated by the material itself. The conceptual frameworks in Chapter 2 were used as a starting point for the ‘tree structure’ for the coding themes. Then, as each new interview was analysed and coded, comparisons and contrasts were made and thematically similar segments of text were identified from which ideas were built-up and formal relationships and structures established (Cook, I. & Crang, M., 1995, pp. 76-92; Crang, I., 2005). The advantage of the nVIVO tool was that additional nodes and sub-nodes could be added to the coding tree as the analysis proceeded.

The analysis of the interviews was focussed on three of the research questions:

- (1.1) What has motivated the formation of viable DASH groups operating in FCRM and how are the types of activities which they undertake affected by their understanding of the problem, the organisation and leadership of the group and the different kinds of expertise and resources available to it?
- (2.1) What are the various kinds of facilitation and support activities currently being provided to DASH groups by or through FCRM professionals?
- (3.2) To what extent can it be empirically verified that the common human dimensions are applicable to all FCRM assets?

Appendix A.3 illustrates the eventual detailed coding structure which emerged for the human dimensions of FCRM assets and this is discussed in more detail in Chapter 0.

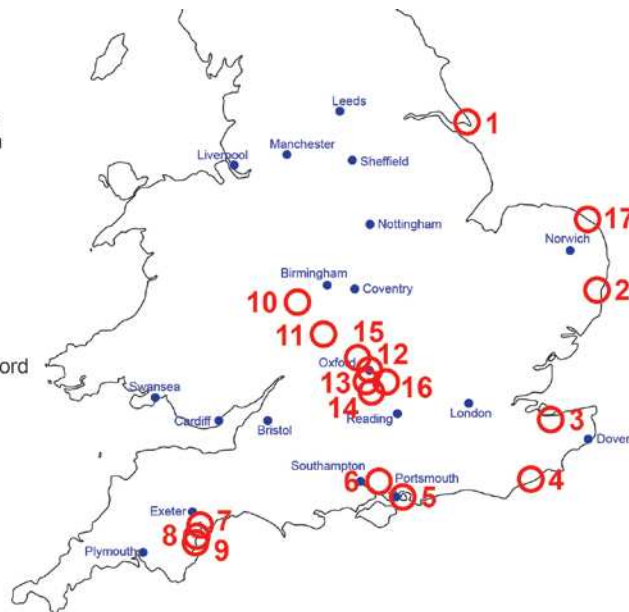
3.3.3 DASH groups contacted

DASH groups managing FCRM assets are still somewhat unusual in England. Furthermore, because they are what Smith (2000) calls grassroots associations, formed from communities through a bottom-up process, there is no centralised record of them. Only if a conscious effort is made by professional FCRM managers to catalogue the groups in a particular area is it possible to gauge their true extent and even then the number and extent are often only estimates (Ockenden, N. & Hutin, M., 2008). Those self-help groups (which were not necessarily all DASH groups) contacted during the course of this particular research are shown in Figure 3-1.

All the groups shown in Figure 3-1 (other than those at Teignmouth and Shaldon) were contacted during 2008/9 and a representative interviewed – usually the group leader. As indicated in the table beneath the map, even where the primary focus of the group had been on lobbying or fund raising [Interviews 14, 36], many of the groups had undertaken some element of direct action at the time of being contacted, although in some cases it was not clear whether a sustainable long-term plan of direct-action had been established. As appropriate, material gathered during the Phase 2 interviews of these groups³⁰ has therefore been combined with the more detailed information obtained from the case studies to which attention now turns.

³⁰ Representatives of the few non-DASH flood action groups interviewed spoke of their role as helping their communities to manage flood events and to influence decision-making about the flood risk management strategies and investment that will affect their communities. These groups appeared to stand back from DASH activity as such, (although some of them have carried out surveys and monitoring in order to influence and facilitate and catalyse the normal professional processes).

- 1 Spurn Head Action Group
- 2 Dunwich Community Coastal Protection
- 3 Faversham Road Residents Association
- 4 Fairlight Cove Action Group
- 5 NE Hayling Residents Association
- 6 Hambledon Action Group
- 7 Lympstone
- 8 Teignmouth
- 9 Shaldon
- 10 Bewdley Residents Flood Committee
- 11 Beckford Flood Action Group
- 12 Edwin Road Residents Association, Oxford
- 13 Charney Bassett (Charney Army)
- 14 Hanneys Flood Group
- 15 Ascott-under-Wychwood FWG
- 16 Chalgrove Parish Council FWG
- 17 Happisburgh (CCAG)



No	Group Name	Fund-raising for Works	Engineering Monitoring	Engineering Maintenance	Flood event management	Date contacted during this research
1	Spurn Head Action Group	•				Sept 2008
2	Dunwich Community Coastal Protection	•	•	•		Nov 2008
3	Faversham Road Residents Association					Nov 2008
4	Fairlight Cove Action Group	•	•			Nov 2008
5	NE Hayling Residents' Association	•		•		2008 - 2015
6	Hambledon Action Group		•	•	•	Nov 2008
7	Lympstone floodgate closers				•	2008
8	Teignmouth floodgate closers				•	2014
9	Shaldon floodgate closers				•	2014
10	Bewdley Residents' Flood Committee				•	Nov 2008
11	Beckford Flood Action Group			•		Feb 2010
12	Edwin Road Residents' Association	•				Dec 2008
13	Charney Army (Charney Bassett group)			•	•	Aug 2008
14	Hanneys Flood Group		•	•	•	2008 - 2015
15	Ascott-under-Wychwood FWG	•		•		Jan 2013
16	Chalgrove Parish Council FWG	•		•		Nov 2009
17	Happisburgh (CCAG)	•				Mar 2008

Figure 3-1 Locations and activities of contacted flood and coastal self-help groups

3.4 Case study work with DASH groups

This element of the work was primarily aimed at addressing the following research questions:

- (1.1) What has motivated the formation of viable DASH groups operating in FCRM and how are the types of activities which they undertake affected by their understanding of the problem, the organisation and leadership of the group and the different kinds of expertise and resources available to it?
- (1.2) How efficacious, efficient and effective is FCRM asset management work by DASH groups in respect of mitigating flood risk and in delivering wider community objectives, given the scale of the problem to be tackled and the changing circumstances under which they operate?

- (2.1) To what extent are the various facilitation and support activities that have been provided to DASH groups by FCRM professionals effective in meeting the needs and aspirations of both the DASH groups and of the FCRM management organisations?
- (2.2) How does the effectiveness of full-time facilitation of DASH groups in a particular area by a dedicated professional compare with alternatives such as no support or diversified support by many professionals?

3.4.1 Case study selection

Given the research questions being addressed, it was recognised that it would be important to evaluate DASH groups both from the perspective of a DASH group and from the perspective of the operating authorities and their FCRM professionals. The following aspects were considered:

Coastal DASH groups as well as riverine

In addition to evaluating riverine DASH groups, there was an initial ambition to include coastal DASH groups. However, it became clear that the opportunities for DASH work in on the open coast were restricted and indeed that, other than some participation of coastal action groups in some monitoring, examples of DASH groups on the open coast had not been found. Discussions with the action groups in coastal communities [e.g. Interviews 5, 24, 25] indicated that management of cliffs and open coasts was likely to require too much heavy engineering equipment to be practical for DASH groups. However, DASH activity in relation to flood defences in more sheltered estuarine situations did seem to be possible

Rural wealthy vs urban poor

A second restriction was that the DASH groups identified were all in rural non-deprived areas. Finding such groups in urban deprived areas had proved difficult for several reasons. Firstly, in areas of social deprivation, finding the individuals who would be able to lead and motivate such groups at a grass-roots level was unlikely, especially given that the focus of any grass roots activity in such areas would be more likely to be focussed on dealing with mutual support issues associated with social deprivation (Smith 2000). Secondly, the nature of urban areas means that they tend to have much more heavily engineered hard assets which would be more difficult for DASH groups to maintain. Thirdly, urban socially deprived areas are deliberately privileged by the FCRM funding mechanisms (see e.g. Environment Agency, 2013)

and hence DASH activity is less likely to be necessary, although this may not compensate adequately for deprivation in smaller urban areas.

Three case studies

Given these objectives and constraints, three case studies were eventually selected from the limited number of options available.

1. The first related to potential work on managing tidal sea defences in Chichester Harbour by the North East Hayling (Island) Residents Association (NEHRA). This group was identified through talking to a professional contact at Havant Borough Council. Although the group had not actually commenced work, it had sought and obtained permission from the EA to carry out repairs to a dilapidated flood embankment around the villages of Northney and Tye and the associated farmlands.
2. A second potential DASH group for study was more mature, the Hanneys Flood Group in Oxfordshire. This had initially been identified through a local newspaper article on the work it had been carrying out on clearance of weed from the Letcombe Brook. Contact with the group in late 2008 revealed that it was already operational and had started to work on improving the conveyance of the Letcombe Brook which flows through the village of East Hanney. Contact was therefore maintained with the Hanneys Flood Group as a case study for three reasons: their more developed approach to DASH had the potential to offer useful insights, they represented a riverine case study in contrast to the NEHRA estuarine/coastal study and the group was also perceived by the EA [Interviews 19 (2008), 44(2010), 46(2011) ; speech by EA chief exec at FCRM 2009 conference; Flood heroes award Jan 2010] to have led the way in setting down benchmarks of good practice in DASH activity.
3. Follow up with regard to the Hanneys Flood Group through the Thames West office of the EA led in turn to the contact with a Mr Keith Lead who had recently been appointed by the EA Flood Risk Manager for Thames West to coordinate a number of actual or putative DASH groups that had sprung up in the wake of the devastating Summer 2007 floods. This was understood to be a

unique position within the EA, similar coordinators not having been appointed elsewhere. It was eventually decided that Keith and the approach to DASH by EA Thames West would form a third instructive case study, this time from the perspective of FCRM professionals, recognising that other area offices might chose, if engaging with DASH groups, to do so in a different way. From a practical perspective, the area office was also conveniently located near to my office and this would facilitate regular interaction.

3.4.2 Deploying case study methodology

Having selected the groups with which to work, the next step was to work up the details of the methodology to be adopted from generalities (see Section 3.2.3).

In the case of NEHRA, this posed some challenges as it had become apparent that one of the reasons why they were keen for me to be involved was that they saw me as being a ‘friendly professional’ who could advise them on the engineering course of action they could adopt, to some extent mirroring the role of Keith with the Hanneys Flood Group. As the focus of the work was on DASH groups and their work, it was necessary to try to identify the influence of myself or Keith. Some investigations five years after the main case study work was concluded were therefore conducted in order to provide a more dispassionate and longer-term perspective.

The main vehicles³¹ adopted for capturing the experiences with the DASH groups were:

- Initial and final semi-structured interviews
- A field diary and journal of events including my own reflective journaling, particularly focussed on inspection days, meetings and the DASH action days in which I joined with NEHRA.
- A diary of activities kept by Judy Clark, the NEHRA DASH group leader, at my request

³¹ Conventional focus group work was also considered as a potential tool for the PAR, for example as a way of disseminating, testing and refining the research findings to date (Conradson, D., 2005, p.131). However, whilst I did engage in discussions with groups of individuals associated with NEHRA, these were primarily for determining the practical approaches to the DASH activity and the primary method in focus group research of capturing the outputs from the discussions using audio recording and subsequent thematic analysis of the transcripts was not adopted.

- The web blogs of the DASH group leader of the Hanneys Flood Group and the membership secretary of NEHRA
- Photographs of activities and outcomes

The specifics of my involvements with NEHRA and the Hanneys Flood Group are given in Table 3-2 and Table 3-3 respectively.

Table 3-2 History of involvement with NEHRA (North East Hayling Residents Association)

Date	Involvement
2 nd December 2008	Interview with Lyall Cairns of Havant BC at which the NEHRA group was mentioned
12 th January 2009	Initial interview with Judy Clark of NEHRA
27 th May 2009	Site visit (am) with Judy and meeting (pm) with Havant BC to discuss future action
June & July 2009	Preparation of my design ideas for the seawall repair.
25 th - 26 th June 2009	Meeting with NEHRA members and local farmers 25 th June 2009, followed by site visit with all concerned am 26 th June 2009
17 th July 2009	Meeting with T-Blocks company on site to discuss involvement in possible permanent repairs. Site visit. Evening meeting of volunteers.
18 th July 2009	1 st working session of sea wall repairs. Two groups, one batching dry concrete in farm yard and filling sandbags and the other, with which I worked, laying sandbags to repair the southern end of the sea wall.
31 st July to 2 nd August 2009	2 nd working session of seawall repairs. Attended on the Saturday.
14 th - 15 th August 2009	3 rd working session of repairs. Not in attendance.
27 th to 28 th August 2009	Email and telephone discussions over the quality of the work following farmer criticisms
29 th August 2009	Attended 4 th and final weekend working session.
4 th September 2009	Celebratory BBQ. Attended.
7 th December 2009.	Trip to survey levels on top of wall with Gavin Long of University of Nottingham (latter using GPRS system) (Winter 2009-10. Farmers repair northern section of wall with some concrete planks.)
January to April 2010	Discussions on next steps with regard to the seawall, including debate about the draft proposals in the Shoreline Management Plan. On 11 th March 2011 conducted site visit to inspect wall including additional concrete plank repairs. Attended meeting with NEHRA members to discuss their strategy to the SMP and helped (April 2010) redrafting their letter to make it clearer for the SMP team to understand.
Summer 2010	No further progress in community repairs due to resistance from some farmers.
24 th November 2010	Recorded close-out interview with Judy Clark. Conducted final inspection of seawall. Attended evening meeting with NEHRA members to discuss future strategy and for them to assist me with social valuation of the sea-wall.
19 August 2014	Follow up site visit and defence inspection and interview with Judy Clark

Table 3-3 History of involvement with Hanneys Flood Group (HFG)

Date	Involvement
1 July 2008	Noticed item in local newspaper ('Villagers team up to clear brook' ³²) about activities of the Hanneys Flood Group (HFG). Approached local EA office for more information.
14 August 2008	Spoke to Keith Lead on the telephone about HFG.
10 September 2008	Interviewed Stewart Scott, leader of HFG, at his home in East Hanney.
12 November 2008	Attended meeting of HFG and made a presentation on 'Managing flood risk in a changing world' and joined in subsequent discussions.
17 January 2009	Participated in a working day with HFG in which we worked to clear a feeder stream of brambles silt weeds and leaves and another small group installed a diversion drainage pipe.
15 January 2010	Attended 'Flood Heroes' event ³³ (at invitation of EA) at which Stewart Scott received an award from David Cameron (MP for Witney) for "best example of community action to reduce flood risk" on behalf of HFG.
Spring/summer 2010	Worked with Stewart Scott, Keith Lead and Barry Russell (EA Area Flood Risk Manager) to prepare a workshop for DASH groups.
Saturday 9 October 2010	Workshop for DASH groups held at HR Wallingford, which I co-chaired with Barry Russell.
20 December 2010	Re-interview with Keith Lead.
1 March 2011	Interview with Barry Russell.
12 March 2011	Attended EA 'Operation Watermark' event in Oxford for flood action groups in the area. This was also attended by members of HFG who were developing emergency flood procedures as a logical extension of their current flood management activities.
22 February 2012	Catch-up evening chat with Stewart Scott with subsequently agreed notes of discussion
28 January 2014	Follow up recorded interview with Stewart Scott
17 April 2015	Attended evening HFG strategy planning meeting to which various external advisors were invited from: EA, Vale of White Horse DC, Oxfordshire CC Highways, Letcombe Brook environmental project
Note: All activities of HFG are logged at their website http://www.thehanneysfloodgroup.org.uk	

In the case of the EA Thames West DASH groups coordinator, Keith Lead, the approach to capturing his activities included:

- Semi structured interviews with himself and one semi-structured interview with Barry Russell, the area Flood Risk Manager
- A diary of activities kept by Keith at my request, including some reflective comments
- A schedule prepared by myself and Keith of all the groups with which he had interaction (See Appendix A.4)

³²

http://www.heraldseries.co.uk/archive/2008/07/01/Wantage+News+%28om_wantagenews%29/2372868.Villagers_team_up_to_clear_brook/ last accessed 6 January 2012

³³

[http://www.heraldseries.co.uk/archive/2010/01/17/Witney+News+\(om_witneynews\)/4855770.Village_s_flood_heroes_honoured/](http://www.heraldseries.co.uk/archive/2010/01/17/Witney+News+(om_witneynews)/4855770.Village_s_flood_heroes_honoured/) last accessed 6 January 2012

- Participant observation of Keith’s activities during days or part-days when I joined him ‘on the job’ in an overt ‘shadowing’ style of participant observation (Cook, I., 2005, p.175)
- Catch-up meetings held on a regular basis in Wallingford.

The specifics of my involvements with Keith are summarised in Table 3-4.

Table 3-4 History of involvement with EA Thames West DASH coordinator, Keith Lead

27 th October 2008	Initial recorded interview with Keith
14 th July 2009	Evening meeting with Lechlade Community Group, Lechlade Memorial Hall
28 th July 2009	Half-day shadowing Keith’s activities – “a half-day in the life of ...”
12 th August 2009	Evening meeting at Buscot with Parish Council group
12 th October 2009	Lunch-time catch up with Keith
2 nd November 2009	Lunch-time catch up with Keith
19 th November 2009	Site visit / walk-about at Chalgrove with local residents
16 th December 2009	Lunch-time catch up with Keith
15 th January 2010	Flood heroes event, Witney.
24 th February 2010	Evening meeting with Stewart Scott and Keith regarding future DASH groups workshop.
15 th March 2010	Lunch-time catch up with Keith
7 th June 2010	Lunch-time catch up with Keith
17 th June 2010	Meeting with Keith Lead and Barry Russell
23 rd June 2010	Evening meeting with Stewart Scott to plan DASH groups workshop
26 th August 2010	Lunch-time catch up with Keith
9 th October 2010	DASH Flood Action Groups Workshop, Wallingford
29 th October 2010	Lunch-time catch up with Keith
20 th December 2010	Final recorded interview with Keith Lead
1 st March 2013	Recorded interview with Barry Russell (EA Thames West Area Flood Risk manager and Keith’s line manager)
12th March 2011	‘Exercise Watermark – Community Day’ event for Thames West area of EA

3.4.3 Case study analysis

Communities of practice such as DASH groups are involved in an action-reflection cycle (Cowan, J., 1998; Kolb, D. & Fry, R., 1975). This classic Plan-Do-Check-Act experiential learning cycle (Deming, W. E., 1986) discussed in Section 2.2.6 is similar to Checkland & Poulter’s (2006, p.xix) Soft Systems Methodology cycle of ‘learning for action’. It was therefore decided to make use of some aspects of the Soft Systems Methodology (SSM) of Peter Checkland (1981, 1999; 2006; 1990). Checkland’s approach is entirely appropriate for analysing the participatory action research case study aspects of this thesis, as SSM was itself developed using an action research methodology (Checkland, P. & Poulter, J., 2006, pp.17-18) and under the influence of the work of management thinker Geoffrey Vickers and his work on ‘appreciative systems’ (Checkland 1999, ppA40-A41). In contrast to hard systems theorists who seek to identify and describe ontologies of systems within the real world, Checkland

believed that the real world is full of complexity and confusion, but that it is possible to organise exploration of it as a learning system. Thus it is not the world which is systemic, but the process of inquiry (Checkland 1999, ppA7-A11). In more formal terms, it is the epistemology rather than the ontology which is systemic. Figure 3-2 and its accompanying notes summarise seven key principles of the SSM approach of Checkland and Poulter (2006, pp60-61).

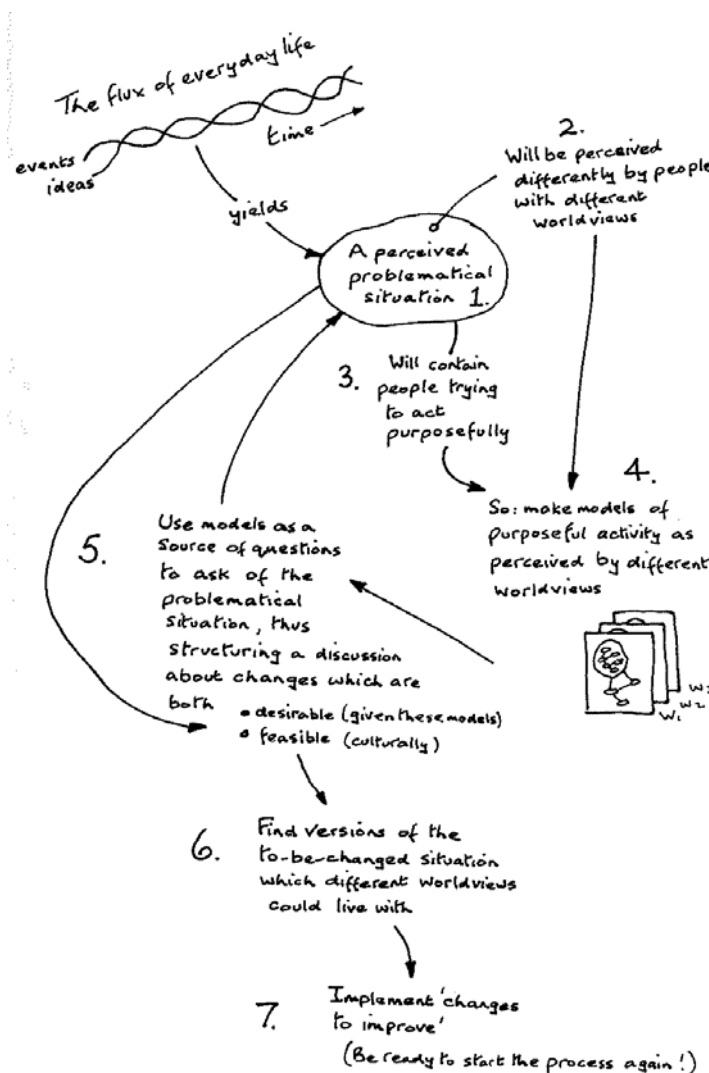


Figure 3-2 SSM's cycle of learning for action (Checkland and Poulter, 2006, p xix)

Notes to Figure:

1. Item 1: A real world *problematical situation* involves a complexity of relationships.
2. Item 2: Thinking about a problematical situation is affected by the *worldviews (Weltanschauungen)* of those doing the thinking and talking
3. Items 3 and 4: Every situation can be explored using *models of purposeful activity* of these individuals created according to their worldview.
4. Item 5: Structured discussion and debate (*inquiry*) about these situations can make use of the models of purposeful activity;
5. Item 6: Actions to improve situations are based on finding *accommodations* – versions of the situation which different people with different worldviews can live with
6. Item 7: Whilst changes can be implemented, there is a never-ending process of learning;
7. Conscious *critical reflection* about the situation and the process is required at all times.

Whilst not all aspects of the SSM methodology were therefore directly applicable to the aims and objectives of this thesis (many of them relating to making deliberate changes to a social process), significant helpful components were identified and used.

First activity of SSM learning cycle: finding out

Following Checkland's approach, the analysis commenced with the first activity of the SSM Learning Cycle, which involves finding out about the (initial) problematical situation. The approach adopted for initial analysis of the case study materials was twofold:

- a. Analyse the semi-structured interview material, as already described in Section 3.3.2 above;
- b. Compile a comprehensive chronological research journal in which my own observations and reflections during meetings and DASH activities were combined with the diaries compiled for me³⁴ by Judy and Keith and records of conversations, emails and meetings with them and others involved.
- c. segmentation of the DASH activities into the elements of the basic Plan-Do Check Act cycle of Deming (1986).

A narrative approach (Crang, I., 2005, pp 229-131) was useful at this stage as it provided the most convenient way of bringing together research materials and allowing subsequent identification of key events and issues which appear to be formative in either facilitating or inhibiting DASH activity.

Checkland-style sub-activities included in this first stage of analysis were firstly the construction of a 'rich picture' (see Figure 4-31) of the problematical situation as an alternative to the descriptions or narratives and secondly an identification of 'commodities of power'. A commodity of power is defined as something that signals that power is possessed in a particular human group or situation (Checkland, P. & Poulter, J., 2006, p.36). The concept seems very pertinent in a situation where much of the literature, from Arnstein (1969) right up to recent policy documents (Environment Agency & Defra, 2011a), is talking about 'empowering' communities. It is also consistent with Green's (2011) vision of carefully understanding analysing how power

³⁴ Judy and Keith were assisting me in my research by recording their experiences, but could not really be considered as co-researchers (in a participatory action research sense, since their objectives were different to me. Judy was more interested in gaining effective coastal defences and Keith in promoting and managing DASH groups activity effectively.

is operating in governance arrangements. Categories of commodities of power relevant to the work of DASH groups include:

- Permissive powers to allow DASH activity to take place
- Physical power/ability to design, develop and carry out DASH management activities on FCRM assets, including access to the necessary human and physical resources in the context of the challenge being faced
- Economic power, including access to resources
- Influence through communications and relationships

Second activity of SSM cycle: making and analysing purposeful activity models

The second activity of the SSM Learning Cycle involves making purposeful activity models. This involves a process whereby a ‘root definition’ of the purposeful activity is first established, explaining what the activity is, how it operates and why it is done and expressed in the form “do P, by Q in order to achieve R”. From this root definition it is then possible to construct a purposeful activity model using as a guide the mnemonic CATWOE. CATWOE is based on the idea (Checkland and Poulter 2006, p42) that a purposeful activity, defined by a transformation process (T) and a worldview (W)

- will require people (actors, A) to do the activities which make up T;
- will affect people (customers, C) outside itself who are its beneficiaries or victims;
- will take as given various environmental constraints (E) from outside itself (such as a body of law or a finite budget);
- could be stopped or changed by some owner or owners (O) of the process.

This activity includes assessment of “the measures of performance by which the operation of the notional system would be judged” (*op cit*, p.42) expressed in terms of efficacy, efficiency and effectiveness. Measures of performance under the headings of these ‘three Es’ are used for analysis of DASH groups in Chapter 5 . Importantly they also pick up on the issues associated with the specific commodities of power mentioned above.

Efficacy is defined by Checkland & Poulter (2006, p. 42) as the extent to which the transformative process achieves its intended outcomes. In this case the obvious application is in delivery of measurable FCRM improvements (delivery of physical capital) by DASH groups.

Efficiency is defined (Checkland, P. & Poulter, J., 2006, p. 42) as the extent to which resources to achieve the transformation are being minimised. Resources could include aspects such as financial resources, expressed in present day or whole life costs, both to the public purse and to the local community in which the DASH group is located. Resources could also include people, plant and materials resources from the local community.

Finally effectiveness is defined (Checkland, P. & Poulter, J., 2006, p. 42) as the extent to which the transformation achieves some higher level or longer term aim. In this regard, each of the motivators and contextual elements in the DASH group framework model developed in Chapter 2 (see Figure 2-8) can also be re-expressed as criteria against which the effectiveness of an actual group can be evaluated. So effectiveness criteria then become:

- Flood risk reduction in the context of physical change
- Degree of improvement in the environment and place in which the FCRM assets are located – a subject which is also addressed by the human dimensions element (to be discussed in Chapter 7), perhaps as measured by the accessibility / availability and visual appearance criteria (discussed in Section 2.3.3)
- Improvement /enactment of ‘community’ and generation of Social Capital and development of human capital in terms of expertise (skills and knowledge), including developing local community understanding of flooding and (appropriateness of) various flood alleviation mechanisms.

and of particular relevance to the EA FCRM DASH coordinator

- The effectiveness of the external support offered, both to the DASH group and in delivery of EA policy targets such as working “with people and communities to create better places” (Environment Agency, 2011c, p.12) and

‘community empowerment’ targets in line with the UK government’s Big Society agenda (Williams, R., 2011)

Another way to view the effectiveness of DASH activity is to use the five capitals model³⁵ of volunteering impacts developed by Rochester *et al.* (2010, pp.166-173). This model has now been embedded into the VIAT (Volunteering Impact Assessment Toolkit) of the Institute for Volunteering Research (IVR) and provides a useful set of “badges to tie together groups of impacts” (Rochester, C. *et al.*, 2010, p.167). Figure 3-3 provides a succinct description of these impacts. With some modification, their application in terms of assessing the efficacy, efficiency and effectiveness of DASH group work in the context of FCRM is evident:

- Physical capital would potentially include the creation/maintenance of FCRM assets delivered by the DASH groups (Stewardship)
- Economic capital in the context of FCRM benefit cost analysis would relate to any flood risk reduction achieved or maintained by the DASH groups. (Flood risk reduction)
- Human capital would potentially include development of expertise (knowledge and skills) in DASH volunteers (Sustainability of Group)
- Social capital would potentially include enhanced relationships between DASH members and hence within the local community within which they are based³⁶ (Identity and belonging with local community; engagement with wider policies plans and activities)
- Cultural capital. The application of this broader element to DASH groups is unclear as it represents (Rochester, C. *et al.*, 2010, pp.172-3) factors such as enhanced sense of identity and ideas of gaining “culturally specific social meanings”. It is probably more relevant to a local community viewed as a whole rather than to a DASH group.

³⁵ The ‘five capitals’ model in the VIAT is not the same as the five capitals model of sustainability adopted by the World Bank/Forum for the Future (Parkin *et al.* 2003), where: cultural capital is just seen as part of social capital; financial capital is used instead of economic capital; and physical capital is split into manufactured capital and natural capital, the latter including resources and services such as ecosystem services.

³⁶ This links to the identification by Einolf and Chambré (2011) of social integration as one of the factors motivating voluntary activity. It also previews the communitarian view of the value of volunteering in strengthening community and Putnam’s (1995, 2000) webs of connections that he argues are necessary to build social capital..

	PHYSICAL CAPITAL goods and services received	ECONOMIC CAPITAL benefits or costs with a financial value	HUMAN CAPITAL knowledge, skills and health of people	SOCIAL CAPITAL cooperative relationships between people	CULTURAL CAPITAL sense of one's own identity and understanding of others' identities
Volunteers	Concrete services or support volunteers receive, such as: - Training courses attended - Support and mentoring sessions - Social events organised - Certificates received	- Travel expenses or accommodation covered - Out of pocket expenses - Value of free training provided - Increased employment prospects and future earning power	- Personal development, such as confidence and self-esteem - Transferable skills, such as IT, public speaking and teamwork - Improved health and well-being	- Range of friendships, contacts and networks - Involvement in local activities - Sense of trust in others and frequency of working with them to solve problems	- Understanding of one's own identity - Extent of expression of one's own values through cultural and leisure activities - Appreciation of others' cultures and interests
Organisations	Quantity and quality of the: - Goods produced, such as a renovated office - Services/activities provided by volunteers, such as administrative support	- Value of volunteering to the organisation - Income and savings made for the organisation - Costs of supporting volunteering to the organisation	- Personal development and skills of staff - Ability to enhance the work of paid staff - Overall level of skills in the organisation	- Ability to attract more staff and volunteers to the organisation - Level of connection with the community	- Services more reflective of cultural diversity within community - Diversity of organisation
Beneficiaries	Quantity and quality of: - Goods provided, such as a skating track built - Services received by the beneficiaries, such as mentoring sessions	- Access to services which they would otherwise have to buy - Services helping beneficiaries to improve their financial situation	- Personal development of skills, physical and mental health - Sense of well-being amongst beneficiaries	- Friendships, contacts and networks that beneficiaries develop - Enhanced trust - Greater involvement in local activities, groups or clubs	- Sense of belonging to a group and taking part in culture and expressing values - Understanding of others' cultures and values
Community	Enhanced quantity and quality of: - Physical environment - Levels of service	- Enhanced value for money in public services - Increased employment - Reduced anti-social behaviour	- Improved skills and more productive workforce - Greater health and well-being of citizens	- Increased social networks - Enhanced trust and participation - More organisations working together	- Richer cultural life - Greater expression of individual identities and tolerance of others

Figure 3-3 A matrix for identifying the impacts of volunteering (Institute for Volunteering Research, 2010)

To support the evaluation of the efficacy, efficiency and effectiveness criteria, in 2014, about five years after the completion of the main case-study work in 2009, some additional data gathering was carried out. This comprised the following activities:

- i. Supplementary interviews [Interviews 47, 49, 50 and 51 in Table 3-1] conducted with the Hayling Island and Hanneys flood groups and an EA representative in Thames West, with the specific purpose of evaluating how the groups have performed since last interviewed and how they had fared without the technical support of either Keith or myself.

- ii. With regard to the Hayling Island case study, interviews 50 and 51 and a site visit were carried out to ascertain whether improvements in condition of defences have been sustained and the nature of the performance of the defences during the severe 2013/14 winter storms.
- iii. With regard to lowered water levels achieved by the Hanneys Flood Group in the Letcombe Brook, the performance of the brook during floods since 2007 (a) qualitatively through interviews and (b) quantitatively by assessing changes in flood water levels in the Brook.
- iv. With regard to both case studies, analyses were carried out using the guidance in Penning-Rowse *et al.* (2013) to assess expected annual damages (on the basis of probability of inundation combined with likely annual damages per property) and their relation to whole life costs in order to assess benefit cost ratios for the work of DASH groups and equivalent conventionally funded and operated public works.
- v. Gathering of evidence by interview of how the concept piloted at Lymstone of community groups closing flood gates is now being applied.

Third and fourth activities of SSM cycle

Evaluation of the efficacy efficiency and effectiveness of a transformative process leads naturally to the third and fourth activities of the SSM Learning Cycle (Checkland and Poulter, 2006, pp.49-54). These involve respectively using the generated models to structure discussion about the situation and its improvement, and defining actions to achieve that improvement.

Checkland and Poulter (2006, pp.54-60) argue that defining actions to improve a transformative process always involves finding ‘accommodations’ between the parties involved. Such accommodations typically involve changing organisational or physical structures, changing processes or procedures and changing attitudes. The challenge is to find a workable mix of these three types of changes, identifying for each change why it should be carried out, how it can be achieved and what criteria will be used to judge success or lack of success and completion. The SSM approach is designed for use in situations where the investigator has been invited to work with those involved in the situation to identify the required changes, which did not apply in this case. However, based on the assessment of the effectiveness of the groups and their

coordination, it has been possible for the thesis to conclude with the identification of some possible improvements actions (see Chapter 8) that might help to make DASH activity more effective.

3.4.4 Relation to EA Thames West DASH coordinator

My role with the Oxfordshire DASH groups (including the Hanneys Flood Group) did not involve providing them any professional advice. Instead I focussed on monitoring the activities of Keith Lead (see Chapter 6). To this end, it proved to be important for me to meet regularly with Keith in order to encourage him in his role and in his recording of the activities he was undertaking as well as shadowing him at pre-agreed times as he carried out his duties.

However, both Keith and the Area Flood Risk manager Barry Russell, saw me as being an important ally in what they were trying to do themselves in changing the approach and attitudes within the EA towards DASH. I thus became professionally involved with them and this was typified by a series of joint actions:

- Joint drafting of a paper on DASH group activity (Russell *et al.*, 2009 which Barry presented to the July 2009 FCM09 conference, Telford.
- Involvement in the 15th January 2010 EA organised 'Flood heroes' event, Witney, Oxfordshire.
- Organisation and co-chairing of a workshop for the DASH Flood Groups at HR Wallingford on 9th October 2010 See Appendix A5
- Involvement in 'Exercise Watermark – Community Day' event for Thames West area of EA on 12th March 2011.

In writing this thesis, I have sought to set aside that promotional role and to adopt a more independent evaluative approach, particularly by use of the criteria of efficacy, efficiency and effectiveness.

3.5 Human dimensions studies

This part of the research was aimed at addressing the third research objective to develop and test a framework for identifying and measuring the human dimensions of FCRM assets that are significant to DASH groups.

3.5.1 Ethnographic studies to identify human dimensions

As explained in Section 3.2, the ethnographic studies were aimed at supporting the investigation addressing the research question 3.2, which aimed to take the generic human dimensions framework identified from the literature (Section 2.3) and to examine empirically whether it was applicable to FCRM assets. The main vehicle for identification of the human dimensions was the semi structured interview process and the subsequent textual coding and analysis using the nVIVO software (see Section 3.2.3), but this was supported by the complementary approaches of participant observation and participatory diagramming carried out at Bournemouth and Cromer.

Participant observation (Cook, I., 2005; Cook, I. & Crang, M., 1995, pp. 21-35; Laurier, E., 2003) was conducted of the interactions of citizens with FCRM assets and recorded through the making of field notes, photographs (Rose, G., 2007, pp.243-5) or sketches (see Appendices A.2.2 and A.2.3). The work was carried out on a covert rather than overt basis, not because there was anything to hide, but simply because it was impractical to advise the transient seafront public what I was doing.

Participant observation does not, however, capture the thoughts of those concerned. A participatory diagramming approach (using an H-frame) was therefore also used at Bournemouth to capture the views of those using the sea front. Originally designed as a concept to work with focus groups and facilitate discussion, the idea here was to use the technique to encourage people as they passed by to indicate what they thought of the seafront. The results of the diagramming (provided in Appendix A2.1) were not seen as end in themselves or even just as a means of gathering further data, but as a means to stimulate small group and /or self-analysis amongst those participating (Kesby, M. *et al.*, 2005, p.149). Participants were asked both to identify on sticky paper notes those features they thought were positive or negative and then to give the seafront an overall rating on a scale from 1 to 10 (Kesby, M. *et al.*, 2005). The H frame board (see Figure 3-4) was populated with comments taken on four occasions during 27-28th May 2009:

- in evening in the bar of a hotel
- and then from those walking along the seafront
- between 09:30 and 10.30 hrs when the frontage was relatively quiet: many respondents being from the older generation

which the group was first asked in an unstructured way to write down on post-it notes all the features of the sea wall that were important to them. A time of discussion was then held in which these ideas were shared. A strong measure of consensus in thinking became evident about the important features and these were easily assembled into the 3 dimensional framework (see Table 7-6).

As a second stage and subsequent to the meeting, the members of the group were then invited individually to complete a very short questionnaire to grade the performance features based on the collected list of performance features. This did not give any opportunity for deliberation between them on the results.

Further trialling of the human dimensions framework (2014)

The first trial with the NEHRA group was useful in confirming that a DASH group could use the human dimensions framework. However, as only three replies were received, further trialling of the process was necessary to assess whether the framework could be used in a credible and consistent way. Application in another context might show a high degree of scatter in the results received, which might invalidate its usefulness.

In fact, it was possible to think of DASH groups assessing the condition of the assets in three main ways, each of which becomes progressively more deliberative³⁷:

Type 1 – Independent multiple assessments. Each member of the group completes the assessment independently without any reference to the others.

This might lead to a high degree of scatter in the results and needed to be tested

Type 2 – Semi-independent multiple assessments. Each member of the group completes the assessment independently but only after having had a discussion amongst themselves about the issues involved. (This was the approach adopted within the NEHRA committee).

Type 3 – Consensus assessment. The DASH group completes the assessment in discussion with other members about the issues.

³⁷ Deliberation has been defined as “a conversation whereby individuals speak and listen sequentially before making a collective decision” (Austen-Smith, cited by Gambetta 1998, p.19).

To address the remaining Type 1 and 3 possibilities, additional survey work was implemented in new situations as indicated in Box 3-3.

Box 3-3 Survey work to capture a range of views of assets based on the human dimensions condition indexing methodology

Type 1 - multiple independent individual assessments

- October 2014 – Completion of condition grading questionnaires for Brixham Breakwater by 31 attendees to a public exhibition about coastal defence in the area. There was almost no discussion between participants in the survey, prior to them completing the questionnaires. The individuals were not known to one another within the context of a DASH group.
- February 2015 – Survey of Hanneys Flood Group members using an on-line Survey Monkey approach. 7 members responded to the survey independently. (Survey also used to gain information on prioritisation of motivations for DASH work and on the impact on insurance costs of the implementation of Hanneys Flood Group activities.)

Type 3 – consensus assessments

- September 2014 – Completion of Condition grading questionnaires for 4 sections of the sea frontage at Middleton-on-Sea, Sussex. The approach adopted here was to compile the responses in a discussion group of three people including two leaders of local residents' associations and the local councillor from Arun District Council who supports the local residents in coastal matters. The replies were all stated to be unanimous.

3.6 Critical review of methodology

This section brings together and evaluates some of the main identifiable challenges arising from the selection and deployment of the methodology discussed in this chapter.

3.6.1 Issues related to DASH groups

In the early stages of the work when the interviewees and case studies were being selected, reliance was placed on a snowballing technique (Gilbert, N., 2001, p.63; Valentine, G., 2005, p.117) with multiple starting points to identify interviewees, especially in regard to those involved in flood action or DASH groups (see more detailed discussion in Section 3.3.1). A nationwide survey might have yielded further information. This was not pursued at the time because the National Flood Forum [Interview 1] identified that all the groups affiliated with that organisation at the time were either lobbying groups or for self-help community support for those who had been flooded. Although the prospects were poor, in hindsight a nationwide formal survey of FCRM professionals in EA areas and local authority regions might have yielded a wider set of individuals involved in FCRM DASH from which to select.

The issue of finding representative case studies was discussed in Section 3.2.3. It was recognised at the time that a challenge would be the extent to which the issues and outcomes observed could be more widely generalised. Chapters 4 and 5 do identify some generalisations, but the extent to which the outcomes observed were influenced by the nature or form of the case studies is addressed in Section 8.4.

The involvement by myself with the NEHRA DASH group was always recognised as being likely to have an impact on the outcome of events. Indeed, as will be described in Section 4.3.3, it is possible that the particular period of NEHRA DASH activity in 2009 would not have happened without my involvement. On the other hand, in practical terms, it would have been difficult for me to be involved in the group without drawing on my professional engineering expertise which seemed to fill a gap in the necessary expertise of the group. It is not felt that this invalidates the case study, however, as it was considered important to get to grips with sea defence issues and there were, at the time, simply no other options available.

3.6.2 Human dimensions

Difficulties were encountered during the semi-structured interviews to get the self-help group members to respond on the identification of human dimensions of FCRM assets. It was considered important during the conduct of interviews, especially given the putative nature of DASH activity at the time, to give the interviewee time to tell their stories. It was therefore difficult to compel them to answer questions on topic areas in which they were less interested or uncertain. The issue was resolved at the time by means of the ethnographic studies outlined in Sections 3.2.2 and 3.5.1. Other options which might have yielded fruit would have included following up the interviews with a formal questionnaire survey on these points or the use of photo-elicitation. At the end of the interviews, interviewees were asked to provide any photographs which represented their take on human dimensions but none were forthcoming and the matter was not pursued.

If photographs had become available from this or other sources, consideration had been given at the time to using photo-elicitation, discussed by Gillian Rose (2007, pp.240-3). In photo-elicitation, interviewees are encouraged to use a camera to capture

in photographs their experiences or perceptions about the issue in question and then write about these (title, description, and the thoughts and feelings each photo evoked) and then meet the interviewer again to discuss the significance of what they have photographed. A practical example of the use of photo-elicitation is given in Jenkins (2004). If a large number of photos are generated, then content analysis (Jenkins, T., 2004, pp.59-83) of the photographs and the meanings attributed to them by the interviewees can be used to draw out emergent common images and themes. This whole process was identified as being quite lengthy and beyond the main focus of the research project, but could still be considered for future work

In terms of the trials in which DASH and other community groups used a semantic differential scale to assess human dimensions, ideally a much wider set would have been conducted to get a wider spread of participants and reactions to the method. However, the results obtained and discussed in Section 7.4 suggest that next steps would not be to implement wider trials of the same format, but to explore approaches to tighten up the methodology. Some options to achieve this are discussed in Chapter 8.

3.6.3 Conclusion

The hidden nature of DASH group work, especially in the early years of the research, posed some considerable challenges in selection and deployment of methodologies both for understanding and evaluating DASH activities and for the identification and trialling of the human dimensions approach. The selected research strategy did provide enough flexibility to respond to unforeseen events and opportunities, but, with the benefit of hindsight, some aspects of the research might more effectively have been conducted in other ways.

3.7 Conclusions: research methodology and its deployment

The paucity of information about the ‘dark matter’ of FCRM DASH groups led to a research approach involving recorded, transcribed and textually analysed semi-structured interviews of leaders and group members selected using a snowballing technique. This approach was followed by in-depth case studies of two village groups and an EA DASH coordinator, selected on the basis of covering both fluvial and coastal situations and practicality for the researcher. Case study experiences were recorded in a research journal and via diaries and other information captured and

supplied by the DASH group leaders and the EA coordinator. Analysis of the case study materials was initially narrative or chronological, then to address viability issues was thematic based around the themes in the DASH groups conceptual model (Figure 2-8) and finally a mixture of quantitative and qualitative methods were used to assess the efficacy, efficiency and effectiveness of the DASH group work. Textual analysis of the semi-structured interviews using the nVIVO tool was also used, supplemented by participant observation and participatory diagramming, to identify human dimensions of DASH groups.

The next four chapters describe the evidence elicited and its analysis. Chapter 4 identifies examples of DASH activity and describes the two case studies in detail. It then goes on to exploring the evidence for the appropriateness of the DASH group model developed in Chapter 2, using the model as a framework to assess the evidence for the motivations for and viability of DASH activity. Chapter 5 then examines the efficacy efficiency and effectiveness of the resulting DASH action focussing on the case study examples. Chapter 6 then evaluates the role of FCRM professionals in DASH activity, evaluating professional attitudes and alternative ways in which coordination and liaison of DASH group activity by professionals can support and sustain it. Finally Chapter 7 explores the identification of the human dimensions of FCRM assets and the appropriateness and reliability of its assessment by DASH groups and other citizens describing the assessment and measurement of the human dimensions of such assets.

Chapter 4 now turns to examine some DASH group examples and their viability.

4 DASH group examples and viability analysis

“In the voluntary non-profit sector, we are much more certain that the ‘dark matter’ exists and that it consists of grassroots associations and associational volunteers”
(David Horton Smith (2000) ‘Grassroots Associations’, p.12)

Chapter Four commences by describing a number of examples of DASH group intervention and monitoring activities and then goes into some details on the two DASH group case studies: the Hanneys Flood Group, maintaining the Letcombe Brook and its environs in Oxfordshire and NEHRA (North East Hayling Residents Association) maintaining an estuarine sea wall on Hayling Island. The FCRM issues facing the groups are described followed by the planning and delivery of various interventions (and in the case of NEHRA the impact of my own role). As well as providing an introduction to the groups, the Chapter focusses on addressing research question (1.1) concerning the types and sizes of DASH groups that form, the motivations for their formation and the activities it is viable for them to undertake. It also explores how these issues are affected by FCRM issue understanding, membership, leadership, working meetings, risks and liabilities, wider engagement and the need for long term/repeat action. The chapter concludes by converting this analysis into a generic summary process for all DASH groups.

4.1 Types of viable interventions

Having understood the problem and collected the necessary information, the groups generally then developed some kind of work plan in agreement with the FCRM operating authority. This might have just been a broad agreement, e.g. to clear weed from a channel [Interview 13] or might have been a more detailed plan.

4.1.1 Examples of physical interventions

This section identifies a number of the physical interventions that have proved viable by DASH groups, to illustrate the type of actions that can be carried out and the limitations of what can be achieved (c.f. research question 1.1).

a. Improvement and maintenance work on channels and river

In the EA Thames West area, several of the groups with in contact with Keith Lead (see Appendix A.4 and discussion in next chapter) became involved in channel clearance activities. In addition to the work by the Hanneys Flood Group (to be

discussed in Section 4.2), these included groups at the villages of Charney Bassett, Crudwell, Ascott-under Wychwood and Chalgrove in Oxfordshire and Bucklebury in Berkshire [Interview 19] who were carrying out the following examples of activity in an attempt to influencing water levels and hence control flood risk:

- Charney Bassett. Clearance of water courses especially the River Ock of unwanted/overgrown vegetation including trees. Permission was obtained from the EA conservation officer to take a tractor into the water course to remove the trees and larger vegetation.
- Crudwell. Heavily overgrown watercourse (Swill Brook) was cleared by a gang of local residents. Guidance was not sought in advance and the EA were unimpressed with the lack of vegetation left on the banks.
- Ascott-under-Wychwood. Manual clearance of debris washed down from derelict bridge foundations and laying of vegetation matting to stabilise excavated bank slopes [coordinator email to author 21/01/2013]³⁸.
- Bucklebury on the River Pang. Here there were:

“only 26 houses in the village, but all but one of them got flooded and the church had 18 inches of water inside it; so they again just donned waders or wellies and got in and cleared vegetation” [Keith Lead, Interview 19, Oct 2008]
- Chalgrove [Interview 19 and research journal]. Here the group negotiated and agreed with the property owners of a mill on a water course that the crest level of a moveable mill weir should be permanently lowered in order to avoid excessive water levels upstream.

b. Repairs and improvements to bunds and defences

Two issues with bunds and defences can be tackled by DASH groups without formal planning or flood defence consent: to repair any damage to the surface protection (including vegetation management); and to ensure that a consistent crest level is provided along the entire length of defence, compensating for any settlement that may have taken place. These activities are reflected in the consent protocol issued by the EA Anglian Region (Environment Agency, 2009).

³⁸ These activities were part of a larger programme of work in which Network Rail carried out improvements to the capacity of a rail bridge, the EA constructed swales in the floodplain to better direct flood flows and the community and the EA paid a local contractor to excavate out a blocked road bridge.

In terms of surface protection, in riverine situations, most of the activity will be in connection with vegetation management, and in that regard will bear similarities to channel management. Repairs to surface protection may be more relevant to tidal or estuarine situations where the wave climate is sufficiently modest that the form of the protection is such that manual handling of individual units is possible. Work on the open coast seems generally infeasible by DASH groups since most of these situations will require very large machinery normally only operated by experienced contractors. The estuarine banks in Essex and Suffolk are a good example of the former:

“old clay banks, they’re basically clay, some of them have got [concrete] block work[229]()³⁹ in them and you know as somebody once pointed out these were created sort of four/five hundred years ago by men with spades, so you know it’s not a highly technical job to actually build these things back up again with a digger or whatever, sometimes bringing in soils from elsewhere or clays from elsewhere and even just, I know some of them are just doing basic sort of grouting work in some of the block work that is there, some are putting [in replacement blocks]” [Country Landowners Association representative, Interview 26, Nov 2008]

Collaboration with landowners over vermin control to reduce animal burrowing might also be a possibility [interview 35].

In terms of open coast protection, there seems little that groups can do directly, with the exception of limited durability minor works to encourage the stabilisation of dunes at the back of beaches through wind fence erection and planting old Christmas trees [Interview 11]. Stabilising beaches at the toes of cliffs is not generally feasible for a DASH group as it typically will require use of heavy mechanical handling equipment and will therefore need to be carried out by a local contractor. As an example a local contractor was needed for the work carried out at Dunwich [Interview 27] using a geotextile bag system to create a shore-parallel breastwork (buttressed by short groyne created in a similar manner) to trap shingle and reduce erosion of the cliffs/dunes.

³⁹ Essex blocks were first used in the 1950s. They are mass concrete blocks 375mm square and either 125mm or 225mm thick. They have the advantage of being constructed off site and being light enough to be picked up without machinery. They have a relatively high cement content to increase their material strength and reduce deterioration problems. Canewdon Blocks are larger and reinforced concrete blocks (1905 × 1145 × 165 mm).

c. Clearing blocked drains

Blockage of drains and other critical flow paths may cause surface water flooding. The Hanneys Flood Group have carried out drain clearance in West Hanney with the cooperation, advice and seed-corn funding from the Oxfordshire County Council Highways Department [Interview 15]. This work was physically demanding as it involved clearing a skip load of dense sticky clay from the drains using a scrapper cone pulled through the blocked drains with a rope⁴⁰.

Equally very modest flow diversion works can be effective. Works in the roads themselves (such as creating ‘sleeping policemen’ to divert flow) would of course need to be carried out by the responsible highways authority although the form of it could be identified by the local community. However, other kinds of diversion such as a bund along the edge of a field to divert flow might be equally helpful and this could be carried out by a local DASH group [EA FCRM technical specialist suggestion, Interview 3]

d. Clearing trash screens

Clearance of trash screens (cf. Section 5.2.6) appears to be one area where citizen involvement has been going on, largely unrecognised, for many years. In many case it is not a DASH group, but a single individual that is involved. A couple of examples are illustrative of the kind of commitments that have been made

1. “the bloke that lives immediately behind the grid has been keeping that grid clear since 1964 would you believe and he lives immediately behind it in a self-built house and he has been keeping that grid clear for all those years, often in the early hours of the morning when nobody else realised the risk” [Chair, residents (river) flood association, Interview 21, Nov 2008]
2. “a trash screen ... which does fill up with debris on occasion and causes the water level to back up. It’s right next to one chap’s house and what he’s done is install a little water level alarm that rings ... whenever the water hits a certain level. He then goes out and sees that the trash screen’s blocked and clears it off with his garden rake. ... And he’s been doing that for as long as I’ve been at the Agency. What he also ... knows that there’s a certain point where you maybe get items on there that are too big, or things that he can’t deal with and he just very quickly rings our incident hotline and reports it to the gang who

⁴⁰ The rope was pushed through the drain in the first instance using drainage rods.

then go and deal with it if they've got the time and if they're available. [EA FCRM technical specialist, Interview 3, Feb 2008]

e. Flood Gate Closing/Opening

DASH groups have developed collaborations with the EA by which they agree to close and open flood gates in defences on receipt of a flood warning. The number of examples of these is unknown but four identified during the interviews can be mentioned.

Lympstone, a little village on the Exe estuary, needed new flood defences with gates and the Parish Council agreed with EA that they would operate these gates on receipt of a warning. About 8 gates sit between concrete flood walls constructed around the boundaries of picturesque houses [Interviews 7, 9, 10]. The system, which involves manual closing and opening of the flood gates gives a lot of local flexibility in operation including voluntary closures if villagers feel that EA has missed something, but also the possibility of being able to open the gates for villagers during low tide periods whilst a storm surge warning is in place. There is a particular local cultural reason for this:

“the people who live down there... hang out their washing on the beach, and on the old net-drying lines, ... when we have got a closure, the Environment Agency will [instruct closure] one day and you'll be told two or three days later when the tide's dropped [that] you can open them again, but ... a lot of the cottages are very small, they really don't have room for tumble dryers, not that they'd want them anyway, but if they want to get their washing dried it's got to go on the line on the beach, so they give me a call and say 'Can you come and open the gate?' and so off we toddle, one of us will go down and open them” [Leader, Lympstone Parish Council DASH group, Interview 9, Jun 2008]

The gatekeeper team have taken full ownership of the system, including maintenance (oiling of hinges and padlocks), closure of air bricks on houses (done by gatekeeper team, not householders) and digging shingle out where it gets washed up against a gate during high tide, so that it can be re-opened. Over the first two years of operation there had been about twelve closures a year on average [Interview 9].

