

PROJECT OVERVIEW



Background, aims and objectives:

Flooding is a major and growing problem for rural communities throughout the UK. The winter storms of 2013–14 demonstrated how communities can become cut-off and people's lives can be disrupted and devastated by the effects of flood water. This project aims to provide a more effective way for communities to become resilient in the face of hazards like flooding and seeks to explore the potential for using 'social learning' between community members, academic researchers and local agencies to understand the flood risks associated with current climatic conditions and how those risks are shifting as a result of climate change and changes to land management in the area. The project

will work towards a community flood resilience plan that will seek to represent the different types of knowledge by everyone involved.

The project has the following objectives:

1. To adopt a community-centred approach for understanding risks associated with flooding.
2. To encourage the participation of as many people as possible in the project to understand local flood risks, and use as many sources of information as we can from the local area.
3. To create a local plan to manage flood risks and reduce the vulnerability we have to flooding as far as possible.

SOCIAL LEARNING FOR COMMUNITY RESILIENCE: REDUCING THE RISKS FROM FLOODING IN AND AROUND CREDITON

Previous research and why the project is relevant

There has been increasing controversy in recent years about the causes of flooding events in the UK and what can be done to reduce the risks posed by flooding to lives, property and businesses. In part, this controversy has stemmed from the different ways people understand the environment around them. For example, much of the debate in the aftermath of the flooding on the Somerset Levels in 2014 has focused on the merits and problems of dredging rivers, with those in the scientific community holding different views from some in the local communities. Scientists no longer dispute whether humans are changing the climate, but instead study how serious the risks will be and how to address them. In the south-west, climate change means heavier and more intense bouts of rainfall. But the media doesn't always reflect this, sometimes giving the impression that scientists are unsure about climate change. What this means is that people draw on different sources of knowledge to understand the changing environment around them. This project is about recognising that there are different types of knowledge we can use, and it aims to find ways of reaching some consensus about how they can be used together. This draws on previous work from the University of Exeter, where researchers have worked with Exmoor National Park Authority and people in Dulverton, Somerset, to explore the causes of flooding in the town.

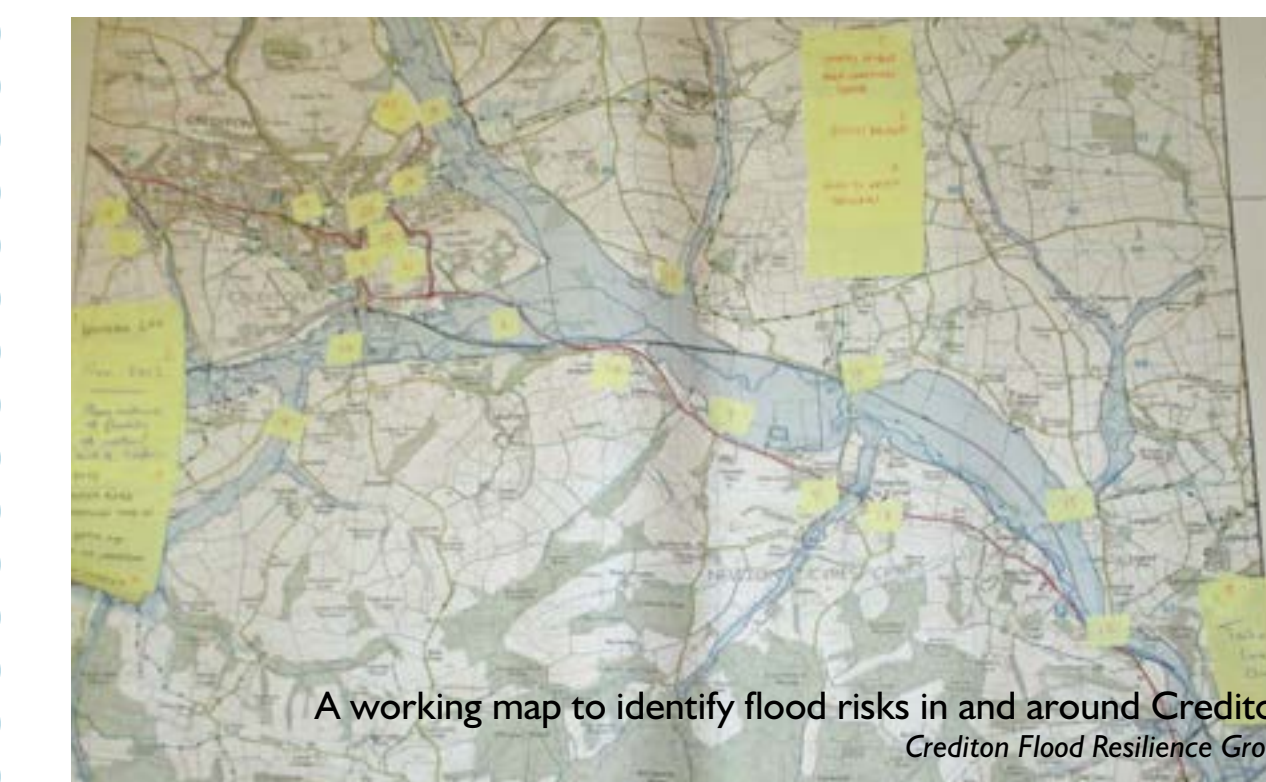
Why focus on Crediton as a case study?

Crediton does not have a severe flooding problem at present, yet it is a locality that is surrounded by low-lying land and rivers that can cause severe loss of transport infrastructure in times of flood. Indeed, the town's location means that intense rainfall events can cause serious surface water flooding. The expected increases in extreme weather events caused by climate change therefore mean that the town itself might be at greater risk of sudden and severe flash floods.



The Crediton Flood Resilience Group

The project is being run by the Crediton Flood Resilience Group, which has representatives from the community of Crediton, Devon County Council, the Environment Agency, Devon and Somerset Fire and Rescue Service, Climate Outreach Information Network and climate change researchers from the University of Exeter. The group has begun the process of exploring current understandings of flood risk and the ways Crediton's vulnerability will change in the future. We are now in the process of hearing the stories and views of everyone concerned with flooding in and around Crediton.



What have we found so far?

