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West Yorkshire Flood Innovation Programme Accelerator Project

Work Package 1: Exploring Flood Early Warning Systems and Communities

Feasibility Study Report

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Dr Sam Ramsden¹, Professor Cathryn Birch², Dr Sarah Jenkins³ and Ashar Aslam²

¹School of Geography, University of Leeds

²School of Earth and Environment, University of Leeds

³Leeds University Business School

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Tracy
Brabin
Mayor of
West Yorkshire



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Executive Summary

Given the growing threats of climate change and flooding, and limited resources within Flood Risk Management Agencies (RMAs), there is an increasing need to build household and community-level resilience. Flood Groups can play an essential role in helping communities to prepare for flooding, act during flooding and recover after the event – adding value to the work of RMAs. Supporting Flood Groups in the use of flood early warning systems (FEWS) can be essential to 1) enable Flood Groups to have accurate information on the potential for flooding; 2) galvanise Flood Groups around concrete, interesting and valuable information and actions.

We worked with ten Flood Groups to understand their use of FEWS. Of these Flood Groups, six used Environment Agency (EA) information on river levels and rain gauges, and five used local monitoring information (e.g. river level monitoring) including from private sector providers. We found a range of good practice including:

1. **Pang Valley Flood Forum:** [Dashboard](#) of FEWS information from EA and private monitoring: river levels, rain gauges, groundwater levels, and EA Flood Warnings & Flood Guidance Statements (FGS).
2. **Whalley & Billington:** working with Previsico and Lancashire County Council, have installed monitoring equipment to view the water levels next to a trash screen. Alerts inform them when debris needs to be cleared, and this has helped prevent flooding a number of times.
3. **Aston Ingham:** A very new group but they have worked with Andel Ltd to install three monitors on local river, streams and tributaries. The group meets regularly to review data and establish trigger points for warnings. This group was supported with a funding and research support from the *University of Chester*.
4. **Fishlake:** This Flood Group analyses a range of monitoring information from the EA and has around 30 Flood Wardens. It has strong links to the Parish Council, RMAs and the Internal Drainage Board.
5. **Calderdale:** Strong network of flood groups and wardens covering vulnerable towns through the valley. They respond to a range of complex challenges including in schools, with tourists, and flooding on the key arterial road, with a range of actions: accessing equipment containers; attending to roads, establishing places of safety, and wider communication with the local community through very active on the ground presence and social media (Facebook).

We also found that the existence of Flood Groups proved essential in the effective use of FEWS by communities.

However, the Flood Groups we contacted also face a range of challenges including: access to funding for FEWS and response equipment, internal and external conflict resolution, technical support for actions and insurance cover, and continued support from RMAs including having ongoing key contacts. Additional support for FEWS is particularly important where flood groups/ locations are not able to access EA information that is effective for their location (e.g. smaller rivers/ streams) and/ or does not cover their type of flooding (e.g. surface water/ multi-source). In addition, the majority of flood groups we contacted had developed in more affluent areas, meaning that there should be additional support to develop flood groups in more deprived areas.

We recommend additional support from RMAs to both establish and continue to support Flood Groups in areas vulnerable to flooding, including to establish effective use of FEWS.

Background and rationale

This report presents the findings from research conducted in 2023 and 2024 on Flood Early Warning Systems (FEWS) in communities in England for the West Yorkshire Flood Innovation Programme¹ (WYFLIP) – a partnership of Flood Risk Management Agencies² (RMAs) in West Yorkshire - the five Lead Local Flood Authorities (LLFAs), the Environment Agency (EA) and Yorkshire Water, plus the West Yorkshire Combined Authority (WYCA) and the University of Leeds Integrated Catchment Solutions Programme (iCASP³). The project was funded by WYCA through the UK Shared Prosperity Fund (SPF).

FEWS includes water-level monitoring information (e.g. on rivers), rain gauges and flood warnings and forecasting. This FEWS information is provided by government agencies such as the Environment Agency and the Met Office, developed by the communities themselves or by working with the private sector.

Project Aim: Develop recommendations to improve FEWS provision in West Yorkshire for at risk communities.

Research: Explore approximately 10 case studies to identify adoption of FEWS and examples of good practice within local communities

Outputs: Report and Recommendations including good practice

FEWS can play a crucial role in mitigating the impacts of flooding, which is particularly pertinent given the increasing frequency and severity of floods worldwide due to climate change. However, the effectiveness of FEWS hinges on the technical aspects such as hazard monitoring and forecasting, but also on the communication and preparedness-response components. While significant progress has been made in the former, challenges persist in effectively communicating risk information and triggering appropriate responses. In addition, there is no one-size-fits-all approach to implementing FEWS. Instead, system-specific guidelines are necessary to tailor FEWS to local conditions, hazards, and community needs. Community involvement emerges as a crucial factor in this regard, facilitating knowledge exchange, increasing local understanding of flooding processes, and enhancing preparedness and response capacity. Flood warnings must be clear, understandable, and tailored to the needs of at-risk communities. The content, format, and communication channels of warnings should be carefully considered to ensure maximum effectiveness. In conclusion, the development and implementation of effective FEWS requires a holistic approach that integrates technical advancements with community engagement, tailored communication strategies, and preparedness measures. By addressing these key components, FEWS can substantially reduce the impacts of flooding and enhance overall resilience to future events.