At the commencement of the research, the Lympstone example was the only known case where a scheme had been developed with the advance intention of involving a

local DASH group in the gate closures. However, as a result of positive feedback and local sharing of experiences two similar gate closure schemes have now been constructed by the Environment Agency at nearby estuarine locations: one on the Exe estuary at Shaldon and the other on the Teign estuary at Teignmouth (see example in Figure 4-1). The Teignmouth scheme also includes reinforcement of property walls and in places reinforced glass windows and window frames.

Although not a formally identifiable DASH activity, a somewhat analogous gate closing situation exists on the Norfolk Broads, where the gates in defences are normally open during the summer boating season but may need to be closed in the event of a warning:

“... one particular gate is closed by the next door boat yard owner and he has taken on that responsibility of closing that ... public gate ... These boat yard owners keep a very close watch on water levels themselves and so they often know even ahead of getting the Floodline official warning ... they’ve lived next to it for all their lives so they know the warning signs of how it’s rising and when and at what rate it is rising. ... he’s been doing that for four years, it has always been shut at the right time” [Engineer, river management contractor, Interview 28, Nov 2008]



Figure 4-1 Flood gates installed in Teignmouth in 2013

f. Ground water control measures

Ground water control measures can be a matter for individual homeowners, but equally a community approach may be possible. Examples of both were found in a Hampshire village subject to significant groundwater flooding:

“People are starting to put ... sumps in their houses and sumps in their garden and a pump available. In fact the people at ... the lowest point have clubbed together and bought a very large capacity pump for their own use, so they can pump out the ditch and just discharge into the fields at a lower level.” [Interview 22, Nov 2008]

g. Conclusions

With reference to the Collins and Evans (2007) periodic table of expertises (see Figure 2-6), many of the activities described above involved a range of relatively ubiquitous tacit mimeomorphic skill sets such as accurately and safely digging and moving materials and commonly associated with activities such as gardening and DIY. However they also involved polymorphic skills around effective group working, sharing and supporting one another and negotiating. Group leaders and members also brought important local discrimination based on their knowledge of the area and the performance of the rivers during previous flood events.

DASH groups were also fairly clear about the limits to the nature and scale of the activities they could undertake. Generally activities were restricted to the immediate geographic area in which the DASH community was located (typically a small village) and to what could be carried out with manual labour or small plant on hire. Activities on rivers and estuarine situations were possible but not on the open coast.

4.1.2 Monitoring and surveying

In common with the activities of natural resources management groups (see e.g. Carr, A., 2002) DASH groups, a range of monitoring activities were identified by interviewees as being undertaken by DASH groups connected to FCRM assets or by individual volunteers.

Walk over surveys were frequently carried out in the Oxfordshire villages [Keith Lead research journal] and were mentioned by more than one interviewee:

“When we did a survey of the water courses at the end of July, we had over twenty people turn out. Now the electorate in the village is only 220-something, so that’s a pretty significant 10%

turn out, of people who were interested in doing something” [Leader, village DASH group (inland), Interview 13, Aug 2008]

In addition to such planned walk-over surveys, several professional FCRM interviewees mentioned more routine feedback from interested citizens walking around FCRM assets who had developed interactional and in some cases almost contributory expertise (Collins and Evans 2007):

- **Coastal residents** “... I could name half a dozen people that would do that, the majority of whom are relatively sensible, you know they have sort of got the idea now that what the beach should look like and therefore once it’s cut back beyond a certain point ... they will give you a call and let you know” [Engineer, coastal management contractor, Interview 23, Nov 2008]
- **Riverine landowners** “landowners... will often ring us up and tell us there is a bit of bank damage here or a bit of erosion there or some overtopping and we will make a note or by visiting immediately we can check what the high water levels were in that area at that particular event for instance ...” [Engineer, river management contractor, Interview 28, Nov 2008]
- **Dog walkers** “ ‘I was out walking my dog and I noticed this, that or the other’”. So there is a certain amount of informal reporting when problems are spotted.” [EA Asset Management Engineer, Interview 8, Mar 2008]

Not including specialist environmental (Flora and fauna monitoring) or archaeological monitoring, more specific monitoring approaches had been implemented included:

- **Water level and flow information**
 - **Rainfall:** “we’ve got someone who’s got a rain gauge, you know a proper datalogger rainfall gauge which measures rainfall every five minutes - you know, one of these tipping bucket ones.” [Stewart Scott, Interview 15]. With in-group IT skills, the Hanneys Flood group is now organising a more permanent automated rainfall recording system with an on line feed to their website [Interview 47, Jan 2014]
 - **Monitoring of water levels in boreholes** either by dipping of bore holes e.g. with a “little device that rings a bell when it hits the water in the bore hole” or electronically, downloaded to a computer with information on water levels and on which dewatering pump has worked, when it worked and for how long it worked. [Interview 6, Mar 2008 and Interview 24, Nov 2008]
 - **Water level and flow in rivers** (Interviews 15 and 18) “we persuaded the parish council to buy [a water level gauge], a Datalogger, so ... it’s about a metre upstream of the fixed weir, so that, we’ve set it to record every hour. So we download the data every month, and that’s on the website. ...” [Stewart Scott, Interview 15, Sep 2008]

- **Photography:**
 - **“Photographs from fixed locations”** with fixed focal length cameras, using a sea wall line and horizon as a guide [Interviews 23 and 27]
 - **Provision of historic photographs** [Interview 23]
 - **Amateur aerial photography:** “we’ve got a chap who loves to take aerial photos ... we have to give money to charity instead of paying him” [Engineer, river management contractor, Interview 28, Nov 2008]

- **Erosion damage assessments**
 - **Cliff top positions:** distance measurements from a fixed point (e.g. a house) to the edge of the cliff (defined as being the nearest tension crack to the house) [Interviews 6, 24 and 31] “At one stage we had half a dozen or more caravan sites would monitor the cliff edge. They would have fixed points of reference and they would just measure from that fixed point to the cliff edge once a quarter and feed us the information.” [Coastal Manager, maritime district council, Interview 6, Mar 2008]

- **Screen and valve operations – identification of condition**
 - **Trash screen blockages** [Interviews 3, 8 and 21]
 - **Flap or sluice gates/valves blocked open** [Interview 8]

Value of data/observations provided by volunteers

It is clear from the above that a wide variety of observations and measurements can be taken by DASH volunteers.

My interviews examined what value might be given by professionals to on-the-spot observations and reporting by individual citizens. On the positive side they were seen to provide

“extra eyes and ears on the ground locally” [EA Asset Management Engineer, Interview 8, Mar 2008]

“they are local; they know what goes on, on a day to day basis; ... they are the eyes and the ears; they have also got a personal interest in it, ... they want to see their environment kept nice, litter free, bags of cement not in the river, you know being able to go and sit by the river on a sunny Sunday afternoon and have a lot of wildlife in it.” [Barry Russell, EA Area Flood Risk Manager, Thames West, Interview 46, Mar 2011]

“[it is] quite handy to get people to ring up and say you know you probably need to do something. ... I could name half a dozen people that would do that, the majority of whom are relatively sensible” [Engineer, coastal management contractor, Interview 23, Nov 2008]

The professional interviewees recognised the value of the rather greater frequency of inspection available from volunteers and the fact they sometimes had interesting vantage points. For example, on the Norfolk Broads, boating folk could

“see a bit more of the bank from the river”. [Engineer, river management contractor, Interview 28, Nov 2008]

The approach was to:

“always treat them seriously; if people are reporting some damage to a bank or something we will always go out there as soon as we can and inspect it. ... it’s very important to keep people’s trust and to make them realise that you don’t just throw stuff in the bin, you do actually look into things and try and report back to them and say what you’ve done and what you intend to do” [Engineer, river management contractor, Interview 28, Nov 2008]

Another spoke of the value of long term residents being able to recognise change along a 9km beach:

“there are people who live along the beach who are by no means engineers but having lived there for thirty years, they’ve got a fairly good idea of how coastal processes work ...[and] ... the moment it changes for the worst they’re on the phone and saying ... we need some shingle here” [Engineer, coastal management contractor, Interview 23, Nov 2008]

Thus there was a recognition by professionals of the value of measurements by local citizens to their understanding of the FCRM problems which they face. One professional identified two aspects to this:

- (1) “a way of educating them as to ... the erosion risk, this is what happens if you lose your wall, this is the importance of maintaining your private defences I would see it as ... another way of engaging with them to make the appropriate decisions where the public authorities aren’t going to take any action.”
- (2) “to enable them to prioritise any maintenance activity that they would be carrying out...; by them doing it themselves that they would learn more about what is actually required. ... [Coastal Manager, maritime district council, Interview 29, Dec 2008].

On the negative side, concerns were expressed by FCRM professionals interviewed about the quality of such monitoring, arguing that it was important to introduce some

kind of consistent “methodology and regime”⁴¹. [Engineer coastal management contractor, Interview 23, Nov 2008]. Some FCRM professionals did not even see the need for additional resource in this area:

We don’t have a huge coastline, to be honest, and I don’t think it takes very long for personnel which I would send out to get to A to B fairly quickly for a flooding event, or whatever. ... I can’t really see a lot of benefit.” [Coastal manager, maritime district council, Interview 31, Dec 2008]

And a significant challenge raised by many professionals was the need to be confident in the quality of measurement data gathered by volunteers (and how it related to the data which could only be gathered by professionals). For example, one professional, discussing the value of volunteer measured cliff top profiles on an eroding coast, explained:

“we have to be confident in the information ... because the main area of usage of erosion rates is responses to people who want to buy houses. So we have to be exceedingly careful about what we say.” [Coastal Manager, maritime district council, Interview 6, Mar 2008]

Thus, the reaction of professionals to data gathering by volunteers was mixed. Different views were expressed about the need for citizen observations and measurement. There were concerns about the potential quality of the observations and measurements but some recognition of the educational value of the information collected.

4.2 Hanneys Flood Group: flooding issues and activities

This section discusses the activities of the Hanneys Flood Group, who maintain the Letcombe Brook and its environs in Oxfordshire as it flows through the village of East Hanney on its way towards the River Ock and thence into the Thames.

4.2.1 Planning what to do

The problem of flooding of the village of East Hanney can be divided into two parts.

Firstly, at times of high rainfall the water spills out of the left hand bank of the Letcombe Brook upstream of Dandridges Mill (a mill on the southern upstream side of

⁴¹ There was a separate issue raised by the Hanneys Flood Group (research journal) that access for DASH groups to upload or download data to Local Authority or EA databases (such as AIMS/NFCDD) has not really been addressed. The upload capability could be restricted to avoid problems of data damage.

the village) and flows from south to north through properties (Figure 4-2). With regard to this issue Environment Agency (2007a) stated:

“Dandridges Mill is currently being re-developed; we have met and are currently in discussions with the new owners regarding flood risk and permissions that are required to make alterations to the mill. We are working with the owners to identify opportunities to reduce flood risk locally via their proposals to install hydroelectric power and an additional bypass channel. These works have the potential to increase the capacity of the mill to pass flows downstream, but will only be acceptable if flood risk is not increased elsewhere.

The Hanneys Flood Group was not therefore able to have any significant input on the left bank flooding problem, although it has examined the possible introduction of new flood bunds upstream of Dandridges Mill.

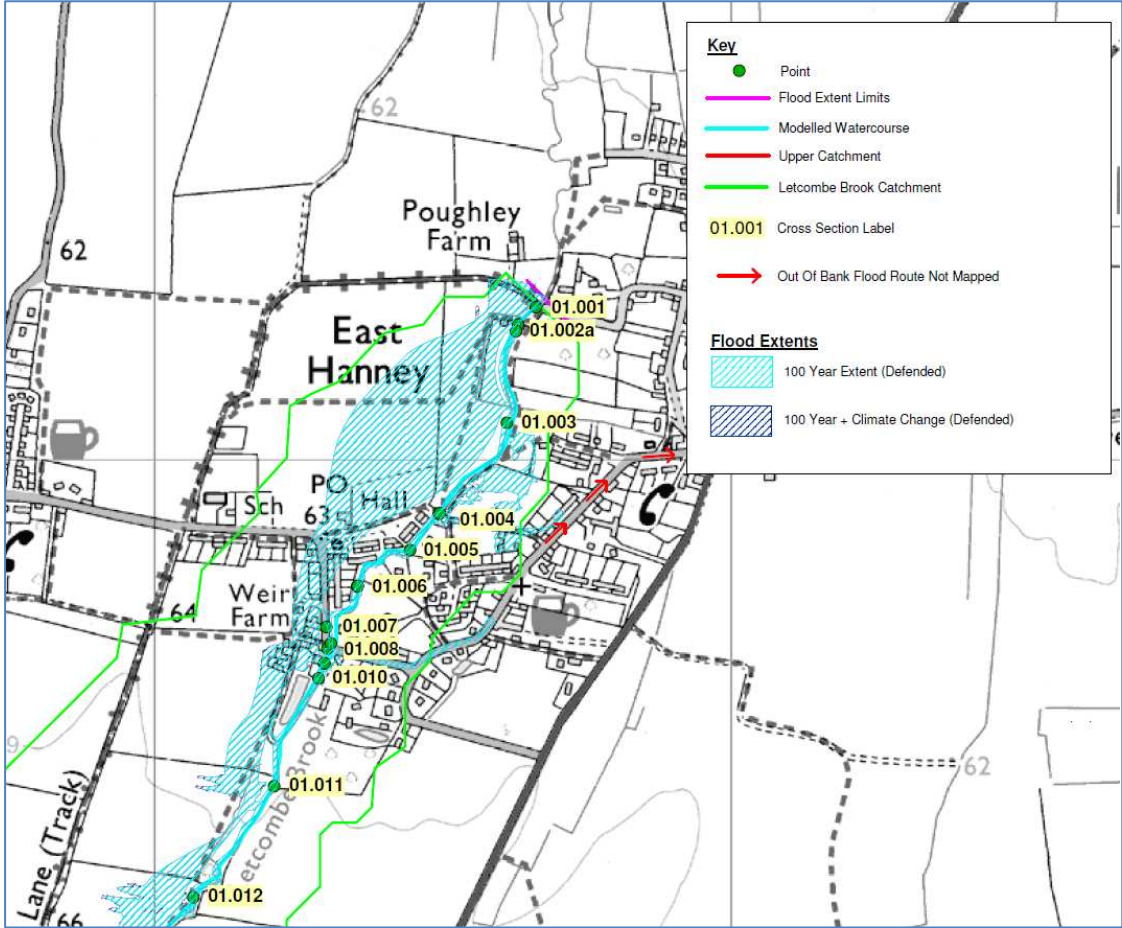


Figure 4-2 Modelled flood outline for East Hanney under 1:100 year event

Secondly, and not fully represented on Figure 4-2 due to poor information about ground levels and flow pathways, during severe flood conditions water spills over the right bank of the Letcombe Brook downstream of Dandridges Mill and flows to the east (see red arrows on Figure 4-2) as far as Main Street. With regard to this second

issue, a work plan was identified jointly with the EA and summarised on a copy of the local Ordnance Survey map (Figure 4-3). The main activities identified included selective weed clearance, a 300mm bund to prevent water spilling into the village to the east preferentially rather than the flood plain to the west, reinstatement of original watercourse across the floodplain to the west, lowering the mill weir and increasing the aperture of a mill bypass stream. [Stewart Scott, Interview 15, Sep 2008]. All these actions to reduce water levels in the Brook and reduce flooding in the village have now been implemented by the Hanneys Flood Group and the following section explains what was done and the conclusions that can be drawn.

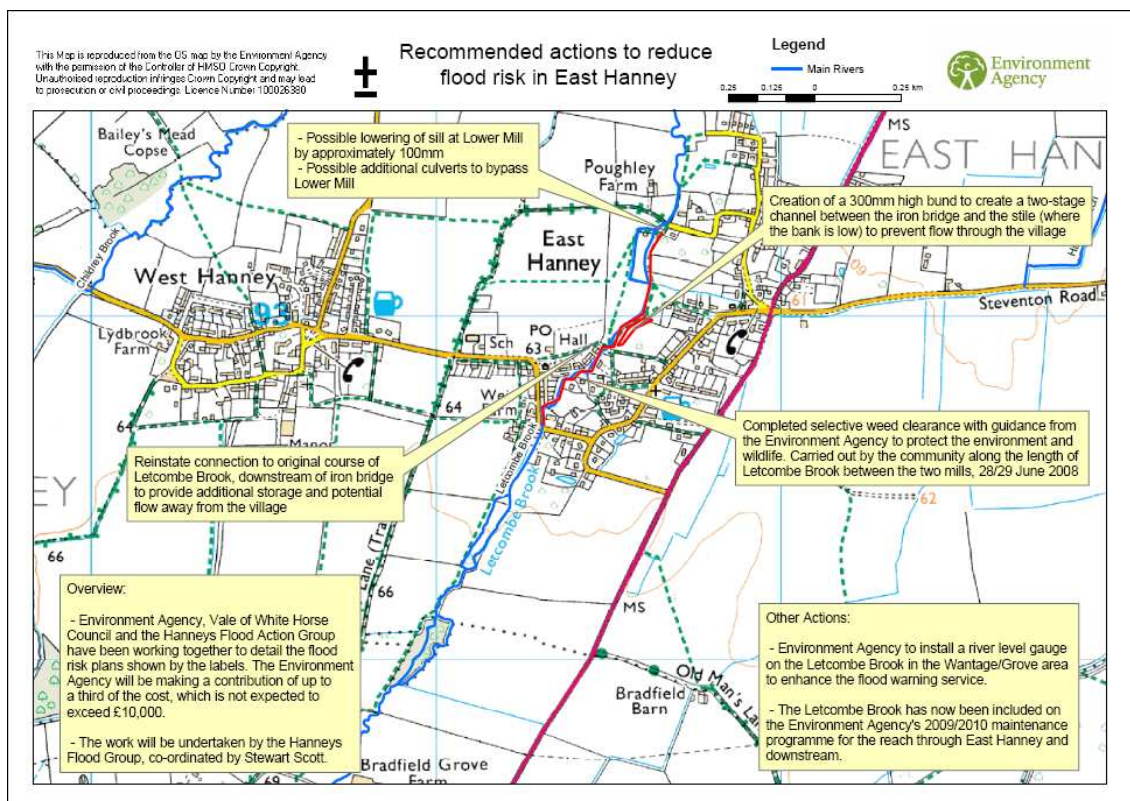


Figure 4-3 Plan of recommended actions to reduce flood risk in East Hanney [prepared by EA for Hanneys Flood Group]

4.2.2 Physical interventions

Planned channel management activities by the Hanneys Flood Group commenced with aquatic weed clearance from the Letcombe Brook (between the two mills in East Hanney, on Dandridges Mill and Lower Mill). This work was carried out in June 2008, when

“the whole of the village, literally over a hundred people, took part for the inaugural session we did between the two mills. [Hanneys Flood Group volunteer, Interview 45-7, Autumn 2010]

The work (compare Figure 4-4 and Figure 4-5) generated

“ten and a half inches of drop of water level at the Iron Bridge, I mean that just proved ... that weed clearance does make a difference, and that there are sufficient people in the village who are concerned that they were willing to get stuck in and pull weeds out. Yes, and it’s bloody hard work!” [Stewart Scott, Interview 15, Sep 2008]

Subsequently, up to 1.5 feet of silt was washed out from the bed of the stream exposing a chalk bed [Interview 47, Stewart Scott]. This lowered water levels further and had the side effect [Interviews 45-1 and 19] of regenerating the river ecologically. Initially there were concerns by the EA conservation officer that too much vegetation had been removed, but the removal of vegetation allowed silt to be washed out of the river and re-establishment of a chalk stream habitat in which fish are now thriving. The efficacy of this work in reducing flood risk is discussed in Section 5.1.

Local discrimination (Collins and Evans 2007) that developed in the Hanneys Flood Group included recognising, much as the River Trusts do [Interviews 35 and 36], that there would be some plant species⁴² that, if not controlled, would even take over and stabilise shoals in the river and thus reduce channel conveyance (Knight, D. *et al.*, 2009) .



Figure 4-4 Hanneys Flood Group weed clearance of Letcombe Brook June 2008 (courtesy EA)

⁴² In the case of the Letcombe Brook this was a type of Iris plant [Interview15] , but in the River Tyne there are even problems with invasive species such as Japanese Knot Weed [Interview 36] which environmental management groups have needed to tackle.



Figure 4-5 Letcombe Brook, showing commencement of low bund construction by Hanneys Flood Group, September 2008 (Note drop in water level compared with previous figure following weed clearance) (Courtesy EA)

In addition to the channel clearance work, the crest level of the fixed Lower Mill weir at the northern end of East Hanney was reduced by 100 mm by removal of one course of bricks. The flood risk impact of this is also discussed in Section 5.1.

The 300mm (maximum) bank raising on the east (right) bank of the Letcombe Brook proved to be necessary following years of deposition of dredged material by the Thames Conservancy teams on the opposite (left) bank of the Letcombe Brook remote from the village. This deposited dredged material had formed into a bank which prevented flood water from spilling over into the flood plain, preferentially forcing it to spill over the right bank into the village. The solution agreed with the EA and implemented in September 2008 was for a modest raising of the right hand bank. 120 tonnes of soil were used to raise the bank by a maximum of about 300mm over a length of about 150 metres, feathering it out into the existing ground levels at the ends [Interview 19]. 45m of pre planted coir rolls were then laid in the stream bank edge to reduce erosion and provide a natural edge to the new bank (Figure 4-6 (a) and (b)). The existing path flagstones and some recovered from the stream were re-laid to be flush with the bank surface. The soil was seeded with a mixture of 80% grasses and 20% wild flowers as approved by the Environment Agency Conservation Officer. [Interview 19].



Figure 4-6 (a) Installing coir rolls at base of bank to provide stabilised toe to (b) new bank slope and encourage water line vegetation, September 2008 (Courtesy Hanneys Flood Group)

Thus the Hanneys Flood Group appear to be meeting their physical objectives. The extent to which their work has actually delivered flood risk reduction or other benefits is discussed in the next chapter.

4.3 NEHRA DASH group: flooding issues and activities

This section is based on material gathered during work with the Hayling Island (NEHRA) DASH group and presents the activities of the group, mainly those prior to and during the Summer of 2009. It draws on information recorded in Interviews 29, 33, 42 and 50 and 51 and in the diary of NEHRA DASH group leader Judy Clark emails and my research journal.

4.3.1 Planning what to do

This section first explains the flooding problems associated with the sea defences to North-East Hayling Island (Figure 4-7) based on the understanding that the NEHRA DASH group had developed. It then describes sequentially the planning process for the repair work, explaining the dilapidated condition of the defences, understanding wave conditions at the sea wall, examining options for the repair of the wall and finally deciding on a solution. I was heavily involved in giving professional advice for this part of the process as will become clear.

Understanding flooding problems

Actual or potential flooding had occurred due to extreme tides (high tides plus storm surges) or due to excessive rainfall not being able to escape due to tide locking and there being insufficient storage. A particularly vivid recent experience of tidal flooding had been that in March 2008 when sea water overtopped the wall at high tide with the following consequences for receptors (summarised in the written report of the event prepared by Judy Clark at the time) as:

- flooding of all land (including the grazing marshes used by the dairy herd) up to the +3.2 m contour (see Figure 4-7 and Figure 4-8) east of Northney village
- flooding the roads to the north and south, cutting vehicle access to the village
- water flowing to the south-west to Gutner Lane causing flooding of one house and another to be completely surrounded with flood water
- imperiling the operation of the sewage pumping station, resulting in tankers being deployed to pump and take away water for many hours.



Figure 4-8 Hayling Island, view east from +3.2m OD contour during March 2008 flooding event (from track at end of Church lane, Northney) (Courtesy Judy Clark)

Thus in terms of the receptors for flood water in more severe events, the villages of Northney and Tye themselves generally lie at levels which do not really exceed about +4.0m. The critical level is a natural ‘slight hump’ contour at about +4.3 m OD which lies between the sea wall and the village, although there are flooding paths which can circumvent this high ground. The villagers want the area between the sea wall and this naturally high contour to be maintained as it provides a ‘reservoir for surface water’ [Interview 33 with Judy Clark, Jan 2009].

Sea level rise projections prepared by the EA (Figure 4-9) compared with the seawall crest elevations in Figure 4-10 suggest that the current defences will progressively become less effective during the course of the present century unless raised or reconstructed. Without improved protection, the increased frequency of flooding of the villages of Northney and Tye will eventually mean that they would become unsustainable.

Poor condition of defences

As well as the defences being overtopped, their poor condition and potential for breach was understood by the local farmers and villagers. Various sections had been identified where the outer protection was damaged or missing and sections where the crest elevation had been eroded below the previous operating level. In the historic past the wall had been maintained by both the farmer and the EA (EA). However, for more

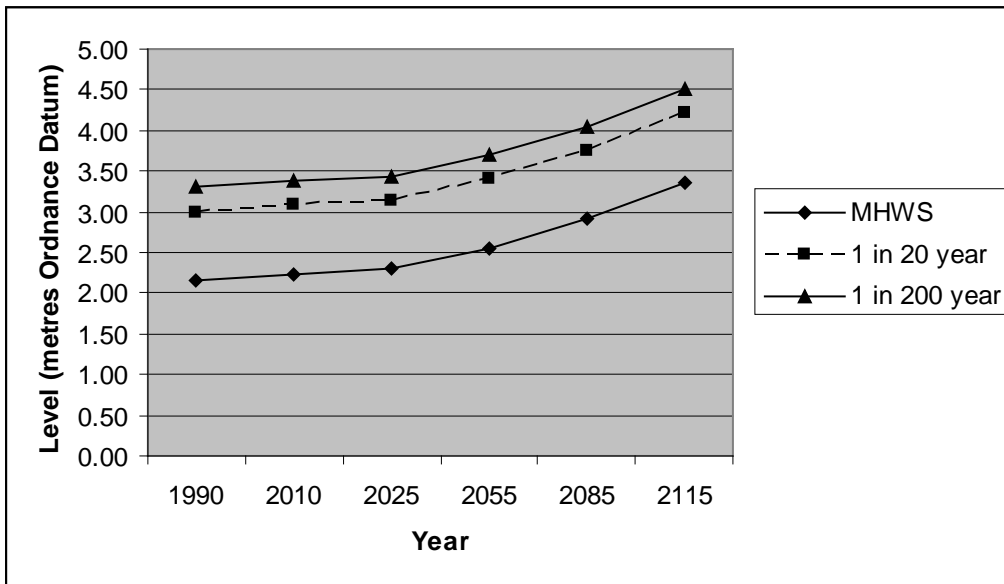


Figure 4-9 Projected sea levels at NE Hayling Island over the next century (Courtesy Havant BC)

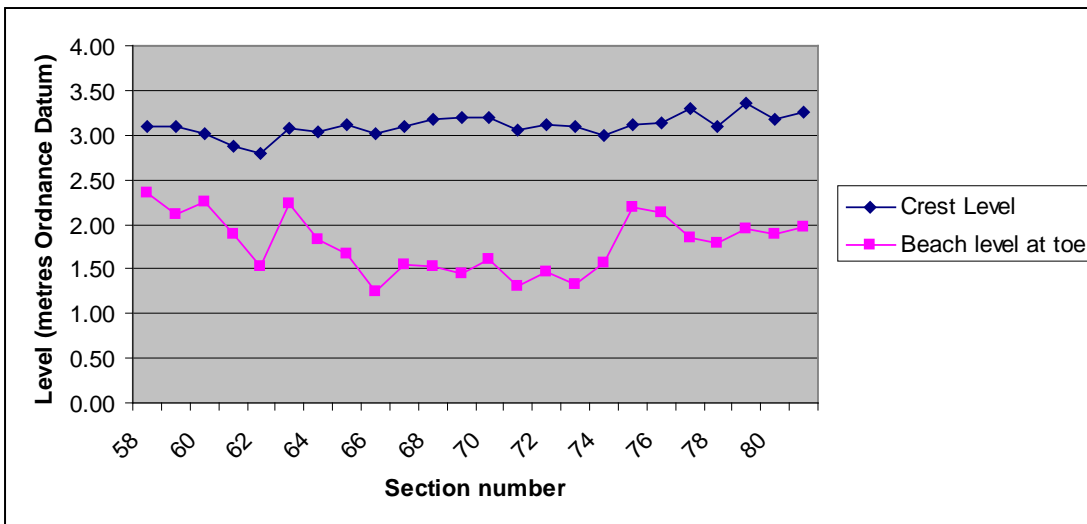


Figure 4-10 Sea wall crest and toe levels as measured by Havant BC, July 2009

than 10 years the wall had been considered to be low priority by the EA and no maintenance activity has been carried out. Previous ad hoc maintenance by the farmer had been conducted in the days when he had a larger work force with capacity to do this work at times of lower farming activity.

The problem was that there were insufficient benefits to justify government funding of the necessary repairs (based on conventional construction procurement). Any repair

that might take place therefore needed to be carried out by the farmers and/or the local community [Interview 29, Coastal Manager Havant BC, Dec 2008].

Inspections which I carried out on 27 May and 25 June prior to the work commencing and cross-sections prepared by Havant BC coastal engineers in July 2009 revealed that the sea wall is essentially an earth and clay bund (Figure 4-11 and Figure 4-12). Being within Chichester Harbour (Figure 4-13), the wall is protected from direct wave action in the English Channel and the Solent, but is still subject to waves generated by winds blowing across the fetches available within the harbour. These have been sufficient over the years to erode the waterward face of the bund which has progressively been protected by various artificial measures. The artificial protection rarely extends the full height of the seaward face and the remainder is largely grassed or vegetated (like the crest and landward face). The waterward face and crest (Figure 4-11 and Figure 4-12) are in many places very uneven and eroded in nature.

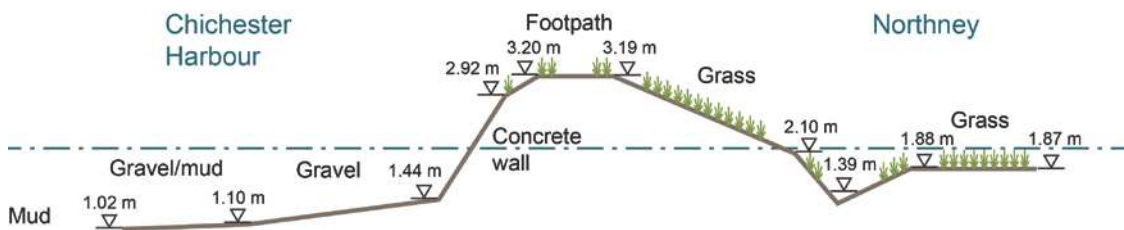


Figure 4-11 Cross section through sea wall (based on Havant BC section Northney -069)



Figure 4-12 Typical view of sea wall (May 2009)



Figure 4-13 Location of Chichester Harbour and Hayling island within the North East Solent

The front face protection is highly varied. In some places it is an *in-situ* concrete wall, but in many others it is formed from a mixture of concrete blocks, concrete filled sandbags, systems of timber stakes and planks (only remnants of stakes generally visible) and (in the more sheltered sections at the southern end) sheet piles supporting a wire mesh screen retaining rubble. These protection systems are in various states of dilapidation as can be seen from Figure 4-14 to Figure 4-17 taken during the May 2009 inspection.



Figure 4-14 Example of mass concrete wall with timber stakes exposed by eroded beach



Figure 4-15 Example of collapsed concrete blockwork wall facing.



Figure 4-16 Example of collapsed concrete wall (mid picture) and bank erosion above



Figure 4-17 Concrete blockwork facing collapse permitting erosion of clay bank



Figure 4-18 Example of existing concrete bagwork walling, including collapsed section in rearground and eroded bank in foreground

Wave conditions at the seawall

From a coastal engineering perspective, a critical factor is the available water depth in front of the wall during periods of high tide as this controls energy dissipation and the maximum wave height that can reach the wall (CIRIA *et al.*, 2007). As can be seen from Figure 4-10, the foreshore level varies significantly meaning that on normal spring tides the water depth can vary from nothing to about 0.9 metres. Some of the southern sections of wall also have a wide vegetated foreshore in front of them which will dissipate the energy of the incoming waves and thus reduce their heights.

Given this information and an admiralty chart of the area (UKHO, 1988) it was possible to deduce wave conditions at the sea wall. Using a previous study of waves in Chichester Harbour (HR Wallingford, 1995), Dr Peter Hawkes at HR Wallingford kindly established the wave conditions at the (most exposed) headland location on the Northney frontage, concluding that these were generally 5-10 cm higher than those at Point D further to the South (Table 4-1).

Table 4-1 Wave heights in Chichester Harbour

Point	Significant wave heights (H_s) for given return periods (metres)		
	1 year	10 year	50 year
D	0.81	0.94	1.03
Off Northney headland	0.86 to 0.91	0.99 to 1.04	1.08 to 1.13

Assuming the waves are all locally generated wind waves (swell waves do not penetrate through harbour opening/bar) then it can be assumed that they are ‘deep water’ waves and hence the wave length is equal to $gT^2/2\pi$ (CIRIA *et al.*, 2007). A reasonable sea steepness (wave height over wave length) to assume is 0.05 (CIRIA *et al.*, 2007) and hence a wave period of about 3.5 seconds and a wave length of about 19m can be deduced. A further check on wave height was possible using the data in Figure 4-10. The lowest foreshore level is about 1.24mAOD and the 2010 1:20 year water level (Figure 4-9) is 3.1 metres. Hence the water depth in present day conditions is 1.86 metres which is sufficiently small to limit the wave heights. Typically the significant wave height will not exceed about 55% of the water depth in such situations (CIRIA *et al.*, 2007), implying a wave height of about 1.0m. This confirms that a design wave height of between 1.0 and 1.1 metres is a reasonable starting point.

Repair options for wall

The problem at this point was assessing what kind of materials could be recommended for repair. There were two significant constraints. Firstly, there was a general agreement with the Operating Authorities that the repair materials should generally be on a like-for-like basis. Secondly, for local volunteers to place them without the availability of lifting equipment, they would have to be moveable by hand. As a result (dry mix) concrete filled sandbags at a typical weight of 25kg seemed an obvious choice, consistent with repairs that had been carried out in the past and adaptable given the irregularity of the wall to be repaired. The bags would be placed with the mixture dry on the basis that they would subsequently absorb water from the sea and rainfall and thus achieve a set. The hessian bags (consistent with previous experience on site) would then be expected to rot or abrade away fairly rapidly.

Having selected concrete filled sandbags, the next issue to address was the placement pattern. Consideration was given to random placement of the bags at a shallow slope of say 1:2 in order better to absorb the energy of the waves. However, this would have required a larger quantity than a vertical wall and would have created a significant encroachment onto the foreshore. Furthermore, calculations (Table 4-2) using Van der Meer's plunging stability equation (CIRIA *et al.*, 2007)(CIRIA *et al.*, 2007)(CIRIA *et al.*, 2007)(CIRIA *et al.*, 2007)(CIRIA *et al.*, 2007) indicated that they would only be stable up to wave heights of the order of 0.4m. It was therefore concluded that a more traditional battered vertical wall construction should generally be adopted. Mike Burras, a local contractor recommended that steel reinforcing bars be driven vertically through the bags to help to bind the mass of bags together.

Table 4-2 Wave heights at which concrete bags are stable in a random placing

Stability number, <i>s</i> _d	Permeability factor, <i>P</i>	No of waves			
		1000	3000	5000	7500
2	0.1	0.45	0.29	0.34	0.31
2	0.4	0.57	0.40	0.38	0.34
2	0.6	0.62	0.44	0.39	0.34
8	0.1	0.59	0.30	0.36	0.32
8	0.4	0.76	0.42	0.41	0.34
8	0.6	0.81	0.46	0.42	0.35

Deciding on solution to be adopted

On visiting the group in 2009 [research journal], it became apparent that there was considerable local debate about the form of any repairs to the sea wall. Previous adhoc repairs by the EA using clay filled hessian bags tied in with steel rods had generated

uncertainty about what kind of repairs should be carried out. When proposed, my idea of using concrete filled sandbags was accepted by the NEHRA committee, but was opposed by two of the farmers who thought that solid concrete pre-cast panels would offer a better solution. They were not persuaded by my arguments that these panels would be more reflective than a sand bag wall risking creating local scour and might not be sufficiently flexible to adapt to the various repair situations⁴³. As a result, during the winter of 2009-10, unconnected with the DASH activity discussed in this thesis, the farmers installed some of these panels on the northern section of the wall.

Eventually the decision was taken to accept my contributory expertise (Collins and Evans 2007) and proceed with the concrete filled sandbag solution. Sources of sandbags were sought, and supported by provision via the EA Coastal Engineer of a large number of suitable hessian bags. The farm agreed to pay for the sand and ballast materials and it was agreed that:

- the cement and ballast for filling the hessian bags would be dry-mixed in a ratio of 1 to 6, (based on a traditional 1:2:4 mix), the ballast being a graded mix containing both sand and coarser aggregate
- the concrete paved farmyard would be made available for mixing and bagging and
- various forms of transport would be laid on to get the filled bags from farmyard to sea wall.

4.3.2 Physical interventions –materials, construction and people

This section describes the implementation of the concrete filled sand bag solution described in the previous section.

Materials and dry concrete mixing

The work was carried out with the cement and ballast being mixed in the farmyard with a mechanical handler belonging to the farm and operated by an experienced handler (a man who maintained farm machinery, or one of the farmers), i.e. those with referred expertise.

⁴³ My arguments were predicated on the assumption that the quality of the concrete in the sandbags would be fit for purpose whereas in fact this turned out not to be the case (see Section 4.3.2)

Cement and ballast for the hessian bags was mixed on a concrete paved area in the farm yard in the farmyard. I was not in control of this process and, since I was effectively only acting as Judy's advisor, could only really discuss this with the farmer with or through her.

One of the farmers seemed to have a fairly clear idea of what was required to make up a proper batch of dry mix, having mixed and laid areas of concrete as part of his routine farm work. As such he had more contributory expertise than the average villager. On the first day of work, when I arrived on site, this farmer had already batched up and almost finished mixing (with the mechanical handler) the first batch of materials and so I was not privy to how these had been measured out. To the eye there seemed to be sufficient cement and it had been well mixed (no brown streaks in the pile). I subsequently spent most of my time supervising the installation on the wall and therefore was not in the farmyard to control the mixing etc.

Unfortunately, other farmers who subsequently got involved in preparing the mixes were much less aware of the criticality of the mix proportions or of the quality of mixing. It subsequently emerged (a) that less cement may have been used in subsequent mixes and (b) that the subsequent batches were not as well mixed (brown patches remaining in mix. This meant that there emerged in some of the bags on the wall nodes of loose material leading to concerns about the overall quality from the work, especially from the critical farmers. Two reasons other than the poor mixing were advocated by the some of the farmers:

- that they should not have relied on water from the air and sea to hydrate the mix in the bags and make the concrete set. There was some justification in this in that it was a relatively hot summer with very little rainfall and almost no wave action washing up to the top of the wall.
- that they should not have used crushed recycled aggregate that was used for some of the mixes. No particular reason for saying this was advocated, but it might well have been that the effective surface area of the aggregate was larger than for a traditional ballast and hence more cement might have been necessary. It is also possible that the aggregate may have had less natural water in it than a conventional ballast

In the final weekend of placement, a conventional ballast aggregate was used and more care was taken that the correct amount of cement was used and that the batches were properly mixed. Some water was also added so that the mix was not quite as dry as before.

Sandbag construction activities

Once the dry concrete was mixed, the bags were filled manually by the NEHRA volunteers (Figure 4-19) and then transported to site using various means including the bucket of the mechanical handler, the tray of a small tractor and even on a trailer towed by the farm Volvo.



Figure 4-19 NEHRA volunteers filling hessian bags with dry concrete mix 18 July 2009

At the eventual location of placement, the bags had to be transported across the ditch behind the sea wall and this was generally achieved by offering up the mechanical handler bucket to the wall and then volunteers offloading it from a position on the top of the wall (Figure 4-20). Where this was not possible the bags were offloaded and ‘chain’ manhandled up the landward side of the flood embankment.

Once on top of the wall the bags were carried or chained to their final position. They were then placed generally in ‘headers’ in one or two rows depending on the height and extent of damage to be repaired. Once placed and packed down steel connector rods were driven down through the sandbags to help to hold them together (Figure 4-21). Where an existing concrete footing was available the bags were built off this.



Figure 4-20 Volunteers on crest of sea wall unloading bags from mechanical handler bucket and placing bags (background) 18 July 2009



Figure 4-21 Driving steel connector rods through placed sand bags 31 July 2009

The bag work proved, as expected, adaptable for completing connections with existing intact defence work. In some locations, smaller repairs were needed and here the sand bags were inserted as best as possible in order to fill the gaps, either by inserting from the front of the gap or where possible without fresh excavation by inserting them to the rear in order to form a proper ‘plug’ (Figure 4-22). Where voids remained behind sandbagged areas, these were subsequently either filled with clay or other available suitable material.

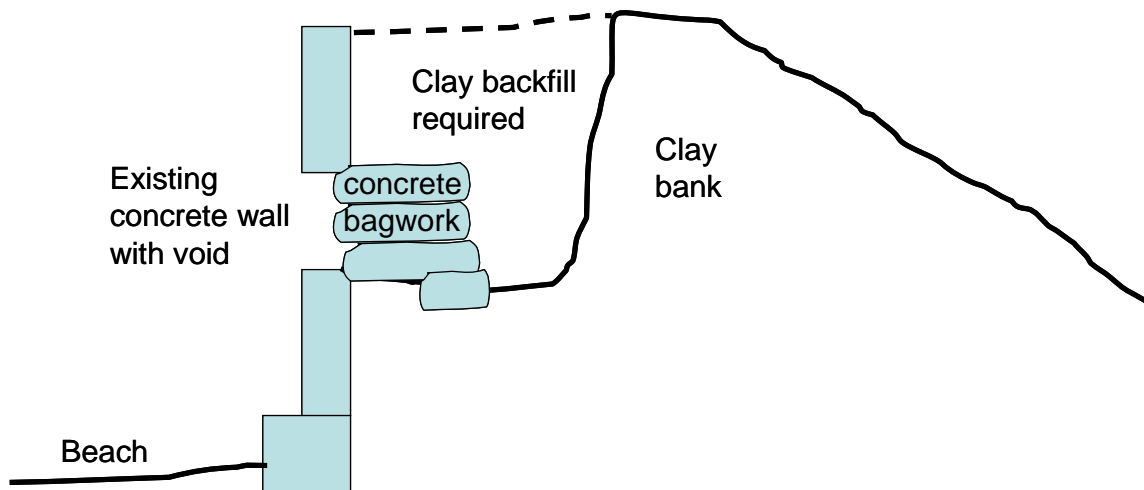


Figure 4-22 Sketch of solution to voiding in concrete wall and erosion of clay bank (Research Journal 1st August 2009)

Crest repairs with clay infilling

Once the facing repairs themselves had been completed, I had to promote attention to the repairing the crest of the wall as there were a large number of locations where the wall was rutted due to a combination of walking and erosion due to wave overtopping, in places leaving stacks of clay typically 0.3.m high with gaps between them (Figure 4-23).

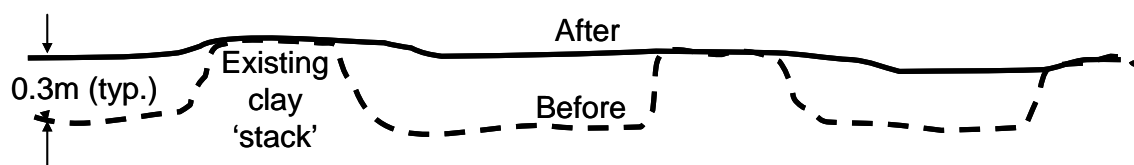


Figure 4-23 Long section through clay filling (sketch from research journal 29th Aug 2009)

I suggested ... that we address the part near the 'point' where the bank had lost height. We laid down a few sandbags as a footing. Then ... Stan ... agreed to use his machine to bring up some clayey material to make up the level of the crest. ... The earth/clay was put up on the crest of the bank by Stan's machine and then transferred along the bank crest using a wheelbarrow and some buckets. (Research Journal 29th August 2009)

The clayey material was moved into its final position with spades (Figure 4-24) using typical mimeomorphic (Collins, H., 2010) gardening skills and compacted as much as possible by 'foot stomping' (research journal)⁴⁴.

⁴⁴ As we were placing the soil/clay on the top of the bank, filling in between the existing 'stacks' of clay (see diagrammatic long section), I am thinking as an engineer about the imperative of raising the crest level back to its original level. However, the reaction of the DASH group members is mainly around how the filling has improved the *quality of the permissive footpath* along the bank. (Research Journal 29th August 2009). This is an interesting corroboration of the importance of the accessibility issues discussed later in Section 7.2.1.



Figure 4-24 Moving and placing clay fill to make up crest of sea wall, 31 August 2009

I had concerns that the clay and soil added to infill holes and to build up the crest in areas where it had been locally eroded was only compacted by foot and, not being at the optimum moisture content for compaction, was unlikely to have been fully compacted and therefore would be subject to potentially severe erosion in the event of overtopping waves. There was no obvious way of solving this problem other than relying on subsequent foot traffic along the crest of the wall (a local permissive path) and the growth of grassy and other low growing vegetation to hold the infilled material in place.

People involved and team formation

Those with particular contributory expertise (Collins and Evans 2007) or equipment made those available and operated them, in particular farming equipment (wheeled front loading shovel, tractors). Two people found they had a key role in opening and closing farm gates to let vehicles through without the cows coming through as well.

An excellent team spirit developed amongst those doing the work, with a lot of friendly banter and joking. The NEHRA weblog for 29th August 2009 says:

“C., our youngest sea-waller and ‘child slave’, insisted at 12:55 he had to leave at 1pm. When asked why, he replied that he had to go and sweep some chimneys. Poor child! The Victorian theme seem to be spreading as those carrying the buckets of soil from the MH [mechanical handler] to where they were needed asked, in an Oliver Twist fashion, ‘Please Sir, can I have some more?’ to those loading them up.”

Those less physically able made themselves useful in whatever way they could. In the farmyard a couple of less able individuals found a role in “separating sandbags and holding them open whilst ... those who were stronger filled them” (Research Journal 18th August 2009). On the wall, one lady commented to me as we were stamping down some clay fill to compact it: “I have found something I can do now!” (Research Journal 29th August 2009). Liquid refreshments and food was provided by others for those who were working hard physically (shortbread made by one of the youngsters was a particular delicacy).

Other than the farmers, those involved seemed to fall into the typical team categories. S. quickly became accepted as a leader, having a proactive style. Most of the others were happy to be team members and follow the general lead given by S. together with my guidance on the configuration for placing the bags, and the backfilling with clay.

Thus at the end of the Summer 2009, the NEHRA DASH group appeared to have met its physical objectives; they celebrated the process and associated community building at a barbeque. However, there were significant emerging concerns about the quality of the concrete used and hence about the durability of the work which subsequently proved to be significant (see Section 5.1.2)

4.3.3 Effect of my professional role on the NEHRA DASH group

Although I might have seen my own role primarily as that of a researcher, it became clear that the group saw me at least as much as a professional advisor. My involvement appeared to give the group confidence to go ahead with the DASH activity for which they had already sought and obtained permission from the EA (see further discussion in Section 4.4). Without this confidence the work might have been further delayed or not have proceeded at all. Judy Clark acknowledged:

“[your involvement] ... suddenly brought it all together; I mean we had been talking ... about various things, not getting anywhere very far and we perhaps hadn’t thought about doing it entirely as a community project; we kept saying we ought to do something you know, but never got much beyond that. And then I think when you came in and said about you know community projects and things, we thought right OK yes perhaps we could do something along those lines and we started to get into gear with it and get involved but I think it was kind of something that drew all our thoughts together as it were, and enabled it to kind of get going.”

[Interview 50, August 2014]

The desirability of involvement by external FCRM professional or professionals to get DASH activity in FCRM started (in addition to any catalytic flood event) is discussed further in Chapter 6 when considering the role of FCRM coordinators for DASH work.

As a result my own professional practice became part of the story of the group and it was essential for me to seek to act with due skill and care, even in a situation where I was not being paid to advise. Hence for example it was necessary for me, where possible, to remind people of things that they needed to do and to emphasise the temporary nature of the repairs that were being undertaken.

I acted as an advisor to, and supporter of, Judy Clark who was the leader of the work and this imposed some restrictions on me. When working for an external client, I would have had more flexibility to find out about the farmers' previous experience of wall repairs and to challenge their understanding of the most effective forms of protection. In practice, the dynamics of the situation made it difficult to take the farmers' expertise on board.

Once I had started to advise a particular course of action (use of similar materials as used before – specifically the sandbags), I was clearly going to be in conflict with the farmers' view about using vertical planks. I was specifically concerned about this (a) because the use of the vertical planks was in clear contravention of what HBC and EA were permitting in terms of 'repairs' and (b) because the lack of wave energy absorption of the vertical planks. On the northern sheltered frontage they were potentially more acceptable, although the way they were installed (without proper connection into the earth bank to prevent scouring at the longitudinal junction between the planks and the earth bank) gave me concern about the longevity of the solution. A further difficulty was trying to change the view of two of the farmers, once they had concluded that their approach was correct. Equally, whilst a great supporter of the DASH project was a third member of the farming family, Judy seemed to believe that pressing too hard for a particular solution would make things difficult for that individual within the family.

Another aspect was the development of my role with time. After the first meeting, it was clear that the farmers and those who deferred to them were not simply going to

accept my expert judgement without question, or indeed without challenge. During the first summer (2009) I appeared to be 'on trial', but that after that batch of work was completed, I became more accepted by the residents and probably also by the more supportive farmer. Thus, when an issue arose in 2010 about how the local community should respond to the draft Shoreline Management Plan (SMP), it was easier to persuade Judy to allow me (a) in the spring to improve the NEHRA letter with regard to the SMP and (b) in the winter to get the group to work with me on the social aspects of the sea wall. It was also easier for me in December 2010 to write down and directly communicate my concerns about the long term condition of the wall and in particular its low elevations in places. This contrasted with my experience during the summer of 2009, where the on-going technical concerns being raised by two of the farmers were all tackled indirectly via Judy.

During the work on site, the role I adopted was at the wall itself, advising on the form of construction and packing of the sandbags as no one repair section was identical to another. Here, I was only able to guide the way the sandbags were laid and not to control it completely. In this regard, the experience differed from a traditional construction site, where, had I been resident engineer, I would have been able to ensure that the requirements of a pre-prepared specification and drawings were met. On the wall it was very much more a 'make it up as you go along' experience and I could only influence the work at those parts of the wall where I could be in attendance. As I explain in Chapter 5, it was helpful that some individuals quickly grasped what was required and took the lead in guiding others.

My focus on the work at the seawall meant that I was not able to monitor the preparation of the dry mix for the sand bags, either in terms of the proportions of materials used or in terms of the quality of the mixing and, as explained in Chapter 5, this became an issue when the control on the mix proportions and the mixing process was not maintained and some poor quality concrete setting had to emerge before the DASH group realised that the proportions and mixing of the concrete was important.

Organising a survey

During the course of my involvement, I initiated a basic quantitative level survey using level and staff and also arranged for a colleague to take measurements along the

crest of the wall using dynamic RTK GPS system (as part of a FRMRC2 research project). The results of the latter can be seen in Figure 4-25. Apart from a slightly wider accuracy range, another reason for the wide fluctuations in levels were that the researcher doing the measurements was not always able to walk on the highest point of the wall. On the other hand the coverage is much more comprehensive than the point measurements of the Havant BC survey data in Figure 4-10 and thus may be more representative of the overall variability in the crest elevation. Importantly the graphs were a useful way of impressing NEHRA of the need to take seriously repairs of the crest of the embankment in order to reinstate a consistent crest elevation .

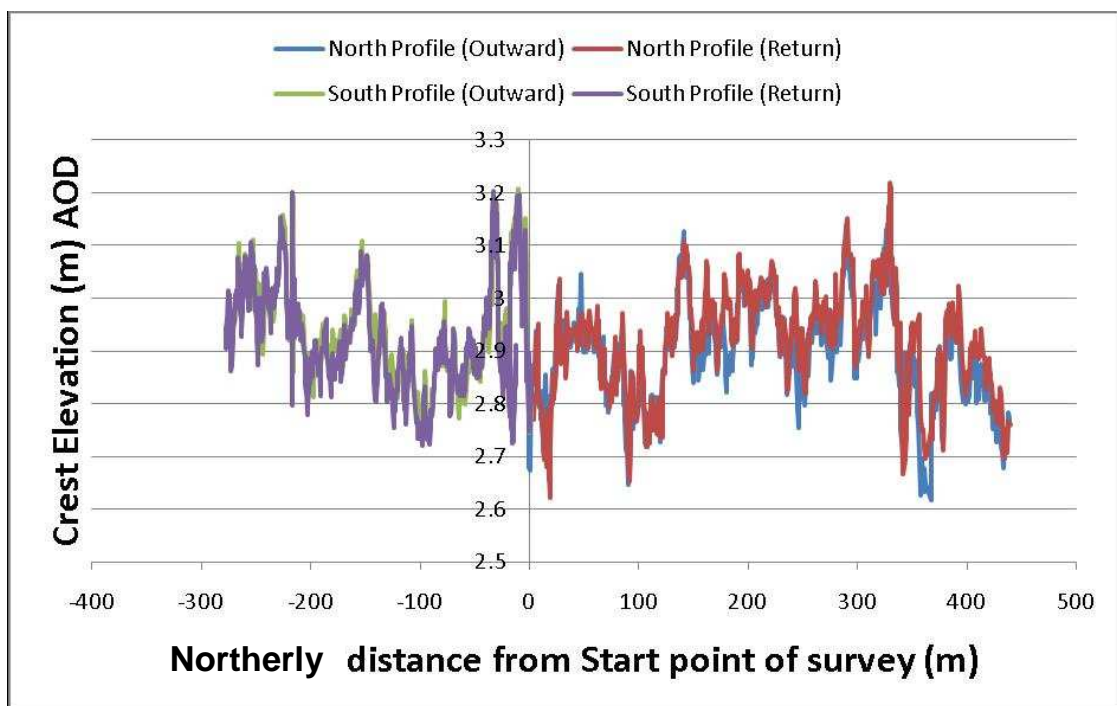


Figure 4-25 Levels measured using RTK GPS along the seawall crest footpath
 Notes: ‘Outward’ refers to levels measured walking away from the start point (0 m). ‘Return’ refers to the equivalent levels measured whilst walking back to the start point.

4.4 Motivations for DASH group activity

This section presents evidence from the case studies and interviews which support the range of motivating factors identified in the literature as explored in Section 2.2.1 and summarised in the DASH conceptual model Figure 2-8. Each of these is now explored in the context of the evidence developed as explained in the previous chapter.