The group has been undertaking extensive searches for evidence of historic flood events and has also been considering how flood risks might change in the future. The following posters provide detail on these two aspects, but briefly we have found that:

- Flooding seems to occur in three specific places: in the centre of town, on new developments, and at key points in the transport network outside of Crediton;
- River based flooding can often cause Crediton to be cut off by road and rail;
- Surface water flooding is a problem for some developments in the town, where there are steep hills;
- High levels of rainfall can cause earth banks next to roads and property to become unstable and to collapse;
- the extent of flooding may be under-estimated due to a reluctance to report flood events;
- Rainfall intensity and extreme weather events are likely to increase as a result of human induced climate change;
- These increases are likely to raise the risks of surface water flooding in a town like Crediton, especially in areas with steep hills;
- There is evidence that a lack of maintenance and drain clearing could make flooding worse, in particular flash flooding;
- The different ways in which farmland is managed and cultivated will influence the rate of flooding in Crediton.



How you can contribute: what else do we need to know?

In trying to re-construct past flooding events in and around Crediton, and in thinking about what factors will influence future events, we need your stories, opinions and advice about what other evidence we need to collect and what could be done in the future to reduce the risks to people, property and livelihoods from flooding in and around the town. Much of this is not about entirely preventing floods, but thinking about how we can be better prepared and ready to respond when a flood does occur.

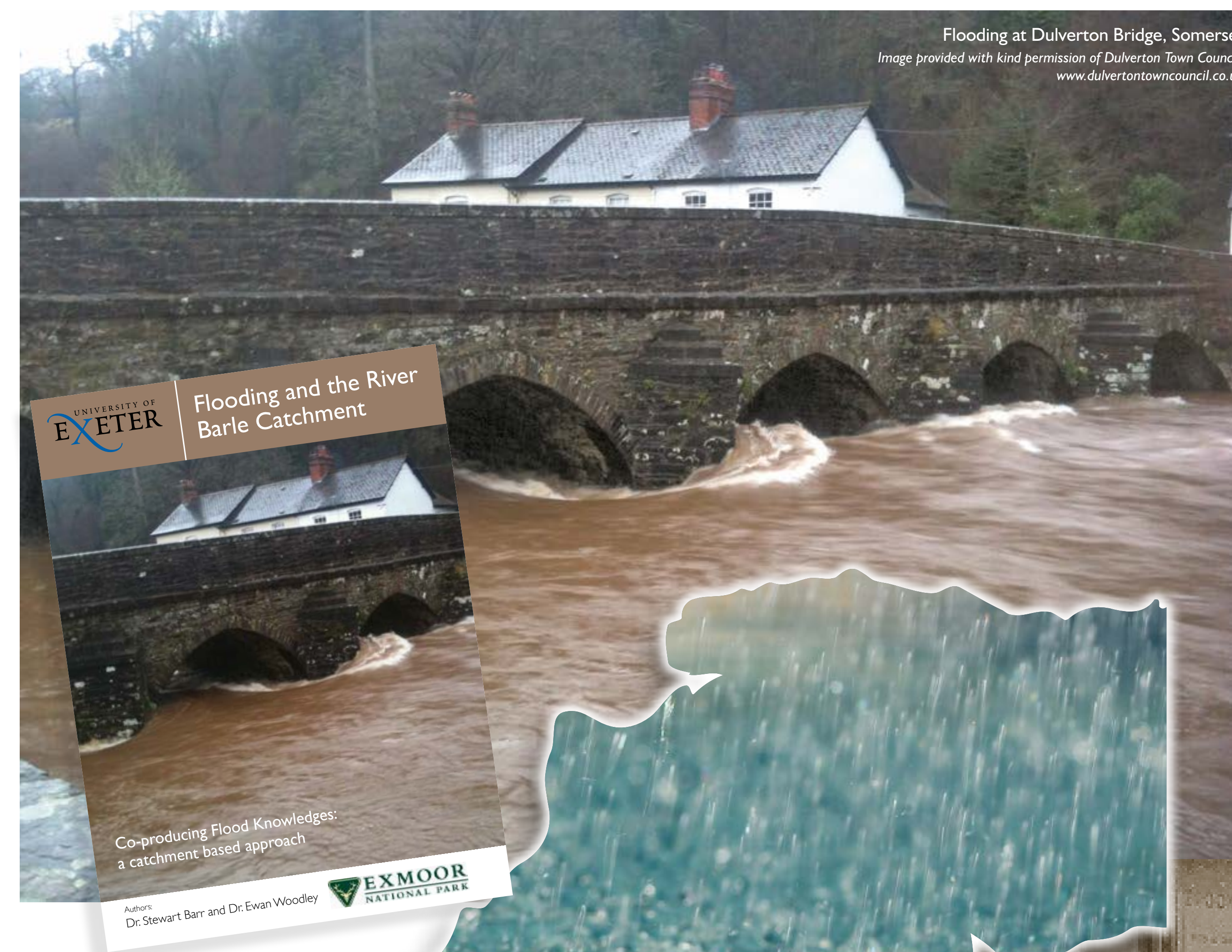
What should a community flood resilience plan look like?

Ultimately, the flood resilience group hopes to use your views and evidence to work with Devon County Council, the Environment Agency and the Fire and Rescue Service to write a community flood resilience plan that might look into how we can:

