

## What is it?

Flood and coastal erosion risk management (FCERM) assets need to be managed so they can work properly. This can include activities such as:

- maintaining the flow of water (vegetation and sediment management)
- repairing infrastructure
- monitoring river levels
- operating flood gates

In England and Wales there is evidence that local groups have been set up within communities to help manage FCERM assets, with volunteers taking part in a range of different activities. Flood risk management authorities (RMAs) can work together with these groups to improve how assets are managed locally.



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## We found that:

- there has not been much past research looking at community involvement in asset management
- much of the existing evidence looks at what motivates communities to become involved in asset management (e.g. social responsibility, environmental stewardship)
- there is limited research to help understand what enables or stops people from becoming involved in asset management
- one of the main challenges for groups involved in asset management is how they sustain momentum, especially when flooding isn't prevalent
- when communities become involved in asset management the outcomes are largely positive, for example it can lead to:
  - cost savings for RMAs
  - better-functioning assets
  - community empowerment
  - less reliance on others (Simm, 2015; Short et al, 2019; Soetano et al, 2017; Twigger-Ross et al, 2015)

## We still need more research to better understand:

- how many community groups are involved in asset management across the UK and which types of activities they are involved in
- case study examples of community groups carrying out different types of asset management activities
- which asset management activities are suitable for communities to carry out
- how RMAs can support local communities to involve them in asset management
- what training community groups need to be able to carry out asset management activities safely and effectively
- what practical guidance and tools community groups need to carry out maintenance activities
- how communities can work with farmers or land managers to manage assets on private land

## Examples

Project	Summary
Direct-action self-help groups	Direct action self-help groups carry out physical activities such as clearing streams or repairing assets either together with or facilitated by RMAs (Simm, 2015).
Stroud District Council Natural Flood Management Project	Local council, the community, landowners and land managers working in partnership as part of a natural flood management (NFM) project - sharing knowledge and carrying out site visits, meetings and practical activities and supporting landowners in implementing NFM measures (Short et al, 2019).
Warwickshire County Council Flood Action Group	Flood groups working with local authorities to develop initiatives to avoid drains and channels becoming blocked. Warwickshire County Council funded 7 flood action groups to buy equipment to monitor or maintain assets, including spades and wheelbarrows, gauge boards, CCTV and surface water pumps (Twigger-Ross et al, 2015 and Warwickshire County Council, 2015).

## References

- Brooks, A. and Agate, E. (2001) *Waterways and wetlands – a practical handbook*. Doncaster: BTCV.
- Short, C., Clarke, L., Carnelli, F., Uttley, C. and Smith, B. (2019) Capturing the multiple benefits associated with nature-based solutions: Lessons from a natural flood management project in the Cotswolds, UK. *Land Degradation and Development Journal*, 30 pp. 241-252.
- Simm, J. (2015) Direct Action Self-Help (DASH) Groups in UK Flood Risk Management. FLOODrisk 2016 - 3rd European Conference on Flood Risk Management.
- Soetano, R., Mullins, A. and Achour, N. (2017) The perceptions of social responsibility for community resilience to flooding: the impact of past experience, age, gender and ethnicity. *Natural Hazards*, 86, pp. 1105–1126.
- Twigger-Ross, C., Orr, P., Brooks, K., Sadauskis, R., Deeming, H., Fielding, J., Harries, T., Johnston, R., Kashefi, E., McCarthy, S., Rees, Y. and Tapsell S. (2015) *Flood Resilience Community Pathfinder Evaluation*. Defra, London.
- Warwickshire County Council (2015) *Warwickshire Community Flood Resilience Pathfinder Project Final Report*. Available at: <https://nationalfloodforum.org.uk/>.