4.4.1 Flood events that disturb citizens' sense of security

An extreme flood event which causes inconvenience, distress and damage, can prompt action of some form. In the case of the flood DASH groups which emerged in Oxfordshire, Berkshire and Wiltshire, it was the floods in Summer 2007 which had this effect. The catalytic nature of the Summer 2007 floods in Oxfordshire and the surrounding counties can be seen from Figure 4-26. This shows the distribution of the rainfall which fell in a period of less than 24 hours on the 19th and 20th July and that it was equivalent to 1 to 2 times the total average monthly rainfall for July. Figure 4-27 shows the same rainfall contours as in Figure 4-26 but superimposed on an equivalent map in which the subsequent emergence of DASH and other self-help groups is shown. Some groups (shown yellow) just developed emergency flood plans; others moved to DASH activity (shown purple) and some (shown green) developed both.

As an example, the moment of conviction of the need for action to tackle the local flooding problems for a lady in Ascott-under-Wychwood took place during the summer 2007 floods when there was at least 1.5m of water in her living room and, on retreating upstairs, she could hear the settee banging about below on the ceiling [comment from Keith Lead recorded in research journal].

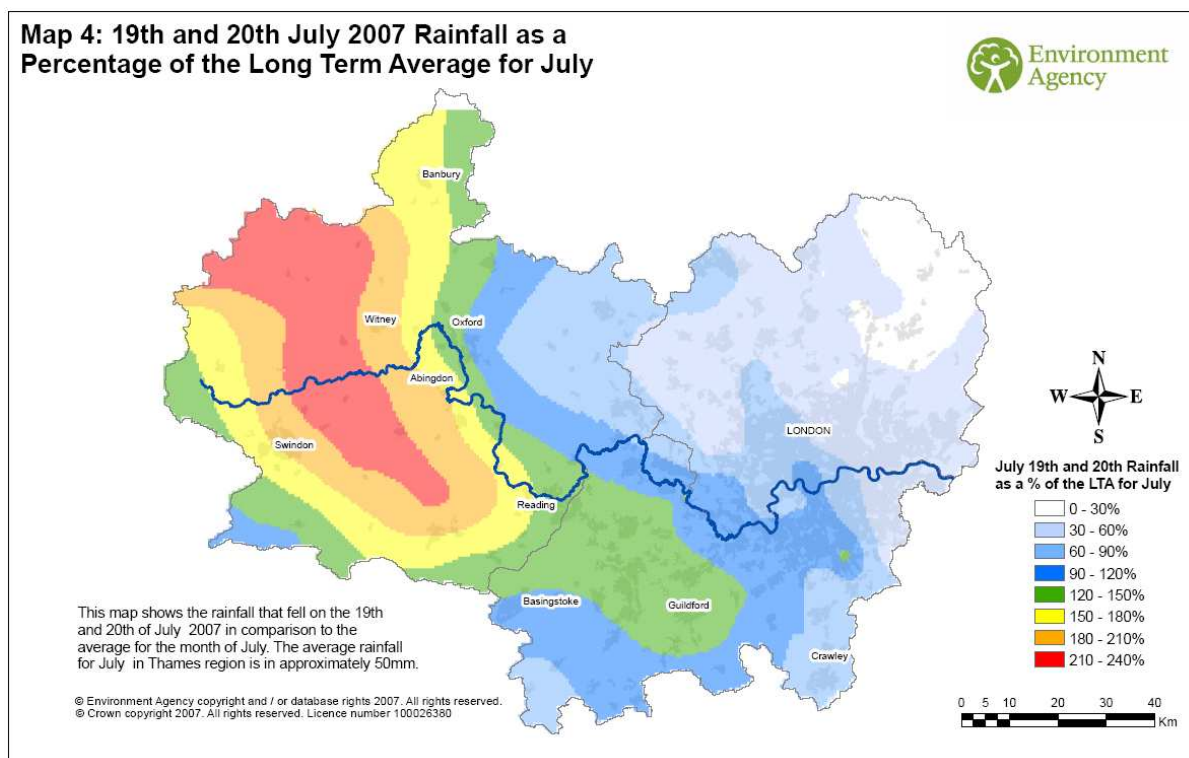


Figure 4-26 19th and 20th July 2007 rainfall as a percentage of the long term average for July (courtesy EA Thames West)

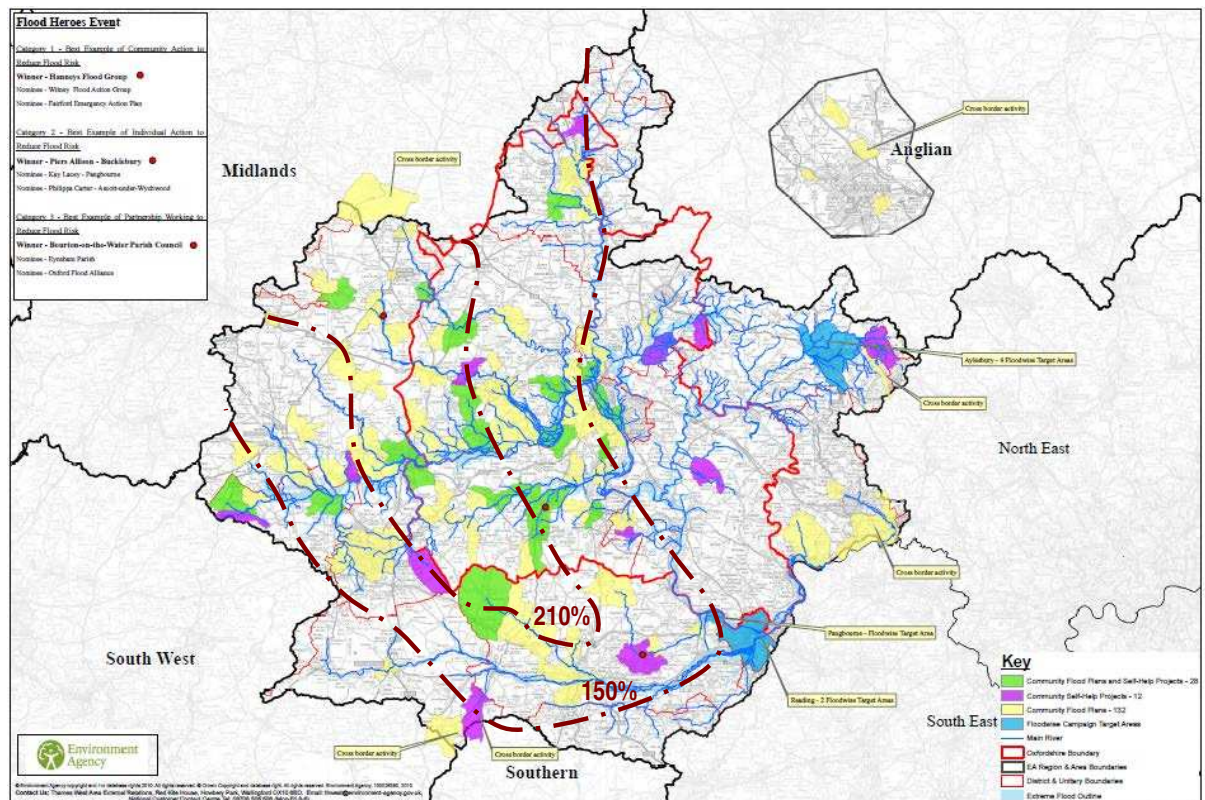


Figure 4-27 Distribution of local community self-help groups, with (green) and without (purple) flood plans with 19th and 20th July rainfall contours superimposed (self-help group map courtesy EA Thames West)

In the case of the NEHRA DASH group, there were actually a series of triggering flood events [Interview 33] at north east Hayling Island. Thus, even though the event in March 2008 described in Section 4.3.1 was one of the most significant, other high tide/storm events leading to near-miss floods were also significant. An example was in mid-2006, when waves were “just breaking over the top” and water “was cascading down one or two kind of lower points” [Interview 33] in particular at the position of the timber steps – see Figure 4-28. Similar kinds of conditions were witnessed in 2009 (see Figure 4-29)

Thus the concern over the progressive damage to the seawall and the potential loss of protection to the farms and the village led to the village being motivated to get something done and to ‘pull together’ to solve the problem:

“they were driven by the need to help prevent the community being flooded. They also seemed to be puzzled by the negative reaction of [some farmers]... to the work being carried out, but this almost helped to generate greater common cause amongst the team members (‘we’ll show them we can do it!’).” [Research Journal 18th July 2009]

The 2006 events combined with the deteriorating state of the wall (see below), was sufficient for NEHRA to apply for Flood Defence Consent to repair the sea wall. This was granted by the EA (on 24th September 2007), (subject to not increasing the current level of protection), such consent to expire within two years.



Figure 4-28 Water cascading down timber steps, 2006 (Courtesy Judy Clark)



Figure 4-29 Sea conditions at Northney seawall 14th November 2009 (Courtesy Judy Clark)
Notes on conditions: Pressure 998mb; high tide nominal height +4.7m CD/ +2.0m OD, actual maximum water level about + 2.5 to 2.6m OD. i.e. at least 0.5m storm surge.

The EA report that there has been continued interest in DASH activity in Thames West spawned by more recent wet winters:

“In the light of the recent flooding the last two winters (2012-13 and 2013-14), groups have shot up and we [the PSO team] do liaise with them [PSO team, Interview 49, Aug 2014]

Thus there is good evidence that flood events or ‘near misses’ do encourage people to consider DASH activity

4.4.2 Need to ‘do something’ given lack of public money

Many of the DASH and other self-help groups emerged in small rural communities where the flood risk at a regional or national scale was relatively small (and had been ranked by the EA as low risk). In these communities, a combination of benefit-cost criteria and little (or diffuse)⁴⁵ social deprivation meant that public funding would be unlikely to be provided. The change of government policy/practice in not defending (or maintaining defences and channels in) lower flood risk areas, is of course not related to specific flood events. But the severity of the July 2007 event combined with recognition by these local communities and the surrounding landowners of the prioritisation of urban areas and the evident lack of public funding for either capital investment or even maintenance of the defences and watercourses in their areas was a significant spur to action.

Smaller local communities are therefore faced with a considerable challenge:

“Because [the EA] have bigger [fluvial flooding] problems, you know, they’ve got problems at Oxford, so we know as a small village we’re going to get less, you know, we’re not going to get the high priority that, well, Oxford and Abingdon have. So, if we’ve got to get things done, we’ve got to, almost, do it ourselves.” [Stewart Scott, Hanneys Flood Group leader, Interview 15]

“... one has to be realistic. These jobs have to be done. And there was a time when these jobs were done, regularly, and people were employed to do it. That’s no longer the case and so we have to take it on ourselves - to sort these kind of things out at a local level. It’s very easily done.” [Hanneys Flood Group volunteer, Interview 45-2, Autumn 2010]

⁴⁵ Rural poverty is often disguised as poorer people are scattered through areas with mainly middle to higher level income populations (Milbourne, P., 1997, 2004).

Thus, in this context, and despite the uncertainties, in the communities in which DASH groups have arisen there has been a sense that

“we’ve got to do something” [Stewart Scott, Interview 15, Sept 2008]

The idea of ‘doing something’ was significant, being mentioned in the majority [7] of the interviews with the DASH group members, with 28 references to the idea. It becomes a key concept when thinking about any potential future role of DASH groups as it expresses on the one hand the desire of communities to be active, but on the other hand recognises the limitations of DASH activity in not being able to accomplish “everything”. In other words, large-scale engineering or capital works, or significant increases in the current operational standard of protection will not be possible and hence flood risk reductions may be modest. In most cases, communities realise that their activity is going to be limited to maintenance or restoration of local assets (streams, flood embankments) to their original functionality, but even achieving this level of flood risk reduction is seen as desirable:

“... the original objective of [the weed clearance] was to lower the river so that there was much less chance of flooding. I’m sure the risk – I know the risk has diminished and that’s really what it’s all about. [Hanneys Flood Group volunteer, Interview 45-3, Autumn 2010]

In fact, in the case of the Hanneys Flood Group, their published objective now states this unambiguously:

“To reduce the probability of flooding below 1 in 25 years⁴⁶ for properties in East Hanney and West Hanney taking into account any effects on downstream properties, farmers and the environment” (Hanneys Flood Group, 2015)

and as the Thames West EA Flood Risk manager comments

“I think in actual fact they wouldn’t carry on doing it if they didn’t think the flood risk was being reduced as a result of their work.” [Interview 46, Mar 2011]

In the case of the NEHRA DASH group, concern over the damaged and eroded condition of the sea wall had extended back over a 10-15 year period with letters of concern being written to the local council (Havant Borough Council, HBC) over this

⁴⁶ Note that the phrase ‘below 1 in 25 years’ was not in the original (2009) version but has been added more recently as the understanding of the flood risk situation by the Hanneys Flood Group has improved.

time.⁴⁷ This concern was in the face of decisions by the Environment Agency not to fund maintenance/repair of the sea wall and also lack of clarity and commitment in regard to their plans for the area pending finalisation of the Shoreline Management Plan (SMP) for the area (North Solent). A ‘Hold The Line’ policy was belatedly agreed (New Forest District Council, 2010) for Northney, but only on the basis of “No public funding available for private defences”. Thus the concern over the progressive damage to the seawall and the potential loss of protection to the farms and the village led to the village being motivated to get something done and to ‘pull together’ to solve the problem⁴⁸:

“they were driven by the need to help prevent the community being flooded. They also seemed to be puzzled by the negative reaction of [some farmers]... to the work being carried out, but this almost helped to generate greater common cause amongst the team members (‘we’ll show them we can do it!’).” [Research Journal 18th July 2009].

4.4.3 Community solidarity with those affected by flooding

The interviews and one to one interactions with individuals during the case study work suggested that there was a strong sense of solidarity with those that have been flooded which drove action by individuals who had not been directly affected. The majority [7] of the DASH group interviews referred to the importance of sense of community as a motivation with a total of 13 references. A leader summarised the motivation as:

“a desire to do something for the community ... we’ve got a lovely village here, we’ve got a good community spirit ...they’re all interested to know what can we do about it... . Of the people who turned out, the vast majority of them were not affected by the flooding but there is this community feeling here: ‘Our friends down the road have been flooded, well let’s see if we can do something about it.’” [Leader, village DASH group (inland), Interview 13, Aug 2008]

This quotation picks up on all the community belonging themes mentioned by Valentine (2001b, pp.112-115) including proximity (‘down the road’), territory (‘a lovely village here’), social homogeneity (‘our friends’) and time (recent flood event which all have directly or indirectly experienced)

⁴⁷ As explained in Section 4.3.2, there was less concern about the (variable) crest height of the wall partly because the impact of that seemed to be less tangible than the damage to the seaward face and partly because the effect of long term sea level rise had not really yet impacted the local community.

⁴⁸ People did also comment, but more in an incidental way, about the value and enjoyment of the open-air exercise. One lady was “quite articulate to me about how she had enjoyed the work ... on the wall with her husband” (Research Journal 1st August 2009).

The social homogeneity component is powerful, individuals in a group expressing the same kinds of feelings and thoughts

“There’s a feeling we need to look after ourselves, yes. And look after the other people in the village” [Hanneys Flood Group volunteer, Interview 45-3]

There is also a growing sense of ‘team’

“... good fun. You feel you’re contributing, you’re helping, and there’s a great sense of team spirit ... the team spirit ... is ... fantastic, so I don’t think it’s that difficult” [Hanneys Flood Group volunteer, Interview 45-2, Autumn 2010]

This ‘team spirit’ or ‘community spirit’ is either believed to be present before DASH group work starts and is reinforced by it, or is believed to have been generated by the DASH activity itself. One interviewee suggested both in the same interview:

“[volunteering is] probably a good thing because it does generate community spirit It means, that if you have to form a volunteer body to do something, you know, you’ve actually got a nucleus of community spirit” [Leader, village DASH group (inland), Interview 13, Aug 2008]

This idea of ‘community spirit’ became quite clear during the work with the NEHRA group (see Section 4.3.2), as this entry from my research journal for [19 August 2009] suggests:

“I asked [the membership secretary] why she had written on her web blog two things that seemed to express an important difference. Firstly that community *existed* and was *demonstrated* by the DASH group: ‘... The friendly banter and teamwork really shows what strong community spirit we have in the village. If we can do this, just what’s next?’ Secondly, that the work together on the wall had *created* community: ‘It truly feels like the village has pulled together in order to achieve something substantial and rewarding. I’ve also heard talks of ‘Well, what’s next? The rest of the wall?’ Or talk about a Village Social in the Hall? A fete next summer? Barn Dance? World Domination? Or are we content just to keep up the jolly and community atmosphere in Northney and Tye we have created so far this summer? ...’. Her explanation was that “the latter comment referred to some people on the island who had not really been linked into the Northney village community; she mentioned specifically one new housing estate in Northney, plus people from other parts of the island.”

This quotation again reinforces the interplay between two factors: on the one hand what is believed to exist, maybe with a somewhat nostalgic look back to Tönnies (1957) *Gemeinschaft*, and on the other what is ‘performed’ or ‘created’, reflecting much more the views of authors such as Etzioni (1995, 1997), Putnam (1995, 2000)

and Day (2006a) (see Section 2.2.1 for discussion). In any event, the responses of the DASH group members suggested that the issues of identity and belonging to both the community and the DASH team were significant motivators.

4.4.4 Emerging sense of stewardship of place

Stewardship of place is a concept most obviously associated with environmental action groups (Carr, A., 2002; Gooch, M., 2005). However, the sense of care or “active keeping” suggested by Carr (2002, p.15) also seems to be associated with DASH groups:

“They’re saying ‘ok we realise it’s our river,’ as in the locals’ river, and that it’s up to them to take action on it. ... They seem very happy to get into that.” [EA FCRM technical specialist, Interview 3, Feb 2008]

These views are reflective of traditional landowner attitudes, perhaps being revived under the pressure of renewed emphasis on riparian responsibilities:

“[landowners/farmers are] all natural sort of conservationists and environmentalists at heart ... they have got to feed their family and preserve that land to pass it on to the next generation and the next generation and the next generation ... I’ve heard it said on many occasions ... , even if they’re not religious, they say, ‘It is ... God’s land, we are custodians in our lifetime and ... hopefully those who come after us will continue our ... good custodianship’.” [Country Landowners Association representative, Interview 26, Nov 2008]

In the case of the NEHRA group, local consultation during the preparation in 2008 of the Northney and Tye Village Design Statement had identified the importance to the villagers of the sea wall. This was not just because of the perceived need to protect the village and grazing marshes from flooding. It had also identified the significance of the sea wall as being part of the ‘permissive path’ in which “notions of community belonging and character” (Macdonald, S. *et al.*, 2005, p.597) are invested by residents, being used by them for amenity purposes and for viewing the seascape at various states of the tide (see also discussion of human dimensions in Chapter 7).

An element of ‘restoration’⁴⁹, perhaps to a sense of former perceived ‘glory’, is also evident in the attitudes within the DASH group movement and relates to the desire to

⁴⁹ The word ‘restoration’ has many other connotations. For example, it is used in the title of the ‘River Restoration Centre’ in the UK which promotes the return of UK rivers to a more natural form and habitat (see www.therrc.co.uk)

restore the quality of something which is valued for more than just functionality (see Chapter 7.3), almost reflecting Tuan's (1972) *topophilia*.

“We are twinned with a French village and the mayor because he speaks such brilliant French is always going there, and the French are always collectively absolutely appalled at the neglect in England of the drains and ditches, absolutely appalled; in France they're not like that, they take this really seriously and any citizen in his bailiwick who has a concern rings the mayor's office and ball! - out there and dug [i.e. action is taken immediately to dig out the ditch]. We have just neglected our environment in an appalling way.” [Leader, village DASH group (inland), Interview 22, Nov 2008]

Thus the various elements of active custodianship combined with providing community functionality and attractiveness (see also discussion in Chapter 7) are apparent as elements of stewardship associated with DASH groups.

4.4.5 Conclusion

The initially dominant motivating factor is the effect of a disturbance in flood security by some kind of catalytic flood event, quickly followed by community solidarity and eventually, as the pressure of any immediate crisis abates, by a desire for longer term stewardship and fulfilment of aims for the place in which the DASH community is situated⁵⁰.

To reinforce this analysis, Hanneys Flood Group members were invited to rank a series of seven statements about potential motivations for them being involved in that group. These statements were developed from statements which had already been made by various DASH groups, including the Hanneys Flood Group itself [Interviews 15, 45 and 47] and from the literature discussed in Section 2.2.1. The results are shown in Table 4-3. A ranking of motivations emerges with ‘doing something’ and helping others in the local community emerging overall as being more important motivations than other self-interest motivations. This prioritisation is supported by the high number of references to these two motivations in the DASH members’ interviews already mentioned above.

⁵⁰ There was some evidence that people involved in DASH groups also appreciated working outside to meet their physical needs for exercise. Keith Lead comments from his observations of different groups that they enjoyed the “ ‘green gym’ ...they're being active and it's healthy being outside” [Keith Lead, EA Thames West liaison officer for DASH groups, Interview 19]. However, whilst the concept of ‘green gym’ is promoted by BTCV for environmental volunteering, DASH group members did not mention this as a main motivating factor.

Table 4-3 Motivations for involvement of Hanneys Flood Group members

Motivation	No of respondents with ranking									Weighted Score (higher more important)
	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	N/A	Total	
<i>I believed it was important to help others in the local community</i>	1	3	1	2	0	0	0	0	7	5.4
<i>I wanted to do something to address the problem of flooding in the village</i>	2	0	3	0	0	0	1	1	7	5.0
<i>I was worried about my house being flooded</i>	2	0	1	1	0	2	0	1	7	4.5
<i>I was worried about the flood insurance for my house</i>	0	2	0	2	1	0	1	1	7	4.0
<i>I wanted to be part of village life</i>	1	1	0	0	4	1	0	0	7	3.9
<i>I get a lot of self-fulfilment from this kind of activity</i>	0	1	1	1	1	2	1	0	7	3.3
<i>I wanted some physical exercise to keep me healthy</i>	1	0	1	1	0	1	3	0	7	3.0

4.5 DASH group life and operation

This section presents the nature and viability of various common aspects of the life and operation of DASH groups, drawing on sources related both to the two case study groups and also the wider information obtained from the semi-structured interviews of members of other groups.

4.5.1 Getting group set up: mandate, constitution.

In setting any group up, a mandate for action is needed from the local Town or Parish Council, Parish Meeting or residents association, whichever represents the local expression of democracy. DASH groups generally reported that support from these local representatives was not difficult to obtain, as they are embedded in the local community affected by flooding.

The Hanneys Flood Group reported that the process started with a meeting of the Parish Council

“And they said, “Well what do you want to do?” you know, “We want to set up this flood group, somebody’s asked about what authority, are you happy for the flood group to act on your behalf in terms of, you know, sorting out the problems of flood management.” And they said, “Yes, yes, yes!” ... so we have a mandate from both the East Hanney Parish Council and the West Hanney Parish Council to further the cause of managing, or reducing the risk of flooding in the villages.” [Stewart Scott, Interview 15, Sep 2008]

Then, at the first formal meeting of the Hanneys Flood Group first meeting there were representatives from county, district and parish councils [Interview 15, Sep 2008] and within a year, the group had created a constitution, with a chairman, vice-chairman, treasurer etc. partly in order for it to be able to effect actions such as taking out insurance and joining the National Flood Forum.

Keith Lead comments that all the groups of which he is aware are formally constituted in one way or another:

“they’ve got a chairman and they have got a mission statement” [Interview 19, Oct 2008]

Nearly all of the groups who were taking direct action seemed to operate either as an authorised subcommittee or sub-group of the parish council [Interview 13] or parish meeting [Interview 27] or residents’ association [Interviews 32, 33] or as an organisation working with the authority of these local democratic structures [Interview 15] and even with insurance cover provided by this route [Interview 9].⁵¹

Thus so long as the DASH group was ‘adopted’ by their local democratic institution, it seemed to gain local support and legitimacy which allowed a formal leadership and membership structure to be set up.

4.5.2 Understanding of FCRM issues by DASH groups

A significant first step for all the groups was to develop their understanding of the problem to be solved.

“The first thing they need to know is: ‘Well, is the Environment Agency going to put in defences?’ and, if there’s a chance, then that would give them a good level of protection, but if not, they just want to know that we’re not as early as possible so they can take [something] forward themselves. It’s been quite surprising how positive they’ve been actually.” [EA FCRM technical specialist, Interview 3, Feb 2008].

DASH groups at this stage are looking for as much information and support as they can find and this is where advice from FCRM professionals (discussed in Chapter 6) can be both important in steering the course of action by the group. Walk-over surveys

⁵¹ Those groups not looking to undertake DASH activity but instead to raise funds to financially contribute towards a significant scheme (to be carried out by professional contractors) reported that they often need to set themselves up as a legal entity in order to be able to handle the money. This might be as a charity [Interviews 5, 15], as a Community Interest Company [research journal] or, in the specific case of a parish meeting, as Parish Trustees [Interview 27].

with an FCRM professional can be particularly informative (see Sections 6.2.2 and 6.2.3). However, as discussed in Section 2.2.5, some in the group will need to gain sufficient of what Collins (2007) would call contributory expertise (see Figure 2-6) in understanding the physical flooding system and thus of the kind of measures that could be used for flood abatement, control or alleviation. Because all the groups examined emerged out of recent flood events, the starting point for the group was their on-the-ground experience of the nature and extent of the recent flooding. At the local level, DASH fact-finding activities have included:

- finding and where possible mitigating the sources of flooding. Actions might include finding means of lowering river levels
- identifying, if there is local knowledge from recent food events, the actual water pathways across the flood plain during flooding
- using local knowledge of water pathways to assess the adequacy of the level of flood protection embankments and structures to meet likely future loading events,
- investigating possibilities for diverting floodwater along routes across the floodplain where it would have less impact
- reducing impacts at a property level, most commonly by introducing resistance and resilience measures into the property (Bowker, P., 2007) if grants can be obtained

One local community, having carried out a walk-over survey and comparing it with the local map,

“immediately ... noticed that the map was wrong. It certainly had at least one significant channel omitted, and it had one or two channels which were on there which we knew had been filled in, and that prompted us to say ‘Well look, let’s go and find out what the watercourses are actually like, and whether there’s anything that needs to be done.’ And I’ve now got maps which show what we did find and where we might usefully do some work.” [Leader, village DASH group (inland), Interview 13, Aug 2008]

In addition, understanding the wider physical context of the local flooding is important for the DASH group to understand (see discussion on ‘alignment’ in Section 2.2.7) so that any activities they may undertake are in sympathy with this and do not exacerbate

the flooding problem. For example, in a riverine context it is important to understand what is happening immediately upstream and downstream:

“I mean, for us, we’d like upstream to be as blocked and silty and weedy as possible because it just floods them, you know, floods into the fields and such like. So I mean, I’m not too concerned with upstream, it’s downstream that’s the key thing for us, and make sure the water gets out of the village. But, what we don’t want to do is obviously flood other people. Fortunately we know we’re in a lot of farmland downstream, so we’re pretty much okay. But yes, working with people downstream is key to us.” [Stewart Scott, Interview 15, Sept 2008].

Thus, effective groups will get to understand the local sources, pathways and receptors of flooding and how each element relates to the others.

4.5.3 DASH group membership

All DASH groups found and investigated included middle class, motivated and often professional people (particularly as leaders – see e.g. Sections 5.2.3 and 5.3.2) involved in some way. The communities were generally rural or village in nature and not all communities were as active as others (see also Section 3.4.1):

“It is very noticeable that different communities have different responses ... our urban communities are very difficult to engage with and they don’t seem so focused on what the flood risks are. Possibly because they haven’t been affected by flooding as regularly but our more rural communities, probably affluent communities, tend to be the ones that try and help themselves more”. [Interview 51, Aug 2014]

For example, the NEHRA sub-committee who supported Judy in leading the DASH activity were

“pretty well informed people, you’ve got some architects, you’ve got a guy that runs his own civil engineering company, so they’ve got access to the right people in their own sub-community to know what to go and do.” [Coastal Manager, maritime district council, Interview 29, Dec 2008]

In terms of total numbers, most village-based DASH groups interviewed seemed to be able to galvanise a significant number of people to come and get involved. Numbers of between 20 [Interview 13] to 50 [Interview 15] for initial activities were not uncommon even if numbers for subsequent maintenance level activities tended to be somewhat lower. Estimates of the order of 10% of the local village populations were thus not uncommon [Interviews 13, 15 and research journal.] The initial challenge of flooding often generated what several individuals described as a ‘wartime spirit’ to meet the common problem.

In the case of the NEHRA DASH group, a wide range of individuals from the local community made themselves available for the work across all ages, both men and women, singles and married couples and even a couple of teenagers (working with parents).

DASH groups also offer a potential outlet for external groups seeking outdoor activities. The Hanneys Flood Group made contact for example with the Thames Valley Probation Service and through them have received help on three of their monthly work days over the last two years from those required to do work under the Community Pay-Back Scheme (Hanneys Flood Group weblog)

“the work of the five chaps that have been on the ground today along with their supervisor ... has actually complemented the work that we’ve done very very well. ... within the course of about half an hour of actually being shown what to do have actually adapted and done the work and I think it would be fair to say, as I’ve been working very closely with them for most of the morning, that they are actually quite enthusiastic about the work that they are now doing. Which is I think a win-win for everybody concerned.” [Hanneys Flood Group volunteer, Interview 45-7, Autumn 2010]

The probation officer commenting on this said:

“It’s very good for the guy’s morale, when they can see other ... volunteers working with them. ... And they can see what they’ve done as well. You can look back and think ‘O yes I’ve cleared that’.” [Hanneys Flood Group, Interview 45-6, Autumn 2010]

Stewart Scott later reported [research journal, 22 February 2012] that although involvement from the Community Pay-Back team had been successful on three occasions, the personnel at Thames Valley Probation service had subsequently changed and, being more risk averse, were unwilling to continue the arrangement.

Thus FCRM DASH groups rely on a core membership from the local community with a range of practical and organisational skills, generally including some professionals.

4.5.4 DASH group leadership

As with action groups in natural resources management (Carr, 2002), the importance of the leader of the DASH group to its functioning was confirmed throughout the interviews and case studies. In line with the literature discussed in Section 2.2.4, three main areas emerge:

Starting to lead

The interviews confirmed that leaders need to be able to network and mobilise support for action (Wenger *et al.* 2002, pp. 80-82), making and using local contacts, as is seen from these examples:

“he has organised his own meeting of residents to actually say ‘Look, do we need to get together; is this a problem for us or not a problem.’” [Coastal Manager, maritime district council, Interview 29, Dec 2008].

“I started coordinating [the flood defence gate closures], because we used to run the Lymptone Post Office, so because everybody knew us we got involved because of our proximity to where the work was going on and because I knew who might be prepared to volunteer to run some of the other gates, ..., I just went round and knocked on a few doors and said ‘Would you like to help,’ and they said ‘Yes’.” [Leader, Lymptone Parish Council DASH group, Interview 9, Jun 2008]

Stewart Scott, described by the DASH groups liaison officer Keith Lead as being the ‘leading light’ [Interview 19] of the Hanneys Flood Group, had the following perspective on taking the lead:

“Yes, so what we did was we had this first meeting and what we said was, we’d like to set up and I said ‘Well I’d like to be Chairman because it needs somebody to sort of drive the thing’, and so that was fine ...” [Stewart Scott, Interview 15, Sept 2008]

Similarly the ‘leading light’ of the Charney Army [in Charney Bassett, Oxfordshire], said:

... I took on the Parish Clerk’s role because I didn’t see the role being performed properly in the past, and I thought there was much more that we could do, and so therefore I took that on as a start. Then two or three of us started doing odd jobs around the village because we could see they needed to be done, and it’s sort of grown from there.” [Leader, village DASH group (inland), Interview 13, Aug 2008]

These were examples of what Smith (2000, p71) described as leaders who “act as if the group exists” and then step into the role being accepted as the most suitable and willing person (Ockenden and Hutin, 2008, p.7). Keith Lead summarised it as follows:

“I think if you’ve just got one... it probably takes only one individual who is prepared to put in a lot of time and make things happen; but it’s been demonstrated you know several times that that’s enough to make it work.” [Keith Lead, EA Thames West liaison officer for DASH groups, Interview 19, Oct 2008]

Being accepted as the leaders does not necessarily require that person to be of an extrovert personality. Judy Clark of the NEHRA DASH group was accepted because

of her professionalism (see below) and perseverance in dealing with the various groups involved. She was a rather retiring person and described herself as being ‘dragged in’ [interview 33]. She also managed to persevere in spite of negativity from some members of the local community [research journal] a quality seen in at least two other cases [Interviews 13 and 25].

The professionalism of the leaders

Group leaders will often also have some form of referred expertise (Collins and Evans 2007), albeit uncertified, from their working life which they can contribute to the DASH activities. A important example of referred expertise is project management skills, which many professional people acquire, irrespective of their specific discipline.

“when he [Stewart] realised he needed flood defence consent for different works he got the forms filled in, he provided all the information.” [Keith Lead, EA Thames West liaison officer for DASH groups, Interview 19, Oct 2008]

Given the ‘requirements’ for the leader, it will not be surprising that all of the leaders encountered during the interviewing had some form of professional background and were able to project manage and engage with official bureaucratic processes and had enough ‘interactional expertise’ to be able to interface with the FCRM professionals with the ‘contributory expertise’ (see discussion in Section 2.4.5). Background professions (either past or present) included: architect [Interview 33], chartered engineers [Interviews 13, 15 and 27], university professor [Interview 36], professional hydrologist [Interview 32], naval officer [Interview 22), local GP [Interview 24], village postmaster [Interview 9]. Stewart Scott comments thus about being professional:

“...we see paperwork as a weapon. You [professionals in FCRM] throw lots of arguments about – we can respond to that. That’s not a problem. So we’re not frightened of bureaucracy if you like. So we’ve done our own risk assessments. We have a method procedure for all our work. And obviously we’ve done things like surveying of water heights with theodolites and such like that. Yes, we can get quite technical. And we’ve done our own calculations in terms of flow rates – looking at the British Standards – through broad crested weirs and that sort of thing. You know, we’re not stupid.” [Interview 15, Sept 2009]

Judy's professionalism as NEHRA DASH group leader was testament to her training and practice as an architect for many years. Although retired, she brought this professionalism as referred expertise (Collins and Evans 2007) to the DASH group activity. This helped her to be persistent in dealing with various official organisations and also in getting the details sorted out (e.g. in preparing a health and safety risk assessment). Aspects which evidenced this were:

- Her generation of 'a file [of letters] going back about 10 or 15 years trying to promote some sort of response [from the Operating Authorities]' to ongoing concerns about the state of the sea wall and the vulnerability of flooding. [Interview 33, Jan 2009]
- Her setting up of a meeting on 27th July 2007 of farm and NEHRA representatives with representatives of the EA, Natural England and Chichester Harbour Conservancy, i.e. of those potentially interested in addressing the seawall issue. As the sea wall had emerged as a critical issue for the sustainability of the village during the preparation of the Village Design Statement (VDS), Judy called the meeting

"to get everyone 'around the table' ... to see if we could get something done ... I subsequently completed a photo report and the forms [for Flood Defence Consent for the DASH work] from the Environment Agency, and sent those off on 9th August 2007 using NEHRA as the applicant. ... Colin Richards [chairman of NEHRA] attended the meeting ... and also agreed verbally that I could make the application in the name of NEHRA.." (email from Judy Clark dated 2nd June 2011)

Leading to get things done

Whilst attending members may make suggestions of possibilities for action at a particular working meeting [Interviews 13 and 15], the leader generally seems to decide which option to go for. For example the Charney Army leader said

"we very often decide what to do on the spur of the moment, but generally I send out a message saying, 'Right,' as I did for this week, 'we're going to meet at the Ock Green and we're going to tackle the Mill Stream'." [Interview 13, Aug 2008]

Keith Lead had identified him as the clear leader

"... the clerk to the parish council ... [he] is the one individual who stood out and he is my main point of contact; he coordinates all the work" [Keith Lead, EA Thames West liaison officer for DASH groups, Interview 19, Oct 2008].

Ockenden & Hutin (2008, p. 9) identified that leaders often progressed decision-making by their personality or strength of vision, in this case related to the underlying motivations of delivering flood risk reduction and generating a better place for the community (see Figure 2-8). The negative aspect of dominance by the leader is that the group can become too dependent on such an individual. For example, the Charney Army leader died in 2010 and it was only in 2015 that the group ended up approaching the EA for advice on how they should recommence stream clearance [conversation with APT officer 17th April 2015]

In the case of the NEHRA group leader, Judy, she preferred that decisions on action were made by consensus. The way this was done was through a subset of the main NEHRA committee plus attendance by key landowners as available. These meetings normally only involved about 6 to 8 people. Wenger (2002, p.83) identified that a weak leader can limit a group's effectiveness. Judy sought to compensate for this by relying on others in this subcommittee, including myself and the NEHRA membership secretary. The latter was an enthusiastic extrovert lady who could 'rally the troops' of local involvement and was the one who actually organised the working parties. This element of counterparts, or leader and right-hand person was also evident in the Hanneys Flood Group, where Stewart Scott as chairman has a very supportive deputy chairman [Interview 15].

Thus DASH group leaders appear to be important for the viability and sustainability of their groups. They need to be willing and able to step up to the role, able to motivate and professional in their work and need to be able to take clear decisions, either on their own or in partnership with others.

4.5.5 DASH group working meetings

The arrangements for involving the members of the Hanneys Flood Group made use of:

“a database of something like sixty volunteers. And it has worked out that it has spread itself around. People don't come every month, and so each month we get a slightly different team, and what we're trying to encourage people to do is perhaps one or two sessions a year and so that evens it out and reduces the burden on everybody. And it's quite physically hard work, so it's not the sort of thing you want to do lightly” [Stewart Scott, Interview 15, Sep 2008]

A member of the Hanneys Flood Group comments on the process of being ‘called up’ for work as follows:

“We’re all in the group. We all get the email. It’s one of those ones you read because there aren’t that many of them. You know what it’s about. You read them. You know when to turn up. You know what we going to do. And that’s it. ... It’s only half a day, four hours, three hours – an hour if you can make it. People come. [Hanneys Flood Group volunteer, Interview 45-2, Autumn 2010]

Similar processes were used by other groups, one leader commenting that, of those that receive the information email, typically

“7 or 8 turn up, out of a group of about ...16 or 17 people” [Leader, village DASH group (inland), Interview 13, Aug 2008]

DASH flood groups meet as frequently as is necessary to complete the task at hand. Initially the meeting frequency may need to be higher. For example, the Hanneys Flood Group met initially every two weeks but have settled down to a pattern of monthly Saturday morning meetings. Working in the depth of winter is often avoided unless essential or seasonally appropriate, e.g. rubbish clearance and disposal on river banks can often be done most effectively in winter when vegetation growth is low (Hanneys Flood Group weblog).

In the case of the NEHRA DASH group, prior to the first working day, people were initially encouraged (verbally, by leafleting, notices put up around the village and a news item on the NEHRA website⁵²) to come to an introductory open meeting at the Barns. There they were advised of the proposed working days and pattern. The number of people who turned up at that initial event (40) suggested that shift working would be appropriate on the various weekends. People advised the membership secretary which weekends they would be available for working. Typically about 20 people made themselves available for each subsequent main shift and the work was divided up into teams as appropriate. The working sessions were organised to be every other weekend during the period from mid-July to the end of August 2009 in order to coincide with those times when the tide was low. The outcome of what had been

⁵² <http://www.nehra.org.uk/seadefences>

achieved and plans for the future were disseminated to all interested via the website and leaflets around the village.

Little formal training of the volunteers was noted during the research, mainly because simple equipment was generally used (no chain-saws for example). Generally the approach seemed to be to make use of what Collins (2007, 2010) would call ubiquitous tacit knowledge of mimeomorphic skill sets typically associated with 'gardening' with some 'learning on the job'. The activities of the groups assumed basic polymorphic skills such as group working, sharing and supporting one another, although in practice (research journal) the specifics of ways of working together in a particular context or activity would always emerge within the half-hour time frame mentioned by the interviewee above.

Thus information about working meetings is generally provided by the group leadership via email, website or an information event. Timings of events, generally at weekends, are organised to suit availability of people, the constraints of the particular site and situation and the weather or seasonal conditions.

4.5.6 Risks and liabilities of DASH activity

In all construction projects, risks can be understood as falling into the following categories: time, cost, quality, health and safety, and environment (Simm, J. D., 2001). Health and Safety is something which is of concern both to the groups themselves, but also to those who may be sponsoring the work. Most groups encountered during the research carried out some kind of risk-assessment or created a risk register before starting the work and sought to put in place appropriate risk mitigating measures. However, the work does involve working in or near water and there is the possibility of slips, trips or falls from heights, manual handling risks and interactions with mechanical equipment. The Health and Safety Executive recommends a hierarchy of controls⁵³ for managing health and safety risks: eliminate – substitute – prevent (collective measures) – control (by procedures) – personal protective equipment (PPE), if all else fails. The way that these were implemented can be considered with reference to both the Hayling Island and East Hanney examples:

⁵³ <http://www.hse.gov.uk/construction/lwit/assets/downloads/hierarchy-risk-controls.pdf>

- Working near water. At Hayling Island, working in or near water was eliminated because, for reasons of access, the work was carried out at low tide at which time water was absent from the sea wall. At East Hanney by contrast, work during the weed clearance, working in water was the key concern. Procedurally, time working in the water for any individual was limited to one hour

“to prevent excessive fatigue or hypothermia” [Stewart Scott, Interview 15, Sep 2008]

and work in water was to be stopped if the temperature fell below 10°C. Personal protective equipment was used by all those working in the water including chest high waders (or wet suits) and lifejackets. An additional measure adopted on the first working day was for each person to be connected by a security rope held by another person upstream on the bank; this measure was subsequently abandoned as it did not significantly reduce risk and impaired working.
- Slips, trips and falls. Here awareness of the potential for slips and falls on slippery surfaces was critical and at East Hanney this risk was procedurally reduced by agreeing to stop work in the event of heavy rain. At Hayling Island NEHRA members made an effort to look out for one another and reminded one another of the height of banks over which they were working.
- Manual handling. This was a particular issue at Hayling Island. Here the amount of cement/ballast mixture was adapted to suit what could be handled by a single person (c.f. Figure 4-20), not exceeding 25 kg which is the maximum that HSE advise can be carried at between elbow and knuckle height (H.S.E., 2012)
- Interactions with vehicles and mechanical handlers. Here sensible measures were adopted: defining a clear path for the vehicles during operation and keeping people out of these areas. At Hayling Island, hand loading and unloading of the mechanical bucket only took place when the bucket was known to be stationary.
- Note that in most cases conventional construction PPE (e.g. hard hats and high visibility jackets) were not worn. Hard hats were not considered necessary as the risk of head injuries was considered minimal and visibility was achieved simply because of large numbers of people working together and avoiding working in a location where others might be operating.

- Lone working was generally avoided by DASH groups

Insurance and liability are issues that are probably of greater concern to the regulatory authorities (see discussion in Chapter 7) than to the DASH groups. However, public liability insurance was obtained through BTCV⁵⁴ by both the Hanneys Flood Group, the NEHRA group and others to cover risks of injury to volunteers or impacts on third parties. The NEHRA group also used the BTCV route for public liability insurance and found it useful as it covered all the volunteering activities of NEHRA and not just the work on the sea wall. Fortunately, there were no adverse incidents in the two case studies; this may have been helped by the fact that the DASH group leaderships had prepared a risk assessment and everyone was made aware of health and safety issues.

Quality of the materials, workmanship and layout of works carried out by local groups is something that needs particular attention when civil engineering amateurs are at work. This is evidenced by the problems with the quality of the concrete materials using in the NEHRA DASH work mentioned in Section 4.3.3 above and discussed in more detail in the next chapter (Section 5.1.2). The issue of work quality was also identified in the literature (see Section 2.2.6); UK practice identified during this research indicates that there is typically no ‘specification’ for the DASH group work, just a general description of what they might want to achieve on a particular day. Some written guidance has been published by British Trust for Conservation Volunteers (BTCV) for work on waterways and wetlands (Brooks and Agate 2001b) and on sand dunes (Brooks and Agate 2001a), but almost nothing exists for the kind of work volunteers may do in rivers and on defences. This remains an important issue for resolution in the future, particularly in regard to maintenance of flood defences (as opposed to river channels) where the quality of the engineering workmanship remains important for its efficacy (see discussion in Section 5.1.2) Furthermore, avoidance of damaging the environment during the work remains a key risk from the point of view of governance/regulatory authorities (see discussion in Section 6.2.5).

⁵⁴ The insurance provides (see <http://www2.btcv.org.uk/display/groupinsurance>) for up to £5m cover for public liability and pays out an agreed monetary benefit to the group if anyone in the group sustains bodily injury by accident or assault whilst carrying out voluntary activities for the group.

For work by DASH groups, lack of funds for the required materials and equipment may be a constraint and this certainly was an issue for the NEHRA DASH group where (other than the EA supply of hessian bags free of charge) the group relied on the generosity of the farmers to pay for the materials used. Equally, time may be an issue, if there is a looming flood season by which the work must be completed in order to avoid flooding.

Thus there are a significant set of risk and liabilities associated with DASH activity. Of these, the evidence suggests that the biggest risks are probably health & safety and quality of workmanship.

4.5.7 Engaging with wider policies, plans and activities

Alongside the intertwined elements of engagement and imagination which pervade the working life of a DASH group discussed above, the dimension of alignment was also identified in the DASH group framework model (Figure 2-8). As explored in Section 2.2.7, there are several aspects involved here. The alignment with natural processes has already been touched on earlier (see e.g. sections 4.2.1, 4.3.1, 4.5.2). This section addresses links with FCRM organisations and their policies, with local landowners and with other DASH groups

Engagement with organisations responsible for FCRM

The complexity of responsibilities amongst the operating authorities (local authorities, EA) and service providers (highways, water) can be confusing and frustrating, with mixed responsibilities for land drainage, road drainage, along road-drainage, water course control etc. A good DASH group can rise to this challenge, acting

“as the catalyst and the focal point that can bring all these groups together, because nobody else wants to do it.” [Stewart Scott, Interview 15, Sep 2009]

Indeed one interviewee went so far as to say

“the agencies don’t speak to each other, the people within the Environment Agency different sections don’t normally speak to each other either, they are completely isolated by the set up, they don’t natter ..., it is only the community involvement that has actually brought people together ...” [Chair, residents (river) flood association, Interview 21, Nov 2008]

A key aspect here is identifying and developing relationships with specific individuals in the various organisations. In the Hanneys Flood Group case this was individuals

from the EA, the County Council, the Highways Agency and the District Council that could get together with the DASH group leader and

“talk about problems and that people had the authority to say, ‘Yes, we’ll do that.’ You know, ‘We’ll agree to that’. Rather than having to go back to a committee and discuss things. ... It’s very much a team work. We see ourselves like we are the initiators and pushers and the Environment Agency are providing the technical support and other support.. [Stewart Scott, Interview 45-5, Autumn 2010]

In the NE Hayling Island experience, knowledge of the roles and responsibilities of the various parties had been built up by NEHRA over a number of years. Through this it had become clear that the work needed to be agreed and consented by the EA and needed to bear in mind environmental restrictions – in this case not to carry out work during the critical migratory bird wintering season (October to March). They also recognised that the authorities had potentially useful information, but to make use of it they would need some technical support.

Landowners

Part of the problem in some riverine village communities is that they might be suffering from flooding due to lack of maintenance by the riparian landowner [Interview 19]. Thus DASH groups have found the need to communicate with landowners to encourage them

“to dig their ditches and clear the water ways” [Leader, village DASH group (inland), Interview 22, Nov 2008]

And as a result

“there is a lot more communication now between the village communities and perhaps the landowners upstream or downstream”. [Keith Lead, EA Thames West liaison officer for DASH groups, Interview 19, Oct 2008]

In most cases the reason for contacting them is either to persuade them to carry out maintenance or to permit and support the DASH group in doing it, making farm machinery available where appropriate [Interview 15]. If this is successful and the riparian owners ‘buy into’ what the DASH group wants to achieve, then a cooperative activity can ensue with landowners for example using machinery to remove material arisings that have been taken from the river by a manual working party [Interview 46]. A representative of the leading national landowners’ association, the CLA, was very

keen to emphasise the work of landowners in maintaining the drainage infrastructure, their representative stating

“... the landowning community is not recognised for a lot of the sort of good public works that it does on the quiet; you know all sorts of things you know say like clearing drainage channels, but you know there is a lot of things that nobody realises that landowners do for their local community, a lot of them are very involved in that sort of thing..” [Country Landowners Association representative, Interview 26, Nov 2008]

However, DASH groups have encountered a number of distinct issues in dealing with landowners, each of which may need to be tackled:

1. Lack of capacity or interest in being actively involved [Interview 46], perhaps because of pressure of work. The farmers associated with the NEHRA group expressed strong views about the nature of the repairs (e.g. at the meeting I attended on 25th June), coloured by their referred and contributory expertises (Collins, H. & Evans, R., 2007), including knowledge of what their father had done in the past.

2. Misunderstanding of landowner responsibilities for watercourse maintenance.

“he said “Yes, but it’s not my problem, it’s not, you know, I can’t do anything; it’s the Highways.” “Oh no, it’s not the Highways, it’s actually your responsibility, because it’s your land.” “Oh is it, o well, in that case I’ll get it dug out.” And two weeks later he dug out almost 500 metres of ditch.” [Stewart Scott, Interview 15, Sep 2008]

3. Fear of prosecution. Concerns over damaging the environment have impacted seriously on maintenance activities by riparian landowners:

“it is in the farmer’s interest to keep the stream flowing well and keep his land well drained ... it’s just up until now, they’ve felt, rightly or wrongly, that the Environment Agency are not letting them do it, because every time they’ve wanted to do something, the Environment Agency’s said, ‘If you touch that river, we’ll take you to court.’ ... That has gradually changed now; so the Environment Agency’s realised that they’ve gone too far and now they’re allowing people to do the simple things like, you know, simple maintenance on the brook. [Stewart Scott, Interview 15, Sep 2008]. [Similar points made in Interview 46 by EA Area Flood Risk manager, Thames West]

4. Lack of technical and practical support:

“the landowners saying well look you know we’ve got the machinery, we can probably you know do the work ourselves, but we need your sort of technical

expertise and all the rest of it to help us to sort of decide the slopes and the shapes and all the rest of it...” [Country Landowners Association representative, Interview 26, Nov 2008]

5. Finance. A length of watercourse may be linked to multiple small riparian landowners and they may not have the necessary finance available to pay for significant maintenance. On the other hand, if clearance of particular drainage ditches for example is not seen as necessary by a farmer for the land drainage for his own crops, then they may need some financial help or incentive.

“... 100s of 1000s of pounds have been spent in clearing the water course, the critical water course below the village, since 2001 we use the money, the community money, part of the council tax that’s ours, into encouraging proper maintenance [by the riparian owners/farmers]” [Leader, village DASH group (inland), Interview 22, Nov 2008]

6. Difficulties of access. If a watercourse runs through an area with a lot of dwellings, a farmer may not be able to adopt the same practices as in open country of bringing in hydraulic machinery to carry out the work.
7. Timing of activities. Differences of opinion emerged within the farming community associated with the NEHRA group about the timing of the proposed sea wall repair work. These were partly coloured by personality but were also affected by differences in priorities between those involved in arable farming and those involved in dairy farming.

Links with other self-help groups

Nearly all groups mentioned that in setting up they had been influenced by hearing about activities of another group. One of these was the Charney Army group at Charney Bassett discussed earlier. The leader there comments:

“two factors influenced me: one was that the Hanneys, the villages next door to us, the Hanneys had formed the Hanney Flood Group, because they’d been badly flooded” [Leader, village DASH group (inland), Interview 13, Aug 2008].

and noted that their work in turn had encouraged other villages to consider taking action

“So all of a sudden it’s high profile, and people have woken up. We’ve had people come and see us saying, ‘Gosh, interested to know what you’re doing.’ I had two people from Stanford

saying, 'We'd love you to do something about our flooding problem in Stanford - Stanford in the Vale.' " [Leader, village DASH group (inland), Interview 13, Aug 2008]

The Hanneys' Flood Group had been inspired [Interview 15] by another group in Berkshire. They were keen in turn to pass on their experience to a wider group of interested parties, specifically other villages which might be experiencing similar problems:

"we really want to encourage other community groups to get involved. And so we're very keen on disseminating this knowledge. Because it's taken a long time for us to get together this information about who's responsible for what and how to do things. And also the methodology and what sort of equipment is best to use. And so we're trying to encourage other groups, whether flood groups or parish councils, to get involved and show them a way and say, 'You can do these things – it is possible.'" [Hanneys Flood Group leader, Interview 45-5, Autumn 2010]

By August 2008 [Interview 15], they had identified that they had already influenced at least 3 other groups and saw the local newspaper and their website as being an important vehicle to spread the word. On the website, the leader comments:

"... We have fortunately somebody in the village who's a website designer and he volunteered to set up this website which we're very proud of. And that's a good way of communicating to our volunteers and to the rest of the village about what we're doing. And also to the wider flood group 'industry', flood group area. So we are members of the National Flood Forum. So we are trying to get more publicity, not for ourselves, but to help each other, to encourage each other and to share good practice, if you like." [Hanneys Flood Group leader, Interview 45-5, Autumn 2010]

This sharing of experience and practice confirms the view of Smith (2000) and Wenger (2001) discussed in Section 2.2.3 of the importance of DASH-like groups networking and collaborating with one other to strengthen and sustain themselves

Conclusion

Aligning the work of a DASH group with both landowners and FCRM professional management organisations like the EA is a sometimes frustrating but essential component if a DASH group is to be able to operate in a viable manner. Sharing of experience and practice by networking with other DASH groups can be helpful.

4.5.8 Longer term repeat/regular action

Most DASH groups were concerned about the durability or permanence of the ‘something’ they might do:

“if we’re going to spend some time and effort on it we feel that it’s something that ought to last a bit” [Judy Clark, NEHRA DASH group leader, Interview 33, Jan 2009]

However, the need for on-going maintenance activities was something that most DASH groups eventually came to terms with. They did not become hydraulic engineers overnight, but developed sufficient interactional expertise (Collins and Evans 2007) to recognise that repeat work might be required in the future. River maintenance groups specifically recognised that there will always be a need for ongoing maintenance of the channel, both in terms of removing unwanted vegetation that has grown up and also debris which has been dumped in it.