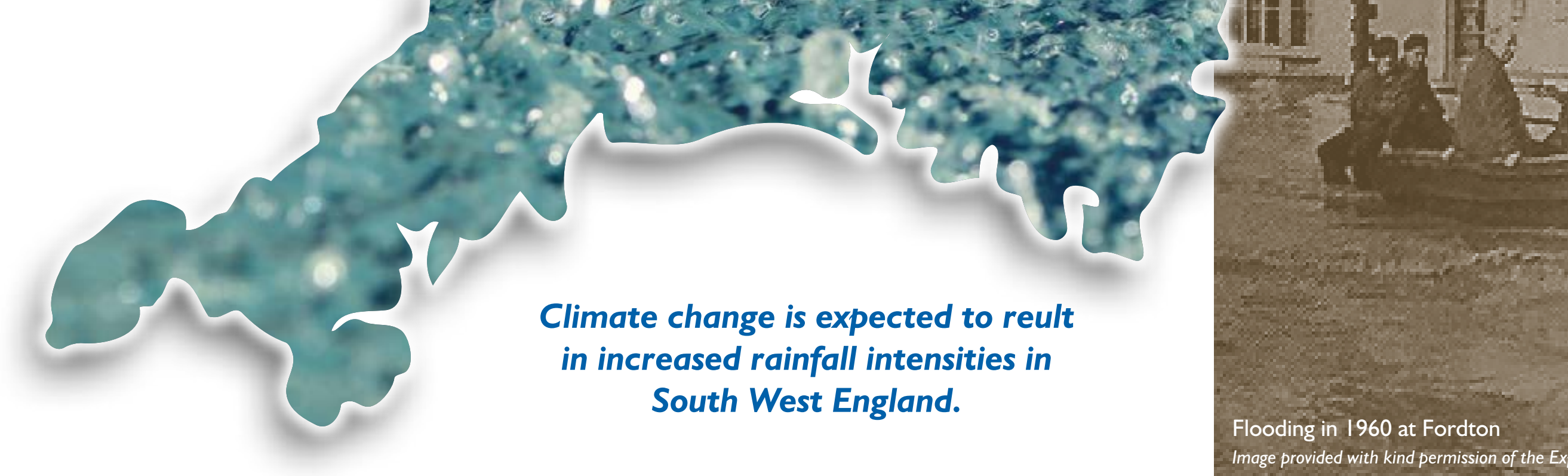
- Identify areas that are at risk of different kinds of flooding;
- Focus on issues that could make flooding worse;
- Plan for the future through taking into account changes in our climate;
- Engage local people to prepare for and know what to do when a flood occurs;
- Have help and support in place after a flood event.

Personal flood plan	
Are you signed up to receive flood warnings? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Let us know when you've completed your flood plan by calling Floodline on 0345 988 1188. This will help us learn more about how people are preparing for flooding.	
General contact list	Company name
Floodline	Environment Agency
Emergency provider	Contact name
Gas provider	Telephone
Water company	
Telephone provider	
Insurance company and policy number	
Local council	
Local water station	
Travel/healthcare info	
Key locations	Description of location
Emergency	
Electricity	
Gas	
Water	
Who can help/who can you help?	
Neighbourhood	Name
Neighbour	Contact details
How can they help?	
Be prepared for flooding. Act now	

Above: A personal flood planning device from the Environment Agency.



Above: A community report on flooding in the Barle Catchment, Somerset (University of Exeter)



Climate change is expected to result in increased rainfall intensities in South West England.



HISTORIC FLOODS IN AND AROUND CREDITON



The 1960 floods Image © WESTERN MORNING NEWS



The 1960 floods Image © EXPRESS AND ECHO

1816

The earliest confirmed, dated reference to a flood near Crediton found during this research was located in court case papers of 1816. These papers alleged that flooding at Four Mills, Denbury Three Corner Marsh and Denbury Broad Marsh were caused by the widening (and thereby lowering) of a weir over the River Yeo. The plaintiff claimed that 'nearly 2 square land yards have been destroyed occasioned by the flood waters of the Yeo passing around the gutters of the Broad Marsh'.



1910

An account of heavy rainfall across Devon in 1910 highlights the impact on business and access in Crediton. The Exeter and Devon Gazette (10 December 1910, p. 1) reported that 'vehicular traffic has been impossible for the past day or two and this has prevented a number of farmers attending the Christmas market'. The water was two feet deep near Moor Acre, and roads at Culvery and Downes Mills could not be negotiated. To access the station at Newton St. Cyres, people had to be 'carried across in carts and traps'.

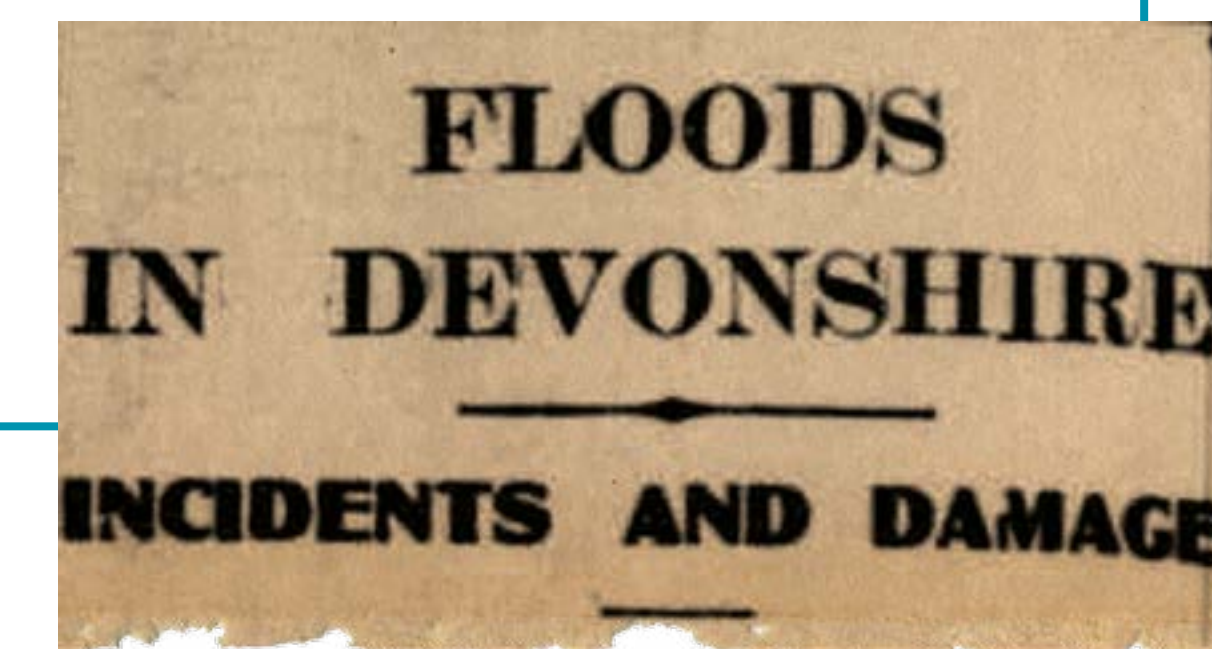


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Western Times 17th October 1903, p.2