## Terms of reference

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# Preparing for, responding to and recovering from incidents

## What is it?

Members of the public sometimes volunteer and act together in different groups to help prepare for and recover from flood incidents. This participation can take place in numerous ways, for example:

- encouraging flood and flood warning awareness
- moving at-risk belongings
- erecting temporary flood barriers
- acting as first responders
- assisting the emergency services
- training in order to participate effectively and safely
- taking part in consultation meetings about flood recovery
- peer-to-peer learning, where flooded communities pass on their experiences to non-flooded communities so that they are better prepared
- putting pressure on flood risk management authorities (RMAs) to take action



Photo: Environment Agency Flickr account

RMAs can work with these groups to improve how local residents prepare for, respond to and recover from flooding.

## We found that:

- much of the existing evidence looks at what encourages or discourages communities from becoming involved in preparing for incidents and recovery (e.g. degree of perceived risk and feeling of personal responsibility, perceived cost of engagement, extent of previous flood experience, socio-economic factors, including age, gender, ethnicity, employment status and income level, and skill level)
- there is strong evidence of the approaches and methods that may be used to encourage and build public participation in preparing for and responding to incidents, but much less is known about recovery (Medd et al, 2015)
- it is difficult to sustain public participation in flood action groups and similar community groups over longer time periods (Forrest et al, 2018; Greaves and Penning-Rowsell, 2015)
- public participation in incident preparedness and recovery are largely positive, for example, it can lead to:
  - increased trust between RMAs and communities
  - a more local, context-specific approach, leading to greater community satisfaction with flood and coastal erosion risk management outcomes
  - greater preparedness and action during and after flood incidents
  - avoiding or reducing some of the costs of recovery
  - developing knowledge of flood resilience, skills, attitudes and values

## We still need more research to better understand:

- the main challenges of the recovery process
- the medium to long-term mental health effects of recovery
- the benefits of community engagement in preparing for incidents and recovery
- which models of collective participation by businesses are most effective
- how RMAs can successfully engage deprived communities which may appear difficult to reach
- how formal consultation procedures (e.g. land acquisition, river improvements and construction of FCERM measures) affect public participation in preparing for and responding to flood incidents

## Examples

Project	Summary
Flood hubs	In the Upper Calder Valley (West Yorkshire) local residents, flood wardens, community associations and others joined together to create 'flood hubs' to develop emergency flood plans and to set about flood recovery (Forrest et al, 2018).
Establishing a flood action group	In Southampton, with the help of the National Flood Forum, a flood action group was set up. This led to improved communication, raised awareness of flood risk, improved preparation for floods and installation of property flood resilience (PFR) measures (Twigger-Ross et al, 2015).

## References

- Twigger-Ross, C., Orr, P., Brooks, K., Sadauskis, R., Deeming, H., Fielding, J., Harries, T., Johnston, R., Kashefi, E., McCarthy, S., Rees, Y. and Tapsell, S. (2015) Flood Resilience Community Pathfinder Evaluation Final Report. Defra.
- Forrest, S., Trell, E-M., and Woltjer, J. (2018) Civil society contributions to local level flood resilience: Before, during and after the 2015 Boxing Day floods in the Upper Calder Valley. *Transactions of the Institute of British Geographers*, 44, pp.422–436.
- Medd, W., Deeming, H., Walker, G., Whittle, R., Mort, M., Twigger-Ross, C., Walker, M., Watson, N., Kashefi, E. (2015) The flood recovery gap: A real-time study of local recovery following the floods of June 2007 in Hull, North East England. *Journal of Flood Risk Management*, December 8(4), pp. 315-328.
- Greaves, L.H. and Penning-Rowsell E. C. (2015) 'Contractual' and 'cooperative' civic engagement: The emergence and roles of flood action groups in England and Wales. *Ambio* 44(5), pp. 440–451.
- O'Brien, L., Ambrose-Oji, B., Williams, R. and Morris, J. (2015) Case study, survey, diary and interview research on FCRM volunteering. Final report FD120013/R13. Joint Flood and Coastal Erosion Risk Management Research and Development Programme, Bristol: Environment Agency.