“After about only three months, we found that the vegetation had grown certainly about halfway towards its original situation which was the reason we needed to do the work in the first place. And that really started us on a trail of saying, ‘Look, if we are going to do this and we are going to be successful, the only realistic way of doing it is to do it on a very regular basis.’ And so from that we developed into a routine of having working parties every month for a Saturday morning typically.” [Hanneys Flood Group volunteer, Interview 45-7, Autumn 2010]

Thus, two summers on from the original weed clearance the Hanneys Flood Group weblog records:

“We did some weed management from the Iron Bridge downstream and the water level dropped from 1ft 11 inches to 1 ft 5 inches in those few hours! C. did a great job collecting up rubbish and along with some carpet, chicken wire and paving slabs. We must have collected about 100 beer cans.... .” [Hanneys flood group journal for 12th June 2010]

By this time the Hanneys Flood Group had purchased a boat using the financial support from the EA and found it a useful way of collecting up the rubbish (Figure 4-30)



Figure 4-30 Hanneys Flood Group using boat funded by the EA being used to collect vegetation removed from river and bank (Photo 9th July 2012, courtesy Hanneys Flood Group)

A related, and “less savoury” [Interview 45-7] part of the regular activities of the Hanneys Flood Group was removal of waste and foreign materials that were anti-socially dumped into the river, including stones and concrete. Since the summer of 2011 the Hanneys Flood Group have also received some help from a family of swans who had been attracted to the improved stream environment including fish returning [Interview 47], but are now also eating a lot of the weed in parts of the channel. The amount of weed clearance required by the group has therefore reduced and blockage clearance is now focussing on clearance of trash and more recently they have started to tackle clearance of fallen trees that may be blocking the flow [Interview 47]

This process of reflection on action leading on to any necessary repeat work confirms the need for a DASH group to follow the Plan-Do-Check-Act cycle (Deming, 1986) discussed in Section 2.2.6 if their role is to remain viable and effective in the long term. Further discussion of the question of effectiveness may found in the next chapter (see Section 5.3).

4.6 DASH group process overview

This section takes the information from the preceding analysis of the life and work of DASH groups and, using the Soft Systems Methodology of Checkland (2006),

develops a summary perspective of the DASH group process to inform the evaluation of efficacy efficiency and effectiveness in the next Chapter.

The rich picture shown in Figure 4-31 sets out the issues and their interactions for a typical DASH group. The process of developing this picture involved identifying the following in an iterative way:

- the constraints operating in the situation, including: the existing assets and the storms and climatic actions which drive their deterioration and damage, legal rights and responsibilities including environmental restrictions on activities and the limited amount of money available from the public purse to fund further action;
- the various actors involved in the process, including: DASH group leaders and EA coordinators, DASH group and local community members, landowners, linked local democratic institutions such as a Parish Council, various EA departments; and
- the activities and issues associated with the actors operating under the constraints, including the need for asset maintenance and the interaction processes (questions, information transfer etc.) including both collaboration and conflicts (marked with crossed swords – the traditional ‘site of battle’ sign).

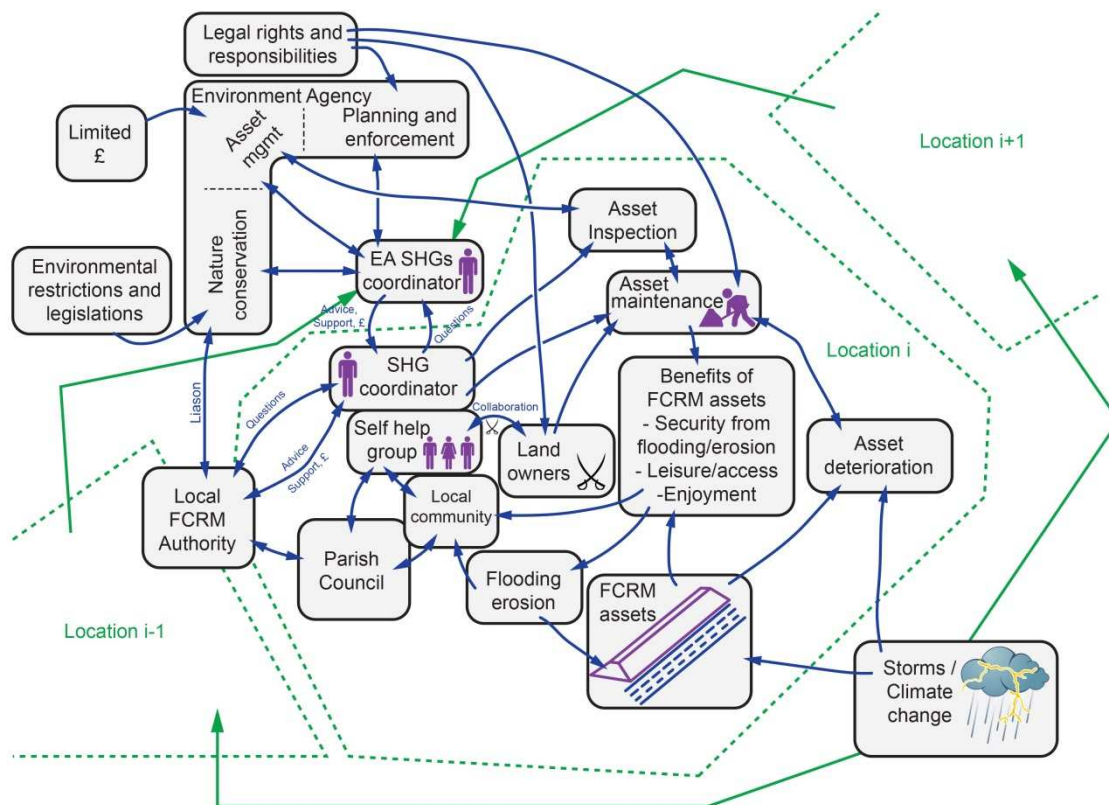


Figure 4-31 Rich picture of direct-action DASH group process
 Notes: £ = finance required/available ; crossed swords = area of (potential) conflict

The rich picture in Figure 4-31 also seeks to indicate that more than one DASH group might be involved (at locations $i = 1$ to n) and that the interaction between these groups discussed at Section 4.5.7 could be important both for information sharing and also because similar external factors such as storms and climate change might affect more than one DASH group. The rich picture also seeks to capture the results shown in Box 4-1 of a Checkland & Poulter (2006) CATWOE analysis (Customers, Actors, Transformation processes, Worldview, Owners, Environmental constraints) of the key components of the DASH process.

Box 4-1 Checkland style CATWOE analysis of DASH groups

Based on this definition, a 'CATWOE' analysis has been made of the form and components of a Transformation process by which:

1. The physical state/condition of the asset(s) is improved (Level 1); and
2. The DASH group becomes responsible for the maintenance of the asset(s) (Level 2)

This transformation process is based on the Worldview (*Weltanschauung*) of the DASH groups who are offering to "do something" to reduce flood risk by physical interventions.

The potential Customers (or beneficiaries) of the process are:

1. FCRM professionals and organisations
2. Landowners affected by flooding
3. All citizens of local communities affected by flooding and assisted by the DASH group

The Actors who will carry out the activities making up the Transformation process are:

1. The leader and members of the DASH group, supported by their committee
2. Landowners involved in supporting work of DASH group or carrying out parallel FCRM improvement activities
3. FCRM professionals involved in supporting the DASH group or carrying out parallel FCRM improvement activities

The Owners who can prevent / stop the Transformation process are

1. EA and other FCRM authorities
2. Landowners unwilling to cooperate
3. Uncommitted / unwilling local residents

The Environmental constraints which are taken as given in attempting the Transformation process are:

- Storms driving the flooding and erosion processes
- Climate change (e.g. sea level rise) which may affect future severity of storms and viability of maintenance/intervention strategies
- Legal restrictions
- Environmental designations and restrictions
- Finance / budget

The activities making up the DASH process are described in flow chart form in Figure 4-32. Whilst there is not a one-to-one mapping with the previous sections of this chapter, the connections with these sections are shown in the notes to Figure 4-32. The flow chart makes clear the importance of:

- support and authorisation from the local parish council or residents association to set up the DASH group,
- interactions with landowners and the relevant authorities to gather information and gain advice support and consent for any activity
- securing the resources and support of volunteers to progress the DASH activity

Figure 4-32 also identifies that at any point the process could be stopped through lack of support from people and organisations (e.g. landowners, FCRM authorities) or through lack of volunteers or resources. Thus continual communication with all these parties and clear identification and consent for the physical objectives of the work becomes essential

and emerges as a significant difference between DASH activity in FCRM and other common grassroots associational activities such as support or study groups.⁵⁵

The flow chart in Figure 4-32 also includes the standard (Checkland, P. & Poulter, J., 2006) monitoring and review activities around efficacy, efficiency and effectiveness criteria. These will be discussed and evaluated in detail in the next chapter.

4.7 Conclusions: DASH groups' form and viability

The conceptual model for FCRM DASH groups developed in Chapter 2 (Figure 2-8) has been tested and shown to be credible in relation to DASH groups. In this regard, interview responses and other evidence discussed in Section 4.4 has confirmed the four motivational factors of disturbance in flood security by flood events, community solidarity, desire for longer term stewardship and (most importantly) 'doing something' to support the local community.

Interview material in Section 4.1.1 and the case study reviews in Sections 4.2 and 4.3 indicate that DASH activities on managing conveyance and flood defence assets are typically restricted to what can be carried out with manual labour or small plant on hire. Some monitoring takes place to help to inform an understanding by DASH groups of the problems they face (Section 4.1.2). Activities of the case study DASH group discussed in Sections 4.2 and 4.3 illustrate the fact that a DASH group can understand its flooding problems and meet a series of physical objectives and even gain an improved sense of security (Section 4.4.2) without necessarily knowing the extent to which they have actually reduced their risk. Health and safety risks associated with DASH activities seem to be controlled (Section 4.5.6) but the quality of work possible on flood defences and its durability remains an issue (as identified for the NEHRA case study in Section 4.3.2). Section 4.5.8 shows that a number of DASH groups involved in the management of the conveyance of river channels have recognised that repeat work is necessary to sustain any improvement delivered by initial management and are undertaking such work.

⁵⁵ Environmental DASH groups are closer to FCRM DASH groups in that they are also stewarding habitats etc. but, even though there is scope for them to do so [Interview 35, Area Manager, Association of Rivers Trusts, Apr 2009], they typically will not get involved in issues such as flood defence consent and thus not need to deal with FCRM engineers in addition to conservation officers.

Analysis of the interview materials and case studies has shown that viable DASH groups are set up with the support of their local democratic institution (Section 4.5.1) and get to understand the local sources, pathways and receptors of flooding (Section 4.5.2 and, for the case studies, Sections 4.2.1 and 4.3.1). They are small, relying on a core membership from the local community (section 4.5.3 and case studies Sections 4.2.2 and 4.3.2) with a range of practical and professional skills and have leaders who are willing and able, motivating and professional and able to take clear decisions, either on their own or in partnership with others (Section 4.5.4). Good communications (typically electronic) assist in sustaining involvement in regular working meetings organised to suit availability of people, the site and the weather (Section 4.5.5). Coordination with landowners and FCRM professional management organisations is essential and sharing of experience and practice with other DASH groups is helpful (Sections 4.5.6 and 4.5.7).

Chapter 5 now turns to address the efficacy, efficiency and effectiveness of DASH groups.

5 DASH group efficacy, efficiency and effectiveness

“What would be the measures of performance by which the operation of the notional system would be judged? Thinking out what those criteria would be really sharpens up the thinking about the purposeful activity ...”

(Peter Checkland & John Poulter (2006) ‘Learning for action’, p.42)

This chapter seeks to use the evidence from the two DASH group case studies to address research question 1.2 and to evaluate the efficacy efficiency and effectiveness of the work undertaken by the DASH groups. In each case, the efficacy of the work is evaluated in terms of the flood risk reduction achieved (and the associated quality of the engineering). The efficiency of the work achieved is evaluated mainly using economic criteria, comparing the funding and time inputs of the DASH group with alternatives. Finally, the longer term effectiveness of the work of the DASH groups is evaluated using flood risk reduction, social and stewardship criteria developed from the DASH group model and linked back to the original motivations for the work. The longer term sustainability of the DASH groups and their activity is also explored.

5.1 Efficacy of DASH group activities

Efficacy can be defined in this case as the extent to which the effect of the DASH activity produces its intended outcome in terms of genuine flood risk reduction?⁵⁶ The section deals with each of the case studies in turn.

5.1.1 Efficacy of channel management activities of Hanneys Flood Group

In the most extreme events (say 1:100 year return period), increased channel maintenance does not significantly reduce the level of flooding experienced because the extra volume in the channel only equates to a very small proportion of the volume of water in the flood plain. However, channel maintenance can assist in flood risk reduction for smaller flood events (Environment Agency, 2007a), when more of the river flow is in bank. The impact of reducing what is sometimes called ‘nuisance flooding’ and the resultant damages for these lower order extreme events can be significant as can be seen from typical analyses of flood damages (see for example the

⁵⁶ In the case of the Devon gate closing schemes the project is fully designed in conventional manner and so the role of the gates has already been verified in advance. The reliability question revolves around whether the gates will be closed sufficiently in advance of a storm surge. The advantage of local action here is that the residents are immediately at hand to close the gates, whereas EA or other employees, if tasked with their closure, might find it difficult to reach the gate site from a remote location due to inclement conditions.

analyses of flood risk in part of the Humber Estuary in Figure 5-1) which tend to demonstrate peaking in damages around the 20 to 30 year return period event.

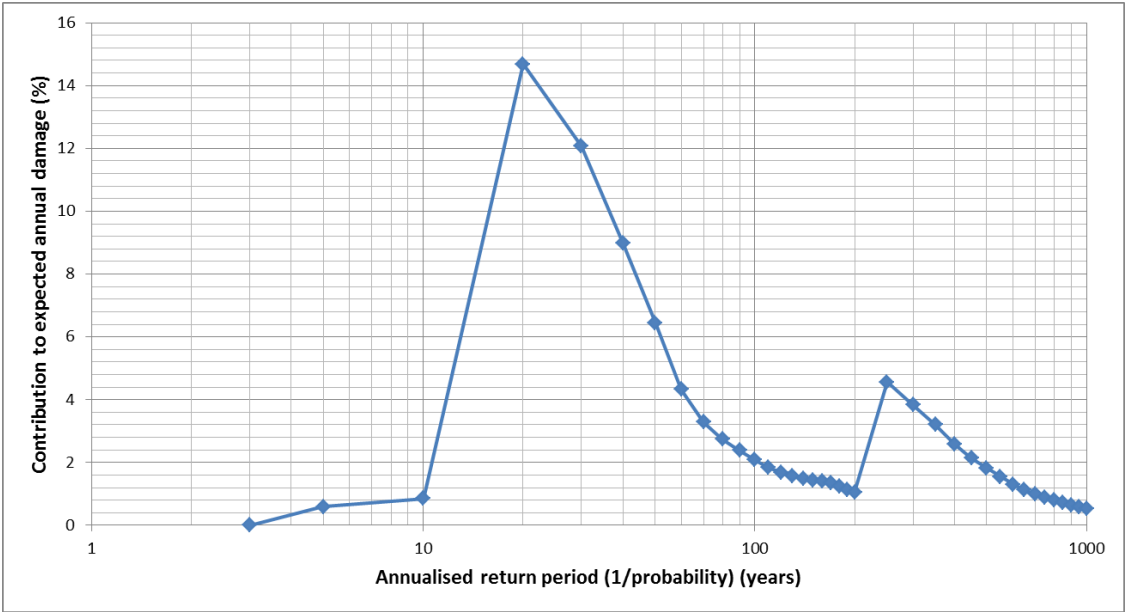


Figure 5-1 Contribution by flood return period to Expected Annual Damages - Humber Flood Area 12 (Panzeri, M., 2013)

Modelling changes to the Letcombe Brook

To address the question of efficacy more thoroughly in the case of the Hanneys Flood Group, use has been made of an ISIS 1D model of the Letcombe Brook. This model had been commissioned by the EA and the model and report (Faber Maunsell, 2009) was released for the purposes of this research. The model used a topographic survey of the brook conducted in July and August 2007 (i.e. prior to the Hanneys Flood group activity commencing). Under my guidance, a colleague at HR Wallingford, Mark Davison, used this model (converted to an InfoWorks RS format) to carry out a some analysis.

The main pieces of additional input information available from the Hanneys Flood Group were the following:

- i. during the first campaign by the Hanneys Flood Group in June 2008, during quite low flow conditions, the water level in the Letcombe Brook immediately dropped by 10.5 inches (0.27m) at a footbridge after the vegetation clearance

- ii. in the days immediately after this, the silt on the bed rapidly eroded down to the underlying chalk bed to lower the average bed level by about 1 foot (0.3m)
- iii. the level of a weir at the downstream end of the village was subsequently reduced by 0.1m (one course of bricks)

This data was used in combination with the existing model and an assumption was tested that the Manning’s *n* coefficient which represents the river bed roughness had been reduced by the Hanneys Flood Group from 0.10 to 0.03 in the reach from Dandridges Mill to Lower Mill. Low flow condition results are shown in Figure 5-2 and these do reproduce the measured water level drops at the Iron Bridge. This gives some confidence both in the reasonableness of the representation of the flow conditions and in the assumptions about changes in bed roughness from the removal of vegetation.

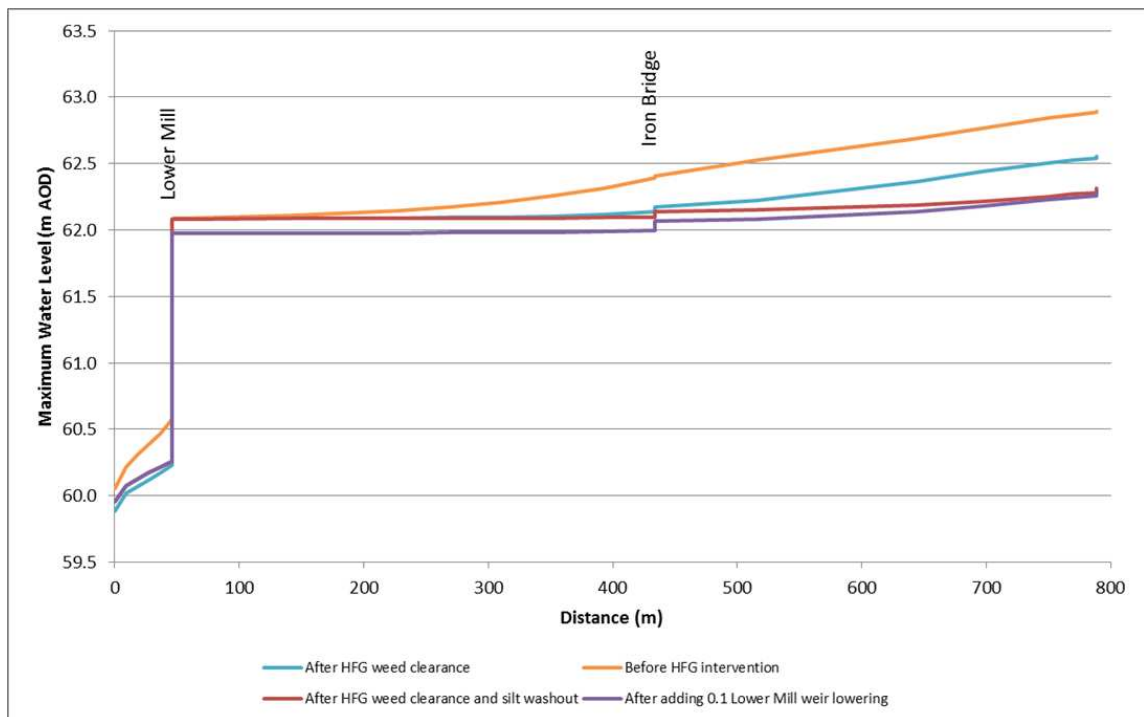


Figure 5-2 Water levels in Letcombe Brook under low flow conditions

Note: These water levels are similar to those which would have been present when the Hanneys Flood Group undertook their work

The model was then run for 1 in 20 return period year flood conditions, conditions which are close to the Hanneys Flood Group target of 1 in 25 years. The results are given in Figure 5-3 and show that the group’s intervention would reduce water levels

over 70% of the reach from Dandridges Mill to Lower Mill (the part of the Letcombe Brook which runs through East Hanney). Reductions in water levels in the upper part of the reach are most significant here, generally exceeding 0.5m. However, reductions in the lower part of the reach (left hand side of Figure 5-3) are more modest and over the final 250m, there are actually increases in water level of up to 0.2m. The hydrodynamics are complex, but it appears that the keeping of the water in-bank in the upper part of the reach reduces storage and energy dissipation effects and the result is to funnel more water down to the bottom of the reach.

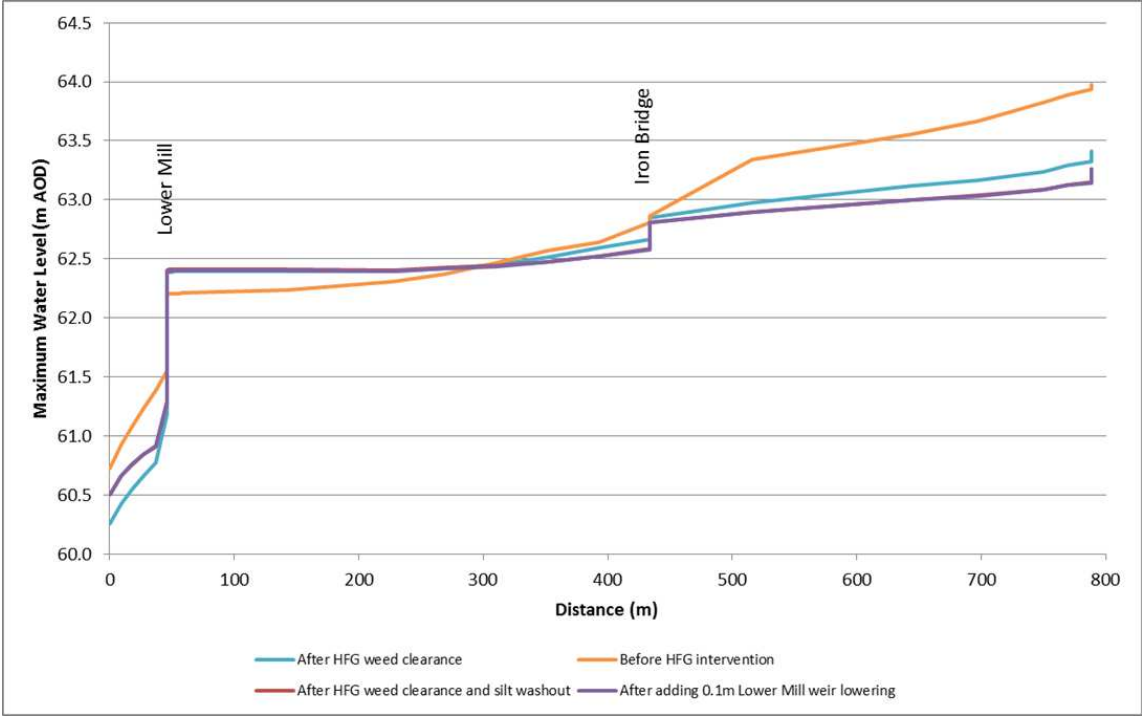


Figure 5-3 Water levels in Letcombe Brook under 1:20 year return period flood conditions

Comparison of the water levels in Figure 5-3 with ground levels is not straightforward as no detailed topographic survey of East Hanney village was available, only Letcombe Brook cross sections. However, levels under the lower roughness present day conditions appear to be close to top of bank on approaching Lower Mill (see Figure 5-3) and there is clearly a risk that under such conditions water would be pushed out of bank.⁵⁷

⁵⁷ At a meeting of the group held on 17th April 2015, a local farmer reported that in the 2007 severe flood event water was not pushed out of bank at this location, although it was downstream of the mill at locations where the Letcombe Brook had been badly maintained

Although in this case, the overall effect of the work is to reduce flood water levels, the example does illustrate that the work of DASH groups on channel maintenance is not without risk of unintended downstream consequences. This effect may also explain why one of the Hanneys Flood Group members responding to my March 2015 opinion survey of the condition of the Letcombe Brook (see Table 7-9 in Section 7.4.5 for details) commented that there had been little improvement in the Ebbs Lane area which is near to Lower Mill and that they had nearly been flooded again during the wet 2013-14 winter.

Note that in the Hanneys Flood Group case study, the pre-existence of a 1D model of the Letcombe Brook facilitated the above hydraulic calculations. However, these would not always be available and so backwater calculations and/or use of models such as the Conveyance Estimation System (Knight, D. *et al.*, 2009) could be used as alternatives for modelling the changes in water surface profile resulting from river maintenance activities.

Impact

A calculation of estimated annual damages avoided may be carried out assuming the work completed by the Hanneys Flood group delivers the hoped-for improvements to the standard of protection to the eastern part of the village and removes up to 10 properties from the 1:25 year flood plain. Applying the principles of the Weighted Annual Average Damages (WAAD) method set out in Penning Rowsell *et al.* (2013, pp. 127-130) and the estimated damages per property of different return period floods, an estimate can be generated of the Expected Annual Damages avoided. The resulting calculation (based on combining mean damage per house in each probability interval with the probability of that interval) is shown in Table 5-1 and indicates avoided annual damages are of the order of £16,800.

This example does raise the issue of what level of analysis is appropriate to establish efficacy of proposed action. In discussions with the Environment Agency, it became clear that a simplified approach was needed for valuing the flood risk reduction achieved (to be set against the combination of a valuation of the in-kind inputs from the volunteers plus the out of pocket expenses from the public purse):

need to try to mitigate overtopping at low spots by building them up. External erosion of the front face is also important in this case where wave action can cause damage, especially if this then leads to mass instability (locals slips or falls of material) or increases the risk of internal erosion or piping. Poor conditions can increase the probability of failure and in a full flood risk analysis this is typically taken into account by using different fragility curves to represent different conditions of the flood defence (Gouldby, B. *et al.*, 2008; Simm, J. *et al.*, 2008). In this case the aim was to improve the condition of the defence in such a way that the probability of breach in a severe event was reduced. NEHRA members were realistic that if a breach were to occur it was unlikely it would ever properly be repaired again.

Direct quantification of the reduction in breach probability and the associated reduction in flood risk is a major task beyond the scope of this thesis. However, there is some important evidence available from site inspections and the impact of the storms which occurred during the winter of 2013/2014. The most significant of these storms were on 3rd January 2014 and 14th February 2014. On the latter occasion there was a force 7 to 8 gale from the south west and, whilst the wave action might not have been as severe as with a more easterly wind there was a storm surge of some 1.2 metres on top of the high tide. This meant that the Northney embankment overweired at a number of locations on this high tide and flooding of the pastureland behind occurred.

Whilst there was no breach of the wall during the early 2014 storms, the work which had been carried out in 2009 by the NEHRA DASH group was severely damaged and in some places completely destroyed. As seen in the sequences of photographs in Figure 5-4 and Figure 5-5, in many places the concrete bagwork had already deteriorated significantly due to normal action of the weather and sea by 2012. The rapid deterioration was due to the poor quality of the concrete used in many of the concrete batches as already mentioned in Section 4.3.3. The deterioration was not just a matter of the bags being displaced but was initiated by the individual bags breaking up. The bag work had in fact deteriorated much more rapidly than much older concrete bagwork present on site, where individual bag ‘stones’ were still in a sound condition after many more years. This flags up the risk identified by Mulligan *et al.* (2011, p.36), discussed in Section 2.2.6, of DASH group members becoming involved in technical

decision-making. In this case the group had made poor decisions about the amount of cement that should be added to the ballast and the degree of mixing required.



Figure 5-4 Section (A) of Northney Farm sea wall: 2009 to 2014



Figure 5-5 Section (B) of Northney Farm sea wall: 2009 to 2014

The NEHRA group did become aware of problems with the quality of the concrete used during the course of the work in July and August 2009 and engaged with methods of solving them (see Section 4.3.2). At the time, the group was less concerned about this because they were expecting to be allowed by the landowners to continue repairs as on an ongoing basis; their idea was that with many local ‘eyes’ upon the wall, any damages which might occur in a storm could quickly be repaired. The view was that a ‘stitch in time’ approach was appropriate given the uncertainty in 2009 about the policy option which would be selected for the final Shoreline Management Plan. However, no one in the group expected the individual bags to deteriorate as rapidly as they did.

Judy Clark assesses the value of the work carried out in hindsight as:

“Probably partially successful in the sense of the wall has not been breached which it would have been if we hadn’t done anything at all. Some parts have held out better than others. And some parts have got... that we haven’t done have certainly got far more eroded than we... you know than the bits we have tackled. [Interview 50, Aug 2015]

She also commented that a more continual maintenance programme would have enabled NEHRA to keep the condition of the more “under control” but that more maintenance had not been possible because permission/resourcing had not been provided by the farmers. [Interview 50, Aug 2015]

However, it remains unclear, given the rapid sequence of deterioration and damage, exactly how much additional reliability was added to the embankment performance by the bagwork installed by the NEHRA DASH group. For the purposes of the calculations that follow it is assumed that any work carried out would have to be repaired and extended every 3 years.

Mitigation of Expected Annual Damages

Even had the seawall repairs been perfectly successful, the question would have remained as to what was the economic value of protecting the coastal grazing marsh between the seawall and the village. The question that arises here is the quantification of the Expected Annual Damages avoided, whether the wall is in its present poor structural condition or in an improved condition. Because the crest level of the flood embankment is at or below +3.2m O.D., the flood embankment does not provide any

direct protection to the village itself other than containing a storage area for surface water run-off to prevent backwards flooding of the village, although it has not yet been proven that this enlarged area is needed to cope with heavy rainfall. However both these functions are captured in the final policy unit statement adopted for Northney Farm (New Forest District Council, 2010) based on a Hold the Line (no public funding) policy.

To assess the order of magnitude of the economic benefits provided by the embankment protection, a calculation has been carried out considering only the benefits of avoided agricultural losses and assuming a general loss in agricultural production per hectare as a result of loss of protection. Estimating that approximately 35Ha of farmland is protected and taking an order of magnitude average annual damage cost for grazing land of £100/Ha (Penning-Rowell, E. *et al.*, 2013, p. 354) gives an expected annual damages avoided of the order of £3,500. (The efficiency implications of this estimate are discussed in Section 5.2 below). Note that the estimate does not include any valuation of habitats, but this would be a complex issue since it would be a question of substituting one form of habitat for another.

Note that if, as at present, the floods continue overtop the crest of the embankment, as mentioned in Section 4.1, the other issues which affect the area are the cutting off of road access to the village due to flooding to the north and the south and flooding of a couple of properties in the Gutner Lane area to the south. These problems would not be resolved by NEHRA maintaining the embankment in its existing condition and to its existing crest level.

5.1.3 Conclusions on DASH group efficacy

The case of the Hanneys Flood group demonstrates that the overall effect of the channel maintenance work is to reduce flood water levels although the work was not without unintended downstream consequences in terms of raising water levels slightly closer to control structures. Calculating the impacts of the work in terms of avoided flood risk is problematic without a full flooding model and even a 1D river model such as was used to calculate the changes in flood levels would not necessarily be available. The calculation of the flood risk reduction achieved (£16,800 EAD) is therefore an approximate estimate.

In the case of the NEHRA wall repair work, the efficacy of the repairs may have helped to prevent breach during the severe storms in early 2014. However, the work which had already started to deteriorate due to poor concrete quality, was completely and unnecessarily destroyed in those storms and makes very clear the importance of good quality work if this kind of DASH activity is to be attempted again in the future. The function of the work was to sustain the presence of the seawall and hence the grazing farmland (not to prevent all overtopping) and the modest avoided damages calculated (£3,500 EAD) have been estimated based on avoided loss of agricultural land.

5.2 Efficiency of DASH activities

Efficiency can be defined as the extent to which resources to achieve the transformation activity are being minimised and is often expressed as a ratio of the output achieved to the input provided. This section addresses efficiency for the work of each of the case study DASH groups, in each case explaining the amounts of funding that were actually provided.

However, before addressing the question of efficiency, it is important first to be clear which resources are being minimised in any efficiency calculation. In this case, there are at least three ways that this could be addressed:

- (1) Conventional Benefit-to-Cost Ratio (Penning-Rowsell, E. *et al.*, 2013) in which the costs of the resources provided are sought to be minimised against the flood risk reduction benefits provided.
- (2) Output-to-Investment Ratio, the measure used by the Institute for Volunteering Research in their VIVA approach (Ockenden, 2007). This is the ratio of the value of the volunteering output in the activity to the out-of-pocket financial investment input in terms of materials and volunteering costs. Minimising the out-of-pocket investment could be an important measure if minimising the use of public funds is the priority.
- (3) Productive efficiency, which relates to delivering units of goods at the lowest possible average total cost (Black, P. *et al.*, 1995, pp.13-15). In the context of this research the most convenient way of measuring the productive efficiency ratio is by the ratio of investment costs between alternative strategies for achieving the same end. In this case, this could be expressed as the avoided

expenditure using conventional paid engineering approaches divided by the cost of the equivalent volunteering activity.

5.2.1 Funding of Hanneys Flood Group

This section examines both the cash and in-kind inputs received by the Hanneys Flood Group. This exploration is partly to support the analysis of efficiency of the work of this DASH group in Section 5.2.2, but also to give an example of the order of magnitude of seed-corn funding that river maintenance DASH work requires.

For riverine DASH group activities most of the input is free of charge: the physical labour of those involved, loan of hand tools, free professional advice and help from supporters (e.g. in maintaining a group website) and in-kind support of landowners [Interviews 13, 15, 19, 42, 45-5]. However, there are some out-of-pocket expenses for equipment materials and insurances and for this reason (as discussed later in Section 6.2.4) EA and local authorities have from time to time provided small budgets to support DASH groups. Financial inputs have to be kept low, given that one of the reasons that often drives DASH activity is that the benefit-cost ratios are inadequate to support a conventionally funded scheme [Interview 19].

Initial capital investment

Prior to commencement of the initial phase of work, the cash funding that was estimated by the Hanneys Flood Group to be necessary from public authorities was about £10,000, although the actual expenditure was less than this – around £7000 to £8000. Funding came from the following sources:

- Parish Council funds: Purchase of life jackets, waders, small tools, pipes, insurance. [Hanneys Flood Group leader, Interview 45-5]
- EA: soil and plant hire (mini digger) for bund construction [interview 19]: £3,500:
- Vale of White Horse DC: provision of coir rolls with planting [interview 19] to support slope of new embankment: £3,000

The initial channel clearance of the Letcombe Brook through the village took 8 three hour shifts with between 8 and 20 volunteers per shift amounting to an estimated total of about 300 volunteer hours, worth about £4000 at the current average hourly wage in the UK⁵⁸. Further volunteer time inputs to construct the bank and lower the crest of the

⁵⁸ “The ONS said in December 2013, the average hourly earnings before tax for UK workers were £13.60 for men and £12.24 for women.” <http://www.bbc.co.uk/news/business-25759780> accessed 10

Lower Mill weir during the remainder of the summer of 2008 are estimated at a further £2000. These figures compare with an Environment Agency estimate of “at least £50,000” to carry out the equivalent work using either an external contractor or their own internal work force. (It should be borne in mind that access for mechanical equipment to some parts of the Letcombe Brook through the village is rather restricted)

Long term maintenance activities

Over the five year period July 2009 to June 2014, the annual out-of-pocket spend of the Hanneys Flood Group averaged at around £1435 per annum. Income received over this five year period exceeded expenditure to give the group a working balance in hand. Income sources are as shown in Figure 5-6 and it should be noted that the Environment Agency only provided 25% of this income. This was in the form of a £2,500 grant to buy a boat and a trailer (horsebox) to store their equipment, with the idea that the trailer and boat can be made available to other groups to use. If such one-off capital items are removed and only operational and maintenance expenses of the Hanneys Flood Group (e.g. insurance, replacement of damaged waders, servicing of life jackets, replacement of small tools) are considered, the annual spend falls to around £1000 per year.

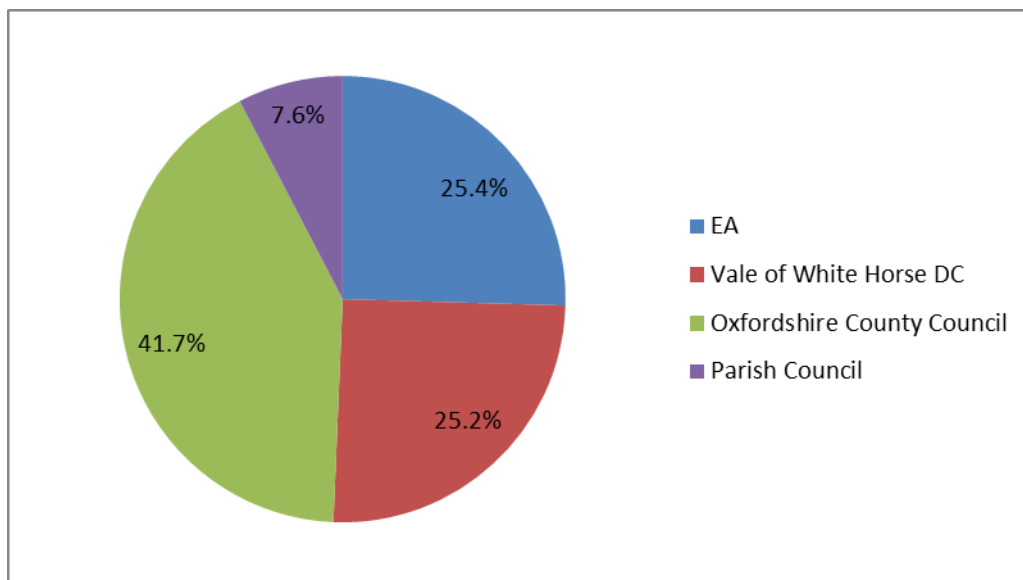


Figure 5-6 Breakdown of Hanneys Flood Group income: 2009-2014

March 2015. Clearly the rate that could be used here can be debated (e.g. should it be the minimum wage?) but the calculations in this section are only designed to illustrate the approximate costs and benefits.

The spend on expenses was matched by an approximate investment of time of £3000 per annum by volunteers as shown in Table 5-2, where the time has again been valued at an average hourly wage for the UK.

Table 5-2 Investment of volunteer time at Hanneys Flood Group 2010-14

	<u>Session attendances</u>	<u>Hours/ session</u>	<u>Hours</u>	<u>Rate (£)</u>	<u>Value (£)</u>
Total attendances	430	3	1290	£11.92	£15,377
Number of sessions	39				
Number of years	5				
Average attendance /session	11	3	33.1	£11.92	£394
Average attendance /year	86	3	258	£11.92	£3,075

The equivalent total costs for the Environment Agency to carry out such activities are difficult to quantify. Very broad cost ranges are given by the Environment Agency (2012) channel maintenance standards guide. For example, for maintenance to sustain defences in EA Condition Grade 3, costs range from £1,025 to £20,770 per km per year for manual clearance of channels up to 10 m in width and from £260 to £5,235 per km per year for mechanical clearance. It would therefore seem reasonable to assume, given the restricted access, that the costs for the Environment Agency to carry out the equivalent annual maintenance would not be less than the total of £4000 per annum which the Hanneys Flood Group effort represents.

5.2.2 Efficiency of activities by Hanneys Flood Group

Assessment of economic benefits arising from the channel improvements is difficult in the Hanneys case because of known inaccuracies in flood plain modelling and hence benefit to cost ratios cannot be calculated reliably. However, lowering of water levels for lower return period events and cutting off water flow routes to low spots on the floodplain give some improvements, progressively reducing as return period gets higher.

Given the estimated EAD available of £16,854 (see Table 5-1), the benefit to cost ratio on the out-of-pocket expenditure of the Hanneys Flood Group is about 12.3: 1 (Table 5-3). The EAD could be slightly lower (of the order of £12,500) and still generate the minimum 9:1 benefit to cost ratio required by the UK Treasury.

Table 5-3 Letcombe Brooke management: benefits and costs

Year	Discount factor	DASH Costs	PV DASH (Costs)	EA Costs	PV EA Costs	Benefits	PV (Benefits)
2008	1.0000	8000	£8,000.00	£50,000.00	£50,000.00	16,854	£16,853.54
2009	0.9662	1500	£1,449.28	£4,000.00	£3,864.73	16,854	£16,283.61
2010	0.9335	1500	£1,400.27	£4,000.00	£3,734.04	16,854	£15,732.96
2011	0.9019	1500	£1,352.91	£4,000.00	£3,607.77	16,854	£15,200.93
2012	0.8714	1500	£1,307.16	£4,000.00	£3,485.77	16,854	£14,686.89
2013	0.8420	1500	£1,262.96	£4,000.00	£3,367.89	16,854	£14,190.23
2014	0.8135	1000	£813.50	£4,000.00	£3,254.00	16,854	£13,710.37
2015	0.7860	1000	£785.99	£4,000.00	£3,143.96	16,854	£13,246.73
2016	0.7594	1000	£759.41	£4,000.00	£3,037.65	16,854	£12,798.77
2017	0.7337	1000	£733.73	£4,000.00	£2,934.92	16,854	£12,365.96
2018	0.7089	1000	£708.92	£4,000.00	£2,835.68	16,854	£11,947.79
2019	0.6849	1000	£684.95	£4,000.00	£2,739.78	16,854	£11,543.76
2020	0.6618	1000	£661.78	£4,000.00	£2,647.13	16,854	£11,153.39
2021	0.6394	1000	£639.40	£4,000.00	£2,557.62	16,854	£10,776.22
2022	0.6178	1000	£617.78	£4,000.00	£2,471.13	16,854	£10,411.81
2023	0.5969	1000	£596.89	£4,000.00	£2,387.56	16,854	£10,059.72
2024	0.5767	1000	£576.71	£4,000.00	£2,306.82	16,854	£9,719.54
2025	0.5572	1000	£557.20	£4,000.00	£2,228.82	16,854	£9,390.86
2026	0.5384	1000	£538.36	£4,000.00	£2,153.44	16,854	£9,073.29
2027	0.5202	1000	£520.16	£4,000.00	£2,080.62	16,854	£8,766.46
2028	0.5026	1000	£502.57	£4,000.00	£2,010.26	16,854	£8,470.01
2029	0.4856	1000	£485.57	£4,000.00	£1,942.28	16,854	£8,183.59
2030	0.4692	1000	£469.15	£4,000.00	£1,876.60	16,854	£7,906.85
2031	0.4533	1000	£453.29	£4,000.00	£1,813.14	16,854	£7,639.47
2032	0.4380	1000	£437.96	£4,000.00	£1,751.83	16,854	£7,381.13
2033	0.4231	1000	£423.15	£4,000.00	£1,692.59	16,854	£7,131.52
2034	0.4088	1000	£408.84	£4,000.00	£1,635.35	16,854	£6,890.36
2035	0.3950	1000	£395.01	£4,000.00	£1,580.05	16,854	£6,657.35
2036	0.3817	1000	£381.65	£4,000.00	£1,526.62	16,854	£6,432.23
2037	0.3687	1000	£368.75	£4,000.00	£1,474.99	16,854	£6,214.71
2038	0.3580	1000	£358.01	£4,000.00	£1,432.03	16,854	£6,033.70
2039	0.3476	1000	£347.58	£4,000.00	£1,390.32	16,854	£5,857.96
2040	0.3375	1000	£337.46	£4,000.00	£1,349.83	16,854	£5,687.34
2041	0.3276	1000	£327.63	£4,000.00	£1,310.51	16,854	£5,521.69
2042	0.3181	1000	£318.09	£4,000.00	£1,272.34	16,854	£5,360.86
2043	0.3088	1000	£308.82	£4,000.00	£1,235.28	16,854	£5,204.72
2044	0.2998	1000	£299.83	£4,000.00	£1,199.30	16,854	£5,053.13
2045	0.2911	1000	£291.09	£4,000.00	£1,164.37	16,854	£4,905.95
2046	0.2826	1000	£282.61	£4,000.00	£1,130.46	16,854	£4,763.06
2047	0.2744	1000	£274.38	£4,000.00	£1,097.53	16,854	£4,624.33
2048	0.2664	1000	£266.39	£4,000.00	£1,065.57	16,854	£4,489.64
2049	0.2586	1000	£258.63	£4,000.00	£1,034.53	16,854	£4,358.87
2050	0.2511	1000	£251.10	£4,000.00	£1,004.40	16,854	£4,231.92
2051	0.2438	1000	£243.79	£4,000.00	£975.14	16,854	£4,108.66
2052	0.2367	1000	£236.69	£4,000.00	£946.74	16,854	£3,988.99
2053	0.2298	1000	£229.79	£4,000.00	£919.17	16,854	£3,872.80
2054	0.2231	1000	£223.10	£4,000.00	£892.39	16,854	£3,760.00
2055	0.2166	1000	£216.60	£4,000.00	£866.40	16,854	£3,650.49
2056	0.2103	1000	£210.29	£4,000.00	£841.17	16,854	£3,544.16
2057	0.2042	1000	£204.17	£4,000.00	£816.67	16,854	£3,440.94
2058	0.1982	1000	£198.22	£4,000.00	£792.88	16,854	£3,340.71
Total			£33,977.55		£144,880.11		£416,619.99
BCR			12.3		2.9		

In comparison, using the estimated equivalent full costs expenditure of the EA and the estimated avoided EAD available of £16,854, the benefit to cost ratio just is 2.9: 1 (Table 5-3). The equivalent amount of avoided EAD that would be required to deliver the full 9:1 benefit to cost ratio required by Treasury is about £52,000; this level of benefits seems unlikely to be achievable.

Clearly much more detailed studies could be carried out but the cost of determination of the benefit-cost ratio but justifying the investment in such studies become problematical when considered in relation to the cost of the channel improvement activities themselves. Barry Russell, for example, contrasted a cost of £15,000 for modelling just

“to be able to say what difference in water levels a certain aperture bridge will give” with a DASH group request for £400 for tools and waders to actually address the problem (rather than just modelling it) through regular maintenance, commenting: “that sort of seed corn money might sound ... peanuts in the big scale of things, but if it means that a group ... can get in and do the work, that’s what we should be focused on, we shouldn’t be saying well before you do that we want to model that river” [Barry Russell, EA Area Flood Risk manager, Thames West, Interview 46, Mar 2011]

Output to investment ratio for the capital projects lies between 0.8 and 1. For the maintenance activities in subsequent years lies between 2 and 3, depending on whether the purchase of additional major items of equipment boat and trailer is included in the expenditure.

Productive efficiency for the capital projects can be assessed on the basis that EA advised that the cost of the improvement works if carried out by a commercial contractor would have amounted to about £50,000. Actual costs are estimated to be £7,000 to £8,000, the productive efficiency ratio is around 6 to 7.

EA staff involved with DASH activity from Thames West region seemed generally to be keen to demonstrate value for money for DASH-type activity. For example in the case of clearance of trash screens, one EA FCRM technical specialist commented that whilst DASH activity might be driven by a combination of self-interest and local community interest:

“I think they’ll also argue that they do it to save our time and money. And probably ultimately, you could take it to the n’t^h degree, if they save our time and money, they save their own time and money because that’s tax funding.” [Interview 3, Feb 2008]

5.2.3 Funding of NEHRA DASH group

The funding of the purchase of the cement and ballast used by the NEHRA group during 2009 was provided by the farmers. Unlike in other areas of the UK, there were no discussions about use of local FCRM levy funding to support the DASH group activity.

In addition to the cement and ballast purchased by the local farm, hessian bags for filling with the ballast-cement mix were provided free by the EA. Clay for topping up the low spots on the embankment was provided by the farm free of charge from a borrow pit in one of their fields. The estimated costs of these cash and in kind contributions is between £1,500 and £3,500 (exact costs could not be obtained). In terms of time inputs it is estimated that around 500 volunteer hours of time were provided over the summer of 2009 to carry out the sea wall repairs, worth about £6000.

5.2.4 Efficiency of activities by NEHRA DASH group

Using the estimate of EAD associated with the fall in agricultural output (from Section 5.1.2 above), the resulting benefit to cost ratios based just on the costs of the materials supplied to NEHRA is about 4.0: 1 (see Table 5-4).

This calculation is made over a 30 year lifetime (the maximum considered to be realistic for the sustainability of the wall). It assumes that work would continue at 3 year intervals with the costs of materials alternating between an expensive repair and a cheaper repair. The ratios are lower than would be acceptable for public funding but do justify investment. If the value of the labour provided by the volunteers were included in this calculation as an estimate of what the EA or a farmer might have to provide, then this benefit cost ratio would fall to about 1.2: 1, based on a Net Present Value of costs of £56,000.

Table 5-4 NEHRA sea wall management: benefits and costs

Year	Discount factor	DASH Costs	PV DASH Costs	Farm Costs	PV Farm Costs	EA costs	PV EA costs	Benefits	PV (Benefits)
2009	1.0000	£3,500.00	£3,500.00	£9,500.00	£9,500.00	£5,000.00	£5,000.00	3,500	£3,500.00
2010	0.9662		£0.00		£0.00	£5,000.00	£4,830.92	3,500	£3,381.64
2011	0.9335		£0.00		£0.00	£5,000.00	£4,667.55	3,500	£3,267.29
2012	0.9019	£1,500.00	£1,352.91	£7,500.00	£6,764.57	£5,000.00	£4,509.71	3,500	£3,156.80
2013	0.8714		£0.00		£0.00	£5,000.00	£4,357.21	3,500	£3,050.05
2014	0.8420		£0.00		£0.00	£5,000.00	£4,209.87	3,500	£2,946.91
2015	0.8135	£3,500.00	£2,847.25	£9,500.00	£7,728.26	£5,000.00	£4,067.50	3,500	£2,847.25
2016	0.7860		£0.00		£0.00	£5,000.00	£3,929.95	3,500	£2,750.97
2017	0.7594		£0.00		£0.00	£5,000.00	£3,797.06	3,500	£2,657.94
2018	0.7337	£1,500.00	£1,100.60	£7,500.00	£5,502.98	£5,000.00	£3,668.65	3,500	£2,568.06
2019	0.7089		£0.00		£0.00	£5,000.00	£3,544.59	3,500	£2,481.22
2020	0.6849		£0.00		£0.00	£5,000.00	£3,424.73	3,500	£2,397.31
2021	0.6618	£3,500.00	£2,316.24	£9,500.00	£6,286.94	£5,000.00	£3,308.92	3,500	£2,316.24
2022	0.6394		£0.00		£0.00	£5,000.00	£3,197.02	3,500	£2,237.91
2023	0.6178		£0.00		£0.00	£5,000.00	£3,088.91	3,500	£2,162.24
2024	0.5969	£1,500.00	£895.34	£7,500.00	£4,476.68	£5,000.00	£2,984.45	3,500	£2,089.12
2025	0.5767		£0.00		£0.00	£5,000.00	£2,883.53	3,500	£2,018.47
2026	0.5572		£0.00		£0.00	£5,000.00	£2,786.02	3,500	£1,950.21
2027	0.5384	£3,500.00	£1,884.26	£9,500.00	£5,114.43	£5,000.00	£2,691.81	3,500	£1,884.26
2028	0.5202		£0.00		£0.00	£5,000.00	£2,600.78	3,500	£1,820.54
2029	0.5026		£0.00		£0.00	£5,000.00	£2,512.83	3,500	£1,758.98
2030	0.4856	£1,500.00	£728.36	£7,500.00	£3,641.78	£5,000.00	£2,427.85	3,500	£1,699.50
2031	0.4692		£0.00		£0.00	£5,000.00	£2,345.75	3,500	£1,642.03
2032	0.4533		£0.00		£0.00	£5,000.00	£2,266.43	3,500	£1,586.50
2033	0.4380	£3,500.00	£1,532.85	£9,500.00	£4,160.59	£5,000.00	£2,189.79	3,500	£1,532.85
2034	0.4231		£0.00		£0.00	£5,000.00	£2,115.73	3,500	£1,481.01
2035	0.4088		£0.00		£0.00	£5,000.00	£2,044.19	3,500	£1,430.93
2036	0.3950	£1,500.00	£592.52	£7,500.00	£2,962.59	£5,000.00	£1,975.06	3,500	£1,382.54
2037	0.3817		£0.00		£0.00	£5,000.00	£1,908.27	3,500	£1,335.79
2038	0.3687		£0.00		£0.00	£5,000.00	£1,843.74	3,500	£1,290.62
Total			£16,750.33		£56,138.83		£95,178.84		£66,625.18
BCR			4.0		1.2		0.7		

If the EA were to take on the work, an average figure of about £3800 per km per year for maintenance of embankments could be considered (as developed in the EA PAMS project). Given a wall length of about 1.3 km this would indicate an annualised cost of about £5000. Using these costs, the total NPV of investment required over 30 years would rise to about £95,000 and the Benefit to Cost Ratio would fall to 0.7.

Comparing volunteer output to investment in materials for the sea wall repairs, an output to investment ratio of about 2 was achieved. Based on the equivalent EA costs for a contractor to carry out the equivalent work, productive efficiency ratio is estimated as about 6.

5.2.5 Conclusions on DASH group efficiency

In terms of benefit to cost ratio, the Hanneys Flood Group work, assuming it is continued, meets the public investment criterion with a benefit to cost ratio (BCR) of about 12:1; this would not have been the case if the work had been carried out by a conventional contractor or the EA's maintenance workforce. This suggests that

riverine DASH groups have the potential of offering a fairly efficient way of providing local flood risk reduction. On the other hand, even if the work of the NEHRA DASH group had not been plagued by quality problems and the sea wall repairs were maintained over a period of 30 years, they would not have met the public investment BCR criterion for FCRM works. In comparison with the minimal out-of-pocket costs of maintaining a river channel, the materials costs associated with a sea wall repair are significant, especially if the work has to be repeated or extended on a regular basis. On these grounds then, the case for DASH group work on estuarine sea walls is not convincingly made, even though it may be cheaper than equivalent professional interventions.

In terms of other measures of efficiency both groups achieved output to investment ratios of about 2 and productive efficiency ratios of about 6. However these figures whilst attractive, do not overcome problems of poor BCR when this arises.

5.3 Effectiveness of DASH activity

Effectiveness can be viewed as the extent to which an activity achieves some higher level or longer term aim (over and above its narrower short-term objective). In the context of DASH groups this can most conveniently be assessed under four categories which relate to the four groups of motivations identified for the work in the first place (see Figure 2-8 and confirmation in Section 4.4):

- Scale of ability to control flood risk – the immediate objective
- Sustainability of the groups themselves (in the context of limited public resources)
- Delivery of social value to the community in which the DASH group is embedded
- Stewardship of place

5.3.1 Scale of DASH group ability to control flood risk

This section deals separately with river channel maintenance and coastal sea wall maintenance.

River channel maintenance

In the case of river channel maintenance by DASH groups such as the Hanneys Flood Group and similar groups in Oxfordshire, it is not immediately apparent that there will

be major sustainability issues to deal with. Projections (Environment Agency, 2011a) suggest that major geomorphological changes are not expected and that, whilst peak river flows may increase this will only be by of the order of 20%.

Improvements in their working practices to deliver effective outcomes are always possible of course. In regard to the Hanneys Flood Group, Stewart Scott thoughtfully reflects:

“... it depends what you mean by effectiveness. I think we are in a continual state of learning of what works, what is difficult, what is not so difficult, what is worth doing, what is not worth doing, and what tools are the most appropriate for that sort of task so yes I think we are...”