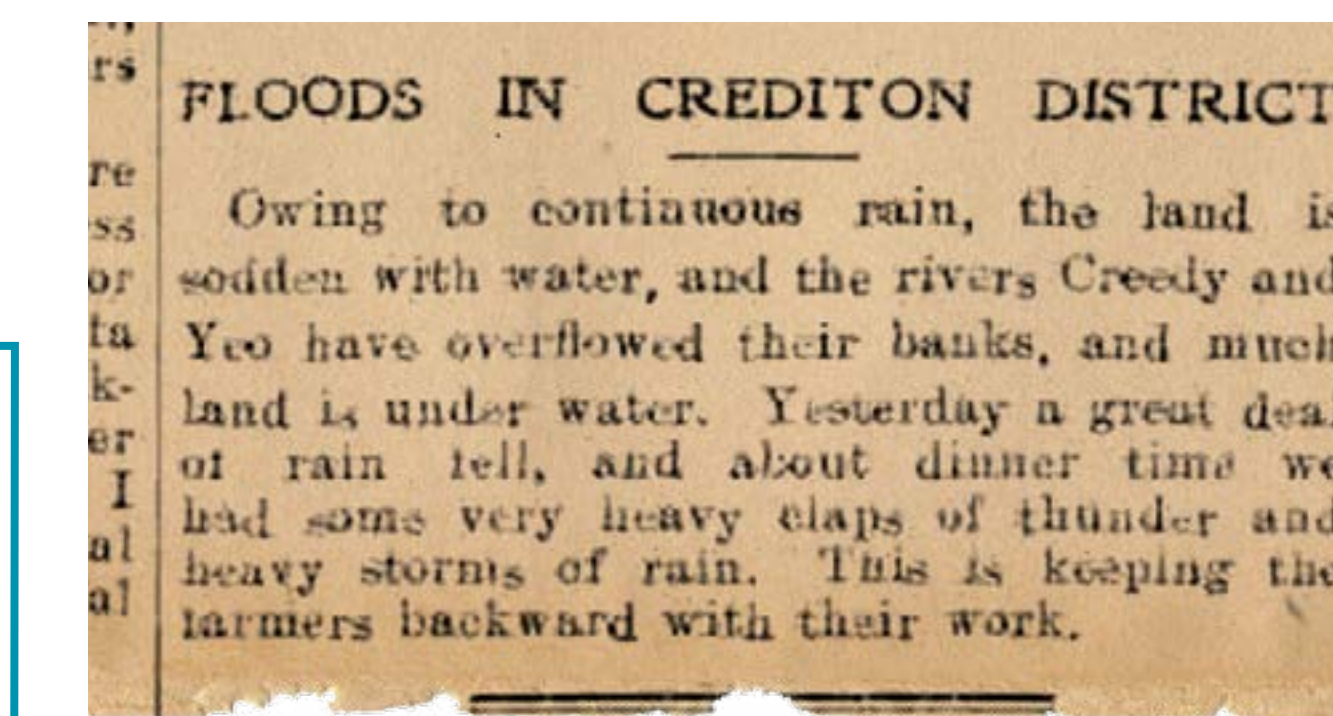


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Western Times 7th October 1913, p.6

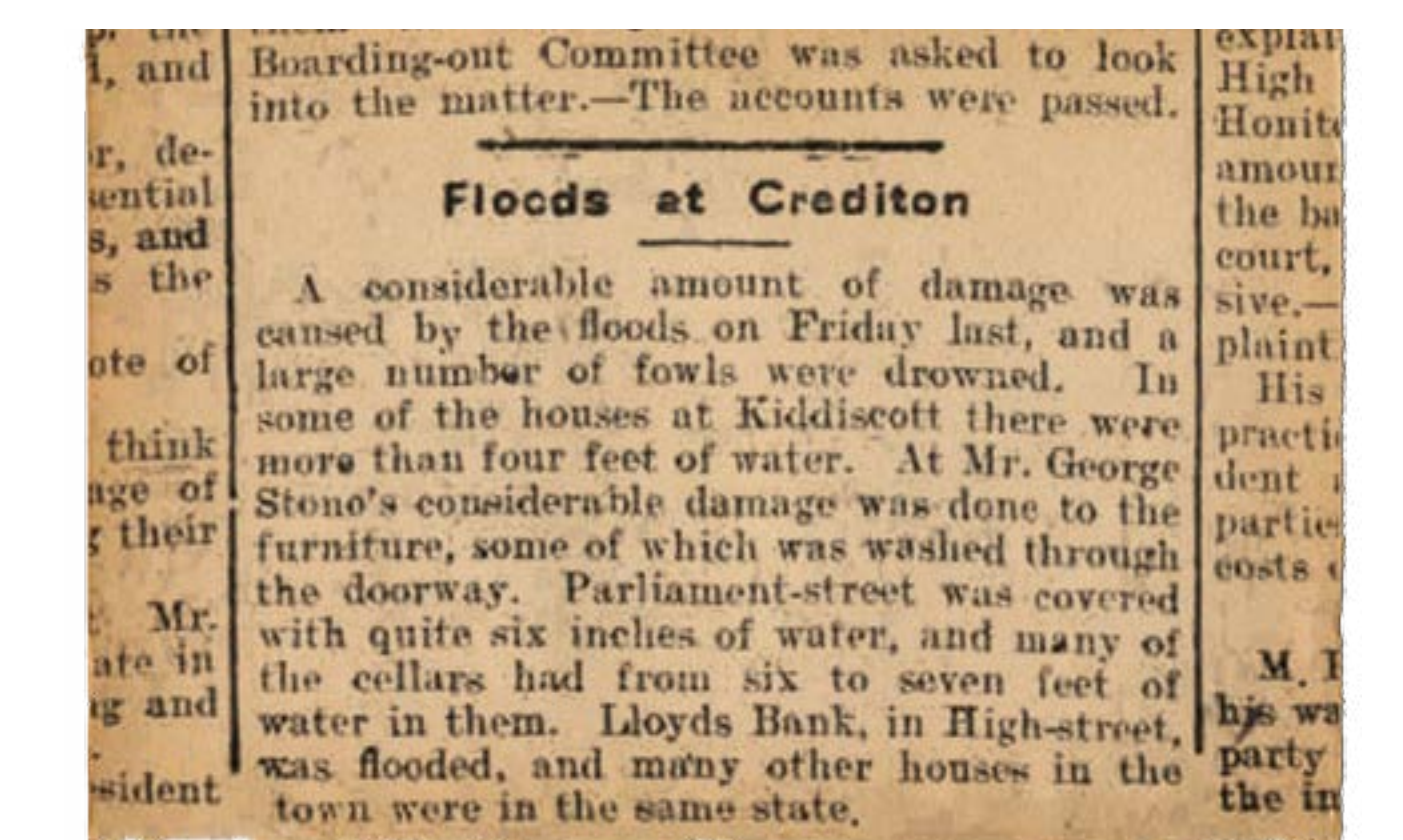


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1800

1800

The earliest reference to flooding around Crediton can be traced to sometime before 1800. Located in an undated and unreferenced clipping in the 'Crediton parish file' (located at the Devon Heritage Centre), an unattributed text discusses rivers including the Exe, Creedy, Yeo and goes on to describes how the:



'Tedburn-brook...discharges itself...into Fordton-river between Yewton and Fordton... There are several other tributary streams: and the rich watered meadows, where they flow, produce the most luxuriant herbage. But in a rainy winter, the lowlands are often inundated by the swelling of the rivers and various rills: so that several of the bridges are rendered impassable.'

The date of this passage can be estimated from its use of a letter known as the 'long s' which was used by printers until 1800.

References

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Acknowledgements

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Thank you to staff at the Devon Heritage Centre.
Thank you to the Express and Echo and Western Morning News.

Western Times 19th May 1893, p.6



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1875

1888

'The oldest inhabitant here cannot remember a more disastrous thunderstorm' (Western Times, 10 July 1888, p.3) than those which caused floods in 1888. The article describes flood water converging on Crediton from George Hill, Park Hill, Bell Court and Park Court. Water streamed down the High Street and Searle Street, flooding several houses. At the Public Rooms the force of the flood 'burst the window; the water pouring in rapidly soon covered the bed', while water running down Union Inn Hill, Parliament Street, North Street and Park Street swamped homes. The article describes mud and sand blocking drains as responsible for deep water in the middle of High Street, Searle Street, Kiddecott, North Street, East Street, Charlotte Street and at the junction of Station Road and Exeter Road.

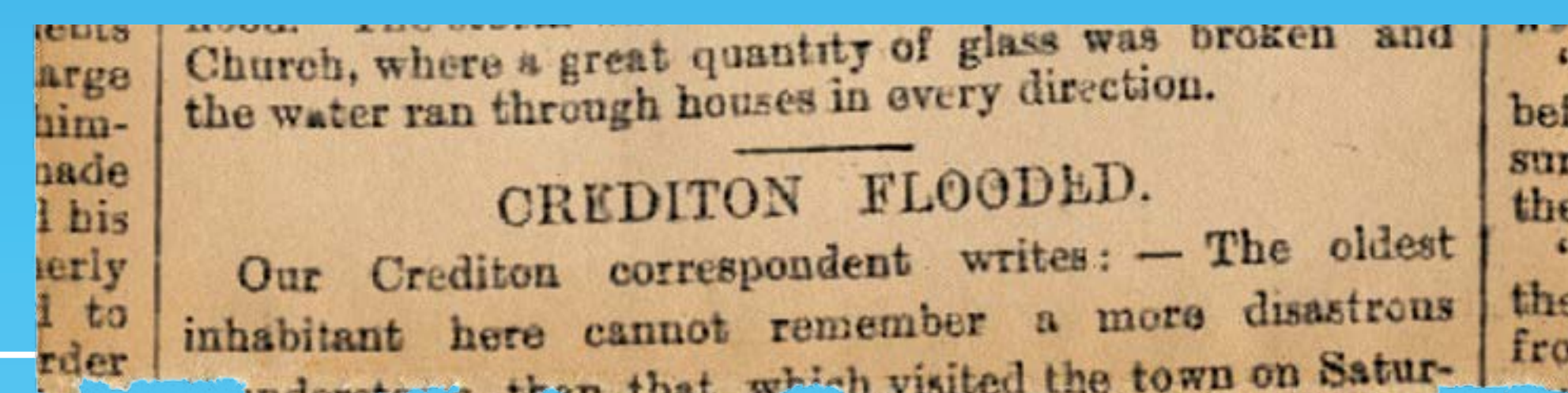


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1900

1924

'Crediton Cut Off' ran the sub-headline in the Western Times (7 November 1924, p.4) after floods in Coleford, Yeoford, Sandford, Creedy Bridge, Downes and Fordton. In many places roads were several feet under water, for instance, at Creedy Bridge the road was 'impassable', at bottom of Moor Acre Hill the water was up to 3 feet deep and at Yeoford it was up to 4 feet. The roads from Yeoford to Hittisleigh and Crediton to Fordton were also flooded. 'It was a great many years since there was such a flood in the district' (Western Times 7 November 1924, p.4).