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# Taking part in decisions, designs and funding for schemes

## What is it?

Communities need to be involved in developing, funding and making decisions about flood and coastal erosion risk management (FCERM) schemes. This can be achieved by using community groups, and can help ensure a scheme will be successfully implemented.

In the UK, there is evidence that public groups have been created to influence decision making. However, this evidence has also shown that there is limited scope for the public to actually influence those decisions. Flood risk management authorities (RMAs) can work together with these groups to improve the way in which they are involved in all stages of funding and decision making.



Photo: Environment Agency Flickr account

## We found that:

- there is a lack of research looking at:
  - which public groups are taking part in making decisions about FCERM schemes
  - the approaches used to engage them in decision making
  - the level of success associated with these approaches
- existing evidence has focused on the ability of public groups and the individuals within those groups to influence decisions
- there is a lack of research exploring the:
  - ease with which communities can become engaged in complex funding schemes
  - influence communities can have on decision making related to design, construction and maintenance
- most of the existing evidence focusses on funding of schemes
- the evidence does not look at the specific challenges associated with engaging communities on coastal FCERM schemes
- the evidence highlights the importance of making communities central to the decision-making process. However, the funding mechanisms, socio-political and flood event contexts can act as a barrier to members of community, affecting their ability to be involved in developing FCERM schemes

## We still need more research to better understand:

- what decision making approaches can be used to help to include the public in developing and funding FCERM schemes
- the success stories where the public's participation has helped to develop and fund FCERM schemes

## Examples

Project	Summary
Hebden Bridge	Applying a participatory modelling approach (co-production), a structured approach was developed to capture both expert and local stakeholder knowledge on local FCERM options in Hebden Bridge to inform scheme decision making (Maskrey et al. 2016).
Belfast flood forums	Using a mixed methods approach, a critical analysis of 3 flood forums was carried out to explore the practice of participatory flood risk management in Belfast (Moon et al. 2017).

## References

- Begg, C., Callsen, I., Kuhlicke, C. and Kelman, I. (2018) The role of local stakeholder participation in flood defence decisions in the United Kingdom and Germany. *Journal of Flood Risk Management* 11. pp.180–190.
- Forrest, S., Trel, E. and Woltjer, J. (2017) Flood Groups in England: Governance arrangements and contribution to flood resilience. In (Eds): Trel, E.M. and Restemeyer, B.
- Maskrey S., Mount N., Thorne C., and Dryden I. (2016). Participatory modelling for stakeholder involvement in the development of flood risk management intervention options. *Environmental Modelling and Software* 82: pp.275-294.
- Mees, H., Crabbé, A., Alexander, M., Kaufmann, M., Bruzzone, S., Lévy, L and Lewandowski, J. (2016) Coproducing flood risk management through citizen involvement insights from cross-country comparison in Europe. *Ecology and Society* 21(3), pp. 7.
- Moon, J., Flannery, W. and Revez, A. (2017) Discourse and practice of participatory flood risk management in Belfast, UK. *Land Use Policy* 63, pp. 408–417.

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# Managing land to achieve flood risk benefits

## What is it?

Sustainable land management is essential to achieve flood risk benefits. It can include:

- natural flood management (NFM)
- Blue-green infrastructure (BGI), for example, sustainable drainage systems (SuDS)
- environmental land management schemes
- spatial planning

Across the UK, there is evidence that members of the public are involved in a range of different activities to inform the way land is managed. This includes presenting posters, screening video material, creating websites, blogging, doing field visits, video recording, and constructing NFM measures. Flood risk management authorities (RMAs) can work together with farmers and landowners to help reduce the risk of flooding to communities.