[Stewart Scott, Interview 47, Jan 2014]

Stewart’s comments reflect the fact that riverine DASH groups will not be able to address all the FCRM issues with which they may be linked. The following may be identified:

- Immediate area. They may not be able to address all the issues in their immediate area. For example:
 - The Hanneys Food Group was not able to carry out any DASH activity to address the issue of flooding arising from the blockage of flow imposed by Dandriges Mill on the upstream side of the village. In detailing with such individual owner or heritage issues, DASH groups are restricted to lobbying for change by others.
 - Some issues may relate to FCRM or drainage assets (e.g. highways) that are the responsibility of others and again here the DASH group can only investigate and point out the problems and lobby for action. To this end, the Hanneys Flood Group is setting up a system for remote camera inspection of blockages in pipes.
- Wider area. The flood risk behaviours associated with a catchment or sub-catchment are dependent on the overall balances of conveyance and storage down through the catchment. Again, DASH groups can lobby to influence asset management behaviour elsewhere, they cannot control it.
- Small events vs big events. As already mentioned under efficacy above, managing conveyance of the channel itself can only influence flooding under the more moderate extreme events and not the very large ones where nearly all

of the water is flowing outside of the main river channel. However, any climate change signal that might increase flows in an overall manner is unclear.

- Insurance costs. A significant motivation for the Hanneys Flood Group wanting to reduce flood risk to below that represented by the 1:25 year event was to improve insurance premium and reduce mandatory excesses. This has not yet been achieved subsequently; of seven respondents to a March 2014 survey question put to Hanneys Flood Group members, none had seen any improvement as a result of the work of the Hanneys Flood Group; indeed, two respondents were still being quoted very high insurance excesses for flood risk.

Sustainability of maintenance of FCRM coastal flood defences by DASH action

On the coast or in estuaries, sea level rise poses significant challenges to the long-term sustainability of action by the DASH groups. This contrasts with the short-term focus of many of the groups:

“the message that we often get back is ‘well, we are only here for maybe another 15-20 years’; a lot of the people who live in some of these areas are getting close to retirement so they have quite a short termist view in terms of their investment” [Coastal Manager, Interview 51, Aug 2014]

Examining the example of the NEHRA group, a comparison of the sea level rises over the next 100 years indicated for Chichester Harbour in the earlier Figure 4-9 with the current crest elevations of the Northney flood embankment in the earlier Figure 4-10 suggests that the flood embankment will be overwhelmed by winter storms on a regular basis by the middle of the century and by normal high tides by the end of the century. The need either to raise the wall on its existing line or to retreat and build a defence on a higher contour to a higher crest level will become an imperative. Thus maintenance of the existing wall becomes at most a 20 to 30 year project and would require improvements and consistency in working practices to achieve it. If an appropriate approach could be agreed with the local authority, despite the absence of capital funding, there is a possibility of revenue funding from the council not exceeding £10,000 to support any activity they might wish to undertake [Interview 51, Aug 2014]. Any solution would need to address the ‘flooding system’ at Northney in an integrated way. Sea level rise therefore means that it is unlikely to be practical (see discussion in Section 2.2.7 above) for a DASH group like the NEHRA group to

maintain the status quo in the long term, even if there were no changes in the governance or policy background for the area.

In the meantime NEHRA are doing what they can and are seeking to address issues such as surface water flooding arising due to lockage of drains and collapse of manholes [Interview 50] and the issue of pedestrian and road access from the mainland bridge along the northern shore of the island [Interviews 50 and 51]. The limitations of the group in terms of direct action to control flood risk are therefore becoming apparent, even though they seem to be relatively effective as a lobbying group. For example, in the case of the manholes:

“we have got engineers and that involved and Southern Water who are responsible for some of the ditch work and some of the manholes and between us we have now shown them where all the manholes are and they realise that one of those is actually caving in, they will have to rebuild it and they’ve... we’ve also unblocked ends of pipes and things and we still need to borrow some rods and rod through so it is partly a community activity as it were and partly involved with the powers that be if we can get them [Interview 50]

Conclusion

In terms of river channel maintenance, the Hanneys flood group example suggests that it is possible to provide some long term localised control of flood risk. However, not all flood risk issues can necessarily be controlled due to a heritage of pre-existing infrastructure such as river weirs and drainage systems. Any work carried out must be understood to have progressively reducing effect as the magnitude of storms increases. Improving flood risk does not necessarily deliver reduced insurance costs.

On the coast, the NEHRA example indicates that sea level rise poses significant challenges to the sustainability of existing sea defences. Maintenance of these without raising and strengthening will only remain attractive to those looking for a short term benefit.

5.3.2 Sustainability of the groups themselves

There is an issue regarding how viable and sustainable are the DASH groups themselves in the long-term. Whilst it is possible that work carried out by a DASH group may be “task and finish” [Interview 6], in most of the cases observed in this research, an essential part of the work is on-going maintenance.

One of the vulnerabilities of DASH group activity, is the risk of the group ‘fading’, particularly if the local leader and driving force in a particular local community is lost. A good example is the effect of the unexpected death of the leader of the ‘Charney Army’ which set-back the work of the group for about 5 years (see Section 4.5.4). Furthermore, at Lympstone, it was commented that all those currently committed to undertaking the gate closures would eventually

“become older and not able to do the physical aspect of closing the gates. And so, at some point, we’ll be needing to replace people as they stand down.” [EA ‘Building Trust With Communities’ representative, Interview 10, Jun 2008]

Keith Lead also comments on this aspect

“maintenance has to be ongoing year after year; and how sustainable is this way forward? and I think again it’s about educating everybody and [having] a feed from younger people coming in as people retire.” [Keith Lead, EA Thames West liaison officer for DASH groups, Interview 19, Oct 2008]

Loss of support for the DASH groups thus remains an issue, and the only real safeguard available is some kind of written agreement with the local parish or town council about continuation of the agreed activity. Such an agreement could also be used to limit the liability of all parties:

“to give a bit more confidence to the community, that you know it will work [in the long term]; it does need some sort of ... memorandum of understanding ... drawn up.” [Keith Lead, EA Thames West liaison officer for DASH groups, Interview 19, Oct 2008]

This was the approach adopted on the Exe Estuary when the Environment Agency was coming to an agreement⁵⁹ with Lympstone parish council for local volunteers to take on the responsibility of closing local small flood gates:

“one of the top issues, not necessarily for the individuals, but certainly for the Council was liability, which we [the EA] have an agreement with the council, a written agreement that was drawn up with our barrister that the Council signed up for, so ... although we just hope we don’t have to test that sort of thing.” [EA ‘Building Trust With Communities’ representative, Interview 10, Jun 2008]

⁵⁹ It is also likely that reciprocal local agreements would be needed setting out long-term commitments from the Environment Agency and/or other relevant FCRM operating authorities, for example in regarding to funding of materials and equipment to assist DASH activity

In addition to embedment in local democratic institutions, it has been suggested that maintaining a good and visible database and website can encourage maintenance of DASH activity. Groups like the Hanneys Flood Group have recognised that making information available about the floods that have happened (so that they are not forgotten) and what they are doing and why can be very powerful to try to encourage ongoing participation and action. Opportunistic advantage can also be taken of the use of severe storm events to raise the profile of the group. A simple, but good, example was an email sent out to supporters by the Hanneys Flood Group following heavy rainfall during April 2012:

“The April rain shows that there is still work to do and that regular maintenance is critical so your support is vital. Our next working party is Saturday 12th May. We shall be working on the Childrey Brook at West Hanney, clearing some fallen branches and other debris washed down last week.”

On 17th April 2015, the Hanneys Flood Group held a meeting to start to develop a longer-term (10 year) for their activities recognising the various likely future developments including property and highway development in the catchment. They have also started to partner with an environmental group (the Letcombe Brook project)

If the longer-term future of the Hanneys Flood Group looks relatively positive at the moment, future DASH activity by NEHRA looks less certain. In 2009 when the work reported in Section 4.3.2 was carried out, the NEHRA group was still very young in terms of Wenger’s (2002) communities of practice (see Section 2.2.3) and had not yet reached the point of long-term stewardship (Figure 2-5). Constitutionally its future seemed assured because of it sitting within the residents’ association. The viability of the group as a general DASH group seemed to be indicated the following summer (2010), when many of the same group became involved in an activity to refurbish/redecorate the village hall. However, as at 2014, prospects seemed less secure. Judy Clark believed that enthusiasm for trying to repair the seawall again has probably diminished:

“Five or six years down the line, at least five or six years older it might be a little bit more difficult to rustle up the same enthusiasm; but on the other hand I think it will still be possible to get a team going, you know if we can work in conjunction, you know we still have some sand bags, you know we could still work in conjunction with the farm on... you know with the slabs they hope to use.” [Interview 50, Aug 2014]

Thus if NEHRA DASH activity on the seawall is to continue and further expenditure is to be justified, the NEHRA group would need to find a way through the impasse with the local farmers and ensure improvements in working practices for any repairs. Depending on the long-term solution eventually identified and agreed with the FCRM authorities, it may be necessary for NEHRA to move away from DASH activity and to raise funds locally to hire a contractor to construct a more permanent solution. The Eastern Solent Coastal Partnership is encouraging small communities to think in this way and is willing to support them with advice to mitigate advisory costs [Interview 51, Aug 2014]. As an example, pedestrian and road access from the mainland bridge along the northern shore of Hayling Island is problematic during times of very high waters [Interviews 50 and 51, Aug 2014] and NEHRA is exploring the strategy of fund raising to pay a contractor to construct a low raised embankment to dual as a footpath and as a flood defence for the road itself.

It may therefore be concluded that a given DASH group may not reach the point of long-term stewardship of FCRM assets and transformation into sustainable long-term activity (c.f. Figure 2-5). They are vulnerable to changes and to loss of their key leadership, and may die rather than being able to continue after the loss of their founding leader. Embedment within agreed local democratic institutions (parish councils or residents associations) may assist as in the case of the Charney Army after the set back of the death of their founding leader. Engagement with other groups and a long-term vision may also help to sustain them, but only if the activities being considered are both supported and resourced, with a leader to help drive them forward.

5.3.3 Social effectiveness of DASH groups

The Institute for Volunteering Research (IVR) ‘five capitals’ model (see Section 3.4.3) identified spin-off benefits of volunteering activity applicable to DASH groups as including development of expertise (skills) in individual DASH volunteers. The evidence from the case studies definitely suggests improved local community understanding of local flooding mechanisms (see Sections 4.2.1, 4.3.1 and 4.5.2) and development of skills for carrying out the work (see Sections 4.2.2, 4.3.2 and 4.5.5)

IVR also identified the value of enhanced social capital (Putnam, R., 2000) or within the local community in which the DASH volunteers are based and this is supported by

the evidence discussed in Section 4.4.3. A practical outcome of this improved community connectedness element of this is the development by DASH and other self-help groups of emergency flood plans. For example, in Oxfordshire (see Figure 4-27) most villages with a DASH group also have an emergency flood plan⁶⁰, unsurprising since many of them were formed following a major flood. As an example, the Hanneys Flood Group, as one of their constitutional objectives, has identified the need to help residents of their villages should flooding occur and are currently in the process of developing their flood plan [conversation with Stewart Scott, 22 February 2012].

5.3.4 Effectiveness of stewardship of environment by DASH groups

“[DASH groups] want to see their environment kept nice, litter free, bags of cement not in the river, you know being able to go and sit by the river on a sunny Sunday afternoon and have a lot of wildlife in it; so they have got a personal interest in that environment being as good as it can.” [Barry Russell, EA Area Flood Risk manager, Thames West, Interview 46, Mar 2011]

Ensuring simultaneous improvements to FCRM and the environment can be consistent with one another, as improvement of the appearance of the urban environment by removal of rubbish not only improves the appearance of the river but can also improve the conveyance of flood water [Interview 36].

DASH channel management groups also typically work by hand rather than with a machine and that is seen positively by the Environment Agency as it is

“far more friendly to the environment than the old ways of the Conservancy that used to be to come in and cut everything down and good was lost with bad ... you have to balance the ecology of the river with its purpose; its purpose is to drain the land and I think the work we have done over the last couple of years is about finding the right balance” [Hanneys Flood Group volunteer, Interview 45-1, Autumn 2010]

However the quality of environmental management by DASH groups remains an issue for EA conservation officers. For example, even though the Hanneys Flood Group had received permission to carry out their work, there was considerable initial concern from the EA conservation officer about the amount of weed that they removed on the

⁶⁰ The Environment Agency has been encouraging the preparation of such plans, which ideally should cover actions before during and after a flood. It has provided a downloadable advice pack to enable such plans to be prepared (<http://publications.environment-agency.gov.uk/PDF/GEHO0111BTJK-E-E.pdf>)

first clearance of the Letcombe Brook. This was mitigated by the eventually observed effect of the initial clearance to return the river to a more natural chalk stream

“and that helps to keep the flow rates of the stream up, it keeps the bed clear – a nice gravelly bottom – and it encourages a lot of wildlife“ [Hanneys Flood Group leader, Interview 45-5, Autumn 2010]

The overall result in the particular context of the Hanneys Flood Group has been an improved environmental balance, with determined efforts to remove invasive species such as Himalayan Balsam on the river banks [Interview 15] and replacing it with native wild flower species and evidence of fish returning and water voles thriving [Hanneys Flood Group volunteer, Interview 45-1, Autumn 2010]. Indeed, by April 2015, the Hanneys Flood Group were in discussions about collaboration with an environmental group, the Letcombe Brook Project [statements made at group meeting 17th April 2015] . This group has the objectives of conserving and enhancing the biodiversity and landscape of Letcombe Brook, promoting environmentally responsible land management practices amongst landowners and land managers, increasing awareness of countryside and environmental issues through education and interpretation and involving all sectors of the community in caring for and appreciating the Letcombe Brook (Letcombe Brook Project, 2015).

No environmental work was carried out by the NEHRA group. Whilst these might possibly have emerged in the future if the group had continued its work through subsequent years, unlike with river channels there were no strongly environmental issues associated with the sea wall, other than constraints on the season of the year in which the work could be carried out.

Thus it may be concluded that, if well managed, riverine DASH group activities have the potential to add value to ‘place’ and environment as measured by the accessibility / availability and visual appearance criteria (see Section 2.3.3). Not only do these help to deliver conservation targets but are also consistent with EA policy targets of “working with people and communities to create better places” (Environment Agency, 2011c, p.12).

5.4 Conclusions

The case study evidence and analysis presented in Section 5.1.1 has shown that river channel maintenance work by DASH groups can be efficacious in reducing flood water levels although an effect of channel maintenance may be to slightly raise water levels close to control structures. Economic analysis of case study data in Section 5.2.2 indicates that the reduced out-of-pocket costs of DASH group work can deliver flood risk reduction associated with rivers efficiently and to an acceptable benefit-to-cost ratio in comparison with conventionally funded work. However, accurate estimates of avoided flood risk are problematic without a full modelling which may not be justified at a local level (see discussion in Section 5.2.5). As identified in Section 5.3.1, DASH groups can be effective in delivering long-term localised control of flood risk, but cannot control all elements of flood risk partly due to a heritage of pre-existing infrastructure such as river weirs and drainage systems and partly because channel management has a progressively reducing effect as the magnitude of storms increases. However a survey question to the Hanneys Flood Group (Section 5.3.1) revealed that improvements in flood risk by DASH channel management do not necessarily deliver reduced insurance costs and may contrast unfavourably with insurance reactions to individual flood resilience actions.

In terms of estuarine sea walls with front face protection, evaluation of the example of the NEHRA case study (Section 4.3) makes clear that good quality repair work is required if DASH activity is to be contemplated as an efficacious solution (Section 5.1.2). The case study analysis in Sections 5.2.3 and 5.2.4) demonstrates that materials costs associated with sea wall repairs can be significant, especially if the work has to be repeated or extended on a regular basis and therefore that repairs cannot necessarily be justified on grounds of efficiency, even though they may be cheaper than equivalent professional interventions. The NEHRA example also indicates that sea level rise poses significant challenges to the long-term effectiveness of existing sea defences (Section 5.3.1); maintenance of such defences without raising and strengthening and even relocating the defence line may only remain attractive to local communities looking for short-term benefit.

Irrespective of any impact in flood risk reduction, analysis of the activities of DASH groups in Section 5.3 has shown that can be effective in delivering improved local community understanding of local flooding mechanisms, development of local skills and emergency flood plans and improvements to the environment. However, (Section 5.3.2) in terms of long-term effectiveness, DASH groups are not inherently sustainable. They are vulnerable to changes and to loss of their key leadership, and may die rather than being able to continue after the loss of their founding leader (Section 4.5.4). Embedment within local democratic institutions (parish councils or residents associations) avoids permanent loss of initiative, but there may be delays whilst a new leader is organised (Section 4.5.4). Engagement with other groups and a long-term vision may also help to sustain them (Section 4.5.7), but only if the activities being considered are both supported and resourced.

The next chapter looks at the coordination and support of DASH groups by FCRM professionals.

6 DASH groups: coordination and support by FCRM operating authorities

“Give a man a fish and you feed him for a day. Teach a man to fish and you feed him for a lifetime.”

(Chinese proverb)

Chapter 6 now turns to the second research objective and addresses research questions (2.1) and (2.2) regarding the evaluation of the role of FCRM professionals in the coordination of and liaison with DASH activity. The chapter is largely based around an in-depth case study of the effectiveness of a dedicated FCRM professional DASH group coordinator (Keith Lead) operating during the period summer 2008 to summer 2011 in the EA Thames West area. Reasons for selection of this unique opportunity are described in Section 3.4.1. Comparison is made with the nature and effectiveness of other more distributed governance arrangements now in place since the coordinator’s retirement. The effectiveness of the coordinator’s role in DASH activity is examined, using as a guide elements identified out of the coordinator’s job description assembled into a systematic flow of activities. For each activity the effectiveness is compared with that of alternative procedures now in place. Activities assessed include the encouragement of appropriate DASH activity in local communities, identification of the nature of these activities, and practical support, funding and consenting. In addition there are ‘inward-facing’ aspects of the role towards fellow-professionals within the EA and these are also discussed, especially in regard to the perceived risks of making use of volunteers.

6.1 Getting started with DASH coordination

6.1.1 FCRM professional attitudes towards DASH-type activity

Professional reactions in 2008

In order to understand the general FCRM industry context surrounding the appointment of Keith Lead to the role of DASH group coordinator in EA Thames West, it is important to commence this chapter with a review of FCRM professional attitudes towards DASH activity and to voluntary activity more generally. This review is based on mainly on the evidence generated by the nVIVO coding of the semi-structured interviews. Ignoring subsequent interviews or re-interviews surrounding the

case studies, 15 of the 17 professional interviews were conducted in 2008⁶¹, the year of Keith's appointment and thus are informative in regard to professional views at the time.

When professionals being interviewed in 2008 were asked about the potential for involvement of volunteers in their area of work some quite dismissive reactions were received. 4 out of the eleven FCRM professional engineers interviewed during 2008 (pre-Pitt Review) were quite negative about the idea of using other volunteers, even for monitoring and four more were quite cautious about the idea. Some professionals were sufficiently honest to admit that in many cases use of DASH groups was an option which they had never seriously considered:

“There's less of an inclination ... to say, “Oh, well if we were to tie ourselves into a volunteer group, we could somehow get this changed.” There doesn't seem to be that knowledge, if you like even, that that's a potential way of doing it. Problem is that money's often involved ... you *can* deal with it with voluntary groups, but you need something.” [Coastal Manager, maritime district council, Interview 6, Mar 2008]

Furthermore, whilst they were open to the idea of using DASH groups, FCRM professionals struggled in interview to see how

“to actually make it tangible.” [Coastal Manager, maritime district council, Interview 29, Dec 2008]

or

“for the benefit of the industry.” [EA senior FCRM manager, Interview 12, Aug 2008].

One professional admitted that his view had changed with time, so that

“what we're now actually trying to do is work with the residents and say if we can't do the work for you then it might well be you can do whatever maintenance you require to protect yourselves down there.” [Coastal Manager, maritime district council, Interview 29, Dec 2008]

He was now seeking to provide DASH and other action groups with data that might assist them:

“we have contributed our information on flood risk, we have done our assets inspections and we provided that information for them to assess what the risks are, so we're helping them to make the informed decisions really.” [Coastal Manager, maritime district council, Interview 29, Dec 2008]

⁶¹ 2008 was also the date of publication of the 'people friendly' Pitt Review (Pitt 2008). Although it was published in June of that year, it took some time for the ideas to find their way out into practice.

However, whilst there was a recognition of the potential of making use of individual volunteers or DASH groups, there were concerns as to whether the benefits would be outweighed by the 'costs'. In this case the costs were not necessarily monetary but draw-backs such as the risk of mis-reporting defects, the concern being that people who might be relying on an asset might over-state the case for action and

“potentially make them more pessimist than optimist ... [and report]... defects when they don't actually exist or they're not defects that would affect the performance of the asset.” [EA Asset Management Engineer, Interview 8, Mar 2008]

There were also concerns about the 'reputational costs' to the operating authority if what volunteers said or did, whilst acting as if they were working “in the name of” the Operating Authority, were to 'undermine' rather than 'champion' the official messages and actions of the authority:

“there was a particular flood warden who was appointed ... to help disseminate the flood warnings ... who was very opinionated on a number of things ... [and] was purporting these ideas to his local community as 'your Flood Warden appointed by ...'. That can be quite dangerous, if those ideas are wrong, factually wrong” [EA Asset Management Engineer, Interview 8, Mar 2008]

There were specific concerns about volunteers attempting to undertake activities requiring specialist equipment and skills. Some activities were not seen as

“the type of thing you could organise [volunteers] to do themselves” [Coastal Manager, maritime district council, Interview 29, Dec 2008].

And there were related concerns about liability issues and ensuring the health safety and welfare of those involved:

“If they are volunteers and they are working on assets that we maintain ... If they were to be injured, or if, God forbid, they were to die, then where would the liability lie with that? Because presumably, they would be carrying out work which we'd agreed that they should do; ... particularly if it's unsupervised as that sort of thing might be. I'm just thinking more of where the legal liabilities [lie]” [EA Asset Management Engineer, Interview 8, Mar 2008]

Finally there were concerns that DASH groups would might not follow correct procedures to secure the relevant consents for their work [Interview 12, Aug 2008].

Thus it may be concluded that although in 2008 there was some openness towards the idea of DASH activity, there was limited experience of it and considerable scepticism and concern about what could be done practically, the health and safety risks, the

organising of consents for activities and the possibility of adverse reputational impact on the EA.

EA public stakeholder engagement

As described in Chapter 1, in recent years there has been a social turn in FCRM with a move towards greater involvement of stakeholders, but the change has been slow as there are ingrained attitudes to overcome. Those interviewed in the early part of this research described the FCRM professionals as having

“no appetite at all for working with residents to look at alternatives ... I don’t think that a conversation about sea defences which only sees the alternatives in terms of hard defences in the shape of sea walls or soft defences in the shape of shingle as the only possible alternatives, is a good conversation” [Chair, residents coastal flooding action group, Interview 25, Nov 2008]

and

“if you asked the landowners, they would say the Environment Agency is a big machine and they never listen to a word you say.” [EA FCRM technical specialist, Interview 3, Feb 2008]

Equally, local action groups can also exhibit the adversarial aspects of what Delanty (2003) calls political consciousness and collective action. Closed attitudes can emerge, along the lines of a group who said:

“We must keep [our local community] defended. We don’t care about what the rules say, that’s it, we must have [our local community] defended, and anything that you say that we don’t like, we’ll ignore.” [Coastal Manager, maritime district council, Interview 6, Mar 2008]

The professional did not have a good relationship with this group because he felt that the group was not prepared

“to understand the constraints that are placed on us - as a starting point” [Coastal Manager, maritime district council, Interview 6, Mar 2008]

Despite this challenge, another FCRM professional suggested that it was better to positively target the people that were being more argumentative because there was the possibility of changing the minds of such individuals [Interview 11, Jun 2008].

However, approaches within the EA are changing. In some places, the new approach called “Building Trust with Communities” (Speller, G. & Twigger-Ross, C., 2005) has been adopted. Many of the recommendations of the Pitt Review (Pitt, M., 2008), including those for formal partnership funding arrangements, have now been implemented. In addition, since the majority of the case study work reported in this

thesis was concluded, the EA Area teams have now been completely reorganised so that the public facing teams are now described as Partnership and Strategic Overview (PSO). The change in philosophy was described in the following manner:

“... we’ve completely changed our approach. Historically we have, with advice from our professional consultants, decided what was best for that community and then we told that community what was best for them, and then we listened to their responses and reactions and then adjusted what we thought was best and then proceeded to get support from the Local Planning Authority for what we needed to do to take the scheme forward. And all the advice and research that we’ve done suggest that’s the wrong way to go about this, and so we are now moving to the position where our policy is to go and talk to a community about the problems and issues that it faces and to engage with them around solutions so we don’t tell and sell but we listen and then bring forward proposals with the support of the community.” [EA senior FCRM manager, Interview 12, Aug 2008]

Indeed, the senior FCRM manager [Interview 12] expressed the view that instead of ‘really good technical solutions’ which are ‘not acceptable to ... the community’, the EA was recognising that consensual solutions derived in this way are actually often the ‘best solution’ (i.e. addressing all the human dimension issues discussed in Section 2.3 and Chapter 7) rather than having something that was purely functional for flood risk security. The leader of a coastal village action group commented that in their case, the FCRM professionals

“welcomed in the end ... the involvement of local people and the technical aspects of the project we were pushing.” [Leader, village action group (coastal), Interview 27, Nov 2008]

An EA professional involved in this new process described it as

“quite a culture shift for not just some of our staff but particularly for some of our consultants.” [EA ‘Building Trust With Communities’ representative, Interview 10, Jun 2008]

Thus in 2008 there was a growing recognition of the importance of meeting declared policy targets for engagement with local communities (see discussion of literature in Section 2.1.2) and the potential value that communities might be able to offer given limited public finances

6.1.2 EA coordination processes for DASH groups

Appointment of coordinator and job description

Given the rather reserved professional attitudes towards voluntary activity described in the previous section on the one hand but also the drive towards greater public

engagement, the decision in 2008 by the Thames West Flood Risk Manager (Barry Russell) to appoint a DASH group coordinator (Keith Lead) appears a significant development. On the ground, the appointment followed a process of having to deal with a particularly ‘hot customer’, the chair of one of the DASH groups, who seemed to be asking for (and being supplied with) an unusually large amount of information:

“[He] came back with question after question after question and ... we thought, well, why is a layperson wanting this huge amount of information? ... In the finish, I went out to meet him to discover exactly why he wanted the information, what he was going to do with it and ... it then transpired that ... they were looking to do all sorts of work ... to try and reduce the risk of flooding to the village ...” [Keith Lead, EA Thames West liaison officer for DASH groups, Interview 19, Oct 2008].

This experience confirmed to the EA professionals in Thames West the emergence of DASH groups and the need to both support them but also to ensure that their activities were appropriately directed to reduce flood risk and to avoid environmental harm. In fact, the need for the role had already started to become apparent through EA engagement with other groups that needed flood defence consent, which was being handled by the Development Control team (of which Keith was leader at the time) [Interview 19, Oct 2008].

Initially, when the role of DASH group coordinator was set up in the summer of 2008, a rather open-ended description was provided of what was required. A formal job description was eventually drawn up during 2009 (see Box 6-1). The following seven identifiably separate aspects relating to DASH groups can be identified in this job description:

1. Key contact for all DASH groups within an area, including coordination of DASH groups for peer encouragement and support
2. Promotion of DASH activities to communities, including:
 - (a) Proactive contact of communities who have not contacted the EA to raise awareness of risk of flooding and possibility of community action
 - (b) On contact with communities (proactive or otherwise), identify options for community action including DASH.
3. Identify and agree DASH activities with DASH group, including:
 - (a) Sharing relevant experiences including timescales and pitfalls

- (b) managing expectations about what a DASH group can achieve and the likely extent of its impact on flood risk
- 4. Identifying financial and/or practical resources and other support required by groups.
- 5. Internal communication with professional colleagues (especially conservation and consenting officers) including support/justification of activities of DASH groups.
- 6. Organising planning and consenting process, working with DAASH groups to advise them.
- 7. Organising release of resources and consents linked to 4 and 6 above.

Box 6-1 Role description for EA Community Engagement Technical Specialist (Courtesy Environment Agency)

<p>The Role</p> <ol style="list-style-type: none"> 1. Be the key contact for all local action groups enquiring about undertaking maintenance or any other works themselves. 2. Identify and approach communities at risk which may not have contacted us and raise awareness of their risk and what they can do. 3. Encourage communities to consider what they can do to help protect themselves against flood risk. Highlight the benefits of this approach. 4. Advise on any consents needed from ourselves, professional partners and landowners 5. Advise on the timescales and pitfalls often encountered and share lessons learned from similar experiences. 6. Manage expectations of action groups about their realistic level of activity and the impacts of this activity. 7. Put action groups in contact with other similar action groups to allow peer encouragement and support. 8. Seek resources from Area, Regional and National budgets to help support groups where they need additional help. This may be financial, resources-based or other. 9. Fully understand and be able to explain our risk-based approach to work including the Streamlining list, FCRM System and maintenance risk categories and criteria for justification of funds. 10. Create and manage a communications plan for all contact with local groups including liaising with the press office, regional communications team and all appropriate internal consultees. 11. Although not essential, engineering knowledge would be an advantage to enable on-site discussions with local groups. <p>Internal Customers</p> <ol style="list-style-type: none"> 1. Flood Incident Management. [Help to deliver] community engagement approach including local emergency flood plans and flood warning awareness 2. Conservation: To ensure appropriate and sustainable actions by action groups 3. Development and Flood Risk: to ensure all required consents are sought and to facilitate with approvals. 4. Flood Risk mapping and Data: To understand impact of works by locals on the Flood Map or the National Flood Risk Assessment. Essential to manage the expectations of the residents. <p>External Customers</p> <ol style="list-style-type: none"> 1. Local Authorities 2. Natural England 3. National Flood Forum 4. Local action groups 5. Thames Water 6. British Waterways 7. National Farmers Union

To assist in understanding how these seven aspects relate to one another in the context of the DASH groups situation discussed in Chapter 4, a Checkland & Poulter (2006) style process flow diagram (Figure 6-1) has been developed. This diagram combines the seven points together along with other typical Checkland elements. In style it is similar to that developed earlier (Figure 4-32) for the DASH groups themselves.

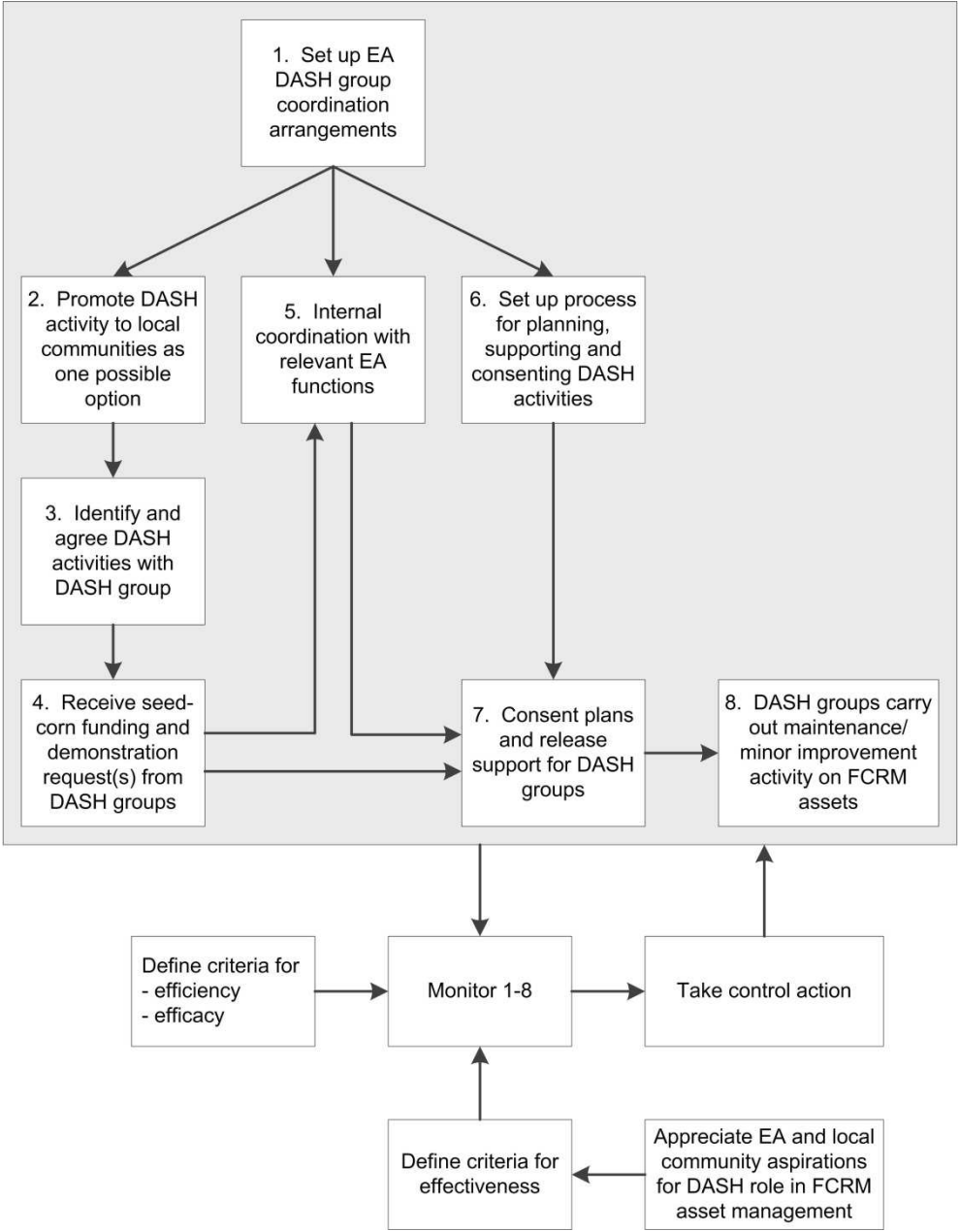


Figure 6-1 Activity sequence in transformation process for EA to engage DASH groups more widely in FCRM asset maintenance and improvement

Figure 6-1 makes clear the dual role of any professional DASH support function in working both with the DASH groups and with other colleagues in the EA. It effectively has to track both the DASH group process discussed in Chapter 4 alongside any internal processes within the EA and bring them together with an agreed and funded plan which also has the necessary flood defence and environmental consents before the actual work can commence. Either of these processes could mean that DASH work would not proceed to action. The coordination has the option of working with other third parties who may have an interest, principally landowners.

The wider objectives of the process for the EA could be summarised by the following (PQR) Root Definition of the process linked to the CATWOE analysis in Box 6-2:

(P) To change the method of delivery of FCRM (Q) to include a role for local community DASH groups in maintenance and improvements of local FCRM assets (R) in order to meet policy targets on “working with people and communities to create better places” and on delivering more effective use of available funding in a time of constrained resources.

Box 6-2 Checkland style CATWOE analysis of EA involvement with DASH groups

Based on this definition, a CATWOE analysis has been made of the form and components of a Transformation process by which:

1. DASH groups become responsible for the maintenance/improvement of appropriate asset(s);
2. Relationships with local communities and their understanding of FCRM processes are improved.

This transformation process is based on a Worldview that believes that DASH groups may be able to “do something” to reduce flood risk by physical interventions and potentially deliver other EA policy objectives. The Customers (or beneficiaries) of the process are:

1. FCRM professionals and organisations,
2. Landowners affected by flooding,
3. All citizens of local communities affected by flooding and assisted by the DASH group.

The Actors who will carry out the activities making up the Transformation process are:

1. FCRM professionals involved in supporting the DASH group or carrying out parallel FCRM improvement activities.
2. Landowners involved in supporting work of DASH group or carrying out parallel FCRM improvement activities.
3. The leader and members of the DASH group, supported by their committee.

The Owners who can stop or prevent the Transformation process are those within and outside of the EA responsible for

1. Conservation (management of the natural environment),
2. Health, safety and welfare,
3. Funding of minor works through the local levy.

The Environmental constraints which are taken as given in attempting the Transformation process are:

- Storms driving the flooding and erosion processes;
- Climate change (e.g. sea level rise) which may affect future severity of storms and viability of maintenance/intervention strategies;
- Legal restrictions;
- Environmental designations and restrictions;
- Finance / budget;
- Policy requirements.

The seven points summarised from the job description and embedded in Figure 6-1 will be used as effectiveness criteria for assessment of the coordination arrangements in the Keith Lead case study. In exploring the effectiveness of a specific DASH group coordinator in FCRM, alternative more diffuse support mechanisms that might fulfil a similar function will also be examined. In particular, the nature and level of support provided that have been in place in EA West Thames area team since Keith's retirement in 2011 will be examined.

It should be noted that Figure 6-1 includes the standard Checkland & Poulter (2006) monitoring activities around efficacy and efficiency as well as effectiveness criteria. However efficacy and efficiency criteria were not available in this case as there was no access to quantitative information for example on staff time expended under the different arrangements, although qualitatively there were known to be changes:

“in the reorganisation we have had to reprioritise what we are doing and we probably don't spend as much time doing this sort of thing as we did immediately after the 2007 floods and leading up to when Keith left in 2011” [2 members of EA PSO team, Interview 49, Aug 2014]

The discussion that follows therefore focusses on assessments of effectiveness of the various elements.

6.2 Effectiveness of components of DASH coordination

6.2.1 Point of contact for DASH groups

Keith's appointment immediately provided the DASH groups with a single point of contact flood risk management professional able to provide advice and information.

Barry Russell saw Keith as an ideal person to take on the role, as he commented later:

“his skills and experience were very, very closely aligned to what was required for the self-help groups. He was the perfect person for that role ... he isn't what I would describe as a core engineer; ... he is much more of a “solutions by talking to people”, so going out and meeting people, understanding their concerns ... he had great empathy, he could go out and he could understand people's concerns, he could go to parish council meetings and he could actually be the person from the Agency who individuals liked, quite different from [a] ... ‘person of hate’ ...; Keith could go along there, still representing the Agency, but because of the empathy he had and because he was trying to help them, they reacted very well to him.” [Barry Russell, EA Area Flood Risk manager, Thames West, Interview 46, Mar 2011]

Keith was certainly valued by the DASH groups:

“Keith is sort of showing us some light at the end of the tunnel, we’re very impressed with him. ... So we’re going to work very closely with Keith because that’s his job, is to support self-help teams ... [Leader, DASH group, Interview 13, Aug 2008].

The retirement of Keith towards the end of 2011 provided a way of testing an alternative situation.

They advised that in the reorganisation the PSO team has the general liaison role with communities, but if DASH activity is being considered they will bring in their Asset Performance Team (APT) maintenance workforce⁶² to explain the details of how things should be done. The fact that there was no longer a single point of contact was not seen as a major problem, more a question of personal preference of some groups against others:

“Some people don’t like talking to more than one person and others just get on with it. And whatever it takes to get what they want, they will get on and make a phone call.” [PSO team, Interview 49, Aug 2014]

Stewart Scott’s view of the effectiveness of the new arrangements was less positive

“It has been much harder ... whereas before we had Keith so we had this you know permanent contact, ever since then they seem to be in a constant state of... they are continually reorganising, ..., staff keeping changing all the time so we haven’t had a permanent contact. ... We have had some meetings with the Environment Agency at my house, and then six months later the people have gone, you know so constant changes.” [Stewart Scott, Interview 47, Jan 2014]

It may therefore be concluded that having a single professional point of contact is valued by the DASH groups as being the most effective way of communicating with the EA. Alternative more dispersed and variable arrangements are not as appreciated by the DASH groups and continual change of personnel seems to disrupt consistent communication.

⁶² When this research started the EA in-house maintenance work force was named Operations Delivery. As at 2015, this function has been absorbed within the (newly-named) Asset Performance Team (APT)

Maintaining contact and experience exchange between DASH groups

The experience of the Hanneys Flood Group would frequently be shared by Keith Lead with other groups and they would be encouraged them to get in contact with that group and to visit their website. Within his area he worked closely with District and County Council engineers to facilitate meetings to exchange ideas. In particular he worked closely with counterparts at Vale of White Horse DC and at Oxfordshire CC Highways in organising on-site meetings to discuss specific flooding problems and their potential solutions.

Keith also recognised the value of having the occasional meeting of all the groups to share experiences. He supported joint meetings of DASH groups within the Vale of White Horse DC organised by that council and held on at least two occasions. In addition, he and I worked together to organise a workshop for the DASH Flood Groups at HR Wallingford on 9th October 2010 (see Appendix A.5). Perhaps the most high profile event was the Flood Heroes event organised by the EA on 15th January 2010 at which the work of the Hanneys Flood Group won an award.

Since Keith's retirement in September 2011, this kind of joint meeting has not been organised by the PSO or APT teams [Interview 49, Jan 2014]. It was earlier identified (Section 4.5.7), that experience sharing between DASH groups had been found by them to be both helpful and encouraging. The value of experience sharing between communities of practice was also identified by Wenger (2007, p.127) as an important feature. Hence it may be concluded that the joint meetings organised during the time of a dedicated self-help coordinator were worthwhile and that in this respect the PSO/AOT arrangements at the moment where no individual is completely responsible for DASH group coordination are less effective.

6.2.2 Considering DASH activity with communities

a. Proactive contacting of communities

There was no evidence from any of the case study material related to Keith's role and work [Interviews 19 and 44, Keith's diaries, my research journal of experiences working with Keith] that proactive approaches to communities were made during the

period 2008 to 2011. Instead, these materials indicate that Keith's activities were always in response to those who had first contacted the EA in some form or other.

Once Keith did have information, often from one of his colleagues or via another DASH group, about a local community that was interested in talking about DASH activities or something similar, he then did make contact with that local community. He also kept a simple database of DASH groups that he had contacted and followed up with each group from time to time. The database, expanded as part of this research using additional information gleaned from both formal interviews and informal conversations with Keith, is presented Appendix A.4 in tabular format. It includes a record of all the groups with whom he had contact, together with information on what their flooding issue was, what activities they undertook and what kind of role Keith adopted to advise or support them.

The situation in 2015 appears to be very similar, as someone from the EA PSO or APT teams will also respond if approached by a community, even if not proactively seeking contact. It is unclear therefore whether more or less communities and potential DASH groups are now being reached with the setting up of the PSO teams. Both arrangements seem to be effective in opening up a dialogue about DASH work.

b. Working with communities to identify local problems and solutions including DASH

Appendix A.4 shows the diversity of the groups in contact with Keith and the problems they were seeking to tackle. He worked with DASH groups at different stages of development and with groups who were considering a variety of strategies in addition to DASH. Such strategies might include acting as a pressure group to get action by FCRM authorities, raising funds locally to deliver action, producing a flood plan for flood emergencies or arranging for provision of property level measures for resistance (flood boards, membranes in walls) and resilience (flagstones, electrical sockets). If appropriate, the possibility of supporting locally funded activity by obtaining matching funds was explored e.g. from the Local Levy. Keith would always emphasise that the EA worked in partnership with the local authorities to tackle flooding problems and to support DASH groups.

In all cases the approach would be broadly similar – an initial meeting and site visit to understand their problems. Initial meetings were often held in the evenings and were an opportunity for people in the local community or putative action group to express their concerns, to seek answers to questions and to hear about the extent to which the EA could or could not assist.

Typically initial meetings would start [research journal, Keith's diaries] with an explanation that that the EA had no obligation to clear watercourses or maintain defences. Furthermore, because of the EA's risk-based approach (dissemination of which was requirement 9 of his job description), it was obliged to focus its efforts and funding on 'high consequence systems' typically those including large urban areas. He would point out that local people, especially older folk who may have lived in a village or town for many years, often knew very well the routes flood water takes through their village/town during flood events and that this local knowledge was important in identifying solutions. He would explain that solutions to flooding problems often involve a range of measures, including flood storage, new engineering projects, DASH activities and individual house flood resilience measures. (He would also reference the Blue Pages of the National Flood Forum in which various property flood resilience products were advertised).

Following or in conjunction with initial discussions at a meeting, Keith would typically conduct a site walk-over around the village and water courses listening to the local experiences in different locations, identifying the FCRM problems. This would lead on to the identification of potential risk-reduction measures (such as those discussed in Section 5.4) and the extent to which local DASH action could address these problems. Time spent at this stage was seen to be important:

“you've got to be prepared to spend quite a bit of time with them; that is very evident particularly if you've got somebody who is a bit difficult and some people, they don't understand, and this has always been the problem of getting across a technical argument or even a solution to a layperson; but you have to spend time with them and you have to persuade them” [Keith Lead, Interview 19, Oct 2008]

Work that might be carried out using DASH activity was explained. Given that in the local area most flood risk was fluvial, maintaining flood flow capacity in key river channels was always high on the agenda, although Keith would caution that

- any activity would only impact lower order floods but not the larger ones
- any works being carried out by communities or riparian owners need EA consent and those carrying out the work need to employ good practice to avoid damaging the river or coast environmentally
- any local action must be based on a sufficient understanding of the wider catchment context, including ensuring that potential adverse effects of action downstream from the DASH activity were recognised and plans adjusted accordingly.

Since Keith retired, the PSO teams have been given the responsibility for this type of community liaison, which they undertake regularly.

“we talk to them about a suite of different things like flood plans, property level protection, self-help, direct action as you’d call it, the possibility of schemes although you know they are almost a separate thing, they are like the big end of the market and we play our part in advising communities on what they can do and if they say ah we want to do some direct action help, self-help whatever you call it, then we bring in the APT team and they do that because that is their field, that is their expertise.” [PSO team, Interview 49, Aug 2014]

It is interesting to draw an analogy here with the situation with the NEHRA group. As indicated in Section 4.3.3, it seems unlikely that NEHRA would have proceeded to DASH activity without some external support and encouragement. Before I started working with the group, the Havant Borough Council Coastal Manager was supportive, but

“we haven’t got an enormous amount of time to put into them but wherever we have needed to [give] support to Judy I have been along the coastline, she has been in the office, we have made the links with the planners, so I want to encourage that... to encourage them to do what they can to help themselves” [Coastal Manager, Havant Borough Council, Interview 29, Dec 2008]

It was because of the willingness to help combined with a lack of time to do so that the NEHRA DASH group was put in touch with me in the hope that I could assist them.

Thus it may be concluded that when it comes to identifying activities, an effective approach requires both a commitment to provide advice and help at an early stage in a group thinking about DASH activity, but also sufficient time spent doing so and being prepared to work up the subsequent detail. It is to the latter topic that the discussion now turns.

6.2.3 Identifying and agreeing activities with DASH group

Once a local community group (the local parish or town council or a group authorised by them) was prepared to get involved in some DASH action, the next step [Interview 19, Research Journal] which took place was the DASH group coordinator, Keith, to work with the DASH group to develop a detailed plan of action. In developing a plan of action, Keith would stress the importance of tackling the problems in a phased way to avoid overworking people and believed that the Hanneys Flood Group had got that balance right [Interview 19, Research Journal].

Part of agreeing on the plan of work was helping the DASH group to understand the principles around which their maintenance work on water courses should be organised.

In connection with maintenance of watercourses, Keith would stress the principles in Box 6-3.

Box 6-3 Channel management principles recommended to DASH groups
[ref: research journal, discussion with Chalgrove group 19th Nov 2009]

On channel management:

- Conducting work “little and often”, e.g. at least annual clearance of vegetation to allow the watercourse to provide a free passage for water and to help avoid over-silting, which would result in the need for more extensive removal of material from the river channel.
- Working with all relevant landowners on watercourse clearance (preferably starting downstream and working upstream) to ensure that the flows in maintained channels are not restricted by a heavily weed-choked and silted channel downstream.
- Keeping any structures such as culverts, bridge crossings or sluices/weirs etc. in good condition and clear of debris and excessive silt.

On management of adjoining banks and flood embankments:

- Locating any machinery being used as far back from the bank crest edge as possible to avoid destabilising the bank and destroying any bankside habitat or burrows.
- Leaving vegetation along the edges of the channel in place to provide habitat for wildlife, including protected species.
- Ensuring appropriate management of waste.

One of the most difficult areas for DASH groups with which Keith was linked was getting all those involved or affected to agree on the plan of action [research journal].

This was not so much a matter of obtaining consents (see Section 6.2.5) as coordinating all the parties. Here, as well as coordinating the various different EA activities (EA maintenance workforce, conservation, legal, hydrology), Keith would

liaise with other FCRM operating authorities (local council and highways) and with riparian landowners.

Keith liaised with the local riparian landowners because of the importance of any DASH action carried out within the curtilage of a village or small town being coordinated with maintenance of water courses in the open countryside. He often helped the local community by emphasising to the riparian landowner their legal responsibilities for maintenance of drainage ditches, streams and river banks and then encouraging collaboration with the work of the DASH group [Research Journal; Interviews 19 and 46]. In so doing, he would have to deal with a legacy of landowners' experiences of being heavily criticised by the EA for environmental damage when completely stripping drainage ditches of all vegetation. As explained in the part of Section 4.5.7 dealing with landowners, this had led landowners to become nervous of doing any maintenance. He was also able to help in negotiating permissions with landowners for construction on their farming land of structures such as flood bunds or drainage swales (for example at Ascott-under-Wychwood)

The resulting action plans which emerged provide practical evidence of the effectiveness of the coordinator's role in this area. An example of such a plan would be that shown earlier in Figure 4-3, developed with the Hanneys Flood Group.

Since Keith retired, it is unclear how much the PSO and APT teams have provided in terms of advice across the board. The separation of functions has meant that advice given has been of a more discrete nature. For example the APT teams will provide demonstrations of how stream clearance should be carried out:

“We do very much encourage self-help activity. Operational activity advice is always offered if we cannot provide support in light of reduced flood risk benefits or funding. The field team in particular spend a length of time with interested parties showing how we would undertake maintenance in the water course, giving advice and guidance on what equipment to use and things.’ So yes we do run these demonstrations” [EA PSO team reporting approach of APT team, Interview 49, Aug 2014]

However, Stewart felt that what was now missing was any proactive sharing of experiences with DASH groups

“We don’t get any communication from them, I mean apart from the flood warnings we don’t... I don’t know if there is any mechanism for getting you know newsletters or... I don’t think there is you know a letter that goes out to all the flood groups and the Environment Agency saying this is what is happening.”

and

“They are not coming back to us and saying you know ‘How can we help you?’ or ‘Did you know about this?’ and you know ‘Have you read this recent article about managing this?’ and that sort of thing. So there is no downward flow in the information.” [Stewart Scott, Interview 47, Jan 2014]

The PSO team did not see it this way. Instead their view was that such kind of proactive communication was unnecessary, particularly for the Hanneys Flood Group

“it was a case of [the Hanneys Flood Group] being self-sufficient - because they were and you may have witnessed that for yourself - and us just checking every now and then you know in the loosest sense if they are doing alright and if they have got any issues ... They just have our contact details if they want... if they have got questions, anything like that, to come to us. So we’re always happy to provide advice.” [Interview 49, Aug 2014]

Significantly, the impression given by the PSO team in their 2014 interview [Interview 49] was that although advice was willingly given, it would be up to the community to produce their own plan of action as the PSO team would not have the time to do that.

Thus it may be concluded that detailed liaison by the dedicated DASH group coordinator in order to assist DASH groups to develop and compile their plan of action is an effective and demonstrable way of assisting the groups to move forward in the right direction. The present situation, with less time input being available from PSO/APT and that effort being more diffuse, means that this level of support from the EA is longer possible and so the effectiveness of that support is less evident.

6.2.4 Arranging support through funding and in-kind activities

Once the decision had been made by a group to proceed with some kind of DASH activity, practical support that Keith would provide [Research Journal, Interview 19] would include the following:

- Help with modelling of water courses or the design of simple structures such as low flood bunds.
- Organising searches for utility pipes/lines in the proposed work areas.

- Checking with the EA conservation staff for protected species in the habitat in the working areas and adjusting the timing or extent of action to avoid any disturbance which may constitute an offence (see also Section 6.2.5)
- Identifying and securing funds to cover out-of pocket expenses of DASH groups
- Investigating the possibility of a joint working pattern with the EA's maintenance workforce

The latter two aspects are now discussed in more detail.

Funding for expenses

As already indicated in the discussions on funding in Section 5.2, DASH action may be low cost but is not free of charge. Hence low-level co-funding of activities (for example in the purchase of materials or simple equipment) by the EA and other Operating Authorities is important. Keith identified being supported by the EA Area Flood Risk Manager as important here:

“what’s worked well ... internally has been... the backing from Barry Russell in helping me to be able to offer funding to these groups” (Keith Lead, Interview 44);

The more experienced a group became, the clearer and more specific the groups were likely to be in their requests for support. For example, at East Hanney requests were met by the EA for funds for a trailer to store and move hand tools and for a small boat to facilitate working over or near water (see Figure 4-30)

To enable such funding to be secured and released, Keith would have to make an internal application within the EA (Form C process). Towards the end of his tenure in 2011, rather than securing the funding on a piecemeal basis, he had secured an overall annual budget of about £50,000 to be spent as required across the various DASH groups requiring support in his area.

Since Keith retired, PSO teams are still, where possible, seeking to meet requests for funding [Interview 49] for specific activities. However, the current PSO approach to the Hanneys Flood Group which views them as being rather self-sufficient has meant that they have not been offered funds by the EA since Keith retired. Instead, as summarised in Section 5.1.2, they have been obtaining their running expenses from

the county and district councils. The district council has been more proactive in offering funding:

“yes they sent out you know, we can give you grants up to £1000 if you justify you know... if you give us a list of things that you want to do with it.” [Stewart Scott Interview 47, Jan 2014]

Funding of out-of-pocket expenses is important for DASH groups and thus coordination of funding is important; the current mechanisms for arranging this for DASH groups seem weak in comparison with when they had a specific advocate within the EA that Keith represented

Joint action with the EA maintenance workforce

Another type of support would come in the form of in kind activity by the EA maintenance workforce, matching their activities to those being undertaken by the DASH groups. This would typically be in more open land where it was easier for the EA maintenance workforce to get their mechanical equipment in place. It was then possible to come up with an informal agreement about how responsibility for activities such as vegetation clearance could be shared out. For example the Hanneys Flood Group are now helping to maintain clearance of a 5km section of the Letcombe Brook downstream of Lower Mill, East Hanney, following initial clearance by the EA maintenance workforce using a long-reach mechanical excavator.