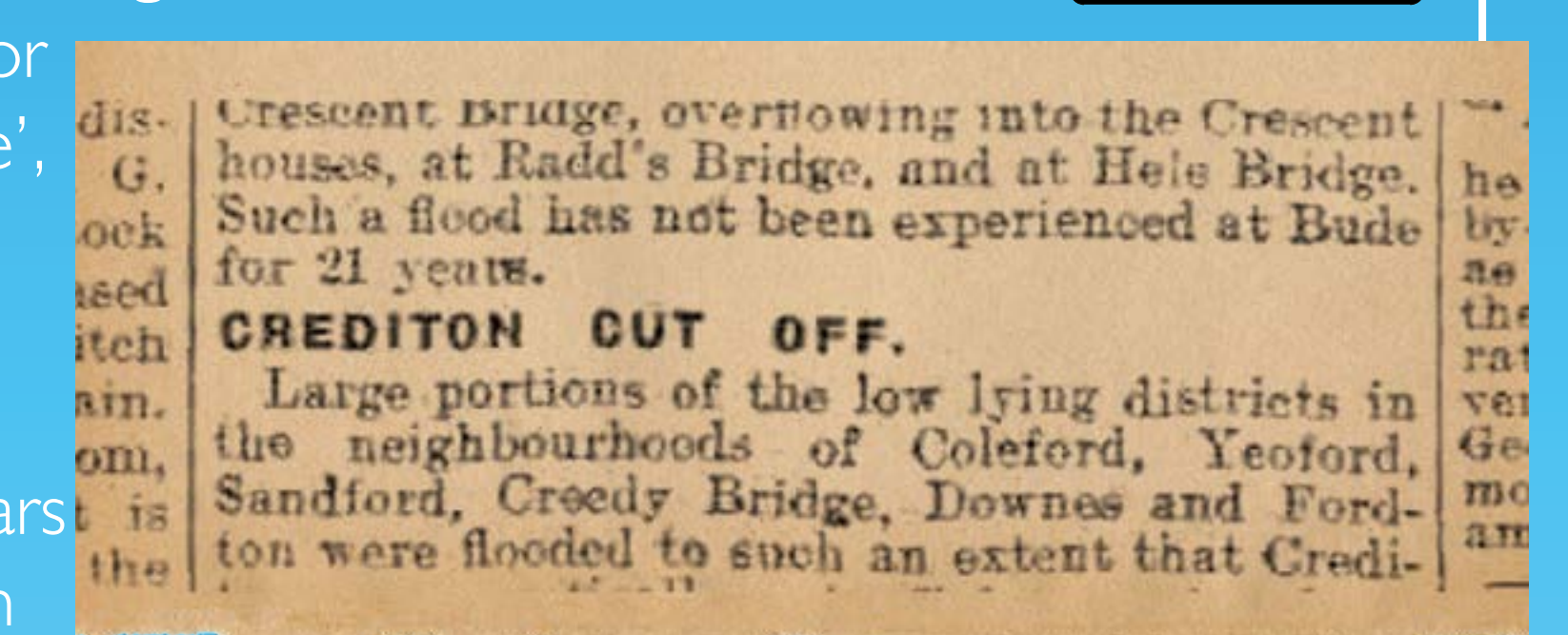


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HISTORIC FLOODS IN AND AROUND CREDITON



The 1960 floods Image © WESTERN MORNING NEWS



The 1960 floods Image © EXPRESS AND ECHO

1936

Description of a sudden storm in the Exeter district, in the Western Times (18 September 1936, p.7), reports that 'at Crediton the rain was of tropical force'. The intensity of the rain was such that 'the storm resembled a cloudburst and within quarter of an hour the streets (of Crediton) were awash'. Shops and houses were flooded in North Street, Church Street and Cockwell, as were roads in the district.

BUSINESS HOUSES AND STREETS FLOODED BY "TROPICAL" STORM

Image © LOCAL WORLD LIMITED. Image created courtesy of THE BRITISH LIBRARY BOARD.

1960

The exceptionally heavy rainfall in September and early October 1960 had a significant impact in and around Crediton. At the time, the year was the third wettest on record (Brierley 1964, 151). On 30th September there was 'serious and unexpected damage' (Devon Flood Story 1960, p.1) in Crediton, while in Fordton, cottages collapsed (see picture). On the 6th October, Crediton was 'completely cut off by road and rail for some hours'. Ground beneath a bridge on the railway line just one mile from Crediton Station was 'scooped out to a depth of about 20 feet' and tracks were 'suspended in mid-air for 150 feet' (Brierley 1960, 163).

2012

In November 2012 Crediton became 'a virtual island' due to flooding. Floodwaters closed roads around the town including the A377 at Cowley, A3072 at Bickleigh Bridge and the A283 at Whiddon Down. With the Tarka line already closed, access to Crediton was so restricted that several businesses were unable to open due to a lack of staff.



Crediton turned into island by floodwater

Image © CREDITON COURIER

1925

1950

1975

2000

2025

1950

Reports of a 'Funnel Cloud' in Devon made front page news as far a field as Aberdeen in 1950 (e.g. Aberdeen Journal, 7th July 1950, p.1). The Western Daily Press (7th July 1950, p.1) described the dramatic events: 'a district nurse's car was swept down a hill at Crediton, Devon, by floodwater when a freak storm hit the Creedy Valley'. The result of the 'cloud burst', which is described as lasting 'only 20 seconds', was widespread flooding, including the lower levels of houses in Mill Street that were covered in water and thick mud. On a farm in Newton St. Cyres 20 fruit trees were reported as having been uprooted by the storm.



The 1960 floods Image © EXPRESS AND ECHO

Mud and wet!

After the thunder storms last week, roads all around Crediton were affected - so were some homes.

Image © CREDITON COURIER

1993

Thunderstorms in late May and early June 1993 (Crediton Courier, 1st June 1993, p.2 14th June 1993, p. 3-4) caused roads to be flooded in and around Crediton. Roadside banks collapsed with saturation resulting in '20 tons of mud... on the Yeoford-Crediton road'. Kiddicott and New Cut were flooded, as were garages at the Westwood end of Western Lea.



The 1960 floods Image © EXPRESS AND ECHO



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 "Business Houses and Streets Flooded by 'Tropical Storm'", Western Times, 18 September 1936, p.7. Available from <http://www.britishnewspaperarchive.co.uk> [Accessed 23 July 2015]
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 "Mud and Wet", Crediton Courier, 1 June 1993, p.2.
 "Not even for ducks", Crediton Courier, 14 June 1993, p.3.
 "Crediton turned into island by floodwater", Crediton Courier, 23 November 2012, p.1.

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IDENTIFYING 'VULNERABILITIES'

Understanding what else we need to know, apart from historic analyses and climate change

So far in our research, we have gained a good overview of where floods have occurred in the past and what impacts they've had. Indeed, we now know something about how weather patterns are likely to change in the future, with increasing rainfall intensities. However, to understand how we might become more vulnerable in the future, and how we can deal with this, we need to know more about other influences on flooding.

This poster outlines some factors that can increase flood risks. You might be able to tell us more about these and how they work; and you might know of other influences that we've not included here.



Climate change predictions indicate that more extreme weather and intense rainfall events will occur in the future

Projected Changes during the 21st Century in Extreme Climate Phenomena and their Likelihood	Representative Examples of Projected Impacts (all high confidence of occurrence in some areas)
Simple Extremes	
Higher maximum temperatures; more hot days	• Increased incidence of death and serious illness in older age groups
More intense precipitation events (Very Likely over many areas)	<ul style="list-style-type: none">• Increased flood, landslide, avalanche, and mudslide damage• Increased soil erosion• Increased flood runoff could increase recharge of some floodplain aquifers• Increased pressure on government and private flood insurance systems and disaster relief

(Data from IPCC Working Group II Report, 2014)

The contribution that different types of farming and cultivation methods can make

The way we use the land in rural areas, in large part for agricultural purposes, can have a major impact on how much water is delivered to streams and rivers, or to drainage systems on roads. Land uses for food production reflect, in the long term, the demands placed on farmers by society, with changing demands for arable or pastoral based products. Indeed, since World War II, agriculture has become greatly intensified, with changes to the ways that land is cultivated and managed, all of which can alter how much water and sediment runs off. Moreover, land managed well can significantly reduce runoff and help to reduce flood risks.