Photo: Defra Flickr account

## We found that:

- there are very few studies that have looked at the engagement of farmers and landowners in decision making related to NFM schemes
- there is little understanding of the public's preferences for BGI measures and their perception of the costs and benefits (Everett and Lamond, 2013)
- the existing evidence shows that, in order to be successful, RMAs should use different kinds of community engagement techniques when undertaking engagement around NFM and BGI, in order to take account of different perspectives
- early community engagement, and valuing the data and knowledge on flooding that communities can provide are essential in building trust and creating more robust partnerships with RMAs
- one of the main reasons members of the public take part in implementing BGI is because they have previous personal experiences of flooding and want to share their knowledge to help resolve the flood risk problem
- when members of the public take part in the delivery of land management and NFM the benefits to both the community and RMA appear to considerably outweigh the costs. Some of the benefits include (Whatmore and Landstrom, 2011):
  - improved decision making
  - cost savings by supporting the development of a flood model and identifying locations for action
  - public support for proposed NFM actions
  - positive partnerships with RMAs

## We still need more research to better understand:

- how to mainstream and encourage the implementation of BGI measures (Everett and Lamond, 2014)
- how to communicate both the flood risk benefits and limitations associated with BGI and NFM (e.g. they tend to reduce flood risk for smaller flood events)
- what tools and approaches RMAs need to help engage and work with farmers and landowners (Boeuf and Fritsch, 2016)
- how to communicate effectively with farmers, land owners and land managers about NFM and potential changes in land management that could help reduce the risk of flooding to communities downstream,

## Examples

Project	Summary
Stroud Rural SuDS scheme	Local community (directly and through flood action groups), local RMAs and land managers participated in a partnership project with the local council to develop a NFM scheme. The appointed project officer was instructed to report to a steering group chaired by members of the local community flood action groups (see Stroud Case Study in Burgess-Gamble et al, 2017).
Ryedale Flood Research Group	Social and natural scientists working with residents affected by flooding in 2 areas through a 'competency group' – a forum created for collaborative thinking, generating new collective competences and redistribution of expertise on NFM and BGI schemes (Whatmore and Landstrom, 2011).

## References

- Burgess-Gamble, L., Ngai, R., Wilkinson, M., Nisbet, T., Pontee, N., Harvey, R., Kipling, K., Addy, S., Rose, S., Maslen, S., Jay, H., Nicholson, A., Page, T., Jonczyk, J. and Quinn, P. (2017) Working with natural processes – Evidence Directory. Horizon House, Bristol.
- Everett, G., and Lamond, J.E. (2018) Considering the value of community engagement for (co-)producing blue-green infrastructure. In Hernández, S., Mambretti, S., Proverbs, D. and Puertas J. (Eds.), Urban Water Systems & Floods, *IIWIT Press*.
- Waylen, K. A., Holstead, K. L., Colley, K., Hopkins, J. (2018) Challenges to enabling and implementing Natural Flood Management in Scotland. *Journal of Flood Risk Management*, 11, pp. 1078–1089.
- Holstead K.L., Kenyon, W., Rouillard, J.J., Hopkins, J. and Galán-Díaz, C. (2017). Natural flood management from the farmer's perspective: criteria that affect uptake. *Journal of Flood Risk Management*. 10, pp. 205–218.

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# Preparing and adapting homes to reduce flood risk impacts

## What is it?

Property flood resilience (PFR) measures can be put in place to keep water out of properties as well as to minimise the damage caused by water entering a property.

Terms used in PFR literature include:

- resistance (keeping water out of the property)
- resilience (minimising the damage caused by flood water entering a property).
- adaptation (changing an existing property so that it is more resistant/resilient to floods)
- active (manually operated - a flood resistance/resilience measure that requires action to set it up in advance of flooding, for example, a flood barrier)
- passive (automatically operated - a resistance/resilience measure that is always in place or automatically activates before or during a flood)