Negotiations to reach such kinds of shared agreements in the Thames West area of the EA were taking place even before Keith took on his role. For example shortly after the summer 2007 floods the EA was in discussions with the parish council of the village of Eastbury on the River Lambourne where soft weed in the river bed had been ripped up by flood flows and caused a blockage at a local bridge:

“we’ve made it very clear to them we’ve only got the resources to go in once a year to clear the worst of the weed before the winter. Their concern is that with climate change, if we’re going to see more inundation flooding like that, then they need to get some of the weed removed during the summer and they know we won’t do it, so we’re giving them advice on who can do it, how they can do it and what sort of process they need to follow - like getting consent from ourselves. ... So what it seems like now is that the Lambourne will get maintained twice a year, once by us and once by the local community group.” [EA FCRM technical specialist, Interview 3, Feb 2008]

There was a similar experience around the same time with a community group in Lechlade

“We (EA) maintained a particular water course and the community actually said we want to do some of this and we want to help out. Not to replace what you’re doing, because then that would totally put the onus on them, but to complement it and we used to do our annual maintenance in September and they would in March or April do another bout of maintenance because what they were afraid of was the summer floods like we had in 2007, so they wanted to keep the vegetation down in the early Spring, leading up to the Summer.” [Interview 49, Aug 2014]

Having had practical experience in a number of locations (including in and around the Hanneys), the wider potential of such shared activity with the EA maintenance workforce had become clear to Keith and his Area Flood Risk manager. One approach which Keith identified was the need for the EA maintenance workforce to do an initial clearance of a reach of water course that had been badly neglected for a number of years and then hand over the subsequent maintenance to a DASH group. The Flood Risk manager commented about the results of this past neglect being a

“huge great big unachievable hurdle” [Barry Russell, EA Area Flood Risk manager, Thames West, Interview 46, Mar 2011]

for nascent DASH groups. He felt that the EA needed to find approaches, such as the use of an initial campaign by the EA maintenance workforce, to stir the

“embers [of interest] into roaring fires” [Barry Russell, EA Area Flood Risk manager, Thames West, Interview 46, Mar 2011]

In 2014-15, the PSO team said that joint working between DASH groups and EA maintenance workforce (now APT) was still being encouraged [Interview 49, August 2014; follow up conversation with APT manager, 17 April 2015], including the principle of shared channel clearance (e.g. clearance by the DASH group in the spring followed by an APT clearance in the autumn).

It may therefore be concluded that shared working between DASH groups and the EA maintenance workforce is continuing to operate effectively under the new regime.

6.2.5 Internal coordination with relevant EA functions

Given the negativity of many professionals towards the concept of DASH discussed in Section 6.1.1, Keith often became involved in discussing with colleagues the proposed plan of work by a DASH group, so that all relevant colleagues (flood risk management conservation, internal work force etc.) were clear

“when something can be done and something can’t be done because it’s too risky.” [EA Asset Management Engineer, Interview 8, Mar 2008].

When the limits of the DASH activities were agreed and consents were in place, he would communicate to his colleagues that this was being implemented and ensure that best practice shared with the various DASH groups.

In such discussions, Keith had to convey to them realism about the fact that not all safety measures which might be employed on a professional construction site would be present with DASH work:

... we’ve got photos of things going on in East Hanney that we would never allow on our sites ... for example diggers being driven along with people not wearing hard hats ..., [and] people standing in the river with ropes around them ... the difficulty is how do you impose your standards on a volunteer group who are keen to get on and do things and may see some of the health and safety focus that we put on things as being restricting them being able to get on with what they want to..” [Barry Russell, EA Area Flood Risk manager, Thames West, Interview 46, Mar 2011]

and that, if self-help action were to be accepted, the liability for health and safety would probably remain the “biggest exposure” for the Agency:

“our liability and the self-help groups liability and where one finishes and the other starts isn’t a clear line, the danger being is that could be tested [in court] at some point in the future and we’d be found to have got too much liability on our side” [Barry Russell, EA Area Flood Risk manager, Thames West, Interview 46, Mar 2011]

Keith was strongly supported by Barry Russell the area Flood Risk Manager in his role and this support extended to helping him promote DASH activity at professional meetings and as an approach within the management of the Agency. As a result, several meetings were held on site with EA directors, regional flood defence committee chairs, head of media and corporate communications, head of environment and corporate planning. Keith also made presentations at meetings of the EA National Capital Programme Management Service (NCPMS) and at other internal meetings within the Agency. A visit by the EA chairman (Lord Chris Smith) was seen by Keith

to be particularly significant as it represented a move of senior management to take interest in his work. It led to the production of the map in Chapter 4 (Figure 4-27) showing the parishes in which DASH or flood working groups were active.

At a more local level, staff from all groups (development control, conservation, maintenance workforce) within Keith's area gradually became aware of his 'DASH champion' role. As result, they would pass 'leads' onto him [Keith comment recorded in Research Journal] whenever opportunities for DASH activity seemed to be emerging from interactions they were having with local groups. As an internal champion within the EA, the result appeared effective.

Since Keith's retirement, responsibility for this kind of internal communication now resides with the PSO team [Interview 49], but there is no longer a single internal champion or coordinator within the EA for DASH work. If the concept of DASH work is now widely accepted then this champion role may be less important internally within the EA, whatever the DASH groups may feel about it.

6.2.6 Dealing with consents for DASH activities

A major barrier to getting DASH work started was helping DASH groups gain consent for the proposed work.

In order to simplify the process, Keith worked with colleagues at the EA to develop a simplified procedure for "light maintenance" of watercourses and liaised closely with the local communities to ensure that the process was workable. The protocol states that if silt and vegetation is to be removed by machine then a consent is required, but only a simple form has to be completed with contact details and a description of the watercourse and location to be maintained. In the event that only vegetation is to be removed and this using hand tools, no consent is required. This approach is generally consistent with that adopted in the protocol developed in EA Anglian region with regard to consents for light maintenance of sea defences (Environment Agency, 2009).

A key issue in obtaining consents and setting up the new procedure was dealing with habitat and related environmental issues. Keith was able to explain to conservation

officers that maintenance of water courses by DASH was just replacing what would have been done by the Agency's EA maintenance workforce. In such cases

“there should be no real change in terms of the environmental impact.” [Barry Russell, EA Area Flood Risk manager, Thames West, Interview 46, Mar 2011].

Keith was also able to point out that volunteers using hand tools were likely to be less severe on the environment than a machine operation. In any event, his approach was to arrange for the EA biodiversity team to

“go in there and do a quick survey and say you know when you're doing this work please can you consider this, this and this, instead of taking all the choppings away, putting them on the bank and put them in this sort of format because that will encourage insects and flora and fauna to grow and become established. They can have that input and that can be betterment for the river.” [Barry Russell, EA Area Flood Risk manager, Thames West, Interview 46, Mar 2011]

Setting up the light maintenance consenting procedure seems to have had enduring effectiveness. The PSO teams advised [Interview 49] that they have maintained the use of this approach and the APT maintenance workforce team will support it by demonstrating environmentally friendly methods of vegetation management. The PSO team also commented that

“we do get people applying for consent unnecessarily” [EA PSO team, Interview 49, Aug 2014]

because

“as far as flood risk is concerned, as long as they're not constraining the flow or impeding flow in a flood plain, the impacts on flood risk are pretty minimal” [EA PSO team, Interview 49, Aug 2014]

However this does suggest that clear advice on whether consent was necessary for a particular activity might not have been readily available to the DASH group concerned and that the information on the protocol could be made more widely available .

The PSO team saw the consenting procedure as useful, because it enabled proposed activities to be scaled back if required on a biodiversity basis:

“Because they say oh we want to strip this whole channel out and biodiversity say well no can you do it sort of hit and miss and leave bits and take bits out.” [EA PSO team, Interview 49, Aug 2014]

This rather positive picture of how the consenting process was working since Keith retired was not reflected in an incident described by Stewart Scott, relating to a concrete block next to a footbridge placed there

“so the allotment holders can carry their watering can, step down, scoop up some water, back over the bridge and water their stuff. One day some kids had knocked off the concrete block in to the stream, so I mentioned in my email, the next flood group we’re going to do blah, blah, blah and if we have got time some of us will go out and put... fit this step back in with a bit of cement and I had an immediate email from the Environment Agency, ‘you must not do that until you have had written permission and approval you know and pay your fee to have...’ I just went ballistic so I wrote to Ed Vaizey and Lord Smith, saying you should fire... not in those words but basically you know do you know what your staff are telling us.” [Stewart Scott, Interview 47, Jan 2014]

This suggests that the EA had arranged to monitor the regular emails being sent out by the Hanneys Flood Group, but only saw fit to engage with them when something seemed to be amiss, a rather one-way form of communication

Thus whilst in principle the consenting arrangements for DASH work seem to have been set up to operate in an effective manner, the lack of hands-on support for DASH groups does seem to mean that things are less straightforward for the groups than they used to be when a full-time DASH coordinator was in place.

6.2.7 Support during action

Once a DASH group had got its work underway (Item 8 of the flow chart in Figure 6-1 the kinds of activities that Keith typically carried out [Research Journal] were:

- Arranging contacts and visits from the EA Conservation officer to provide guidance to the group on carrying out vegetation clearance at a time and in a manner which would avoid unnecessary destruction of habitats and ensuring that the groups were properly briefed about their duties in relation to endangered species (e.g. water vole)
- Carrying out site visits during the DASH work, which was typically carried out at weekends
- Preparing material for local community magazines to help explain the approach to DASH.
- Preparing progress notes where professional contractors were working on some elements of the flood risk mitigation.

Since Keith retired, the DASH group would have to organise themselves this kind of input from EA personnel or others [Interview 49]. The support of the APT maintenance workforce team seems to be limited to a willingness to come and perform demonstrations of vegetation clearance procedures.

6.2.8 Unsupported, unconsented DASH activity

Finally in terms of an assessment of effectiveness, it is worth contrasting the situation in West Thames with that in a different place and time, namely Gloucestershire in 2008-9. This contrasting situation illustrates the dangers of a DASH group not being given appropriate guidance.

The approach in the area can be seen from the example of Beckford, Gloucestershire, which following the Summer 2007 floods carried out work without land drainage consent:

“In one case (Beckford, Gloucestershire) the DASH work had been misguidedly focussed on all the ditches and drains upstream of the village rather than downstream of the village. The effect of this was to increase flows through the village, not to reduce them” [Professional hydrologist, Interview 39, Dec 2009]

In these areas, one interviewee stated that there had been an unwritten script from the EA along the lines of

“Don’t apply for land drainage consent, because there will be very long delays before any application is dealt with and it may then be refused” [Professional hydrologist, Interview 39, Dec 2009]

In such locations, where DASH groups and activity were effectively ignored, there was a degree of abrogation of responsibility by the FCRM authorities. In terms of Arnstein’s (1969) ladder of participation (see Section 2.1.1), the level of citizen participation at this location seems to have become inappropriately high and serves as a warning. Thus, even the reduced support currently being provided to DASH groups through the PSO teams in West Thames seems more desirable than no support at all.

6.3 Conclusions; DASH group coordination by FCRM authorities

6.3.1 Conclusions: effectiveness of facilitation and support activities in meeting the needs and aspirations of DASH groups and EA

The needs and aspirations of DASH groups relate to the effectiveness criteria discussed in Section 5.3. Whilst their main target is reducing flood risk, their embedment in their local community means that they are also interested in:

- providing improved understanding of local flooding mechanisms to their local community;
- receiving practical support in the development of flood management strategies and the skills to deliver them;
- receiving consent for their activities to proceed;
- financial support of seed-corn funding for materials and equipment.

They may also be interested in developing emergency flood plans and generating improvements to the local environment. The Environment Agency has an interest in ensuring all these things take place too, given their national policy target to “work with people and communities to create better places” (Environment Agency, 2011c)

The analysis in this chapter shows that support mechanisms provided within EA West Thames area have helped to meet these needs and aspirations. Walk-over surveys and discussions with EA officers have provided DASH groups with improved understanding of flooding problems and the effectiveness or otherwise of different measures to reduce flood risk (Sections 6.2.2 and 6.2.3). Working with EA officers has helped to develop DASH group action plans (Section 6.2.3). Information, including demonstrations provided by the EA maintenance workforce, has assisted in the development of appropriate skill sets (Sections 6.2.4 and 6.2.7). Financial support (Section 6.2.4) has provided seed-cord funding for equipment, materials and insurance etc. Simplified consenting processes for work by DASH groups been prepared by the EA (Section 6.2.6). These support activities have been summarised in a framework process diagram (Figure 6-1)

6.3.2 Effectiveness of different DASH support coordination approaches

The example discussed in Section 6.2.8 provides evidence that some DASH coordination and support from FCRM professionals is better than none. The analysis of the effectiveness of alternative arrangements in Section 6.2 also shows that there are clear differences in the effectiveness of a full-time single coordinator and dispersed arrangements where the responsibility of dealing with DASH groups does not fall to one person. The contrasted evidence presented in Section 6.2 suggests that this is related to the DASH groups reporting less time resource being now put into DASH coordination under the new arrangements than when a single full-time coordinator was in place and as a result the groups feel less supported because support cannot be as in-depth. However, other reasons for the difference identified relate not just to the quantity of the support but also to its quality. A single point of contact (Section 6.2.1) is able to bring together support on a number of aspects with a degree of focus that is missing from dispersed arrangements. These include: being able to explain and share from working with other groups the practicalities of DASH activities (Sections 6.2.2 and 6.2.3); being able to provide contacts between groups (Section 4.5.7); being able to readily coordinate funding on a block basis (Section 6.2.4); and being able to follow through on a whole range of miscellaneous details that would not be available to someone uninvolved with DASH on a regular basis (See e.g. Section 6.2.7).

Table 6-1 summarises the effectiveness of the DASH coordination arrangements under the alternative regimes discussed in the previous section.

Of course, if the decision were ever made to move back to appointing DASH coordinators by the EA, care would be needed in selection and training of the appropriate candidates. For, as Barry Russell comments

“what we have really found is it takes a very special set of skills ... so you could be asking people to do things that they are not at all well able to do and therefore probably do more damage than good ... at that sort of level that you need to be able to have someone that can go in and be really enthusiastic about it and really help them out, ... can go out and meet the community groups and can actually almost be a part of the community themselves in very many ways,” [Barry Russell, EA Area Flood Risk manager, Thames West, Interview 46, Mar 2011]

Table 6-1 Effectiveness of DASH group coordination under different regimes

Aspect of role	Effectiveness of a DASH group coordinator role	Effectiveness of new PSO/APT arrangements within EA
1. Point of contact for DASH groups	Effective and appreciated by DASH groups	EA do not believe Single Point of Contact (SPC) is needed and have provided different arrangements. DASH groups would still like SPC.
1a Experience exchange between DASH groups	Experience sharing is part of role of DASH champion. Meeting exchanges can be encouraged and organised	Neither PSO or APT teams are organising exchange of information or exchange meetings.
2a. Proactive community contact	Limited. It is difficult to make contacts without some kind of lead.	Limited. Communities at highest risk are prioritised.
2b. Identifying options for community action	Carrying out role on a permanent basis allows sufficient time to explain to communities the range of available options (including DASH) and to support the initiation of subsequent action	PSO team meet communities and explain range of options available but do not have as much time to do so.
3 Sharing experiences to assist DASH group start-up and activity and managing expectations	Key principles of channel and defence management can be shared and expounded. Experience sharing can be proactive.	Principles shared by PSO team in initial meetings but time is limited. APT provide detailed advice on hands-on aspects like channel maintenance techniques. Proactive experience-sharing is missing.
4&7. Resourcing: funding and in-kind support	Hands-on support can provided for: modelling and designs, utility searches, liaison with conservation officers. Block funding can be sought and joint arrangements made with EA maintenance workforce;	Provision of resourcing present but fragmented. DASH groups have to proactively obtain any resources and support from the EA themselves. Joint arrangements with EA workforce are made.
5. Coordination with professional colleagues	Keith was a pioneer. He adopted a balanced approach which allowed the positive aspects of DASH activity to come through without ignoring the problems	DASH activity is now more accepted than when Keith was working. However, with the role split between PSO and APT, there is no single internal champion for DASH activity
6&7. Organising consents including conservation issues	Keith sets up simplified consenting procedure. Emphasises value of hand working in reducing habitat/ biodiversity damage	Simplified consenting procedure continues. PSO team happy with way it is operating. DASH groups feel less supported.
8. Support to DASH groups during action	Arranging and conducting site visits during work; preparing material for community magazines; arranging advice of EA maintenance workforce	Advice and demonstrations from EA maintenance workforce are given. Other during action support is patchy.

The next chapter examines the final research objective in relation to the human dimensions of FCRM assets, following the initial discussion in Section 2.3.

7 Human dimensions of flood risk management assets

“... the life of a community, and the lives of individuals in that community, may interact both with the structure of what lies in their hearts, and with the way that stones and trees and buildings, too, are shaped to be in harmony with that structure in their hearts.”

(Christopher Alexander (2002) ‘Battle for the life and beauty of the earth’, p.90)

This chapter addresses the third research objective in regard to the identification and measurement of human dimensions of FCRM assets significant to DASH and other community groups. Within this objective, research question (3.1) was addressed by the part of the literature review in Section 2.3 and established that a set of common human dimensions could be identified that are generally applicable to engineered structures and features.

This Chapter now addresses the remaining research questions and starts (research question 3.2) by conducting an empirical verification of the applicability of the human dimensions framework identified in Chapter 2 to FCRM assets. The approach is largely based on the nVIVO analysis of coded textual data from the semi-structured interviews with some additional validation from the further ethnographic work (as described in Sections 3.3 and 3.5). The full nVIVO coding tree for the human dimensions aspect is given in Appendix A.3, but summaries are given in each of the subsections of the chapters to give an indication of the relative balance of references to the various points made. Since the aspect of reduction of risk associated with flooding and erosion is inherent in the security-order provided by FCRM assets, the main focus of the data analysis is on the dimensions of the theoretical model relating to Availability-Accessibility and Delight-Inspiration.

The chapter then turns to an evaluation (research question 3.3) of whether the measurement of the human dimensions can be carried out by DASH groups in a credible and consistent manner. A semantic differential scale is developed for scoring of each of the three dimensions. The use of this scale is then tested in field trials in which DASH or other local community groups are asked to score their local assets against the scales and an evaluation presented of whether it has been possible for such groups to score the human dimensions in an credible and consistent manner.



Figure 7-1 Couple enjoying view from sea wall at Cromer, UK (photo J. Simm)

7.1 Sense of security from flooding or coastal erosion

Because dealing with the dimension of sense of security from flooding or coastal erosion was explored in other aspects of the interviews, it was not always discussed in depth in the human dimensions part of the interviews. However, such comments as were made were unequivocal about the importance of the protection provided by the assets, both natural and man-made. Table 7-1 shows the numbers of references made to the various identifiable elements under the sense of security topic

Table 7-1 References to FCRM Sense of Security identified by coding of interviews

Sense of security (1,1)	Coastal erosion (5,13)
	Flooding (4,7)
	Health and safety of users (6,7)
	Protecting habitats vs people (8,15)

Note:

Figures in brackets after each node description are respectively the number of sources (i.e. interviews) mentioning the aspect and the total number of references in all those sources. So, as an example, (5,13) means the topic was mentioned in 5 interviews with a total number of references of 12. Figures quoted are non-cumulative, i.e. they relate just to that node and not to any references to the sub-nodes.

In areas low lying to adjunct rivers or the sea, of course, the main concern was the risk of being flooded:

“you know as the sea gets closer and closer to you, you feel a bit more threatened as well ...”
[Judy Clark, DASH group member, Interview 33, Jan 2009]

Hence FCRM assets are valued for what they can bring to minimise this risk (see Figure 7-2). One professional said, for example:

“people support our flood defences and of course the main one is that they appreciate not only themselves and their land being protected from flooding but also all the nature conservation sites and in fact it probably is the nature conservation sites which caused this project to go ahead in the first place; because by government decree they have to be protected, so protection I think is very high on a lot of people’s minds” [Engineer, river management contractor, Interview 28, Nov 2008]

In addition, as the Table 7-1 suggests, aspects of sense of security which emerged were quite broad and not restricted to the obvious themes of security against coastal erosion or flooding. For example Table 7-1 shows that interviewees were also concerned about the health and safety of asset users. This was a topic which particularly exercised professional respondents and touches on the next topic on accessibility and useability (see Section 7.2). They were also aware of the potential benefits that FCRM assets could provide in urban communities in terms of *protection against theft and anti-social behaviour*. The form of river channels can also be of interest in this regard:

“the community copper for the area ... forced his way into the debate about the width and depth and plan form of the new river, because ... he wanted width and depth adjusted to stop criminals; he also badly wanted to stop new bridges because youths would gather underneath to sniff glue ...” [Director, Rivers Trust, Interview 36, May 2009]



Figure 7-2 New floodwall decorated by citizens of Sunbury, PA, USA, after it successfully protected their neighbourhood from flooding by Tropical Storm Lee, Sept. 2011. (Photo courtesy USACE)

Unsurprisingly, given the motivations and objectives behind DASH work discussed earlier, the dimension of sense of security, in this case against flooding or coastal erosion was a high priority for interviewees. Confirming this was not a major surprise and so the focus of the chapter now turns to the case for confirming that other two dimensions are also applicable to FCRM assets

7.2 Accessibility-usability

The dimension that is described as accessibility-usability became populated in the nVivo analysis of the interviews with a significant number of issues. Table 7-2 shows the interview references made to the various identifiable elements associated with accessibility-usability.

A key justice issue which can be quite controversial is the statutory emphasis on protection of habitats and geological exposures: citizens are often affronted by the fact that protection of habitats and geological exposures is legally required whereas protection of people is only provided if it is justified on economic and other criteria:

“there is a fair amount of animosity, because they seem to think, and quite rightly so, that the wildlife is far better protected than we are. ... Natural England and the EA ... were going to spend between five and seven million pounds recreating some lagoons ... further back as the coast eroded, purely and simply because European legislation said that they had to do it
[Leader Coastal protection Action group, Interview 14, Sep 2009]

Most of the accessibility-usability issues related to the maintenance or provisions of facilities for specific activities around the coastal and riverine environment.

7.2.1 Access

A key aspect for many people, mentioned by two-thirds of the interviewees and the most frequently mentioned topic overall, is the issue of provision of free access over, along or through FCRM assets adjacent to the sea and rivers:

“... some dog-walkers came up behind me ... and I suddenly realise I’m looking at this [farmland] as a floodplain asset ... and they’re looking at that’s where they exercise their dogs every day. Plus ... a nine to five job as well ... grazing cattle and things.” [EA Technical Specialist, Interview 3, Feb 2008]

The CRoW Act (Anon., 2000a) has meant that there has been increased pressure to provide or negotiate improved open access to the

Table 7-2 References to FCRM asset Accessibility-Usability identified by interview coding

Accessibility-useability (4,4)	
Access including access structures (19,43)	... including access for disabled (2,2), painting (0,0), beach cliffing (1,1), hanging washing out to dry (1,1), right of way along frontage (8,14). And preventing access for dumping rubbish or stolen goods (2,2)
Educational value and potential (1,1)	
FCRM assets	Including potential for community or individual adjustments to FCRM assets (2,3) Hydro-power generation (1,1) Shelter or windbreak (2,3) Visibility of river or sea (8,10) Maintaining historical significance (2,2)
Non-leisure use	Including agricultural (2,2) and commercial (6,9) use and broader socio-economic development (1,1)
Ownership of watercourse (1,1)	
Place (0,0)	Including FRM assets as part of community of place (3,4) or as a place of celebration (2,2), meeting (3,4) or play (9,15)
Recreation and tourism (7,11)	Amenity facilities (0,0), including: buildings (3,3), car access and parking (6,13), electrical recharging (1,1), entertainment facilities (2,6), proximity of hotels (1,1), residences (2,8), shops (2,3) and public transport (1,1), restaurants and cafes (3,4), skateboarding (1,1) Beach activities (1,1) including: barbeques and picnics (7,8), beach huts (1,1), crabbing (e.g. in beach pools) (2,3), driving cars on beach (1,3), effect of weather or season on use (2,4), flights from beach (1,1), horse riding and training (2,2), jogging, running (1,1), sand karting (1,1), sunbathing (2,2), throwing stones into water (1,1), time of day affecting beach use (1,1), volleyball (1,1), watching air shows (2,2), use of beach materials (grain size of material, sand castles) (4,4) Enjoying outdoors (1,1) Hygiene (1,1) including: cleanliness (1,4), showers (1,1), toilets (1,3), water quality (sea or river) (1,1), wind-blown sand (1,1) Security from theft and anti-social behaviour (3,3) Water sports and activities (0,0), including: boating (mooring, navigation) (7,12), canoeing (5,9), jet-skiing (2,2), kayaking (1,1), paddling, swimming, bathing (3,5), pleasure cruises (1,3), sailing (3,7), sea-kiting - kite surfing (2,2), speedboat rides (1,2), surfing - wind surfing (3,8) Water-side activities (0,0), including: bird-watching (5,7), dolphins and seals (alive or dead) (2,2), fishing (angling) (17,30), golf (1,1), photography (2,2), promenading (4,4), shooting (1,1), sitting and watching (4,6), walking, dog walking and exercising (13,29)

Note:

Figures in brackets after each node description are respectively the number of sources (i.e. interviews) mentioning the aspect and the total number of references in all those sources. So, as an example, (5,13) means the topic was mentioned in 5 interviews with a total number of references of 12. Figures quoted are non-cumulative, i.e. they relate just to that node and not to any references to the sub-nodes.

countryside, although in some areas landowners are still fighting a strong rearguard action against this:

“we have a very, a rather antiquated organisation [of riparian owners] ... who are dedicated to stopping this [CRoW Act open access] coming to the [area], and I know someone who said to me you can say anything you like here but don't mention access to me...; and you know that's kind of keep off, this is my land, we don't want you here unless you're an angler who's just paid us £100 a day to fish it.” [Director, rivers trust, Interview 36, May 2009]

In urban areas, the ‘green ribbons’ that lie along watercourses are highly prized by residents for walking etc [Interviews 7, 8, 12, 28] and this was also mentioned as being important by USA interviewees. With regard to the coast, Natural England has a statutory duty (Anon., 2009) to improve access to the English coast through the creation of a continuous long-distance walking route around the coast and a margin of accessible land alongside it.

The evidence of the interviews suggests access can mean many things to different people: how much access; spatial frequency of access points; access both along defences, banks etc and across them; sufficient access to avoid being cut off by changing rising tides or changing water level conditions; access openings, steps and ramps of different widths and types reflecting the interests of walkers, fishermen, wheelchair users, those wishing to launch boats, canoes, and other water equipment. As a result there may be conflicts between different potential users about the form of access:

The most common cause of anguish ... is access to the river ..., so canoeists versus fishermen for instance, there’s always bush fires there; but following the CROW Act, which opened access to the countryside as a whole, people are now fighting for access to walking river banks [Director, river trust, Interview 36, May 2009]

Access can also have unintended consequences, examples cited including the illegal dumping of rubbish and shopping trolleys [Interviews 45-7 and 46] and vandalistic behaviour such as where:

“the local not nice part of society used to steal cars and use the flood embankments as ramps to take off to see how far they could get the car into the river” [EA Asset Management Engineer, interview 8, Mar 2008]

There is also the question of supporting accessibility to access points with features such as car parking (mentioned in a number of interviews both in regard to the coast e.g. Interviews 6 and 11 and rivers e.g. Interviews 8 and 28), public transport, cliff steps and lifts, links to shopping areas (Interviews 6 and 30). Those parking their cars seem to want two main things: to take a walk or to sit either inside or outside the car and take the view, watching ships, nature etc (Interviews 6 and 11). A lack of car parking or difficult access for cars seems to be a powerful way of keeping visitor numbers down.

Professionals indicated access can often have a significant impact on the design of river and coastal defences, with conscious decisions being taken to improve or limit access, depending on the circumstances. Concerns cited for limiting access included: health and safety of people trying to use access points to climb over dangerous structures such as rock armoured slopes, disturbance of wildlife and loss of the sense of remoteness:

“in community terms it’s a good idea to have a path on a flood bank because it gives people an elevated view of what’s going on ...[but] it might mean they could overlook houses actually, which might not be so good ... the other danger is having ... Habitats Regs sites and SSSIs [when Natural England will be] absolutely anti, because these sites are remote and if you have people streaming past them, then they lose that remoteness.” [Specialist, EA National Environmental Assessment Service, Interview 7, Mar 2008]

Provision of access facilities to FCRM assets thus helps citizens to feel that the place belongs to them and can encourage them to view themselves as stewards of it. Poor (social) justice around this issue can therefore be thought of as relating to exclusion from access or use by professionals or landowners (whether deliberately or in ignorance) even though the exclusion might be justified by professionals for safety reasons:

“there was a conscious decision made, this is along quite a long length, that public access onto this berm would only be provided at the upstream and the downstream end, because we didn’t want the public climbing up” [EA Asset Management Engineer, Interview 8, Mar 2008]

A particularly complex aspect of access relates to equality of provision of the access to all (e.g. including disabled access) to the same place or activity and fairness in making provision for a wide range of citizen interests [e.g. Interviews 6,7].

Professionals also mentioned issues of maintenance arising from provision of access along or across structures, e.g. balancing the costs and maintenance effort required to provide formally surfaced paths, cycle tracks etc vs. allowing more informal tracks that could cause undesirable rutting and depressions. They also mentioned where beaches are being maintained by nourishment with fresh material (especially where the material is mixed sand and shingle) that there was a need to manage the access difficulties that arise with vertical ‘cliffing’ of the freshly placed material following wave action:

“this one particular time towards the end of the summer - as you know when we recharge, {the fresh material} ‘cliffs’ quite readily - ... they hadn’t cliffed horrendously but he had his small grandchildren who were on the beach and of course they found it difficult to get off the beach, you know you or I would have had to scramble a bit but we would have been fine, so he rang up and I went to see him and the first ten minutes he sort of basically didn’t stop, talking quite loudly, but you know he made his point [Engineer, coastal management contractor, Interview 23, Nov 2008]

The importance of access is well illustrated in the case of Lympstone, an old fishing village on the Exe Estuary, Devon. Here the defence scheme developed in collaboration with the local community involved strengthening of existing property boundary walls into proper flood walls and importantly retention of key access ways (known locally as ‘drain-ways’) between these walls and the associated old fishing cottages and houses

“people are always asking if they can walk along, or how to get down to the foreshore. It’s just the way it’s been and I can’t conceive of them blocking off the accesses. It would have changed the whole character of this end of the village.”[Coordinator, Lympstone Parish Council, Interview 9, Jun 2008]

One particularly unusual feature in this village is the fact that the beach is used for hanging out washing to dry on lines stretched between old fishing poles. Maintenance of the drain-ways to access the beach for this and other purposes was achieved by means of insertion of steel flood gates, which villagers close on being notified that a storm surge is imminent:

“the gates we’ve got are fantastic ... but up Key Lane there, we open them between times [during low tides in a storm surge period] so the villagers can go and get their washing out and dried, because a lot of the cottages are very small, they really don’t have room for tumble dryers, not that they’d want them anyway, but if they want to get their washing dried it’s got to go on the line on the beach, so they give me a call and say “M, can you come and open the gate” and so off we toddle, one of us will go down and open them. Because sometimes they get called and I’m not in the village, I’m working away, and so I’ll find someone else who I know is around and say can you go and open the gate for J, she wants to get out and put her washing on the line” [Coordinator, Lympstone Parish Council, Interview 9, Jun 2008]

Thus the aspect of provision of free access over, along or through FCRM assets adjacent to the sea and rivers is important to citizens for a variety of practical educational and active and passive leisure activities. It also helps to engender a sense

of belonging and ownership of the assets. However, conflict can arise with FCRM professionals where there is a desire to limit access for reasons of safety or limiting maintenance effort.

7.2.2 Availability of View

The desire to be able to have a view of the sea or river as much as possible also emerged as a major theme in the analysis. This is related to the issue of access, but also to the form of man-made assets, particularly in regard to their height and location. Many of the professional interviewees raised this issue and pointed out the impact it had made on the eventual engineering solution. Examples were given in the interviews of demountable defences so that the view of the river is only obscured during times of flooding [Interviews 7, 12, 21], or even a recognition that a defence was not an appropriate solution at all. This issue tended to dominate in urban areas and related to harder defences of steel or concrete; in rural areas where defences are mainly embankments it is less critical, although citizens expect to be able to walk along the crest of embankments and see the water that way:

“from people having the flood defence in the urban situation – yes, they want it to look nice and to be able to walk along the river’s edge safely; they want to be able to sit and admire the view; they want to be able to park their cars safely and admire the views – all these things.”

[Engineer, river management contractor, Interview 28, Nov 2008]

7.2.3 Waterside and in-water activities and provisions

Taken as an overall grouping recreational and leisure issues (including for tourists) dominated the kinds of things that people were expecting from their water environment and the assets associated with them. This group of activities can be loosely divided into categories of waterside and beach activities, activities in the water and other amenity issues.

Active waterside recreation

Of the waterside recreational activities, from the evidence of both the comments in the interviews and the frequency with which they were mentioned, walking, especially dog walking, and fishing (i.e. angling) emerged as being the most significant and for both of these the form of the engineering assets could be very important.

With regard to angling, one design professional pointed out that for the water frontage for which his team was responsible

“all the banks throughout the 240 kilometres are potential angling for somebody, so whether it be urban or rural we are constantly talking with angling associations and individual landowners” [Engineer, river management contractor, Interview 28, Nov 2008]

Another professional went further and explicitly stated that:

“the next biggest involvement [after FCRM] is then angling and there’s some parts of our river system where it’s been managed to promote fishing and angling more than anything.” [EA Technical Specialist, Interview 3, Feb 2008]

The widespread nature of fishing/angling activity applies as much to the coastal waters as it does to rivers, as a coastal frontage manager commented:

“if you [had] come out here [in the] evening ... on the late low water you would have seen dozens and dozens of head torches, bobbing around on the sand digging lug worm. It’s literally almost like ... those ... Barry Manilow concerts where they used to hold their cigarette lighters up ... the auditorium lights would go down and there would just [be] these people with their [lights] ... well it’s a bit like that you just saw this blackness and these little bobbing lights all over the place where people are digging lug worm ... During the winter I would say there is a fishing competition certainly at least once a weekend ... and they peg them out at ... every ... twenty metre intervals, I have seen virtually six kilometres of fishermen.” [Engineer, coastal management contractor, Interview 23, Nov 2008]

Fishermen look for assets that allow them to get closer to the types of water they want to fish in and the interviews suggested this was often provided by the form of revetments and bank stabilisation structures and by groynes and flow deflection structures. In addition, bespoke fishing platforms, ramps etc were often included in the design of FCRM works to accommodate the fishing constituency, supported wherever possible by non-FCRM sources of funding. Alongside fishing, hunting and shooting would also be important in a few areas, but interviews indicated that this was a much bigger issue in the USA than in the UK where population density makes it impractical in many situations.

Walking, especially dog walking and exercising, constituted the other major group of around-the-year waterside activity. Waterside river and coastal paths are attractive to both walkers and their dogs and one river trust manager commented on the ‘magnetic

effect' on people walking dogs of even the smallest water course. The structures themselves can be useful as well: flood embankments provide a

“nice flat multi-user trail along the top of it which is always dry because it's above river [flood] level” [Area Manager, Association of Rivers Trusts, Interview 35, April 2009]

and groynes on beaches can be used to 'steeplechase' exercise dogs. Another form of more relaxed walking associated with the seaside is what is commonly known as 'promenading' and those interviewed from coastal local authorities emphasised the effort they make to ensure that this experience is pleasant, attractive and safe. Even piers, groynes and outfalls seem to provide a big attraction, with one coastal manager commenting:

“I mean, we're a strange nation, we like to walk out on piers and get out, don't we.” [Coastal Manager, Maritime District Council, Interview 6, Mar 2008]

Golf as a form of exercise which includes walking is also significant with many golf courses being located alongside coasts and rivers (Interview 11).

The attractive nature of walking along rivers and coasts, reinforces the importance of the issue of access and rights of way already discussed, both for walkers and cyclists. Skateboarding is popular with youngsters but may require separate facilities to avoid interference with other uses and enjoyment of footpaths, promenades etc. (Interview 30).

Passive waterside recreation

As already indicated in the discussion above about cars, sitting and watching the river, sea and the activities of the water, the water environment, water users, birds and creatures such as dolphins and seals is a very important form of recreation and relaxation. Within the Cromer seafront paving the concept of sitting and watching is epitomised in some words from Elizabeth Gaskell (1855) engraved into the stone decoration:

“She used to sit long hours on the beach gazing intently on the waves as they chafed with perpetual motion against the pebbly shore.”

This emphasises the need for places to sit and watch, ideally in comfort; at coastal seafronts such as Bournemouth and Cromer the ethnographic investigations showed a consistent demand for more seats and benches, even with towns like these having the

longstanding tradition of deck chairs. The form of sea and river defences often offers possibilities for incorporating both formal and informal seating arrangements and these are well used (see Appendix A.2 and Figure 7-1). In more remote locations, embankments and bunds can provide an elevated position for observing areas such as salt-marshes which are rich in flora and fauna

“and allows you to go out further into the salt marsh away from the road” (Coastal manager, maritime district council, Interview 11)

Watching can also extend into photography and painting. One professional coastal manager commented in interview:

“our coast is much photographed, much painted and much used for artistic purposes, either the natural features of the coast or the man-made features or the human activity on the coast. It’s very, very strong in people’s psyche in the area, and they come here specifically to photograph or paint here. See it, feel it.” [Coastal manager, Maritime District Council, Interview 6, Mar 2008]

Beach activities

On beaches, there are a wide range of activities, including the traditional sitting, sunbathing, picnicking, playing in the sand making castles, crabbing in sand pools etc, throwing and skimming stones into the water, and making use of beach huts. More physical activities include running/jogging, sand karting, football, volleyball and horse and donkey riding and training (Interview 30 and ethnographic observations).

A restricted number of beaches allow cars to drive on them and even on the wider beaches have flights taking off and landing (Interview 11). A few larger coastal towns now have air shows which people assemble on the beach to watch (Interview 30). Evening barbeques have become popular recently and coastal rock or timber groynes offer a sheltered location for these (in the lee of timber groynes or between rocks), although with some risk of setting fire to timber groynes (Interview 30). Rock groynes have become popular for sunbathing as they act as massive storage heaters: they warm up during the day and then stay warm into the evening, so that people can sit or lie on them and keep warm (Interview 6).

According to the Bournemouth Seafront Amenity manager (Interview 30), the extent of beach use depends on the weather and time of day. Usage patterns are changing

from a pattern of maximum usage from early morning through to late afternoon, to a pattern between late morning and evening. The weather significantly reduces beach activities, with people retreating from the beach to the promenade.

In-water activities and sports

Water-based activities and sports that are important to people in both riverine and coastal waters include:

- paddling, bathing and swimming, which take place in both coastal and river waters. In the view of one river trust manager such activities are widespread:
[if] you get a nice summer ... everyone dives into their nearest river ... actually there is a big constituency of river swimmers ... in this country, a huge amount. A nice shallow pool is a magnet for you know toddlers and families and things on a nice sunny day; [Director, river trust, Interview 36, May 2009]
- boating, canoeing and kayaking; these activities can be supported by: provision of launching facilities and in rivers by such things as mooring locations and electrical charging points [Interview 28]
- pleasure cruising, which is popular in both rivers and on the coast but maintenance of water depths can be an issue and here collaboration between those involved in maintaining water depths for flood risk management and for navigation is vital [Interviews 8 and 28]

In coastal waters windsurfing, jet-skiing, sailing, sea kiting/kite surfing and speedboat riding are also found [e.g. Interview 30].

Waterside facilities

Desirable waterside facilities mentioned in interviews included:

- Shelter. Manmade assets can also provide shelter and warmth for people when sitting and watching, most notably groynes on beaches provide shelter from the wind for people and for barbeque fires [Interview 6]; bridges over water courses also provide shelter from rain and thus can be attractive for homeless people [Interview 8]. Restaurants and cafes

- Amenity buildings for lifeboats, gift shops, entertainment, offices for official persons responsible for rivers and coasts so they can be available to support the public
- Cleanliness and hygiene facilities were an important aspect and strongly reinforced during the sea-front survey at Bournemouth, when the most important and repeated reaction to emerge from users about the seafront was: “Its clean!” Alongside this comment were requests for more toilet facilities. Bournemouth’s seafront amenity manager commented in interview:

“Well those are the two fundamental things... decent toilets, clean toilets, lots of them, so clean sandy beach.” [Interview 30, Dec 2008]
- Proximity of hotels, shops, public transport and residential accommodation:

“... being an island race we always had a fondness for the sea and I don’t know that when all of us retire we would all move to the sea but there is a good percentage that think ‘Wouldn’t it be nice to have a little house on the coast?’” [Engineer, coastal management contractor, Interview 23, Nov 2008]

Another issue was maintenance of historical features and significance of places and artefacts, whether for individuals or for whole communities. A few interviewees commented that coastal and riverine locations offered great potential for people, especially children, to enjoy the outdoors, have a break from an internet-dominated increasingly virtual world and gain some educational value in the process:

“so you’ve got educationalists and creative people working with kids or with adults and I’ve also come across projects where artists have put in structures to rivers which are you know multi-purpose for want of a better phrase, you know flood risk management structures as well as feeding platforms and educational things, got engraving on the bottoms of stones on the bottom of the river which kids go in and find you know.” [Area Manager, Association of Rivers Trusts, Interview 35, Apr 2009]

Sense of place

A sense of place which people value (see literature discussed in Sections 2.2.1, 2.3.2 and 2.3.3) can be generated in a variety of ways such as the presence of commercial fishing activities. Sense of place can in some cases be generated directly by the assets themselves; for example weirs, culverts, bridges, groynes etc can act as focal points for meeting, playing and even celebration. A coastal manager [Interview 6] cited an example of a set of steps down a cliff which were used as the focal point for a firework display. An environmental specialist [Interview 7] referred to a weir/cascade in an

urban setting which attracted a wide range of children, families and young people playing in and around the water pool and even interest from schools. These interviewees reported that such locations can also be subject to vandalism (but no more so than any other public feature which is created to encourage interest) and appropriate design or redesign was needed to manage this risk.

7.2.4 Conclusion: accessibility-usability human dimension

A wide range of accessibility and usability issues have been identified from the data analysis which confirm the importance of this dimension for FRCM assets. Free access over, along or through FRCM assets adjacent to the sea and rivers is important for a variety of practical educational and active and passive leisure activities. It also helps to engender a sense of belonging and ownership of the assets. The desire to be able view the sea or river, from or across man made assets is also important and is affected by access and also by the height and location of the assets. Usability issues are manifold and include requirements for active waterside recreation (e.g. walking angling), passive waterside recreation (sitting and watching, art), beach activities active and passive, in-water activities with and without boats and other powered and non-powered equipment. Waterside facilities to support such activities are important including seating shelter shops restaurants toilets and showers, accommodation and transport. All of these facilities associated with the physical water or waterside FRCM assets and the incidental or commercial uses of the area (e.g. fishing) combine to produce a sense of place which is valued in its own right and leads naturally into consideration of the final human dimension of delight and inspiration.

7.3 *Delight-Inspiration*

The dimension that is described as Delight-Inspiration became populated in the nVivo analysis of the interviews with a significant number of issues. Table 7-3 shows the interview references made to the various identifiable elements associated with accessibility-usability.

Table 7-3 References to FCRM asset Delight-Inspiration identified by interview coding

Aesthetics (Imagination-Inspiration) (2,2)	Visual appearance (11,30)
	Attraction (0,0), including: inspiring poetry and song (1,1), tourist attraction (11,15) and attraction of beach pools (1,2), seaside pier (2,2), river channel and corridor (8,16), sea and coast (4,10) and surrounding area (1,1)
	Flora and fauna, including birds and wildlife (3,7) and park along river corridor (1,1)
	Historical-heritage interest, including: listing (preservation) of structures (3,4) and maritime links and history (2,4)
	Inspiration of environment, including: liminal space affected by weather and tidal changes (1,1), seasons of the year (1,1)
	Inspiration of FCRM assets, including artistic involvement in assets (5,9), derelict structures (2,7), emotional and spiritual input to asset form (1,1), attractive paving (1,2), quality of construction (1,4), vegetation on or near assets (2,8)
	Negative appearance including litter and debris (3,4), presence of trash (2,2) and silt deposits (2,5)
	Negative attraction, including: poor environmental and social conditions (1,1), vandalism (4,6), wind-blown sand (1,1)
	Sense of place (6,10)
	Spirituality
	Liminality (1,1)
	Quietness vs action (0,0), Including both liveliness & action (3,3) and quietness, wildness, remoteness (6,21)
	Sense of freedom, calmness (1,1)
	Timelessness (1,2)
View (0,0) including: colour-light (3,14), landscape-seascape (9,12), order-disorder (1,1), reflections in water (1,1), rhythmic features (1,1), ships passing (1,1) and view of the coast (2,6), river (11,20), sea (5,12) and sea and sky in different weather conditions (1,3)	
Water movement around asset (4,13)	
Noise of water motion (2,2)	
Wave overtopping (1,1)	

Note:

Figures in brackets after each node description are respectively the number of sources (i.e. interviews) mentioning the aspect and the total number of references in all those sources. So, as an example, (5,13) means the topic was mentioned in 5 interviews with a total number of references of 12. Figures quoted are non-cumulative, i.e. they relate just to that node and not to any references to the sub-nodes.

In this dimension there are two intertwined themes which emerge and will be discussed in this section: one is the delight-inspiration of the FCRM assets themselves and the other is that the FCRM assets should not detract from but ideally enhance the intrinsic attractiveness of the landscape that surrounds them as might be assessed in a landscape character assessment (see e.g. Scott, A., 2002; Swanwick, C. & Land Use Consultants, 2002).

7.3.1 Delight-inspiration of FCRM assets themselves

People seem to value public works themselves looking ‘nice’, or which compare favourably with other things or places (‘nicer than’). Although ‘nice’ is a weak word, it came up repeatedly as interviewees struggled to find an expression that captured their view of the aesthetic appeal of public works. Sometimes it was used in a comparative way. An artist encountered during observational work at Cromer commented that the sea walls there were “nicer to look at than the ones at

Sheringham” and helped to create a “splendid profile” across the sea front. [Interview 38, Aug 2009].

This corroborated the perspective of the Coastal Manager [Interview 6] who said that both visitors and the local community at Sheringham were of the opinion that the sea walls there were ‘boring’ – a simplistic assessment but one which can be very telling and powerful if you live with structures like that on a permanent basis. In 2008, the President of the Chartered Institution of Water and Environmental Management (CIWEM) [Interviewee 12] was sufficiently troubled about this issue to make Art and the Environment his presidential theme. He spoke about engineers needing to use their ‘hearts and souls’ as well as their minds in designing engineering works (particularly having in mind the flood risk management works with which he was familiar) and the need to consider bringing in artistic talent at an early stage in scheme design. What is ‘nice’, ‘imaginative’ or ‘inspiring’ is of course difficult to pin down and potentially very subjective, as the debate initiated by Prince Charles over the architecture of public buildings has borne witness. However, there is project-by-project evidence of situations where the consensus is that things have either gone demonstrably badly (as in the Sheringham sea walls) or well. The Fosse Barrier at York (see Figure 7-3) is an



Figure 7-3 The River Foss Barrier as viewed from Castle Mills Bridge, York.
(© Copyright David Rogers and licensed for reuse under a Creative Commons Licence. Downloaded 15th July 2011 from www.geograph.org.uk/photo/866662)

example of an FCRM asset where, after residents' pressure and planning input, the resulting structure was a significant architectural improvement on the original proposals and fitted much better into the surroundings.

In some cases FCRM schemes have even received additional funding (e.g. Heritage Lottery Fund) for the inclusion of items of public art and as well as adding visual interest, the attraction of these can help in the inspiration and regeneration of local communities (see e.g. Figure 7-4).

Understanding what is aesthetically pleasing in the urban environment may be relatively clear cut. In the rural environment, FCRM assets, as with the previous dimension of accessibility-usability, face again the challenge of both being imaginative and inspirational in their own right (if feasible) or simply not detracting from and ideally enhancing the natural environment.



Figure 7-4 'The Couple', Newbiggin on Sea
(Downloaded from <http://www.freefoto.com/preview/1033-05-19/Offshore-sculptures-Couple--Newbiggin--Northumberland-> on 18th July 2011
Creative Commons Attribution-Noncommercial-No Derivative Works 3.0 License)

Good examples of structures discussed in interviews with potential to be imaginative and inspirational are weirs in rivers (which have a direct impact on flows and water levels) and groynes on coastal beaches (which have a direct impact on waves, sediment transport and beach levels). In the best examples, their ability to transform natural processes actually enhances the environment for people, and makes the place

‘attractive’ [Interview 7]. Weirs appear to be a particular focus for interest because of the pools of water upstream including different water depths, the water motion over the weir, and the pleasant noise of water falling; they even offer opportunities for fine detailing of water motion patterns to create even more interest. As importantly as creating something that is functional and aesthetically pleasing, a professional commented that they can also create a “sense of place” and “become the focus for community activity” [Interview 7].

Coastal groynes modify the natural coastal geomorphology, but may be found attractive. The early 20th century artist Paul Nash found the stark form of the sea wall and rhythmic groynes pattern at Dymchurch attractive (see Figure 7-5). One professional commented about groynes:

“... they’ve been used for so long, that they’re almost a natural part of what you expect to see at the seaside ... from a member of the public’s point of view, they’re there to help keep the beach in place. It also gives them variety as well visually in terms of the level of the beach either side, because you get the drift up against the groynes and then it drops; so I think they’re interesting from that point of view.” [EA Asset Management Engineer, Interview 8, Mar 2008]



Figure 7-5 Dymchurch Wall – painted by Paul Nash in 1923

FCRM professional interviewees also commented on the importance of the use of sympathetic and/or imaginative materials in FCRM structures. Examples included

getting the fine scale, the ‘look’, of the materials and their composition right, in stone walls and the use of coloured concrete materials in coastal and riverside paths and promenades. This can extend into other forms of public art, such as at Pittenweem Harbour, Scotland, where a ‘Golden Age’ 23.5 carat gold disc seven metres in diameter by artist Hill Jephson Robb has been installed on the promenade or at Gainsborough, where a coloured path created with involvement from local school children expresses the force of nature and the interaction of the River Trent with the town and highlights the role of the flood defence⁶³.

Good quality materials and construction can also be critical in some urban areas to enhance or at least not encourage decline in the overall built environment that arises by mimicking existing buildings. Getting a good look to some types of structure was thought to be difficult in any circumstances, such as trash screens and gabion and concrete crib walls. If it is essential to use these structure types, such as trash screens, the solution suggested by an environmental assessment specialist (Interview 7) was to provide imaginative surrounding landscape materials such as carefully positioned trees and shrubs.

A controversial interface between the natural environment and structures is the subject of trees on embankments (see CIRIA, 2013 Chapter 4). Engineering arguments suggest that tree roots can damage embankments and the trees themselves obstruct water flow (although even between engineers these are contested points). Equally trees and shrubs are often seen by the public as an ‘*expected*’ part of our river corridors and channels (as well as providing shade for fish species). They

“create a maturity and an interest ... the whole landscape was treed or most of it at one time, so I guess it’s within our psyches that we like, we expect, trees or vegetation, and it adds interest, it’s aesthetically pleasing” [EA National Environmental Assessment specialist, Interview 7, Mar 2008]

Part of the success of river restoration projects in urban areas has been the restoration of these kinds of environments where rivers have previously been heavily engineered and canalised or even culverted. A professional from the USA supported the view that

⁶³ www.rspb.org.uk/news/details.aspx?id=tcm:9-254043 ; Accessed 18th July 2011.

“we’re better off keeping water courses open, and the aesthetics that those bring to the community” [Flood management engineer, USA, Interview 16, Sep 2008].

Public expectation of what a particular asset should look like is deeply engrained: “the seaside should always be like the seaside always was” (Tunstall, S. & Penning-Rowell, E., 1998, p.330), even if the changes are only occurring due to natural processes (examples given including growth of grass and mud deposits on a beach).

This public expectation was emphasised by professionals in the interviews:

“it is beautiful down there and they don’t want to see that landscape or aesthetics changed by building something modern out of concrete.” [Coastal manager, Maritime District Council, Interview 29, Dec 2008]

If there some kind of ‘historic ... look and feel’ to the place, this expectation can be much stronger and can lead to formal preservation orders being set up:

“they just felt that [the sea walls were] historic and ... the Preservation Society ... is one of those that says “Thou shalt not change anything”. Anything that is changed is for the worse. Regardless. And so they’ve gone and listed the sea walls.” [Coastal manager, Maritime District Council, Interview 6, Mar 2008]

In complete contrast to the work of Paul Nash mentioned above, who celebrated the modernity of the sea defences (Figure 7-5), weathered or derelict timber or steel structures can be quite appealing to artists, both sculptors and painters. Sculptors have been given permission for example on beaches either to modify a structure in place or to put something on the beach and let the sea move it around and abrade it. The appeal to artists is illustrated by the painting (Figure 7-6) of deteriorated timber groynes. Clearly a crumbling aesthetic can have an equal appeal depending on the artistic genre.