“Land managers can intervene to control run-off and retain water in the landscape by, for example, (1) land use changes, such as a switch from arable cropping to grassland or forestry; (2) changes in land management practices that avoid soil compaction and/or erosion damage, such as controlled machinery ‘traffic’ in fields or avoidance of field operations under wet conditions; and (3) measures to ‘slow water down’ such as retention ponds and field boundary features such as grass or wooded buffer zones”

Morris et al., in press, p.3

The role of drainage and drain management, both on farmland and in urban areas

Once water has been delivered to drains on farmland and on roads or on residential development, how these drains are managed and how they are maintained can have a major impact on localised flooding events. For example, a severe thunderstorm over Exeter in November 2014 caused flash flooding and inundated a number of properties, largely because drains were blocked by leaves.

How we manage our infrastructure of drains, culverts (streams running underground), urban streams and rivers makes a difference to how much water can escape into primary water courses during flood events and can make the difference between homes being inundated or staying dry.

“The particular role of the urban drainage system in contributing to the severity and geography of the flood became, in the days and weeks following, a matter of much contention. Some argued that this engineered system simply did not have the design capacity to cope with the extreme and very unusual summer rainfall of June 2007; others that various elements of the system were not properly functioning due to poor maintenance and management, including the mundane clearing of leaves and garbage from street gutters and drains by the city council”

Walker et al. (2011, p. 2308) discuss the impact of drainage systems on the Hull floods of 2007



The role of housing and commercial developments on surface water runoff

Some of the areas we've identified as being prone to flooding are in or close to new developments. Research exists that suggests when areas of land are paved over for development, driveways, roads and other uses that involve impermeable surfaces, runoff increases rapidly, adding to surface water flooding and delivering water at greater speed to streams and rivers.

“In contrast, low intensity, more sprawling development patterns significantly increase flood losses...”

Low-density development patterns can compromise hydrological systems and amplify surface runoff by spreading out impervious surfaces across a watershed, placing more structures and residents at risk from flooding over a larger area. Furthermore, unlike well-established urban centres, low-density suburban and ex-urban communities are less likely to have adequate storm drainage systems and other infrastructure to accommodate increase increased surface runoff”

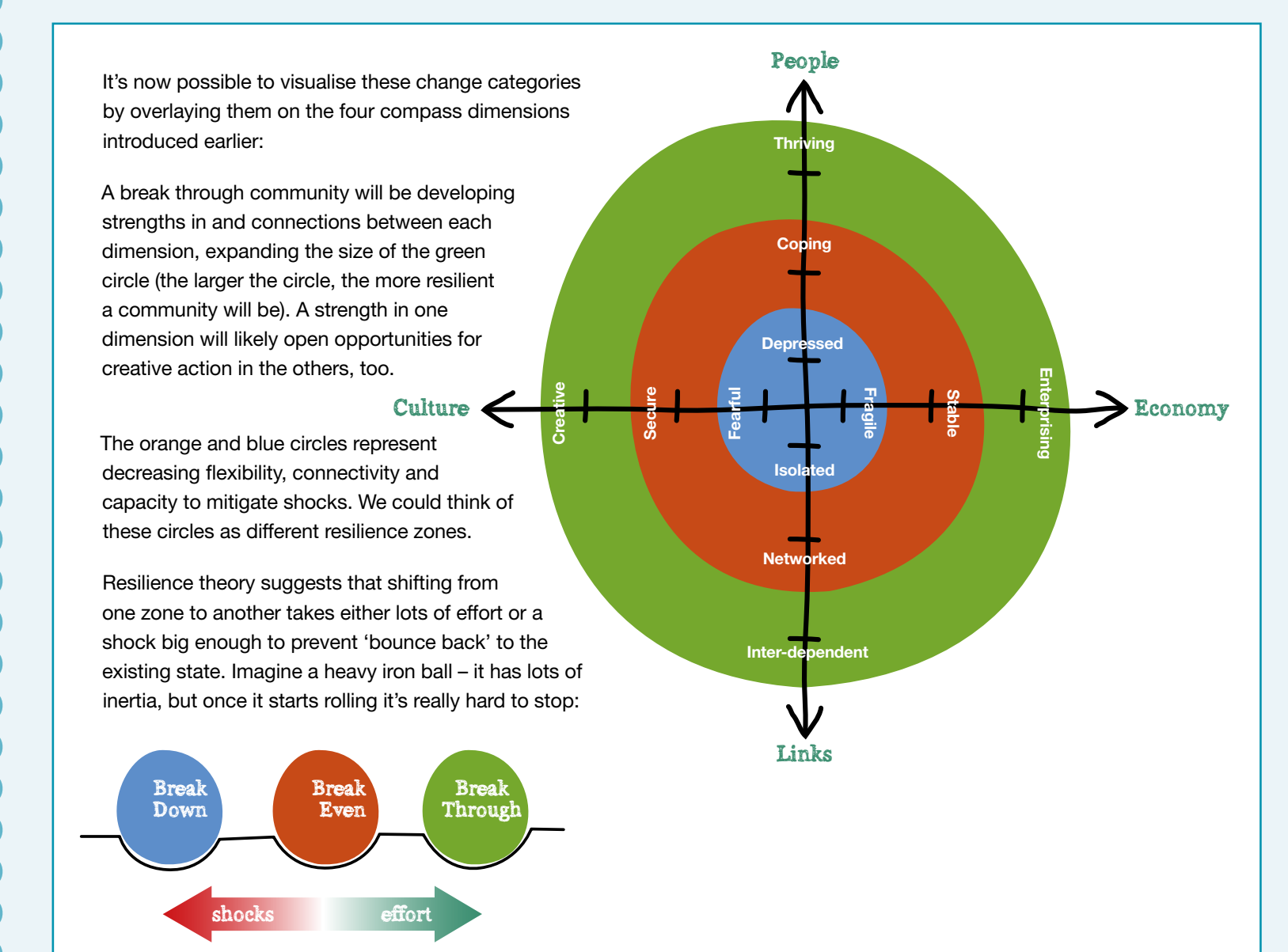
Extract from Brudy et al. (2014, pp. 1262-1263)



The role of responses to flood events and asking 'who's responsible'?