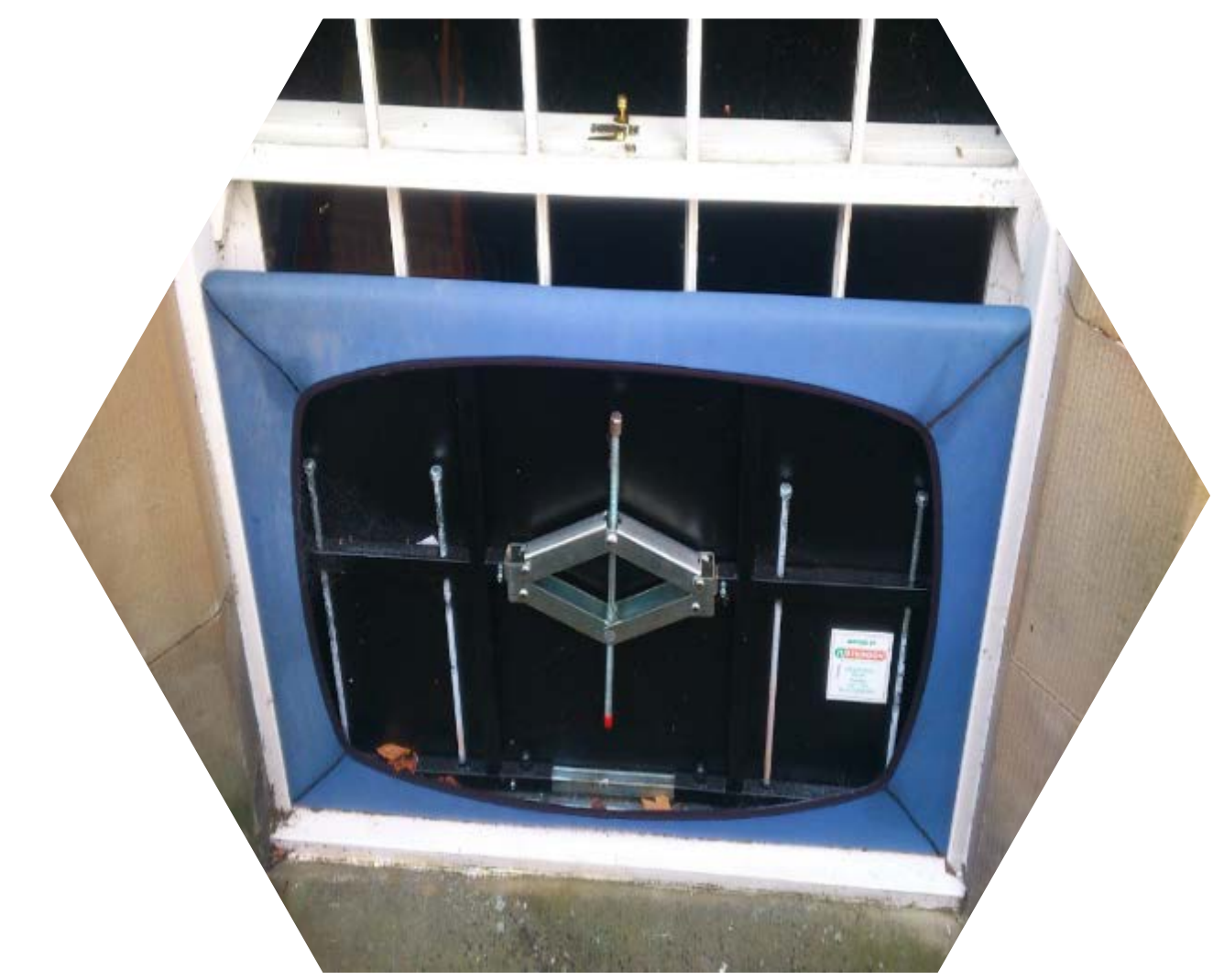


Photo: Environment Agency Flickr account

## We found that:

- past research has looked at a wide range of PFR measures (e.g. using resistant materials, sandbags, flood guards, flood walls, water pump and sump system). It is hard to compare these studies because they have not focused on the same measures (Soane et al. 2016; Defra, 2014; Harries, 2012)
- there is more awareness and uptake of PFR among people affected by flooding, but overall, awareness in general is still low
- much of the existing evidence focuses on what enables or stops people from becoming involved in PFR (e.g. emotional and social factors, fragmentation of the recovery process, lack of skills and knowledge among professionals) (Harries, 2018; Lamond et al. 2019)
- evaluation of PFR schemes shows the role of taking a group/community approach, and how it can improve community capital and maintenance of PFR measures. Linking PFR schemes to community emergency plans and regularly practising using them were keys to success (Defra, 2014)
- there has been some analysis which shows that having insurance in place that takes account of PFR could improve uptake (Suykens et al, 2016)
- when communities participate in PFR, there are different types of costs and benefits such as (Harries, 2012; Lamond et al. 2019):
  - psychological - increased anxiety associated with a reminder of flooding; and benefits from being prepared for floods
  - social - PFR schemes leading to the development of community emergency plans and flood groups
  - material - upfront financial and time costs from instalment of PFR measures

## We still need more research to better understand:

- when do the positive aspects of implementing PFR measures (such as an increased feeling of security) outweigh the negative psychological costs of being reminded of the risk of flooding
- what might the potential health and wellbeing impacts be on individuals and communities from installing PFR measures
- how the experience of flooding affects the idea of home as a safe place, in the context of PFR
- how a sense of flood risk responsibility and an ability to make decisions and take action develops among people living in flood risk areas