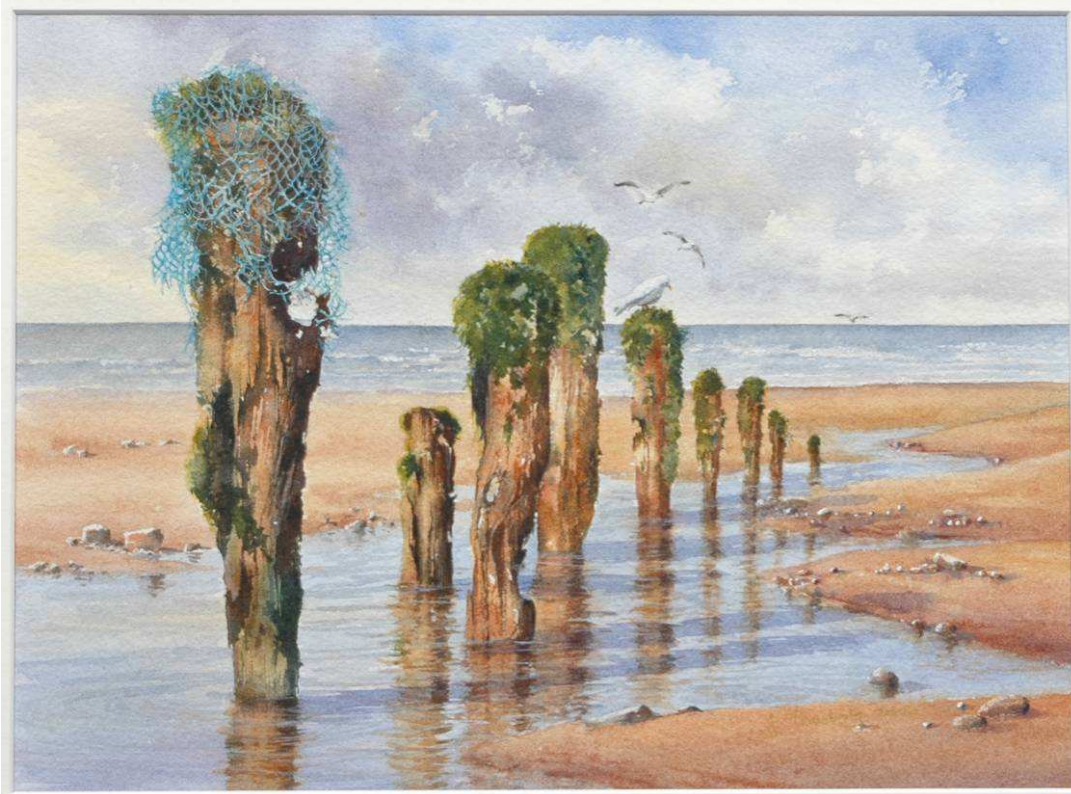


Figure 7-6 'Groynes at Spurn Point': painting by Janet Thackaray inspired by a deteriorated structure

The more negative side of the appearance of assets also emerged with key issues mentioned by interviewees (Interview 30 and ethnographic work at Bournemouth) including trash and debris on/in hard and soft assets such as beaches and channels. 'Trash' can be highly variable, including cans, bottles, drug apparatus, shopping trolleys and even larger items. Of course both coasts and rivers have much natural debris, such as woody debris in channels and seaweeds on coasts and these are generally perfectly acceptable visually. However siltation in heavily engineered and over-widened channels can be very unattractive:

“who wants to enjoy a walk by the river when it’s got two foot of black silt in the bottom and crisp packets everywhere?” [EA Technical Specialist, Interview 3, Feb 2008]

7.3.2 Landscape and environment context of FCRM assets

The visual aspect of assets leads into consideration of the wider context of the river and coastal scene within which the assets are set. This, especially on the coast, but bearing in mind that beaches are an important part of coastal defence assets, is what is important to many and was what the artist interviewees [Interviews 34 and 38]

enthused about. The scene is rich with different elements and processes, including the attractions of:

- The water environment itself: waves breaking, rivers rushing; the attraction of ‘reflections’ in quiet waters;
- Fauna: birds and gulls singing, swooping and calling, diving and fishing, in the UK a richer diversity often being experienced when migrating birds overwinter; individual mammals (seals, dolphins, squirrels) often forming a focus of interest;
- Flora: tree-lined river corridors forming a rich feature of the scene whether rural or urban (with water ‘rippling through’ bridges); wilder areas such as salt-marsh and dune slack and open countryside displaying a rich habitat;
- Manmade objects: where the sea or river is a dominant part of the scene, features such as bridges and ships can add interest can help to generate iconic images for people to associate with and indeed be used in tourism or business promotional materials.

In all of this, light and colour can capture the imagination: the ‘magical’ effect of the sun over the sea with the ‘light dappling on the water’ especially at times of sunrise and sunset (Figure 7-7) when the angles of light and the colours of the sky and of the water can vary dramatically with weather and time of day, from misty scenes to times when the visibility extends for miles and it seems ‘so clear’. This, in addition to the aspects of either new or crumbling defences discussed above, was stated to be a “painter’s paradise”:

“water is just such a draw ... sparkling water, the all-changing sea and the sky, and the skies here are massive, they are huge, when you look out over here, over the west... beautiful sunsets here and ... because of the storms coming in from the sea ... when the sky is darker than the sea and the sea is light and just a little patch of light on the top and the sky is really dark, I mean it moves me, it impresses me” [Artist, Interview 34, Jan 2009]

Interviewees spoke warmly of the way in which river and, especially coastal scenes, had what the Country Landowners Representative [Interview 26] called a ‘spiritual’ dimension, something which had to be directly experienced in the place and was more than just the scene, and included involving a wide range of sensory experience. In attempting to capture this aspect, artist interviewees used words such as: timelessness,

quietness, peacefulness, stillness, naturalness, isolation, desolation, desertion, wildness. They commented on the powerful combination of land, earth, water, sea and sky, and the power of ‘nature’ including the sea in winter.

“I don’t think there’s anything that quite compares to that [indicating the view/panorama out over the sea]. ... Yea I mean obviously the light [varies] but there’s a sort of timelessness about it, isn’t there ...” [Coastal artist, Norfolk, Interview 38, Aug 2009]



Figure 7-7 ‘Another Place’: Anthony Gormley’s cast iron statues at Crosby, Liverpool, UK (Downloaded from Wikimedia Commons)

The changing interface between land and water illustrates the concept of liminality first brought into a wider context by Victor Turner (1969) - a place of change and vulnerability which has an impactful effect on those who experience it. One professional interviewed said:

“recognising this boundary between sea and land that is actually a very fluctuating boundary and quite a special place and also changes through the time of day, the state of tide and the seasons; so for me yes the coast is a very special place because of that, because there’s that boundary, because it changes, it is always changing and it changes through time of day, time of week, time of year, whatever it may be.” [Coastal Manager, Maritime district Council, Interview 11, Jun 2008]

Some of those interviewed expressed a personal preference for places where this liminality could be experienced by going down the “narrow road that doesn’t really go anywhere” [Engineer, coastal management contractor, Interview 23] or finding the

“forgotten place at the end of everywhere” [Coastal/river artist, Interview 34]. But interestingly the professional cited above who described the coast using the language of liminality, was responsible for a largely urban sea frontage and thus this ‘spiritual’ sense does not appear to be limited to places that are isolated, desolate, deserted and wild. For example, during the survey at Bournemouth sea front, two little girls with their father spoke of how ‘calm and peaceful’ the place was, despite the number of people using the beach. Likewise an artist commented in relation to a family on the beach at Cromer, on the ‘sense of freedom’ and ‘calmness’ he observed and sensed [Coastal artist, Norfolk, Interview 38]

It is therefore not surprising that many people are very passionate about dealing with things that damage this dimension, including anything from trash to rowdiness.

However, it has to be acknowledged that some people may not observe or notice at all:

“one girl [I knew]... just didn’t know the rubbish was there, she had never walked on the beach there, she had never looked at it ... some people seem to just pass through their environment, other people take an interest in it and acknowledge it.” [Coastal Manager, Maritime District Council, Interview 11, Jun 2008]

7.3.3 Conclusions: delight-inspiration human dimension

There are two strong elements of delight and inspiration that are confirmed by the above analysis: the importance of the form of the assets themselves and the context in which they are set. Aspects of the form of the assets that are humanly attractive are diverse and their assessment can be subjective: the attraction of the new versus the old and even deteriorating; the way the assets pleasantly or unpleasantly disrupt the natural environment (e.g. weirs and groynes); the materials used in the assets, which can extend to components of public art and need to fit in with the materials in the surrounding natural environment; and the need to avoid areas where rubbish and other undesirable materials are trapped. Aspects of the surrounding environment which the assets need to complement are equally diverse: the water environment itself, flora and fauna and manmade features; the light and colour of the water and the sky; and the spiritual dimension and ‘calmness’ which is sensed, enhanced by the ever-changing combinations at the liminal land-water-sky interfaces.

7.4 Valuation/scoring of human dimensions

The previous sections have empirically verified (research question 3.2) that the human dimensions framework identified in Chapter 2 is applicable to FCRM assets and has provided a degree of richness and colour to each. This section now moves on to address whether the human dimensions can be measured by DASH or other citizen groups in a credible and consistent manner using a semantic differential scale analogous to that used by the EA for structural condition assessment .

7.4.1 Using a semantic differential scale to assess human dimensions

As well as the use of a semantic differential scale in assessing the structural condition of engineering assets discussed in Section 2.3.1, there is also some pedigree for the use of a simplified scale to score the elements of the sustainability of projects. Bell & Morse (2003), for example, advocate its use to create a RADAR, star or spider diagram to illustrate a number of aspects simultaneously. This was also the approach adopted to enable experts to score the sustainability of a number of response measures across a range of socio-economic and climate change scenarios as part of the Foresight Future Flooding project (Simm, J. D. & Thorne, C. R., 2007). Each dimension was scored using a semantic differential scale, similar to the example for social justice shown in Table 7-4. This information was then combined into an overall spider diagram (see example in Figure 7-8) which included dimensions of cost-effectiveness, environmental quality, social justice, precaution and robustness .

Table 7-4 Scoring system for social justice used in the Foresight Future Flooding project

Score	Social justice
++	Action increases the capacity to deliver improved standards of social justice (fairness in distribution of benefits and costs, and in engagement), promptly, and with associated progressive re-evaluation.
+	The action provides some capacity to deliver improved standards of social justice.
0	No deterioration of social justice
-	The action reduces capacity to deliver minimum standards of social justice.
--	Action strongly reduces capacity to deliver minimum standards of social justice, causes measures of social justice to worsen

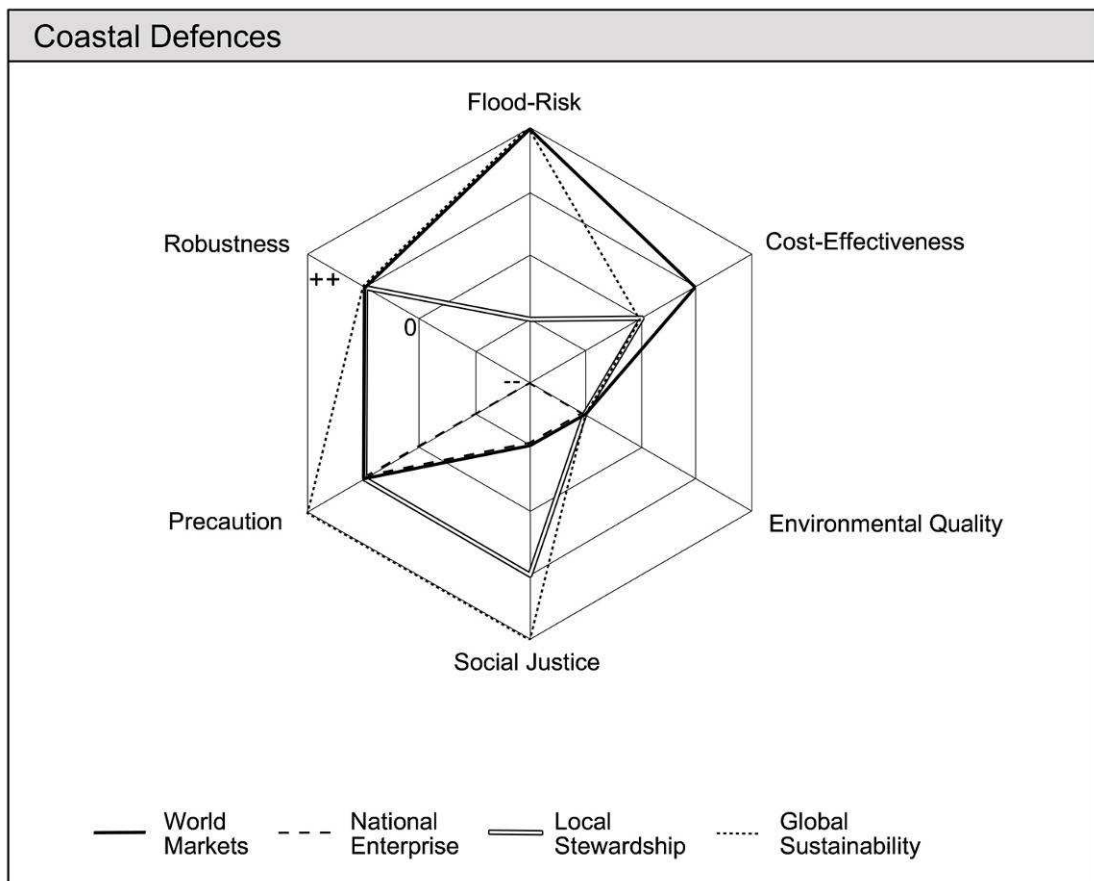


Figure 7-8 Sustainability score diagram, Foresight Flood & Coastal Defence Project (Evans, E. *et al.*, 2004)

Table 7-5 sets out a semantic differential scale for the three human dimensions, using generalised descriptions and a scale of 1 to 5 consistent with the EA condition grading system. The table also includes examples of human dimensions⁶⁴ of flood risk management assets within each category, drawn from the material described in the previous sections of this Chapter.

That changes in human dimensions are important to people can be inferred from a consideration of the impact of negative change. Many of the interviewees in FCRM emphasised this. One professional said:

“A recurring theme across the coast [is] that people don’t like change; very often they tend to have false memories or idealised memories of what the coast was like and from that one day when they were six years old and it was lovely and sunny and they had an ice cream in their hand, or whatever, something similar to that.” [Coastal Manager, maritime district council, Interview 11, Jun 2008]

⁶⁴ Although some of the human dimensions overlap with potential equivalent environmental dimensions, the latter have not been identified or assessed as part of this work.

Table 7-5 Human dimensions of FCRM assets

Performance feature: INSPIRATION/DELIGHT		
Condition Grade	Generalised description	Examples of features that could be assessed (drawn from flood risk management)
CG1	Inspirational sensory effect Very enriched sense of place	<ul style="list-style-type: none"> • Effect on scenic appearance • (Visual) appropriateness of engineered works in context • Visual form/proportions of engineered works (incl. embedded 'art') • Tastefulness of materials used • Tidiness • Interface with floral/faunal interest (including urban vs rural differences) • Cultural appropriateness • Effect on motion (visual/sound) of water (river or sea)/sediment • Effect on tranquillity/peace
CG2	Pleasing sensory effect Rich sense of place	
CG3	Neutral sensory effect Sense of place unaffected	
CG4	Displeasing sensory effect Poor sense of place	
CG5	Repulsive sensory effect Very impoverished sense of place	
Performance feature: JUSTICE/BELONGING		
Condition Grade	Generalised description	Examples of features that could be assessed (drawn from flood risk management)
CG1	Ideally suitable Very inclusive	Suitability for amenity use Suitability for landowner use and enjoyment Access <i>to</i> desirable adjoining features (e.g. foreshore), Access <i>along</i> asset Disabled access Seating availability Views of waterscape/landscape / Viewing points Sense of belongingness / ownership of asset Degree of multiple functionality afforded
CG2	Suitable Inclusive	
CG3	Acceptable Neither inclusive or exclusive	
CG4	Unsuitable Exclusive	
CG5	Very inappropriate Very exclusive	
Performance feature: ORDER/SECURITY		
Condition Grade	Generalised description	Examples of features that could be assessed (drawn from flood risk management)
CG1	Very secure Negligible risk of harm	<ul style="list-style-type: none"> • Freedom from fear of flooding/erosion • Safety of defences (demountables particular concern) • Erosion loss of valuable/historic property • Health & safety during use (including personal safety at night) • Property security/freedom from thieves/vandals • Hygiene: cleanliness, waste management and toilet provision
CG2	Secure Low risk of harm	
CG3	Acceptable security Some risk of harm	
CG4	Insecure High risk of harm	
CG5	Very insecure Extreme risk of harm	

However, deterioration is an inevitable part of both the engineered and natural parts of FCRM assets and systems (Hooper, R. *et al.*, 2009; Thorne, C. *et al.*, 2007). A number of aspects of this were discussed in the interviews including morphological change, climate change, asset deterioration, and socio economic change. Morphological changes in rivers and along coasts lead to erosion and accretion processes which if the systems are to be managed sustainably in the long term often have to be allowed to

proceed with relatively little human interference. Similarly climate change, for example sea level rise, means that defences which previously were able to withstand given environmental forcing conditions (e.g. wave action) may not be able to do so in the future without substantial works at potentially excessive cost.

When assessing human dimensions some respondents (mainly flood risk management professionals) expressed the view that that improvements in one human dimension might be to the detriment of another. For example at one location the desire to retain the existing sandy beach for amenity purposes was in conflict with the need to provide security against flooding by introducing a shingle beach or rock revetment. The distinctions between the three human dimensions in Table 7-5 allows this difference or tension, where present, to be explicitly captured, without having to compromise the views of those involved. As an example, potential differences in ranking between the dimension of security from flooding and inspiration are illustrated by the following quotation in which security from river flooding is set against the delight and inspiration of the view from a water side property:

“The biggest most expensive properties ... that we deal with, are all along the river Thames. People will pay extra for the view, as they see it, or pay extra for the flood risk, as I see it [or for the access for their boats].” [EA technical specialist, Interview 3, Feb 2008]

7.4.2 Assessing the human dimensions – NEHRA trial

With the semantic differential scale in Table 7-5 set up, it was then possible to start to assess whether the measurement of the human dimensions can be carried out by DASH groups in a credible and consistent manner. The challenge, having identified generic categories would be whether in a particular location the nature and state of locally specific performance features associated with a particular dimension could be assessed in a consistent way. It was believed that some kind of local participatory or consensual process might be necessary to achieve this consistency, recognising that different local communities might value the same type of feature in different ways. As one professional interviewed said:

“you have to learn what other people value. It’s no good going in there and thinking that you know what they’ll value.” [EA National Environmental Assessment specialist, Interview 7, Mar 2008]

As explained in Section 3.5.2, a first trial of the process (Type 2 semi-independent multiple assessments) was carried out with the NEHRA group. During the brainstorming session a number of performance features associated with each dimension were mentioned which were then readily assembled into the 3 dimensional framework (see Table 7-6).

Table 7-6 Human dimensions framework for assessing Northney sea wall

Performance feature: INSPIRATION/DELIGHT		
Condition Grade	Generalised description	Example statements by NEHRA members regarding Inspiration-Delight of sea wall
CG1	Inspirational sensory effect Very enriched sense of place	Sea wall ... <ul style="list-style-type: none"> ○ “(via permissive path) allows community to view and appreciate the seascape as well as the landscape” ○ “[offers] pleasant walk on permissive path” ○ “[needs] grassed areas for visual effect” ○ “Ensures the [grazing] marshes exist and thus, by helping to keep farm viable, helps to maintain cows and farm and so a beautiful area” (“No farm = no beautiful Northney”)
CG2	Pleasing sensory effect Rich sense of place	
CG3	Neutral sensory effect Sense of place unaffected	
CG4	Displeasing sensory effect Poor sense of place	
CG5	Repulsive sensory effect Very impoverished sense of place	
Performance feature: ACCESSIBILITY/USEABILITY		
Condition Grade	Generalised description	Example statements by NEHRA members regarding Accessibility-Useability of sea wall
CG1	Ideally suitable Very inclusive	Sea wall ... <ul style="list-style-type: none"> ○ “needs availability of a good harbour-side path, preferably permissive” ○ “allows people to get to the shoreline – i.e. access” ○ “[in]sufficient width for walking [along it] safely” ○ “[lack of] smooth surface to walk over (where there is a proper footpath)” ○ “being repaired gave us a boost in community spirit” ○ “brought together the community to maintain the wall” ○ “maintains integrity of marshes for grazing and rainwater storage” ○ “maintains a barrier between wetlands and pastures for different levels”
CG2	Suitable Inclusive	
CG3	Acceptable Neither inclusive or exclusive	
CG4	Unsuitable Exclusive	
CG5	Very inappropriate Very exclusive	
Performance feature: ORDER/SECURITY		
Condition Grade	Generalised description	Example statements by NEHRA members regarding Order-Security in relation to sea wall
CG1	Very secure	Sea wall ... <ul style="list-style-type: none"> ○ “keeps us dry” ○ “keeps sea from village” ○ “defends against flooding behind” ○ “prevents sea water flooding” ○ “maintains integrity of marshes for grazing and rainwater storage” ○ “protects all the property in the village” ○ “protection of the farmland – a major asset to the village” “As the sea gets closer and closer to you, you feel a bit more threatened”
CG2	Secure	
CG3	Acceptable security	
CG4	Insecure	
CG5	Very insecure	

Only three replies were received to the subsequent questionnaire, although the views expressed did reflect previous comments made by a broader group of individuals during the course of working together with the NEHRA DASH group as well as what had been compiled during the previous Village Design Statement survey. The combined results of the three replies received from the committee members are shown in Box 7-1 and show that the responses were identical in terms of the condition grade values.

Box 7-1 Condition grading of Northney sea wall by residents

1. For Order/Security, we would give the Northney seawall in its *present* condition a Condition grade of CG 3 (Acceptable security - some risk of intrusion) because...

(RES 1) "...existing condition protects except for, fortunately, rare occasions when high tide, low atmospheric pressure and E/SE high winds coincide. The integrity of the sea wall is vital for prevention of flooding and therefore maintenance of the rainwater storage facility and grazing potential of the marshes."

(RES 2) "...the wall could still be overtopped at exceptionally high tides. Fear of the wall breaching has been reduced by the repairs carried out."

(RES 3) "...through the work we have been able to carry out, the integrity of the wall has been maintained, at least in the short term."

2. For Availability/Accessibility, we would give the Northney seawall in its *present* condition a Condition grade of CG 3 (Acceptable - neither inclusive or exclusive) because...

(RES 1) "...the wall permits use of the area by both landowner and public. The condition of the path along the wall is mostly acceptable but would benefit by widening in many places and the permissive stretch could be extended to improve public access to the 'harbourside experience'. Disabled access for wheelchairs etc is impractical."

(RES 2) "...there is only limited access to part of the wall, and not to the foreshore. Repairing the wall has bought the villagers together with a good community spirit. Complete cooperation with both owners of the farmland would enable the work started to be completed."

(RES 3) "...we have maintained access along the permissive path, albeit it needs a smoother safer surface along it for wet weather use. Access is still limited, but the work we can carry out is limited by finance and owners of the farmland. What work we did achieve bought out a strong community spirit, which has carried us through other village projects."

3. For Inspiration/Delight, we would give the Northney seawall in its *present* condition a Condition grade of CG 2 (Pleasing sensory effect - rich sense of place) because...

(RES 1) "...it is a delight that frequent flooding has for the present been prevented. Also the permissive path associated with it allows the public to enjoy the beauty and diversity of the harbour at all states of the tide and time of year. Materials used for repair should be as unobtrusive as possible and blend in with the surroundings..."

(RES 2) "...the repairs were carried out with sandbags, which mould into the bank, and are cost-effective in materials and using voluntary labour. A lovely walk along the permissive path."

(RES 3) "...the engineering works are appropriate visually in the context of finance available. It allows the community access to the path along the shore, to share in the views and wildlife etc, and also maintains the viability of the dairy farm, an important and integral part of Northney."

NOTES:

1. Based on responses from 3 members of NEHRA (North East Hayling Residents Association) completed 10th-12th December 2010

2. All three residents independently gave the same scores for each of the three performance features.

The consistency in responses from the NEHRA DASH group members was not entirely unexpected given the prior effort that had gone into identifying the local aspects of the three human dimensions, not just in the group consensus discussion, but also those by the wider cohort of DASH members during the course of working together and during the survey work carried out during the compilation of the Village Design Statement survey. Thus in this case it was not necessary to resolve differences through a final *deliberative* discussion amongst the DASH group members, “a conversation whereby individuals speak and listen sequentially before making a collective decision” (Austen-Smith, cited by Gambetta, D., 1998, p.19).

7.4.3 Assessing the dimensions – Brixham Breakwater trial

As explained in Section 3.5.2, the Brixham Breakwater trial was a Type 1 assessment, involving multiple independent individual assessments. It took place on 23rd October 2014, when members of the public in Brixham attending a public exhibition about coastal defence in the area were asked to complete a condition grading questionnaires for Brixham Breakwater and its flood defence function. 31 attendees completed the questionnaire and there was no known discussion between participants in the survey, prior to them completing the questionnaires. These individuals were not known to one another within the context of a DASH group. The results are shown in Table 7-7.

The following observations can be made on the results

- a. There is quite a lot of scatter in the results. Table 7-7 shows both the mean condition grade scores and also the standard deviations. Standard deviations can legitimately be calculated since condition grades can be considered as continuous functions even though the assessment here is incremental. Standard deviations reach or exceed one whole condition grade and suggest an unacceptably wide degree of variation for practical condition grading.
- b. The highest degree of scatter of the results is for the sense of security dimension. Looking at the explanatory comments given to justify their scoring, people used a wide range of different factors to assess whether it would provide the necessary protection including both visual assessments and local knowledge about the recent history of performance of the structure. Lack of understanding about which of these aspects would be important in practice lead

out visual condition grading of a structures physical condition and the wide range of results that an inspector might give led to EA inspectors being required to undertake training and pass a competence test (T98) before being allowed to carry out the work (see e.g. Bown, C. *et al.*, 2014).

- c. There is less scatter on the other two dimensions, but the range (4 standard deviations) is still 3 condition grades.
- d. Pearson moment correlation analysis (Pearson, K., 1895) has been carried out on the data. Use of correlation analysis is not unreasonable since, as explained above, the incremental data is a representation of a continuous function. Correlation coefficients between the results for the three different human dimensions shows no significant correlation except for the dimension pair security and availability/accessibility; here the correlation shows some significance ($\rho = 0.52$). This suggests that those who ranked the condition of the breakwater low on security also tended on average to rank the condition low on availability/accessibility and the same for high condition. Probably all this implies is that there were differences amongst those surveyed in terms of their mental ‘calibration’ of what was an average condition. But it does suggest that if this could be resolved by some kind of consensus-building activity then there would be less scatter on the results.
- e. This exercise can be viewed as a worst case test for the condition grading approach, because there was no prior discussion to determine what might and might not be important. Such discussion could have ruled out one serious misapprehension in a response that “water can go around the end of breakwater” which was used to justify given a condition grade 5 for security against flooding, not realising that the driver for flooding was wave action and not water levels. Removing this anomalous result actually increases the correlation coefficient between security and availability/accessibility from 0.52 to 0.66, further reinforcing the previous point. (It also reduces the scatter slightly, with a standard deviation of 1.0 instead of 1.1)

It may be concluded from this trial that Type 1 multiple independent assessments are not really a reliable and consistent way of carrying out assessments of human dimensions, other than perhaps as an initial fact finding exercise which might be followed by a debate about the reason why different people gave different scores.

7.4.4 Assessing the dimensions – Middleton-on-Sea trial

In September 2014 another action group (not a DASH group) agreed to complete the condition grading questionnaires for 4 sections of the sea frontage at Middleton-on-Sea, Sussex. The approach adopted by the group was to compile a Type 3 single consensus assessment (see Section 3.5.2) based on discussions between three people including two local residents' leaders and the local councillor from Arun District Council who supports the local residents in coastal matters. The replies were all stated to be unanimous and are given in Table 7-8.

Table 7-8 Human dimensions assessments of seawalls at Middleton-on-Sea, W. Sussex

Order/ security	Explanation	Suitability/ accessibility	Explanation	Inspiration/ delight	Explanation
Eastern Greensward					
4	The sea causes regular damage to the breastwork and the greensward behind. Sections of the breastwork have been damaged and repaired several times in the last few years. There is very little shingle on sections of the beach causing concern about further damage to the breastworks. During extreme weather events the sea overtops the breastworks and waves, shingle and seaweed wash up to the garden fences. A considerable amount of shingle is deposited on the greensward and in gardens.	3 for most of year; 4 during very high tides and storms	The coastal footpath is unusable during a stormy high tide because of sea spray and shingle thrown up across the path. Some parts of the beach have very little shingle making it impossible to climb down from the greensward because the drop is too much, typically 2m. This also prevents access from the beach to the greensward. Whilst the greensward has disabled access there is no disabled access to the beach. There is good seating on the greensward.	4	The poor condition of the breastwork is unsightly and there are large holes in greensward which reappear after being repaired. The concrete ramp has deteriorated badly in places and is unsightly.
East End of Old Point & Southdean					
3	The timber breastwork is probably in a reasonable condition because it is buried under shingle. There is some shingle retention and the foreshore is slightly sheltered by the seawalls to the west.	4	There is no greensward and although one can walk along the shingle at high tide it is very difficult going. There is limited access as private gardens run down to the foreshore.	2	The breastwork is buried and the groynes are in good condition. The landscape is very pleasing and unspoilt, although when looking to the west the view is interrupted by the poor seawalls along Old Point.
Old Point Seawalls					
4	The sea walls were damaged in the recent storms and a wall and steps down to the beach were undermined and collapsed. Although they have since been repaired, the condition of seawall gives concern because of the concrete has degraded to expose the reinforcement and there are cracks in many places.	5	The seawalls are at the end of the private gardens and there is no footpath although there is one path down to the beach which has very steep steps.	5	The seawalls look in very poor condition, are heavily stained and black in colour in places.
Western Greensward					
4	The timber breastwork is seriously deteriorating, crumbling in places, particularly to the western end of the greensward. This is also the lowest point of the greensward and at this point there is minimal shingle defence. We therefore have little confidence in the long term viability of the defences at this point.	3	There is reasonable access to the beach as the greensward is lower and there is enough shingle to provide access without a drop. However the footpath at this point is very close to the breastwork and is impassable in very bad weather.	2	Although deteriorating the breastwork is not unsightly, being covered by shingle and coastal plants, and the greensward and beach retain a natural appearance.

The results received can be evaluated as follows:

- a. Confidence in the security offered by the defences appears to be strongly influenced by the visual appearance. As explained in the Condition Assessment Manual (Environment Agency, 2006), superficial appearance is only part of the story. Thus if the equivalent EA condition grade were being assessed, the

scores would not necessarily be so poor if the structures concerned were not in imminent danger of collapse.

- b. The assessment of suitability/accessibility criteria by the assessors has been dominated by access issues and it would be useful to understand why this was the case.
- c. The impact of the visual appearance of the structures themselves has a significant impact on the assessment of inspiration/delight even though the assessors are taking into account factors such as the general seascape.

In the case of this Type 3 consensus assessment there are no formal questions of reliability or consistency. However, there is a question as to how representative the views of the group leaders were in relation to others in the community. This could only have been addressed by them holding a meeting to discuss the results. The feedback on the security parameter also opens up the debate about actual vs perceived security which was also noted in the previous Brixham trial.

7.4.5 Assessing the dimensions – Hanneys Flood Group trial

In February-March 2015 a survey of Hanneys Flood Group members was carried out using the on-line “Survey Monkey” tool, as agreed with Stewart Scott the group leader. Group members were asked to use the tool to independently assess (Type 1 multiple independent assessments) the Letcombe Brook in its present condition . They were also asked to give their assessment of what they believed the condition to be prior to the work of the Hanneys Flood Group commencing in 2008. Seven members responded to the survey independently and the results are given in Table 7-9.

The results in Table 7-9 can be evaluated as follows:

- a. There was scatter on the results but less than for the Brixham example. For the assessment of present day conditions, the scatter was less than for the assessment of the condition in 2008.
- b. Explanations for the scatter may be found in the range of reasons people gave for their scores. In particular:
 - The assessment of security depended whether the individual property owner had been flooded and their view of the effectiveness of the work of the Hanneys Flood Group. Nonetheless on average there was an

Table 7-9 Hanneys Flood Group: Results of Letcombe Brook human dimensions survey

Participant number	Order/ security	Explanation	Suitability/ accessibility	Explanation	Inspiration/ delight	Explanation
Present day condition						
1	3	The situation is much improved due to the efforts of the flood group. The brook does not rise quickly as it once did after heavy rainfall, but the improved security does rely on the ongoing efforts of volunteers.	2	The walk along the brook is very pleasant and a good mixture of kept and unkept land	2	The clarity of the water and evidence of wildlife is most enjoyable.
2	4	Village flooded in 2012 and 2007.	2	The footpath by the brook through Hanney has several access points, is walkable (though not suitable for the disabled) and retains its rural character. There are seats and informative plaques which describe the flora and fauna and provide a useful resource for children and adults.	2	The character of the brook through the village has not changed in the 20 years I have lived here and probably for long before that. The views across the water meadows from the iron footbridge are bucolic and timeless and lift my spirit, irrespective of the season. Litter can be present but mostly the footpath is used by people who care about their environment and remove it.
3	3	Additional new housing poses a risk there will always be a risk from extreme events no matter what and I'm not sure about the clearance work above the village as this will only let the water through more quickly - I assume that someone has asked about this?	2		1	
4	3	I live in Ebbs Lane and despite all the work we have done to the brook we nearly flooded again last year	3	you can't see a lot of the brook as it goes through people's gardens, it would be good to get a balance of more access for villagers but not too much disturbance	2	it could be so much better for wildlife but too much management takes away important features like kingfisher perches
5	4	The river level at the mill is already higher than the grazing land already. By adding additional weight on the land there will be a hydrostatic response. This will ultimately increase the probability of flooding particularly putting at risk adjoining properties.	2	Apart from being muddy in the winter it has good access. I go for runs along part of the brook every weekend	1	The water looks great. Much cleaner with no rubbish. My three dogs swim in it every time I take them walking. It is great to see fish!!
6	4	Recent past history shows several examples of flooding ranging from minor inconvenience from road closure through to property damage. Flood Group does help but there are still issues with areas that are the responsibility of individual property owners or the Council	4	Visually you can see the brook but it is neither accessible or available to enjoy given the proximity of the road.	2	Regardless of the fact there is room for improvement, the fact the brook exists brings a sense of calm and relief by being able to see the brook. The sound of the river alone brings relief
7	4		3	It is relatively accessible to able bodied people, but is so low lying the paths are waterlogged and slippery when wet. Good seats/benches without diminishing the rural aspects. Interesting and informative sign boards.	1	Lovely local walk.
Mean	3.6		2.6		1.6	
Std Dev	0.5		0.8		0.5	
Condition prior to Hanneys Flood Group work commencing in 2008						
1	4	The poor state of the brook and ditches around Hanney prevented rapid dispersal of water from heavy rainfall	3	The lack of maintenance caused some restrictions to access at certain times of year and less enjoyment of the brook itself due to excessive weed and debris	3	See previous answers; some parts were spoilt by debris and excessive vegetation both in and on the banks of the brook
2	5	Little or no attention had been paid to the brook and surrounding drainage areas. Likely to be the largest factor in the disastrous flooding of 2007.	2	Little has changed except for the information plaques which were a private initiative.	2	Please see answer to present day condition
3	5	Village was flooded	3		1	
4	3		3	nothing has changed really	2	
5	5	We flooded before 2008 and nearly flooded several times before the work was done to the brook. The work to the brook has had a major impact on the area but we still have concerns.	3	It was still accessible but not so good as now	4	The water condition was poor with lots of rubbish. I discouraged by dogs from swimming
6	4	An improvement but vulnerability remains	5	Visually you can see the brook but it is neither accessible or available to enjoy given the proximity of the road.		For me the river was and always remained a point of inspiration
7	4	Flood Group has done a lot of work and continues to keep the Brook as clear as possible which seems to help but there are still issues with areas that are the responsibility of individual property owners or the Council. The land will always remain very low lying and with additional building developments scheduled for the flood plain without suitable ameliorative measures, concerns of flooding remain	3	Flood group has had limited input to accessibility. Main work has been to attempt to reduce the spread of Himalayan balsam, which detracts from the natural flora and restricts views of the brook	1	No significant change to the natural environment and pleasure of a local walk.
Mean	4.3		3.1		2.2	
Std Dev	0.8		0.9		1.2	

improvement in condition of nearly 1 condition grade between the 2008 retrospective view and the present day.

- The responses on the suitability and accessibility of the brook depended on how active and mobile the respondent was; there was some acknowledgement that the work of the group had improved accessibility.
- The assessment of inspiration / delight depended on which factors they had in mind for the assessment. Most people thought that the attractiveness of

the brook had been improved by the litter clearance and management of the brook leading to a clearer stream, but there was one dissenting voice who thought that there was a risk that the brook was now being over-managed.

- c. For all human dimensions, average scores improved between the assessment of 2008 conditions and the 2015 conditions. This is not surprising given the known input which the DASH groups have made, but it also reflects the philosophy that they believed that their work was doing something to improve the situation (see Section 4.4).

It may be concluded that, although the group members knew one another and there was less scatter than in the Brixham trial, some kind of consensus-building exercise would have been necessary after the survey to come up with a fully agreed response. In particular there would need to be agreement on the local performance characteristics under each dimension which were being assessed. The comparison of the 2008 and 2015 conditions suggests it is may be possible to monitor change in conditions, but it should be noted that the two assessments were not completely independent and if a survey had actually been carried out in 2008 as well as in 2015, the result might have been quite different

7.4.6 Conclusions on valuation/scoring of human dimensions

It may be concluded that assessments of human dimensions by DASH groups using a semantic differential scale is practical but there are a number of issues that will need to be addressed for the method to be effectively and consistently implemented.

- a. Surveys without discussions between DASH groups members lead to a wide scatter on the condition grade results obtained.⁶⁵
- b. Clarity on the physical extent of the asset being assessed is important, especially in regard to the interface between man-made and natural features, even though natural or semi-natural features (e.g. beaches, floodplains) would be viewed by FCRM professionals as FCRM assets as well and are often adjusted or managed by human intervention. Examples would include (i) assessing just a seawall or the whole seawall and beach area and (ii) assessing

⁶⁵ Potential reduction in the spread of results might be achieved by the alternative use of willingness to pay (contingent valuation) methods adopted widely in benefit-cost analysis (see e.g. Penning-Rowsell, E. *et al.*, 2013). However, these approaches would involve considerable effort for DASH groups and they would be faced with the challenge of splitting an overall willingness to pay at a particular location into the various human dimensions.

just the river channel or the whole river channel corridor including its banks etc.

- c. DASH groups need to agree before completing a survey what local manifestations or performance features of the three dimensions are important to them. (This activity is equivalent to the training which EA inspectors undertake before completing structural condition grading work to avoid inconsistency and an unnecessary spread of results.)
- d. Individual member assessments are worthwhile, but only as an input to a subsequent discussion to reach a consensus.
- e. There is a difference between the Condition Grade that would be determined by a DASH group based on the perceived FCRM security offered by a defence and the assessment of structural reliability condition grade that would be made using the EA Condition Assessment Manual; visual appearance has a significant impact on DASH assessments and therefore they should not be treated as engineering assessments, although the assessment of perceived security has a value in its own right.
- f. The need for local calibration of assessments means that there cannot be a national consistency between assessments and the engineering performance of the assets. The assessment has to be regarded separately and only valid locally as an input into any discussions
- g. The assessment approach may be able to identify changes in the scoring of the human dimensions of the FCRM assets although the fact that in the trial the two assessments were not on separate dates means that this cannot be reliably demonstrated. It does suggest however that it may be possible to assess improvements as well as deteriorations in the human dimensions of FCRM assets

7.5 Conclusions: human dimensions and their assessment

The applicability of the identified three human dimensions (Section 2.3.3) to FCRM assets has been explored and empirically verified (Sections 7.1 to 7.3), using both textual analysis of semi-structured interviews and ethnographic materials.

Unsurprisingly, the importance of a dimension of sense of security against flooding or coastal erosion has been readily confirmed. The verification has also identified considerable richness of features within the other two dimensions. In the case of

accessibility-usability, these features included free access over, along or through FCRM assets (section 7.2.1), and being able to view the sea or river (Section 7.2.2). They also included (Section 7.2.3) requirements for active and passive waterside recreation and in-water activities and for supporting waterside facilities. In the case of the delight-inspiration dimension, both the form of the assets themselves (Section 7.3.1) and their context (Section 7.3.2) were important. Assessment of the delight-inspiration aspect of asset form may favour new, old or deteriorated assets depending on the context. Elements of assets that have an impact on inspiration-delight include disruptions to the natural environment, the materials used and the need to avoid rubbish entrapment. Aspects of the surrounding environment which the assets need to complement include the water, flora, fauna and manmade features as well as changing lighting and colour conditions and a prevailing sense of ‘calmness’ at the land-water-sky interfaces.

Assessments of human dimensions by DASH groups using a semantic differential scale (Section 7.4.1) has been demonstrated to be practical but a number of issues will need to be addressed for the method to be credibly and consistently implemented. A major issue emerging from the assessment trials (Sections 7.4.2 to 7.4.5) is the wide scatter found on the condition grade results obtained when multiple individual assessments are made. Groups reaching consensus decisions resolved this issue but individual member assessments may be useful as an input to the subsequent consensus building discussion. To improve focus (Section 7.4.6), DASH group discussions will need to clarify the performance features associated with a particular dimension and physical extent of the asset being assessed, including to what extent the context surrounding the asset should be taken into account in the assessment. Because of the impact of visual appearance on the assessment of the sense of the security dimension, assessments made by DASH groups are likely to differ from a structural reliability condition grade that would be made using the EA Condition Assessment Manual, although the assessment of perceived security has a value in its own right. The dimensioning trial (Section 7.4.5) with one group suggested that the assessment approach should be able to identify changes (deteriorations, improvements) in the scoring of the human dimensions.

8 Conclusions

This chapter presents the conclusions of the thesis principally in relation to the aim, objectives and research questions described in Section 1.2, but also in relation to the methodological challenges of seeking to draw generalised conclusions from case study material and the involvement of FCRM professionals in the selected case studies. It then identifies some recommendations in relation to DASH groups emerging from the research and concludes with some future research that has been identified, both in relation to DASH groups and in relation to the identification and measurement of human dimensions of FCRM assets.

The overall aim for this thesis has been to critically evaluate the extent to which Direct Action Self-Help (DASH) groups are, or can be, viable and an efficacious, efficient and effective means of managing and monitoring FCRM assets (and to determine what makes them so). The first three sections of this chapter addresses each of the three research objectives and their related research questions

8.1 Role of DASH groups in FCRM

The first objective of the thesis has been to critically examine and evaluate the role of local community Direct Action Self-help (DASH) Groups in creating, managing and maintaining FCRM assets. The related research questions for this objective are set out below with the conclusions related to each:

(1.1) What has motivated the formation of viable DASH groups operating in FCRM and how are the types of activities which they undertake affected by their understanding of the problem, the organisation and leadership of the group and the different kinds of expertise and resources available to it?

A review of the literature identified the importance in current policy and governance trends of wider partnership with and empowerment of local communities as part of FCRM, pressurised to some extent by lack of public funding. Although there is no substantive literature about DASH activity in FCRM, examination of contextual literature has enabled a new conceptual framework (Figure 2-8) to be developed

(section 2.2.8) of the different dimensions, contextual aspects and motivations for DASH activity and its support by government, which has been further tested (Chapters 4 to 6).

The conceptual model for FCRM DASH groups developed in Chapter 2 (Figure 2-8) has been tested and shown to be credible in relation to DASH groups. In this regard, interview responses and other evidence discussed in Section 4.4 has confirmed the four motivational factors of disturbance in flood security by flood events, community solidarity, desire for longer term stewardship and (most importantly) ‘doing something’ to support the local community.

Interview material in Section 4.1.1 and the case study reviews in Sections 4.2 and 4.3 indicate that DASH activities on managing conveyance and flood defence assets are typically restricted to what can be carried out with manual labour or small plant on hire. Some monitoring takes place to help to inform an understanding by DASH groups of the problems they face (Section 4.1.2). Activities of the case study DASH group discussed in Sections 4.2 and 4.3 illustrate the fact that a DASH group can understand its flooding problems and meet a series of physical objectives and even gain an improved sense of security (Section 4.4.2) without necessarily knowing to the extent (analysed in Sections 5.1 and 5.3) to which they have actually reduced their risk. Health and safety risks associated with DASH activities seem to be controlled (Section 4.5.6) but the quality of work possible on flood defences and its durability remains an issue (as identified for the NEHRA case study in Sections 4.3.2 and 5.1.2). Section 4.5.8 shows that a number of DASH groups involved in the management of the conveyance of river channels have recognised that repeat work is necessary to sustain any improvement delivered by initial management and are undertaking such work.

Analysis of the interview materials and case studies has shown that viable DASH groups are set up with the support of their local democratic institution (Section 4.5.1) and get to understand the local sources, pathways and receptors of flooding (Section 4.5.2 and, for the case studies, Sections 4.2.1 and 4.3.1). They are small, relying on a core membership from the local community (section 4.5.3 and case studies Sections 4.2.2 and 4.3.2) with a range of practical and professional skills and have leaders who

are willing and able, motivating and professional and able to take clear decisions, either on their own or in partnership with others (Section 4.5.4). Good communications (typically electronic) assist in sustaining involvement in regular working meetings organised to suit availability of people, the site and the weather (Section 4.5.5). Coordination with landowners and FCRM professional management organisations is essential and sharing of experience and practice with other DASH groups is helpful (Sections 4.5.6 and 4.5.7).

(1.2) How efficacious, efficient and effective is FCRM asset management work by DASH groups in respect of mitigating flood risk and in delivering wider community objectives, given the scale of the problem to be tackled and the changing circumstances under which they operate?

The case study evidence and analysis presented in Section 5.1.1 has shown that river channel maintenance work by DASH groups can be efficacious in reducing flood water levels although an effect of channel maintenance may be to slightly raise water levels close to control structures. Economic analysis of case study data in Section 5.2.2 indicates that the reduced out-of pocket costs of DASH group work can deliver flood risk reduction associated with rivers efficiently and to an acceptable benefit-to-cost ratio in comparison with conventionally funded work. However, accurate estimates of avoided flood risk are problematic without a full modelling which may not be justified at a local level (see discussion in Section 5.2.5). As identified in Section 5.3.1, DASH groups can be effective in delivering long-term localised control of flood risk, but cannot control all elements of flood risk partly due to a heritage of pre-existing infrastructure such as river weirs and drainage systems and partly because channel management has a progressively reducing effect as the magnitude of storms increases. However a survey question to the Hanneys Flood Group (Section 5.3.1) revealed that improvements in flood risk by DASH channel management do not necessarily deliver reduced insurance costs and may contrast unfavourably with insurance reactions to individual flood resilience actions.

In terms of estuarine sea walls with front face protection, evaluation of the example of the NEHRA case study (Section 4.3) makes clear that good quality repair work is required if DASH activity is to be contemplated as an efficacious solution (Section 5.1.2). The case study analysis in Sections 5.2.3 and 5.2.4) demonstrates that materials

costs associated with sea wall repairs can be significant, especially if the work has to be repeated or extended on a regular basis and therefore that repairs cannot necessarily be justified on grounds of efficiency, even though they may be cheaper than equivalent professional interventions. The NEHRA example also indicates that sea level rise poses significant challenges to the long-term effectiveness of existing sea defences (Section 5.3.1); maintenance of such defences without raising and strengthening and even relocating the defence line may only remain attractive to local communities looking for short-term benefit.

Irrespective of any impact in flood risk reduction, analysis of the activities of DASH groups in Section 5.3 has shown that they can be effective in delivering improved local community understanding of local flooding mechanisms, development of local skills and emergency flood plans and improvements to the environment. However, (Section 5.3.2) in terms of long-term effectiveness, DASH groups are not inherently sustainable. They are vulnerable to changes and to loss of their key leadership, and may die rather than being able to continue after the loss of their founding leader (Section 4.5.4). Embedment within local democratic institutions (parish councils or residents associations) avoids permanent loss of initiative, but there may be delays whilst a new leader is organised (Section 4.5.4). Engagement with other groups and a long-term vision may also help to sustain them (Section 4.5.7), but only if the activities being considered are both supported and resourced.

Contribution to knowledge

In relation to this first research objective, this thesis has provided a critical evaluation of the role of FCRM DASH groups in managing river channels and estuarine flood defences with front face protection, a subject not directly addressed by previous literature, and has developed conceptual frameworks for such groups (Figure 2-8) and their operational process (Figure 4-32). In providing an understanding of how a range of current DASH groups operate, evaluating both their weaknesses and strengths, it has identified the limitations and possibilities for DASH activity as part of a portfolio of approaches to managing FCRM assets. Whilst assessments have previously been made of other kinds of voluntary action group, including in environmental and natural resources management, there was little knowledge of how DASH activity might work

in the UK FCRM context and the extent to which it might be efficacious, efficient and effective.

8.2 Role of government facilitation of DASH groups

The second objective of the thesis has been to critically examine and evaluate the role of government support, particularly as channelled through FCRM professionals, in facilitating and sustaining involvement of DASH groups in the management of local FCRM assets. The related research questions for this objective are set out below with the conclusions related to each:

(2.1) To what extent are the various facilitation and support activities that have been provided to DASH groups by FCRM professionals effective in meeting the needs and aspirations of both the DASH groups and of the FCRM management organisations?

The needs and aspirations of DASH groups relate to the effectiveness criteria discussed in Section 5.3. Whilst their main target is reducing flood risk, their embedment in their local community means that they are also interested in:

- providing improved understanding of local flooding mechanisms to their local community;
- receiving practical support in the development of flood management strategies and the skills to deliver them;
- receiving consent for their activities to proceed;
- financial support of seed-corn funding for materials and equipment.

They may also be interested in developing emergency flood plans and generating improvements to the local environment. The Environment Agency has an interest in ensuring all these things take place too, given their national policy target to “work with people and communities to create better places” (Environment Agency, 2011c)

The analysis in Chapter 6 shows that support mechanisms provided within EA West Thames area have helped to meet these needs and aspirations. Walk-over surveys and discussions with EA officers have provided DASH groups with improved understanding of flooding problems and the effectiveness or otherwise of different measures to reduce flood risk (Sections 6.2.2 and 6.2.3). Working with EA officers has helped to develop DASH group action plans (Section 6.2.3). Information, including

demonstrations provided by the EA maintenance workforce, has assisted in the development of appropriate skill sets (Sections 6.2.4 and 6.2.7). Financial support (Section 6.2.4) has provided seed-cord funding for equipment, materials and insurance etc. Simplified consenting processes for work by DASH groups have been prepared by the EA (Section 6.2.6). These support activities have been summarised in a framework process diagram (Figure 6-1)

(2.2) How does the effectiveness of full-time facilitation of DASH groups in a particular area by a dedicated professional compare with alternatives such as no support or diversified support by many professionals?

The example discussed in Section 6.2.8 of this thesis provides evidence that some DASH coordination and support from FCRM professionals is better than none. The analysis of the effectiveness of alternative arrangements in Section 6.2 also shows that there are clear differences in the effectiveness of a full-time single coordinator and dispersed arrangements where the responsibility of dealing with DASH groups does not fall to one person. The contrasted evidence presented in Section 6.2 suggests that this is related to the DASH groups reporting less time resource being now put into DASH coordination under the new arrangements than when a single full-time coordinator was in place and as a result the groups feel less supported because support cannot be as in-depth. However, other reasons for the difference identified relate not just to the quantity of the support but also to its quality. A single point of contact (Section 6.2.1) is able to bring together support on a number of aspects with a degree of focus that is missing from dispersed arrangements. These include: being able to explain and share from working with other groups the practicalities of DASH activities (Sections 6.2.2 and 6.2.3); being able to provide contacts between groups (Section 4.5.7); being able to readily coordinate funding on a block basis (Section 6.2.4); and being able to follow through on a whole range of miscellaneous details that would not be available to someone uninvolved with DASH on a regular basis (See e.g. Section 6.2.7).

Contribution to knowledge

This thesis has provided an evaluation of the kinds of government and FCRM professional support that may be required in order for DASH activity to function together with a summary process diagram (Figure 6-1). It has also made an assessment

of the effectiveness of alternative ways in which this support might be delivered. Knowledge of how to support voluntary activity generally was available in a range of contexts but there was no structured understanding of the specifics, both engineering and social, required to support DASH management of FCRM assets.

8.3 Human dimensions of FCRM assets

The final objective of the thesis has been to develop and test a framework for identifying and measuring the human dimensions of FCRM assets that are significant to DASH groups. The related research questions for this objective are set out below with the conclusions related to each:

(3.1) What different theoretical bases are available for assessing the human dimensions of engineering assets and can a set of common human dimensions be identified?

Three key human dimensions of engineered structures and systems have been synthesised from the literature (Section 2.3) : sense of security; accessibility and useability and delight-inspiration. These dimensions were drawn from theoretical bases in impact assessment, human needs (psychology) and human capabilities (philosophy), architecture and theology. Strong connections have been identified between these dimensions and the motivations which influence DASH groups (Section 4.4).

(3.2) To what extent can it be empirically verified that the common human dimensions are applicable to all FCRM assets?

The applicability of the identified three human dimensions (Section 2.3.3) to FCRM assets has been explored and empirically verified (Sections 7.1 to 7.3), using both textual analysis of semi-structured interviews and ethnographic materials.

Unsurprisingly, the importance of a dimension of sense of security against flooding or coastal erosion has been readily confirmed. The verification has also identified considerable richness of features within the other two dimensions. In the case of accessibility-usability, these features included free access over, along or through FCRM assets (section 7.2.1), and being able to view the sea or river (Section 7.2.2). They also included (Section 7.2.3) requirements for active and passive waterside recreation and in-water activities and for supporting waterside facilities. In the case of

the delight-inspiration dimension, both the form of the assets themselves (Section 7.3.1) and their context (Section 7.3.2) were important. Assessment of the delight-inspiration aspect of asset form may favour new, old or deteriorated assets depending on the context. Elements of assets that have an impact on inspiration-delight include disruptions to the natural environment, the materials used and the need to avoid rubbish entrapment. Aspects of the surrounding environment which the assets need to complement include the water, flora, fauna and manmade features as well as changing lighting and colour conditions and a prevailing sense of ‘calmness’ at the land-water-sky interfaces.

(3.3) Can the measurement of such human dimensions by DASH groups be carried out in a credible and consistent manner?

The thesis has provided evidence that assessments of human dimensions by DASH groups using a semantic differential scale (Section 7.4.1) is practical but a number of issues will need to be addressed for the method to be credibly and consistently implemented. A major issue emerging from the assessment trials (Sections 7.4.2 to 7.4.5) is the wide scatter found on the condition grade results obtained when multiple individual assessments are made. Groups reaching consensus decisions resolved this issue but individual member assessments may be useful as an input to the subsequent consensus building discussion. To improve focus (Section 7.4.6), DASH group discussions will need to clarify the performance features associated with a particular dimension and physical extent of the asset being assessed, including to what extent the context surrounding the asset should be taken into account in the assessment. Because of the impact of visual appearance on the assessment of the sense of the security dimension, assessments made by DASH groups are likely to differ from a structural reliability condition grade that would be made using the EA Condition Assessment Manual, although the assessment of perceived security has a value in its own right. The dimensioning trial (Section 7.4.5) with one group suggested that the assessment approach should be able to identify changes (deteriorations, improvements) in the scoring of the human dimensions.

Contribution to knowledge

This thesis has identified a set of dimensions within which the human functioning of FCRM assets may be assessed and the extent to which this can be done in an effective

and consistent manner. Various frameworks in different disciplines have been developed over the centuries for understanding the human dimensions of engineering, but these frameworks had not previously been brought together into a single framework for FCRM assets that could readily be applied by community groups. The approach may also help FCRM authorities to assess the extent to which their interventions are helping to meet their policy objectives for local communities. The resulting framework of dimensions provides DASH and other local community groups with a means of assessing the extent to which FCRM assets are meeting the needs and aspirations of their local community.

8.4 Generalising the results: effects of case study selection

8.4.1 Impact of case study selection on the outcomes observed

In order to understand the impact of the case study selection on the outcomes observed, it is instructive to refer back to the DASH group process overview in Section 4.6. Here the analysis, supported by the flow chart Figure 4-32 and by Box 4-1 summarising the CATWOE analysis, reveals that the main aspects constraining the effectiveness of a DASH group are the constraints of the site and the nature of the flooding problem itself, the available resources (money, volunteers) and the owners controlling authorisations (landowners; FCRM authorities).