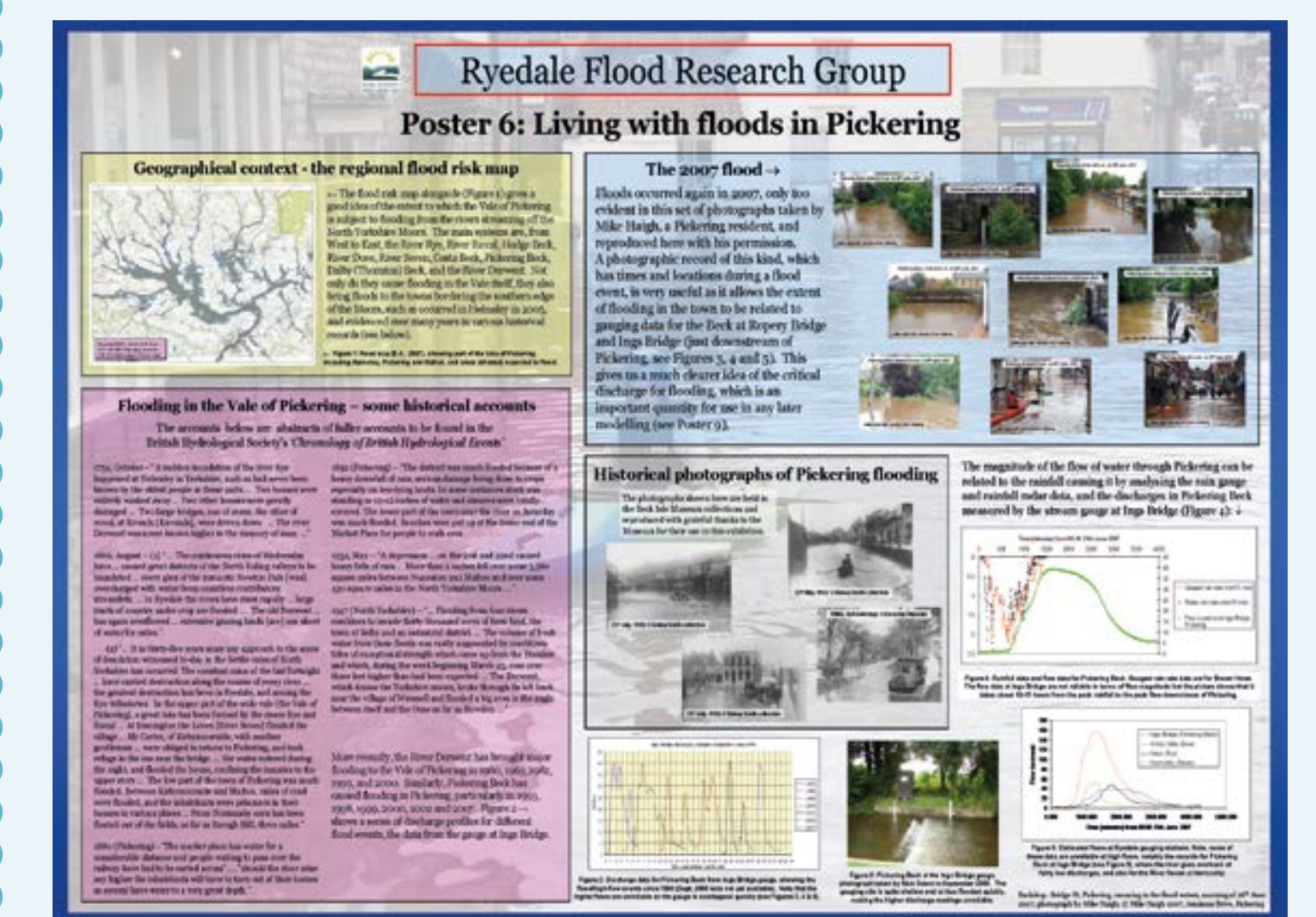
In the event that a flood does occur, whose job is it to react? In Britain, we've traditionally relied on services delivered by local government to provide immediate assistance and longer term recovery. Yet in rural communities in particular, there are often well-established networks of support that do or could provide help and advice in preparing for floods and dealing with their aftermath. This is what some call 'community resilience' and is about re-balancing the responsibility between what local government needs to do, and what we can do for ourselves. The question is: what's the right balance?

One approach, taken by the community of Loswithiel in Cornwall, is to have a dedicated group of volunteers who act as flood wardens. Their role is to engage people to think about floods before they happen, to issue local flood warnings, help people to prepare for a flood, and co-ordinate responses afterwards. You can see their work on YouTube (search for 'Loswithiel Flood Plan').



Above: The Carnegie Trust has outlined what a resilient community might look like (image provided with kind permission of the Carnegie Trust)

Below: The community of Pickering has pioneered ways to work together to tackle flooding problems (image provided with kind permission of the Ryedale Flood Research Group)



References

“Business, Houses and Streets Flooded by ‘Tropical Storm’”, Western Times, 18 September 1936: p.7. Available from <http://www.britishnewspaperarchive.co.uk> [Accessed 23 July 2015]
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IDENTIFYING VULNERABILITIES AND LEARNING TO COPE

In the first four posters, we described the work of the Crediton Flood Resilience Group and the types of factors that can influence vulnerability to flooding. However, these posters only represent part of the story: you have the other half. We would like to know what stories or memories you have of flooding in the local area, what you think could lead to more flooding in and around Crediton, and how we could manage floods better in the future, in particular with the likelihood of increasing rainfall intensities.

Please have a look at the following questions and use the sticky notes provided to share your thoughts under the relevant question(s):

Are there memories you have of flooding in the local area and would you like to record these with a member of the research team (option to provide contact details)?



What do you think are the key influences on flooding in and around Crediton, such as extreme rainfall events, climate change, drain maintenance, farming practices, new developments, or other influences?



What do you think the most effective ways are to manage floods in the future?



What role do you think the community can play in reducing the risks associated with flooding and its impacts?