- how the perceptions of who is responsible for protecting properties (particularly in rented properties and businesses) affects the uptake and effectiveness of PFR measures

## Examples

Project	Summary
Appleby-in-Westmorland PFR scheme	The Environment Agency used a community approach to implement PFR, this encouraged a collective response, looking across the whole village and asking what could be done to help reduce the flooding. This led to the implementation of some individual and community PFR (e.g. a flood wall in front of a number properties, a pump for the extrusion of water) (Harries, 2009).
Alconbury and Alconbury Weston PFR schemes	Measures were trialled as part of the implementation of the PFR scheme, resulting in increased confidence in their effectiveness. This also provided an opportunity for residents to establish how long it takes for the PFR measures to be comfortably installed as well as to educate new tenants of rented properties on how to install their measures (Defra, 2014).

## References

- Defra (2014) Post-Installation Effectiveness of Property Level Flood Protection: Final report FD2668 London: Defra.
- Harries, T. (2012) The anticipated emotional consequences of adaptive behaviour - impacts on the take-up of household flood protection protective measures. *Environment and Planning A*, 44, pp.649-668.
- Lamond, J., Harries, T., Twigger-Ross, C., Rose, C. and Dhonau, M (2019) Supporting the uptake of resilient repair in the recovery process (FD2706): Final Report. London: Defra.
- Owusu, S., Wright, G. and Arthur, S. (2015) Public attitudes towards flooding and property-level flood protection measures. *Natural Hazards* 77, pp. 1963–1978.
- Soane, E., Schubert, I., Challenor, P., Lunn, R., Narendran, S. and Pollard, S (2010) Flood perception and mitigation: the role of severity, agency, and experience in the purchase of flood protection, and the communication of flood information. *Environment and Planning A*, 42, pp. 3023- 3038
- Twigger-Ross, C., Orr, P., Brooks, K., Sadauskis, R., Deeming, H., Fielding, J., Harries, T., Johnston, R., Kashefi, E., McCarthy, S., Rees, Y. and Tapsell, S. (2015) Flood Resilience Community Pathfinder Evaluation: Final Report. Defra.