Flooding of the Letcombe Brook through East Hanney was exacerbated by typical in-channel weed growth problems combined with constraints imposed by existing hydraulic controls on the river (in this case old mill structures and weirs) and by requirements associated with environmental permitting. Managing weed growth and associated siltation there, as elsewhere is a perennial problem that cannot be addressed by one year's campaign, although the first campaign may be more intensive if it follows a period of management neglect. This was entirely typical of many sites on which riverine DASH groups were working. The coastal site that NEHRA addressed was also typical of many low lying estuarine floodplains protected by earthen flood embankments with front face protection with typical seasonal environmental permitting, but facing rising sea levels and reducing availability of funding. Thus it can be said that the two sites selected had many contextual characteristics commonly found in these genres.

In terms of the volunteer resources available the case studies were also typical in the DASH groups studied, being mandated by their local democratic institution (Section 4.5.1), able to draw on a sufficient proportion of the local community to assist in the activity (see Section 4.5.3), having a professional person or persons in the leadership roles (see Section 4.5.4) and all being typically motivated (see Section 4.4). The sustainability of the group and hence of the effectiveness of the ongoing repair/maintenance activity is dependent, however, on the knowledge and skills of the individuals involved and the drive and ability of the leader. There were differences in terms of the materials required and their associated funding requirements, but these can be seen as generic differences (see details in Section 5.2); this is because riverine sites being maintained for conveyance require less materials and hence funding than a coastal embankment being maintained to repair the erosive effect of the sea.

However, there were differences exhibited by the case studies from a 'typical' DASH situation, which related to the specifics of the local 'owners'. A significant specific for the NEHRA group was its reliance on the local farmers to cover the cost of the materials for the work (this funding not being forthcoming from the FCRM authorities) and to give permission to carry out work on land that they owned. For the Hanneys Flood Group there was no reluctance on the part of adjoining landowners for the work to progress and no requirement for them to fund any work since seed-corn funding was being supplied by the FCRM authorities.

Because of the more engineered nature of flood defence structures with front face protection (such as those addressed by NEHRA), more specialist contributory expertises (Figure 2-6) are needed for undertaking maintenance activities, potentially requiring some basic skills training. By contrast, the periodic management of channel conveyance such as is being addressed by the Hanneys Flood Group uses more ubiquitous tacit knowledge skills commonly associated with 'gardening', although these skills needs guidance by more specialist understanding of ecological aspects.

8.4.2 Impact of involvement of FCRM professionals in case studies

Involvement of FCRM professionals in DASH work in some form, at least for consenting purposes, seems inevitable unless the FCRM authorities are going to abrogate responsibility (see Section 6.2.8). Given the current EA policies discussed in

Sections 2.1 and the current PSA / APT arrangements discussed in the next chapter, some professional advice also seems likely. Hence at one level, some FCRM professional involvement in both the NEHRA and Hanneys Flood Group case studies would not be untypical. There is a contrast, however, between the two groups.

The Hanneys Flood group, although guided by Keith Lead from the EA in the early days, were very committed to doing something to mitigate flood risk. Subsequently, they have managed their way through a number of FCRM personnel changes (between 2008 and 2015) and have sustained their activity, drawing on resources from not just the EA but also the district and county councils. Thus it is not unreasonable to believe that their activity would have taken place in any event and would have had very similar efficacy, efficiency and effectiveness as described in this Chapter.

8.5 Recommendations in relation to DASH groups

In addition to the conclusions related specifically to the aims and objectives, several recommendations can be drawn from the research in relation to DASH groups. In particular, the following can be recommended:

- (1) In Chapters 4 and 5, it was identified that in order to encourage more efficacious, efficient and effective activities by DASH groups, they would benefit from greater understanding and skills in the key processes involved. This does not arise naturally and DASH groups spent considerable time finding the information they required and developing their skills (as illustrated by the case studies of the Hanneys and NEHRA DASH groups in Sections 4.2 and 4.3). The availability of a guidance manual or web resource for DASH groups would improve implementation and consideration should be given to the production of one. Such a document should include guidance on:
 - a. setting up and running a DASH group, including management and health and safety issues (see Section 4.5)
 - b. engineering, hydraulic and environmental management basics to assist DASH groups in delivering better quality outcomes. This is critical for ‘engineered’ activities such as sea wall repairs. For channel maintenance, EA guidance could also be summarised in a user friendly form (see e.g. discussion in Sections 5.1.2 and 8.4)
 - c. explanation of flood defence consenting procedures (see Section 6.2.6)

- d. procedures to follow in the collection of FCRM monitoring data to ensure that the nature and format in which it is collected is of general use (see Section 4.1.2).
- (2) Organising a regular programme of training and mutual experience sharing events would provide support for DASH groups covering the items discussed in (1) above. Such events could also be used to identify detailed end-user requirements for any guidance documents.
 - (3) Wider adoption and promotion of simplified flood defence consenting procedures by the EA would assist DASH groups (see Section 6.2.6)
 - (4) Encouraging involvement of FCRM groups in environmental management could have benefits for both FCRM and environmental management. (The Hanneys Flood Group have already commenced this process in working with a local environmental group). Note that a number of Rivers Trusts, which were born out of environmental and conservation concerns, are also interested in being more involved in flood risk management and collaboration with such groups on FCRM matters could be explored further.
 - (5) Training of FCRM professionals, such as EA PSO (Partnership and Strategic Overview) officers, in the support requirements of DASH groups is desirable so that they can more effectively support these groups (see Chapter 6). If a decision were ever made by the EA to move to appoint more specialist DASH coordinators, selection and training of the appropriate candidates would be particularly important.

8.6 Future work

The following elements of potential future research work have been identified:

DASH groups

- (1.1) Any necessary supporting research to help deliver the recommendations to support DASH groups set out at Section 8.5 above. This might include:
 - a. More longitudinal studies of case study DASH groups.
 - b. A national survey of DASH groups, working with the National Flood Forum
- (1.2) Wider study of DASH group facilitation mechanisms and processes by FCRM authorities. This could include

- a. National survey of the understanding and abilities of EA PSO (Partnership and Strategic Overview) officers in working with DASH groups.
 - b. Working beyond the EA with those responsible for DASH facilitation in Lead Local Flood Authorities set up under the 2010 Floods Act
- (1.3) Development of sea wall protection design concepts that will enable FCRM assets to be more easily maintainable by DASH groups.

Human dimensions of FCRM assets and their assessment

- (2.1) Further development and piloting of methods to enable community and DASH groups to identify key performance features within each human dimension
- (2.2) Evaluation of consensus building methods to reach more consistent conclusions on human dimensions by DASH groups.
- (2.3) Piloting of the use of performance features within specific human dimensions criteria as a way of DASH groups self-monitoring the effectiveness of their activities.
- (2.4) Evaluation of the assessment of environmental dimensions in similar way to human and engineering dimensions. This would allow conflicts between environmental and social objectives to be clearly exposed and perhaps help in the development of accommodations.
- (2.5) Human dimensions performance dependent on weather and hydrological conditions. Fragility curves express the likelihood of an asset failing as the (hydraulic) load on it increases (Schultz, M. *et al.*, 2010), with different fragility curves being required for each structural condition grade. Human dimensions of an asset, such as accessibility will also vary depending on the weather and hydraulic forcing (e.g. beaches are only available at certain states of the tide and water based activities may be restricted by weather; water courses may not be safe for navigation and swimming when in spate or flood). It may therefore be possible in the future, as assessment of human dimensions improves, to conceive of creating simple social performance curves to represent how the performance of this human dimension changes dependent on the prevailing conditions.

Appendices

A.1 Interview schedules

A.1.1 Interview schedule for semi-structured interviews of volunteers

Introduction

Thank you for agreeing to take part and for allowing the interview to be recorded, transcribed and analysed. The interview is anonymous and your name will not be disclosed in any published documents papers theses etc, unless we agree at a later date that it is appropriate to acknowledge you or your organisation in some way. Anything you tell me will be taken to be your personal view and not that of your organisation unless you specifically tell me otherwise.

My research is about 'Involvement of local people in defining, monitoring and managing the socio-economic-environmental performance of Flood and Coastal Erosion Risk Management defence assets.' My background is as a civil engineer who has worked in flood and coastal erosion risk management for many years. However, in this research, I am seeking to adopt a neutral stance and not promote the views of any particular organisation or group. I am basically in 'listening mode' and in this interview I'd like to find out about:

- *your role as a volunteer, something about what makes your group tick and how that relates to what goes on in the locality as a whole*
- *the extent to which there is involvement in monitoring or managing of flood and coastal defences,*
- *and what features of the flood or coastal defences are important to you and the people in your local area*

You and your current role as a volunteer

Solicit information about the position of the individual on volunteering, personal involvement.

- a. What is your normal occupation?
- b. Explain any involvement you have in voluntary activity?
- c. What is your role in your volunteer group and how does this work?
- d. To what extent is your voluntary activity associated with an interest in local rivers or coasts? Could you explain how that came about?
- e. What other factors motivated you to get involved? (*Raise issues of sustainable development and climate change and their significance to the management of rivers and coasts if they don't come up naturally*)
- f. What have been the best and worst things that you have experienced during your time as a volunteer?
- g. What other kinds of activities of volunteer groups do you know about in your local area? Are you involved in any of them?
- h. The government's overall policy is to support increased volunteer involvement. What do you think about that?

Expanding volunteer roles into FCRM asset monitoring and management

- a. [*If not already discussed*] (How) do you get involved in the monitoring or management of any river channels flood and coastal defences or other structures? How does this work in practice: rhythm of meetings/activities; hierarchies of roles, authority and delegation; working practices; training and mentoring; managing data and information. Does the volunteer group view itself as being a coherent whole and what helps to create and sustain this feeling?
- b. How do you liaise with professionals and authorities. Do you find any difficulties or conflicts in perception or practice in working with them? How do you overcome these? Have you managed to find a common vocabulary and language that you both use and understand?
- c. Do you know of any (other) volunteer groups, schools or colleges involved in investigating, monitoring or managing local rivers or coasts? Contact details? Do you think there is potential for volunteers to become [more] involved with monitoring and/or management of flood and coastal erosion management structures, channels, etc [*explain*]?

Your locality (community of place)

- a. What made you decide to live in this locality? What is there about its character and people that keeps you here? Do you feel part of the locality? What helps you feel that? Do you have to do anything to belong? Is there anything negative about the place?
- b. Introduce 'community' word, if interviewee does not do so. Ask them to define what they mean by 'community'.
- c. Which structures, places or things within the locality are important to people? Do any of them really capture the essence of the locality or perhaps even symbolise it?
- d. Is there anything which you would you say marks the boundary of your locality (*Have map available in case it is needed. Note that community could be a social, geographical or other grouping.*)

Social features of FCRM structures or channels

Solicit information on what helps to make FCRM assets socially significant.

For each of the main types of structures or channels for which you have interest (or even responsibility?), please try to answer the following questions:

- a. How and to what extent are the physical features of flood or coastal defences, structures and river channels *used* by the public, either individually or as groups, or for the whole local community? Bear in mind that this use may be at a range of spatial scales? Have there been changes with time?
- b. Have there been any *tensions* between professionals and members of the local community over the form and management of the defences, structures and channels? i.e. Would you or other people be inclined to complement officials or complain to them about the form of the defences, structures and channels? Describe these tensions and the extent to which they have been resolved? Were there different tensions in the past?
- c. To what extent do you see the defences, structures and channels as attractive/unattractive, or aesthetically appropriate/inappropriate to the environment in which they are situated? Does this vary with the scale that you are thinking about? To what extent would you say that their configuration and design shows '*inspiration*' or a failure of that? Has this changed with time, either actually or in perception? Are historical associations with people, places or events important?

[This could include institutions/organisations, action groups, famous people, writers, artists etc. Try to tease out whether there are any books, poems, paintings etc which capture the cultural/historical/social meanings embedded in the physical features of flood and coastal management defences, structures and channels]

If time ...

Do you have any ideas on how the importance of these features might be described or captured in written, visual or other forms? Could the importance be 'calibrated'? Do you think that these approaches would be able to detect improvement or deterioration?

2. The future and helping out with the research

- a. Do you have any photos, or would you be willing to take a few to capture what you consider to be socially important about FCRM defences, structures and channels? [*explain details after interview*] or which illustrate the role of volunteers?
- b. Any interest in being involved in piloting?
- c. Would you be willing to be involved as a volunteer in monitoring and/or managing the condition of FCRM defences, structures and channels? Would you be willing to record/manage both the aspects that were of interest to yourself and also those aspects that might of interest to others, including other community members and professionals?

[If other ideas have been suggested by the interviewee for capturing the social importance of FCRM features, then explore whether there is interest in the interviewee using these ideas and how it might be done in practice.]

A.1.2 Interview schedule for semi-structured interviews of professionals

Introduction

Thank you for agreeing to take part and for allowing the interview to be recorded, transcribed and analysed. The interview is anonymous and your name will not be disclosed in any published documents papers theses etc, unless we agree later that it is appropriate to acknowledge your help or that of your organisation. Anything you tell me will be taken to be your personal view and not that of your organisation unless you specifically tell me otherwise.

My research is about 'Community involvement in defining, monitoring and managing the socio-economic-environmental performance of Flood and Coastal Erosion Risk Management defence assets.' My background is as a civil engineer who has worked in flood and coastal erosion risk management for many years. However, in this research, I am seeking to adopt a neutral stance and not promote the views of any particular organisation or group. I am basically in 'listening mode' and in this interview I'd like to find out about:

- *your role in flood and coastal erosion risk management*
- *the extent to which volunteers are or could be involved in monitoring or managing flood and coastal defences,*
- *and what features of the flood or coastal defences might be important to local communities that you are or have been involved with*

Personal information

Solicit information about the position of the individual in relation to flood and coastal management and explore how they position themselves.

- May I start by just confirming your job title and role in flood and coastal erosion risk management?*
- How long have you had that role? What have been the best and worst things that you have experienced during that time?*
- What particular activities or initiatives are you involved in at the moment? Do any of these involve volunteers?*
- Do you have any personal experience of volunteering?*
- Given the way your organisation works, how open do you think you (and others in your organisation) are to influence by individuals from local communities who want to engage with your organisation or profession?*

Including volunteers in FCRM asset monitoring and management

Solicit any information known to the interviewee on volunteering, personal involvement and potential for future link to FCRM assets.

- The government's overall policy is to support increased volunteer involvement in our communities. In addition, in paragraph 7.50 of the Pitt Review it states "that voluntary contributions and actions to fund flood risk management measures locally, providing they are technically and environmentally sound and sustainable, should also be encouraged." This led to Pitt Review Recommendation 24 that "**The Government should develop a scheme which allows and encourages local communities to invest in flood risk management measures.**" Given the Environment Agency's new supervisory responsibilities with regard to both the coast and urban flooding, do you think there is (increased) scope for community group involvement in the monitoring and management of flood and coastal erosion risk management assets? How do you think that might work? What do you see as the strengths and weaknesses of the approach?*
- To what extent do you regard as useful any information which they have generated or maintenance/management actions they have carried out? What constraints do you envisage on expanding their role (e.g. health and safety)?*
- Do you know anything about how the local community volunteer group(s) work(s) in practice: rhythm of meetings/activities; hierarchies of roles, authority and delegation; working practices; training and mentoring; managing data and information?*
- How do you liaise with any local community volunteer group(s) that you know? Do you find any difficulties or conflicts in perception or practice in working with them? How do*

you overcome these? Have you managed to find a common vocabulary and language that you both use and understand?

1. Social features of FCRM assets

Solicit information on what helps to make FCRM assets socially significant. It may be that the professional has little to offer here, in which case just pass on rapidly to the next section.

For each of the main types of assets for which you have responsibility, please try to answer the following questions:

- a. How and to what extent are the physical features of flood or coastal defences and other assets such as river channels *used* by the public, either individually or as groups, or for the whole local community? Bear in mind that this use may be at a range of spatial scales? Have there been changes with time?
- b. Have there been any *tensions* between professionals and members of the local community over the form and management of the defences and other assets? Describe these tensions and the extent to which they have been resolved? Were there different tensions in the past?
- c. To what extent do you see the assets as attractive/unattractive, or aesthetically appropriate/inappropriate to the environment in which they are situated? Does this vary with the scale that you are thinking about? To what extent would you say that their configuration and design shows '*inspiration*' or a failure of that? Has this changed with time, either actually or in perception? Are historical associations with people, places or events important?

[This could include institutions/organisations, action groups, famous people, writers, artists etc. Try to tease out whether there are any books, poems, paintings etc which capture the cultural/historical/social meanings embedded in the physical features of flood and coastal management assets]

If time ...

- d. Do you have any ideas on how the importance of these features might be described or captured in written, visual or other forms? Could the importance be 'calibrated'? Do you think that these approaches would be able to detect improvement or deterioration?

2. The future and helping out with the research

- a. Do you think photographs taken by local volunteers might capture what you consider socially important aspects of FCRM assets? [*explain details at end of interview*] Do you visit rivers or coasts frequently? Do you have any photos that might capture the socially important aspects of FCRM assets? Would you be willing to take some with this in mind?
- b. [*If not already discussed*] Any interest in being involved in piloting?
- c. [*If other ideas have been suggested by the interviewee for capturing the social importance of FCRM features, then explore what interest there might be in carrying forward these ideas and how it might be done in practice.*]
- d. *Now that we have completed the interview, what do you want me to do about acknowledging your help or that of your organisation?*

A.1.3 Structures included in Condition Assessment Manual

River Defences

Channels

- Channels – Vegetation
- Channels – Blockage

Culverts and Debris Screens

- Culverts
- Debris (Trash) Screens

Weirs

Sea and River Defences

Embankments

- Embankment Slopes
- Embankment Crests

Structures

- Concrete Structures
- Steel Structures
- Brick and Masonry Structures
- Timber Structures

Revetments (systems for protecting against erosion by waves and currents)

- Rock and Stone Revetments
- Grouted Stone Revetments
- Precast Concrete Units and Concrete Blockwork
- Gabions and Reno Mattresses

Bridges

Flood Gates and Barriers

Outfalls, Flap Valves, Penstocks and Sluice Gates

Demountable Defences

Sea Defences

Seawalls

Beaches

Groynes

- Timber Groynes
- Rock Groynes

Dunes

Saltmarshes, Saltings and Warths

Sea Outfalls

Offshore Breakwaters

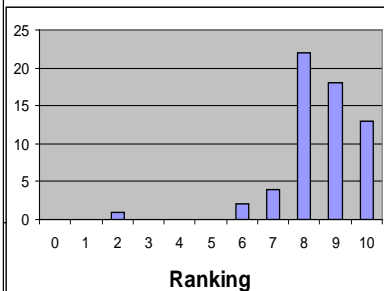
A.2 Surveys and direct observations made at seaside towns

A.2.1 Bournemouth – results of participatory diagramming activity

Negative comments

No barbeque areas x2
 More places to eat & better service
 Improve area around pier x2
 Yobbish behaviour around pier
 High car park charges
 Beach huts break up view
 Too restrictive on alcohol
 Too busy sometimes

What do you think of Bournemouth Seafront?



Suggestions

Improving/more places to eat x3
 More fixed seats/benches x3
 Sunbeds and shades
 Control cyclists
 More designated walks
 Manage access to disabled lift
 Nets for games like volleyball
 More kids attractions
 Restricted section for topless bathing
 Paint beach huts
 Improve pier
 Deal with disposable nappies

Positive comments

Clean x21 Safe
 Sandy, clean beach x17 Lifeguards
 Toilets (clean) x3 Showers
 Good views x4 Good walks x3
 Happy children
 Calm/peaceful x3 Good atmosphere x2
 Tidy x2 Attractive/love it/wicked! x3
 Lots to do x2 Can play ball games
 Easy access to town x2
 Good facilities x2
 Public transport x2
 Promenade x2
 Disabled lift x2
 Pier x3 Not too crowded x2
 Inexpensive
 Beach huts
 Close to places of interest
 Good weather
 Smell of sea and sand
 Absence of sellers No dogs
 Kite flying Air show
 Eating places
 Access to water

A.2.2 Bournemouth – Photographs of sea front activities

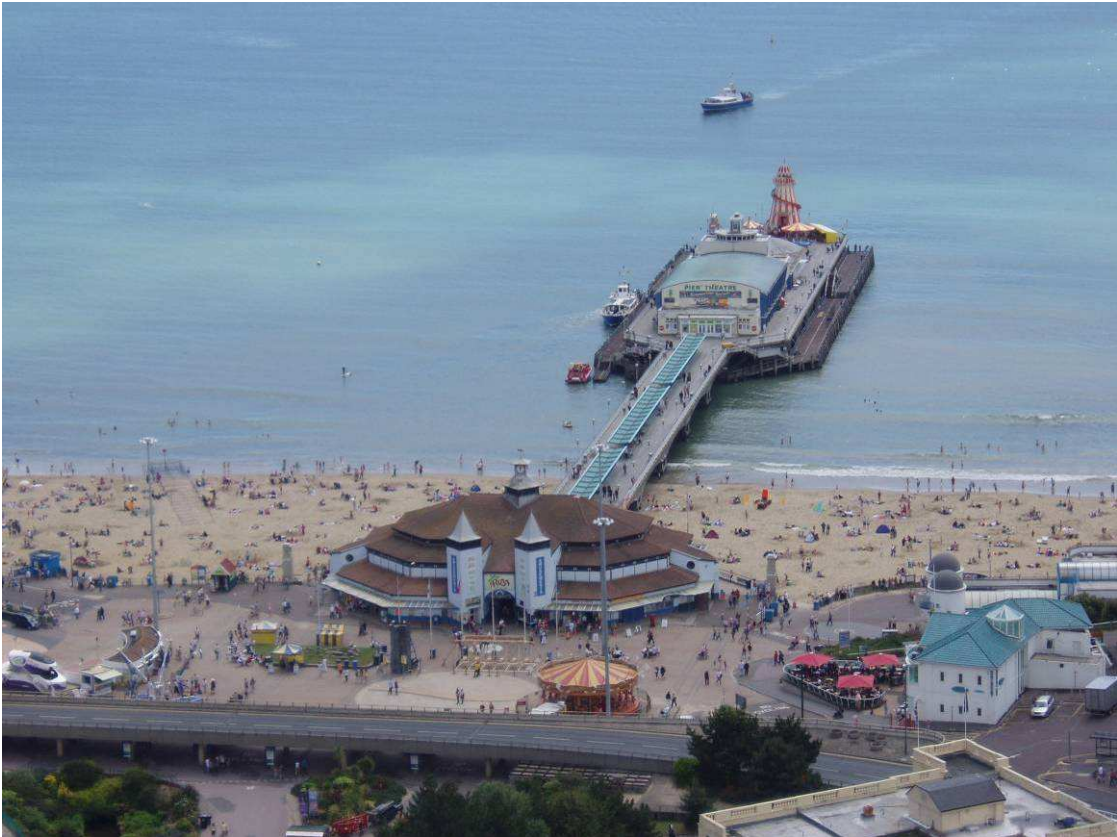


Figure A.3.1 Bournemouth pier 28th May 2009



Figure A.3.2 Bournemouth promenade and sea front 28th May 2009



Figure A.3.3 Bournemouth 28th May 2009: seafront shower (pier behind)



Figure A.3.4 Bournemouth 28th May 2009: land train



Figure A.4.5 Bournemouth 28th May 2009: sunbathing and ball games

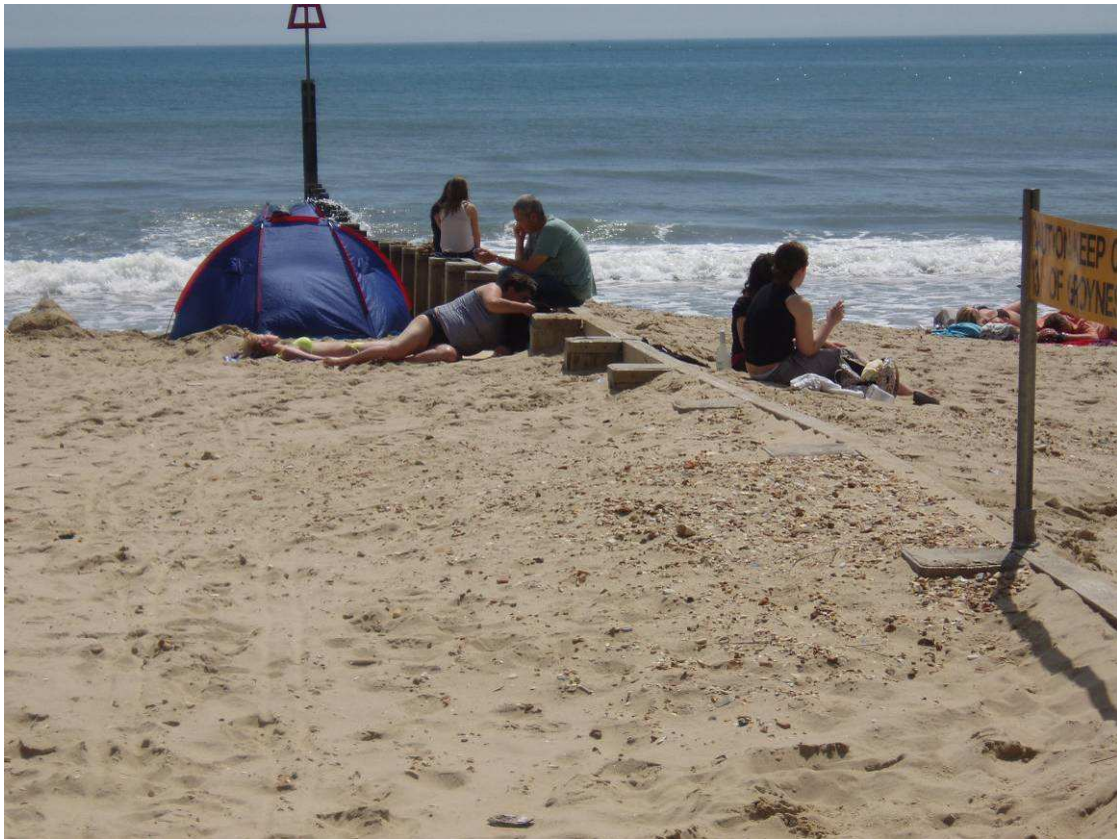


Figure A.3.6 Bournemouth 28th May 2009: amenity use of timber groyne

A.2.3 Cromer – example participant observations

Sitting and watching

- Lady – reading newspaper sitting on own chair on a sandy part of the beach with her bare feet feeling the sand
- Lady and daughter – sitting on a blanket on a sandy/pebbly part of the beach eating fish and chips out of paper and gazing out to sea.
- Lady sitting on her own chair, barefoot, gazing out to sea over her male partner who is lying on a blanket sunbathing – they have occasional conversation
- 2 older ladies leaning on seawall, looking out to sea somewhat and having a chat
- A few people leaning against the seawall for relaxation and a bit of shade
- Life guard station – guards sitting on railings looking out over beach, their towel drying on railings near steps
- 2 people sitting on timber groyne drying themselves with a towel after a swim
- People using bit of seawall near pier to sit on, swinging their legs and gazing out to sea.
- There seems to be a lot of ‘being’ going on as well as ‘doing’

Walking and cycling

- People walking slowly along promenade enjoying sunshine
- Man cycling slowly along promenade
- A lot of dog-walkers seen, for example a group of 7 people with 6 dogs between them

Playing

- Elder and younger brother digging in the sand together
- 3 ladies and 2 children arrive with a pull-along trolley having come down steps onto beach carrying a small inflatable boat
- Man gathering pebbles – reason not clear
- Husband wife and child playing in sand
- 5 young men all in inflatable boats
- Mum and son playing game with ball and catcher thing
- 2 men playing bat and ball type game whilst standing knee height in sea.
- About 6 people swimming in the sea or floating (probably water not that warm!)

(Observations made on 25th August 2009)

A.3 Coding tree example (human dimensions of FCRM assets)

Note: figures in brackets after each node description are respectively the number of sources (i.e. interviews) mentioning the aspect and the total number of references in all those sources. So as an example (5,12) would mean the topic was mentioned in 5 interviews with a total number of references of 12.

Figures quoted are non-cumulative, i.e. they relate just to that node and not to any references to the sub-nodes

Adjusting to change (5,12)		
Accessibility-useability (4,4)		
Access including access structures (19,43)	Access for disabled (2,2)	
	Access for painting (0,0)	
	Beach cliffing (1,1)	
	Dumping rubbish or stolen goods (2,2)	
	Hanging washing out to dry (1,1)	
	Right of way along frontage (8,14)	
Educational value and potential (1,1)		
FCRM assets	Community or individual adjustments to FCRM assets (2,3)	
	Hydro-power generation (1,1)	
	Shelter or windbreak (2,3)	
	Visibility of river or sea (7,9)	Form and siting of assets (1,1)
	Maintaining historical significance (2,2)	
Non-leisure use		
	Agricultural use (2,2)	
	Commercial use (6,9)	
	Socio-economic development (1,1)	
Ownership of watercourse (1,1)		
Place (0,0)	FRM assets as part of community of place (3,4)	
	Place of celebration (2,2)	
	Place to meet (3,4)	
	Place to play (9,15)	
Recreation and tourism (7,11)		
	Amenity facilities (0,0)	Buildings (3,3)
		Car access and parking (6,13)
		Electrical recharging (1,1)
		Entertainment facilities (2,6)
		Proximity of hotels (1,1)
		Proximity of residential (2,8)
		Proximity to shops (2,3)
		Public transport (1,1)
		Restaurants and cafes (3,4)
		Skateboarding (1,1)
	Beach activities	Barbeques and picnics (7,8)

		Beach huts (1,1) Crabbing (e.g. in beach pools) (2,3) Driving cars on beach (1,3) Effect of weather or season on use (2,4) Flights from beach (1,1) Horse riding and training (2,2) Jogging, running (1,1) Sand karting (1,1) Sunbathing (2,2) Throwing stones into water (1,1) Time of day affecting beach use (1,1) Volleyball (1,1) Watching air shows (2,2) Use of beach materials (grain size of material, sand castles) (4,4)
<hr/>		
Enjoying outdoors (1,1)		
<hr/>		
	Hygiene (1,1)	Cleanliness (1,4) Showers (1,1) Toilets (1,3) Water quality (sea or river) (1,1) Wind-blown sand (1,1)
<hr/>		
	Security from theft and anti-social behaviour (2,2)	CCTV (1,1)
<hr/>		
	Water sports and activities (0,0)	Boating (mooring, navigation) (7,12) Canoeing (5,9) Jet-skiing (2,2) Kayaking (1,1) Paddling, swimming ,bathing (3,5) Pleasure cruises (1,3) Sailing (3,7) Sea-kiting - kite surfing (2,2) Speedboat rides (1,2) Surfing - wind surfing (3,8)
<hr/>		
	Water-side activities	Bird-watching (5,7) Dolphins and seals (alive or dead) (2,2) Fishing (angling) (17,30) Golf (1,1) Hunting (0,0) Photography (2,2) Promenading (4,4) Shooting (1,1) Sitting and watching (4,6) Walking, dog walking and exercising (13,29)
<hr/>		
Demographics of asset users (4,5)		
<hr/>		
	Aesthetics (Imagination-Inspiration) (2,2)	Visual appearance (11,30)
<hr/>		
	Attraction (0,0)	inspiring poetry and song (1,1) of beach pools (1,2) of pier (seaside) (2,2) of river channel and corridor (8,16) of sea and coast (4,10) to surrounding area (1,1) Tourist attraction (11,15)
<hr/>		
	Flora and fauna	Birds and wildlife (3,7)

	Park along river corridor (1,1)	
Historical-heritage interest	Listing (preservation) of structures (3,4)	
	Maritime links and history (2,4)	
Inspiration of environment	Liminal space - weather and tidal changes (1,1)	
	Seasons of the year (1,1)	
Inspiration of FCRM assets	Artistic involvement in assets (5,9)	
	Derelict structures (2,7)	
	Emotional and spiritual input to asset form (1,1)	
	Paving (attractive) (1,2)	
	Quality of construction (1,4)	
	Vegetation on or near assets (2,8)	
Negative appearance	Litter and debris (3,4)	
	Presence of trash (2,2)	
	Silt deposits (2,5)	
Negative attraction	Expression of environmental and social conditions (1,1)	
	Vandalism (4,6)	
	Wind-blown sand (1,1)	
Sense of place (6,10)		
Spirituality	Liminality (1,1)	
	Quietness vs action (0,0)	Liveliness, action (3,3)
		Quietness, wildness, remoteness (6,21)
	Sense of freedom, calmness (1,1)	
	Timelessness (1,2)	
View (0,0)	Colour-light (3,14)	
	Landscape-seascape (9,12)	
	Order-disorder (1,1)	
	Reflections in water (1,1)	
	Rhythmic features (1,1)	
	Ships passing (1,1)	
	View of the coast (2,6)	
	View of the river (11,20)	
	View of the sea (5,12)	
	View of sea and sky in different weather conditions (1,3)	
Water movement around asset (4,13)	Noise of water motion (2,2)	
	Wave overtopping (1,1)	
Public expectations (2,5)		
Scoring the assets (2,2)		
Security-Order (1,1)	Coastal erosion (5,13)	
	Flooding (4,7)	
	Health and safety of users (5,6)	Lifeboat facilities (1,1)
	Protecting habitats vs people (8,15)	
Sustainability of FRM assets (3,5)		
Tension between dimensions (3,4)		
When asset used (1,1)		

A.4 Local groups engaged by EA Thames West Coordinator

Group (Local Authority)	Flooding issue	DASH group activity and supporting activities by others	Keith's role
Ascott-under-Wychwood (West Oxfordshire DC)		Some SHG channel maintenance on Evenlode. Applying pressure to get work completed by others: Network Rail enlarging river bridge opening, EA constructing swale including constructing training bunds. Clearing existing road bridge arches	<ul style="list-style-type: none"> • Liaison with all parties, including Network Rail, local residents, EA legal, • Completing procurement forms • Arrangements with landowners • Organising utility searches • Site visits and meetings • Progress information leaflets
Asthall Parish Council (West Oxfordshire DC)	Flooding, including from River Windrush	Non-main river problem. Banks of river need to be lowered to reconnect river with floodplain	<ul style="list-style-type: none"> • Attending Parish Council meetings on flooding • Site visit and walkover to identify flood risk reduction measures • Coordination with WODC and OCC highways
Aylesbury (Aylesbury Vale DC)	Flooding from Piddington Brook	One or two residents taking action.	<ul style="list-style-type: none"> • Site meeting with Aylesbury Vale district engineer to identify any blockages
Bampton FWG (West Oxfordshire DC)	Flooding from Shill Brook	Dwarf flood wall on footpath, project managed by residents. Funding sought from EA, WODC and OCC	<ul style="list-style-type: none"> • Attending Bampton FWG meetings • Arranging EA co-finance • Established feasibility of upstream storage area and sourced LIDAR ground terrain data to assist with this
Benson FWG (South Oxfordshire DC)		FWG will do some vegetation clearance, even though it is main river and thus EA responsibility	<ul style="list-style-type: none"> • Initial meeting with FWG. • Advised against removal of two low level weirs • Gave advice on vegetation clearance
Bishopstone (Aylesbury Vale DC)	Ordinary water course problem		
Bledington (West Oxfordshire DC)		(Problem raised by local MP)	<ul style="list-style-type: none"> • Site meeting with landowners. Additional vegetation clearance talked about to EA work already undertaken.
Brize Norton and Carterton FPWG (West Oxfordshire DC)	Flood risk at RAF base and surrounding villages	FWG applying pressure to make sure that run-off from new development properly considered	<ul style="list-style-type: none"> • Attending Brize Norton FPWG meetings
Bucklebury River Pang Community Interest Company (West Berks C)	Flooding from River Pang	Initial unconsented vegetation clearance. Vegetation clearance, every spring (EA to clear in Autumn). Financial contributions to River Pang bypass channel (1:100 year). Encouraging local authority to carry out other drainage works. Website: www.floodalleviation.co.uk	<ul style="list-style-type: none"> • Attending meetings • Advising on plan of action • Phone calls and emails • Arranging EA and co-finance for bypass channel • Coordination of different EA activities (ops delivery, conservation, legal etc)
Buscot (Cotswold DC)	Surface water and some river flooding of village mainly owned by National Trust	National Trust spending £110k re-routing drainage	<ul style="list-style-type: none"> • Evening talk, including PowerPoint presentation to Buscot PC
Carswell nr Faringdon (Vale of White Horse DC)	No maintenance of water courses for many years	Riparian owners will maintain water courses after initial 'kick-start' of clearance by EA maintenance workforce	<ul style="list-style-type: none"> • Met local landowner and walked some of the watercourses to ascertain work required.

Group (Local Authority)	Flooding issue	DASH group activity and supporting activities by others	Keith's role
Chalgrove Parish Council (South Oxfordshire DC)	Blocked sewer. Severe flooding in Mill Lane where the Emergency Services have had to pump out several properties	TWU to clear sewer FWG to arrange maintenance of channels, including clearance of poor quality vegetation from channel and banks, removal of overhanging vegetation and fallen trees, and debris dumped by children and replacement with native tree species and wild flowers Local resident clears leaves etc from stream flow sweetening point every day. SODC fund clearance of 'back channel' OCC clears underneath road bridges downstream of village EA maintenance workforce clear the channels near the bifurcation point as this is 'too difficult' for local people to carry out.	<ul style="list-style-type: none"> Working with SODC Regularly attending FWG meetings Site walk-over with PC and DC Encouraging maps showing water courses needing attention and riparian ownership. Attending public meeting of all house and landowners Helping formulate action plan Encouraging owners of mill to operate more responsibly, keeping water levels down and thus also amount of siltation and to allow villagers to operate mill in their absence. Encourages prioritisation of actions and clear time line for work Arranging (as part of another development) modelling of Chalgrove Brook Meetings to discuss issues such as tree root balls, blockages and bank protection
Cricklade (Wiltshire CC)		SHG only applying pressure here. Contractor completes work to replace culvert and install new channel alignment	<ul style="list-style-type: none"> Regular contact with one councillor and arranging consents and funding for tree ball removal and replacement of undersize culvert. Liaising with fisheries over placement of new riffles
Crudwell Parish Council (Wiltshire CC)	Flooding of A429. Village flooding	Initial unconsented vegetation clearance of Swill Brook by local landowner. Subsequent first stage channel improvement works on Swill Brook funded by EA (£5k) and Wiltshire CC (£10.9k). Second stage works to remove silt upstream and replace with combrash (a local limestone shale commonly found as a river substrate). Channel widening and foot bridge replacement by EA contractor at a 'pinch point'	<ul style="list-style-type: none"> Liaison with Parish Council Attendance at North Wilts DC Flood Working Group Arranging co-funding for Swill Brook channel improvements Site visits during works Emails, phone calls Obtained agreement to replace a foot bridge with inadequate afflux capacity (4m span) with a 6.5m span bridge with more capacity
Cuxham (South Oxfordshire DC)			<ul style="list-style-type: none"> Site meeting to discuss possible work.
Devizes (Wiltshire)			<ul style="list-style-type: none"> Meeting with operational flood working group every other month.
East Hagbourne (South Oxfordshire DC)			<ul style="list-style-type: none"> Site meeting to encourage vegetation control in channel.
Eynsham (West Oxfordshire DC)	Flooding from Chil Brook	DASH FWG part-funding construction of a bund (in field owned by OCC) to protect 6-8 properties (BCR inadequate for public funding). Wetland features installed between bund and river EA provided £4.5k towards project. Other funding: OCC £4500, WODC £1000, parish Council £250, residents £1350 (£150 per household x 9 properties)	<ul style="list-style-type: none"> Arranging £4.5k co-funding Attending evening meeting with FWG Site visits Sorting out consents for work Liaison with OCC highways, ecologist and other partners Design of simple bund with OCC (max height 0.5m)
Grove (Vale of White Horse DC)	Flooding of houses in Kingfisher Drive from Letcombe Brook	No DASH group activity. EA and VoWH DC fund removal of restricting redundant access bridge and desilting of storage ponds	<ul style="list-style-type: none"> Liaison with VoWH DC, Sally Wallington (Wantage DC) and Hanneys Flood Group Completing Form C's Arranging funding for modelling of Letcombe Brook

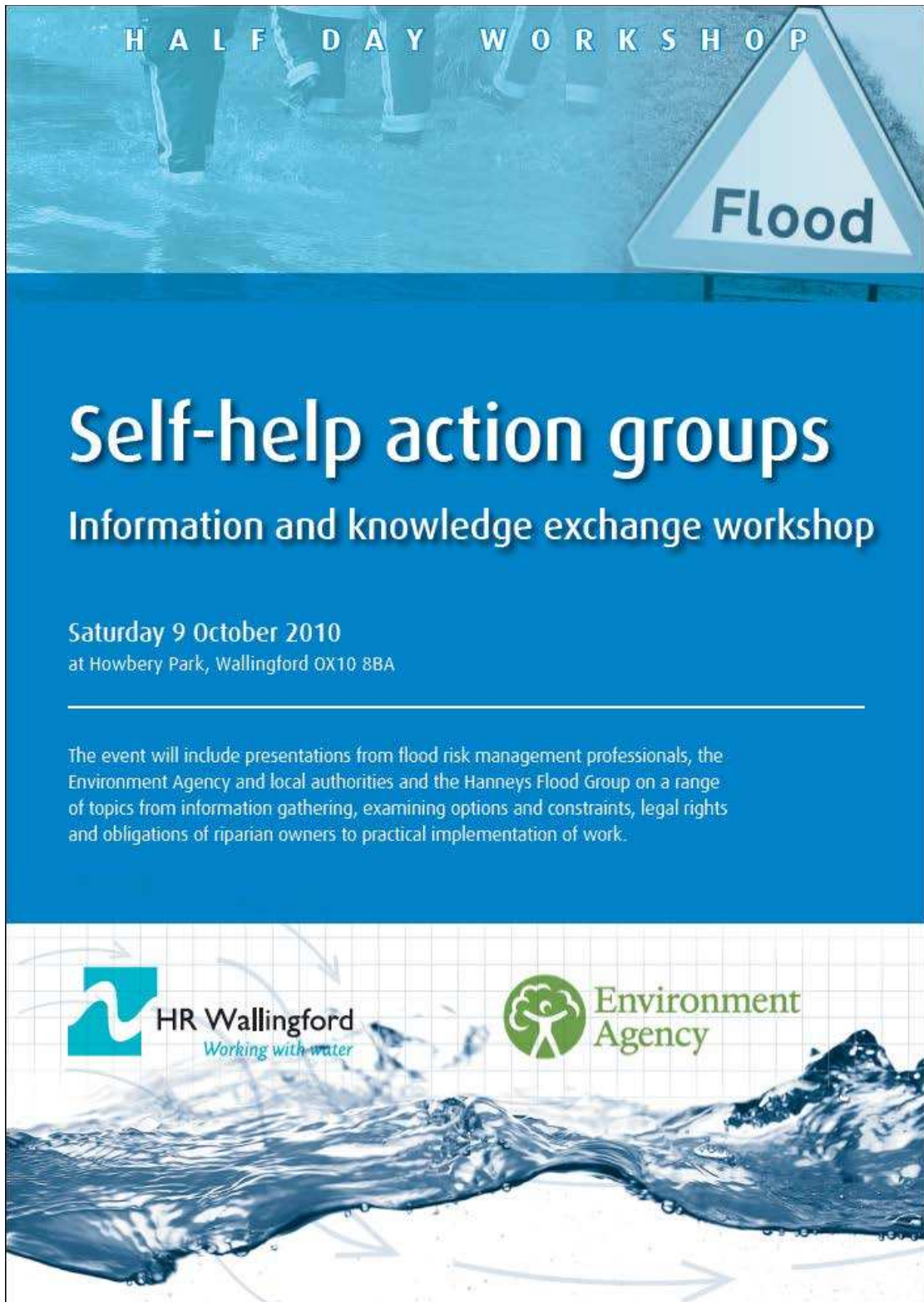
Group (Local Authority)	Flooding issue	DASH group activity and supporting activities by others	Keith's role
Hankerton PC and North Wiltshire FWG (Wiltshire CC)	Flooding from Swill Brook	Hankerton PC spent £10k on maintenance of brook. EA spent effort in 2009.10 in clearing brook downstream of village. It is hoped that villagers/landowners will feel able to take this work on from now on. Wilts CC to provide new culvert and EA to fund construction of swale by Wiltshire Wildlife Trust who used their own machine	<ul style="list-style-type: none"> • Walk-over visits of Swill Brook and advice on plan of action (with Wilts CC) • Meetings with North Wilts FWG and more localised Hankerton FWG. Encouraged agent for key landowner to attend. • Meetings with Wiltshire Wildlife Trust regarding extension of swale through flood bank to reduce flood risk. Arranging part funding of £1k to support this work. • Meetings regarding culvert replacement
Hanneys Flood Group (Vale of White Horse DC)	Flooding from Letcombe Brook, including 10 times in period 2007 to 2008	Clearance of aquatic weed. 100mm lowering of sill at Lower Mill. Installation of diversion flow pipe around Lower Mill. New flood bund on village side of Brook. High level channel to divert high flows into old flood channel. See www.thehanneysfloodgroup.org.uk Maintaining clearance of Letcombe Brook downstream of Lower Mill following clearance by EA maintenance workforce.	<ul style="list-style-type: none"> • Initial responses to queries • Regular meetings with Hanneys Flood Group • Development of agreed plan of action and assisting with consents • Securing £3k funds for materials and equipment for initial projects Securing £2.5k for trailer and boat • Organising EA maintenance workforce to clear silt from brook downstream of Lower Mill
Lambourn (West Berkshire DC)	Flooding from River Lambourn	EA has limited funds for maintenance of Lambourn. Agreed to give demonstration on how to cut vegetation Clearance of overgrown watercress beds. FAG to help out with regular weed cutting and watercress bed management	<ul style="list-style-type: none"> • Meetings with FAG and farmers from Lambourn valley to agree maintenance actions by them • Meeting with MP and WB DC • Assisting with production of local flood plan • Arranging for FAG to have access to information on environmentally sensitive management of water-cress beds
Lechlade-on-Thames Town Council Flood Working Group (Cotswold DC)	Flooding from Donnington Brook and Ditch, including to access roads	EA provides channel clearance once per year. Would another clearance by residents be helpful?	<ul style="list-style-type: none"> • Walk-over visit (Barry Russell) • Attendance at FWG meeting
Lyford (Vale of White Horse DC)	Flooding of Manor House and 6 other properties from River Ock	Bund and compensation area constructed by local landowner	<ul style="list-style-type: none"> • Advice given on bund solution. Involvement in consenting process
Murcott		Fencott and Murcott Parish Council. EA withdrawing maintenance	<ul style="list-style-type: none"> • Provide leaflets for PC meeting
Northmoor	Flooding from River Thames	Residents keen to undertake own maintenance of river channels etc	<ul style="list-style-type: none"> • Walk-over visit (Barry Russell) • Attendance at FWG meeting • Arranging for input from conservation officer
North Moreton	Silting up of ordinary water course downstream of a culvert		<ul style="list-style-type: none"> • Meeting with local residents to discuss local flooding issues • Walk-over survey with SODC and villagers
Oxford Housing Association (Oxford City Council)	Flooding in Bullstake Close, Botley Road, Duke and Earl Streets	Oxford housing association set up a system of demountable defences to protect housing and reduce flooding (in up to 1:10 year event)	<ul style="list-style-type: none"> • Help with Operational R&D meeting

Group (Local Authority)	Flooding issue	DASH group activity and supporting activities by others	Keith's role
Oxford City Groups	West Oxford flooding		Explored the possibility of building a secondary bund to prevent flooding
Piddington and Luggershall (Cherwell DC)	Surface water flooding from Muswellhill and culvert blockage		<ul style="list-style-type: none"> • Arranging walk-over
Shalbourne PC (Wiltshire CC)			<ul style="list-style-type: none"> • Site meeting with PC and CC • Meeting with whole FWG • Walk-over survey
Shipton-under-Wychwood (West Oxfordshire DC)	Flooding from Littlestone Brook	Some FDGIA funding available through WODC	
Stadhampton (South Oxfordshire DC)		House owner reshapes banks and lowers area in front of silted-up culvert	<ul style="list-style-type: none"> • Site visits • Obtaining consents for works
Sunningwell (Vale of White Horse DC)			<ul style="list-style-type: none"> • Presentation given to Parish Council
Marlow (South Buckinghamshire DC)		Protection of home in St Peter Street with flood resistance measures	<ul style="list-style-type: none"> • Provided advice to the owner and consultant. EA consent granted.
Tring PC at Long Marston (West Hertfordshire DC)		PC agrees to keep water course clear	<ul style="list-style-type: none"> • Evening presentation • Walk-over site visit, identifying critical points on watercourse • Writes article for parish magazine on riparian responsibilities
Wantage Flood Group (Vale of White Horse DC)	Flooding	No physical action by residents. Joint action with VoWH DC, and Oxfordshire CC to remove silt downstream of Wantage Mill and under road bridge in Mill Street. VoWH DC improvements on Mill Bypass	<ul style="list-style-type: none"> • Meetings on site with VOWH and Flood Group • Arranging co-funding of improvements works.
Ock Valley FWG, Abingdon	Flooding from River Ock	An active group, clearing vegetation. Produced their own leaflet	<ul style="list-style-type: none"> • Gave PowerPoint presentation and provided guidance on potential storage upstream of the A34 raised highway embankment
Yarnton Parish Council	Flooding of allotments	Concern about condition of ditches Thinking of forming a FWG	<ul style="list-style-type: none"> • Provision of large scale maps needed by PC to mark up maintenance • Gave talk to Yarnton PC • Reviewing emergency plan

NOTE: The summary in this table was prepared by the author based on the information provided by Keith and then cross-checked with him when completed.

A.5 DASH group workshop, HR Wallingford

A.5.1 Brochure cover



HALF DAY WORKSHOP


Flood


Self-help action groups

Information and knowledge exchange workshop

Saturday 9 October 2010
at Howbery Park, Wallingford OX10 8BA

The event will include presentations from flood risk management professionals, the Environment Agency and local authorities and the Hanneys Flood Group on a range of topics from information gathering, examining options and constraints, legal rights and obligations of riparian owners to practical implementation of work.

 **HR Wallingford**
Working with water

 **Environment Agency**

A.5.2 Workshop programme



DASH FLOOD ACTION GROUP INFORMATION AND KNOWLEDGE EXCHANGE WORKSHOP

Howbery Park, Wallingford – Saturday 9 October 2010

Programme

- 09:00** **Registration opens, refreshments**
- 09:30** **Welcome and introduction**
Chair – Jonathan Simm, HR Wallingford
Barry Russell, Environment Agency
- 09:40** **Information collection**
Tim Mcguire, Environment Agency
Steven Wade, HR Wallingford
- What information is needed to understand the problem. Finding out what kinds of information is available on your catchment? What is being measured and by whom? How can you get access to this information? What else can your group do?*
- 10:20** **Examining the options and understanding the constraints.**
Keith Lead, Environment Agency.
Graham Scholey, Environment Agency
- How can your groups find out what options are available for solving flooding problems in your community? Which of these can you tackle yourselves? How do you get permission to do the work?*
- 11:00** **Refreshments**
- 11:30** **Legal rights and obligations of riparian owners**
Pennie Yorath, Environment Agency
- What is a riparian owner? What are their rights and obligations? What kinds of work can a riparian owner do to reduce flood risk? How does this relate to the role of the EA, County Council Highways, Local council, Parish council, Thames Water*
- 12:10** **Implementation**
Peter Dela, Vale of White Horse DC
Stewart Scott, Hanneys Flood Group
- Obtaining permission, estimating costs, sources of funds, cash flow, planning, method statements & risk assessments, management, monitoring and maintenance.*
- 12:50** **Wrap-up discussion**
Chair – Jonathan Simm, HR Wallingford
- 13:00** **Wrap-up discussion**

A.6 Conference, journal papers and presentations

1. Journal paper

- Simm, J, (2012) A framework for valuing the human dimensions of engineered systems. *Proc. Inst. Civ. Engrs. Engineering Sustainability*, **165** (ES3), 175-189

2. Written conference paper and presentation

- Simm, J. and Samuels, M. (2006). Telling good stories: engaging in dialogue with communities about flood and coastal erosion risk management in a post-modern society. Proc. 41st Defra Flood & Coastal Management Conference, York. (When presented to a largely professional national audience, using examples of both written and oral storytelling, responses suggested that this paper was received extremely well, suggesting that the use of storytelling might find wide acceptance.)
- Simm, J. (2007). Perspectives on involving community volunteers in flood and coastal erosion risk management. In: Schanze, ed. Proc. European Symposium on Flood Risk Management research (EFCRM 2007), Dresden, Feb., pp. 164-171. (When presented in Dresden to a European audience, this paper seemed to touch on issues that many of the professionals and researchers present had not considered)
- Simm, J., (2008) Sea wall or sea front? Looking at engineering for Flood and Coastal Erosion Risk Management through different eyes. *Proc. Eur, Conf. on Flood Risk Management, Oxford: Research into Practice (FLOODrisk 2008)*. London: Taylor & Francis, 535-545.
- Russell, B, Lead, K and Simm J. (2009) Towards active involvement of communities in flood management – lessons from experiences in Thames Region. *Proceedings FCM09 conference*, Telford. Bristol: Environment Agency.
- Simm, J, (2009) Coastal defences: social utility, imagination and justice. *Proc. Int. Conf. Coasts Marine Structures and Breakwaters 2009*. London: Thomas Telford.
- Simm, J. (2012) The role of self-help groups in flood risk management. *Proc. 2nd European Conference on Flood Risk Management. Science policy and practice: closing the gap (FLOODrisk 2012)*, Rotterdam, 20-22 November. London: Taylor & Francis.
- Simm, J., Cairns, L. and Clark, J. (2013) Self-help groups – a new paradigm for managing shoreline structures? *Proc. Int. Conference Coasts Marine Structures and Breakwaters, Edinburgh*. London: Institution of Civil Engineers.

3. Conference presentations only.

- Simm, J. (2009) Can civil engineers be 'radical' too? A perspective on emerging voluntary activity in the area of Flood Management. *One-day workshop 'Volunteering: the making of communities?' Annual Int. Conf. Royal Geographical Society/ Inst.Br.Geographers*, Manchester, August
- Simm, J. (2011) The role of self-help groups in flood risk management – an emerging aspect of the 'big society'? *CIWEM national conference 6/7th April 2011*
- Simm, J. (2011) The role of self-help groups in river flood management *River Restoration Conference 2011: Restoration and management of rivers at the local and catchment scale*. University of Nottingham, 14th April.

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