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# Taking part in conversations about long-term adaptation

## What is it?

The risks associated with flooding and coastal erosion will increase as a result of climate change and sea level rise. Helping communities prepare for and adapt to these risks is essential. Measures communities are involved in to facilitate long-term adaptation can include:

- developing flood and coastal erosion management (FCERM) plans (e.g. shoreline management plans (SMPs) and flood risk management plans (FRMPs) carrying out regular inspections and monitoring coastal land instability/erosion
- forming Coastal Action Groups (CAGs) to challenge specific policies, secure greater participation in decision making, and mobilise the local community/stakeholders
- implementing integrated coastal zone management
- organising public consultation on FRMPs and SMPs



Photo: Environment Agency Flickr account

## We found that:

- the evidence reviewed mainly includes community groups engaging in conversations about long-term adaptation using risk management authorities' (RMA) formal consultation channels in response to the development of FCERM strategies (Frisch, 2017; Bennett-Lloyd et al, 2019)
- there is limited research to help understand the factors that can facilitate a shift in expectations about who is responsible for managing coastal flood and erosion risks
- there is a fair amount of evidence on the individual, social, and institutional barriers to community engagement in conversations about long-term adaptation
- the reviewed evidence around costs and benefits of community engagement in long-term adaptation was disjointed and sometimes contradictory (e.g. public participation is viewed to both enhance and obstruct collaborative decision making depending on the local context (Kelly and Kelly, 2019; Young et al, 2014)
- the evidence shows that there is increasing recognition within agencies of the benefits of managing adaptation to flood risk at the catchment level rather than at the level of the individual community
- early, accessible, inclusive and interactive engagement encourages greater public participation in conversations about long-term adaptation (Kelly and Kelly, 2019; Young et al, 2014)

## We still need more research to better understand:

- how to engage communities around long-term climate change adaptation
- how to engage communities where there is apathy
- what resilience means for different stakeholders and how to address differences in perspectives
- what needs to change so that we develop FCERM schemes based on 'resilience' rather than protection
- what can be done to help people and communities take actions to become more resilient
- how to communicate climate change uncertainty and adaptive strategies
- the main challenges associated with adaptation to severe climate change impacts, specifically where communities face potential relocation

## Examples

Project	Summary
Coastal Action Groups	A qualitative study explored the activities of 12 Coastal Action Groups (CAGs) in England to understand personal motivations, knowledge, attitudes and perceptions towards coastal management policy and practice. The 12 CAGs identified 3 main priorities: 1) How to challenge specific local SMP policies, 2) How to secure greater participation in decision making, and 3) How to mobilise the local community and other stakeholders to meet and discuss solutions to shoreline management issues (Famuditi et al, 2018).
Community driven coastal management in South Uist	This study looked at community driven coastal management in South Uist (Scottish Outer Hebrides). Since the 'Great Storm' in 2005, local communities put pressure on authorities to take action and erect structural coastal erosion management measures due to concerns about further erosion and loss of agricultural land in future storm events. This led to local people becoming key instigators of and participants in the coastal management programme (Young et al, 2014).

## References

- Bennett-Lloyd, P., Brisley, R., Goddard, S and Smith S. (2019) Fairbourne Coastal Risk Management Learning Project. Cardiff: Welsh Government.
- Benson, D., Fritsch, O. and Langstaff, L (2018) Local flood risk management strategies in England: patterns of application. *Journal of Flood Risk Management*. 11, pp. 827-837.
- Famuditi, T., Bray, M., Potts, J., Baily, B. and Inkpen, R. (2018) Adaptive management and community reaction: the activities of Coastal Action Groups (CAGs) within the shoreline management process in England. *Marine Policy*, 97, pp. 270-277.
- Kelly, R. and Kelly, U. (2019) Community engagement on climate adaptation – an evidence review. Environment Agency, Horizon House, Bristol.
- Maiden, T., Anderson, M., Kirkup, B., Fawcett, J., Wilson, N. and Ogunyoye, F. (2017) Evaluation of the arrangements for managing local flood risk in England: Final report. Prepared by Defra January 2017.
- Young, E.; Muir, D.; Dawson, A.; Dawson, S. (2014) Community driven coastal management: An example of the implementation of a coastal defence bund on South Uist, Scottish Outer Hebrides. *Ocean & Coastal Management*, 94, pp.30-37.

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