The rationale for our project was to find evidence showing if, and how, communities use FEWS to help prepare for flooding and to explore how better use can be made of FEWS, both in West Yorkshire and beyond.

¹ WYFLIP is the West Yorkshire Flood Innovation Programme, a partnership of the lead local flood authorities, the Environment Agency, Yorkshire Water, the West Yorkshire Combined Authority and iCASP.

<https://icasp.org.uk/projects-2-2/west-yorkshire-flood-innovation-programme-flip/>

² Descriptions of roles and responsibilities and definitions of RMAs and LLFAs are available here: [Managing flood risk: roles and responsibilities | Local Government Association](#)

³ iCASP is the Yorkshire Integrated Catchment Solutions Programme, based at the University of Leeds. <https://icasp.org.uk/>

Research methodology

We contacted a range of experts/ stakeholders to find examples of FEWS in communities. This included through:

- iCASP and WYFLIP meetings and events including the WYFLIP Board and Steering Group meetings and a LoRaWAN workshop focusing on communities
- National stakeholders and experts including through the Surface water flood forecasting and real-time communication symposium (January 2024 in Birmingham).
- Reviewing a previous iCASP & WYFLIP project: Communicating Flood Risk – which had a focus on working with communities and flood groups in Yorkshire
- The WYFLIP Board and Steering Group which includes representatives from local EA teams, enabling us to contact the EA Flood Resilience Team in Yorkshire which supports local Flood Groups.
- Flood Groups also signposting other Flood Groups using FEWS.

From this we contacted 14 community/ flood groups to explore the use of FEWS, such that we:

- Visited eight locations using FEWS
- Two more Flood Groups using FEWS were interviewed online/ by phone
- Separated four groups not using FEWS but who discussed some of the challenges they faced and were interested in the findings.

In these case studies we explored the following questions:

1. *What FEWS is being used?* E.g. Local monitoring (rain and rivers), EA river level information, rainfall nowcasting/ forecasting, Flood Guidance Statements
2. *Who is providing the information?* e.g. EA & RMAs, Private Sector, local Flood Groups
3. *Who receives the information?* e.g. trusted Intermediaries such as Flood Wardens/ Groups
4. *What do communities do after receiving flood warnings through FEWS?* e.g. help vulnerable people, close roads, prepare emergency shelters
5. *What are the challenges and lessons learned?* e.g. sustainability, funding, liability

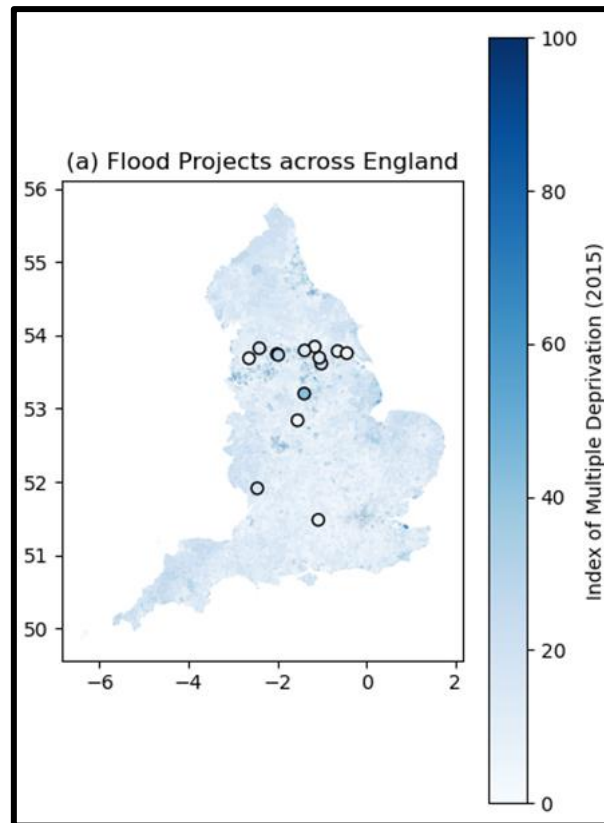
From these case studies, we have identified examples of good practice. Not all of the flood groups consider themselves 'good practice', but they have interesting stories and would like to learn from other groups. We have named the Flood Groups used in our good practise examples but have kept Flood Groups anonymous where they reported challenges. The Flood Groups that we contacted who were not using FEWS also remain anonymous. These case studies do not form an exhaustive list of flood groups using FEWS, but ones that were recommended through contact with stakeholders and responded to contacts, and since completing the field work further examples have been identified. We also tried to find examples in Europe - this included meeting researchers connected to two larger scale EU projects, but they were not currently working with community groups/ flood groups.

Main Findings

Background and governance

- The Flood Groups contacted were developed by local communities after flooding incidents (e.g. Whalley & Billington 2015, Aston Ingham in 2020),
- Calderdale and Fishlake are older and more established flood groups, having increased in size after more recent floods.
- The Flood Groups are located in villages and small towns, mostly in quite affluent areas. Of the 10 featured case studies, only Mytholmroyd has above median Index of Multiple Deprivation (explored in detail in Appendix 1).
- Some of the locations are larger villages/ small towns (over 2,500 inhabitants): e.g. Wittle-le-Woods (pop 5,500), Hebden Bridge (~ 4,500), Mytholmroyd (~ 4,000), Whalley (~ 3,700). In contrast Aston Ingham has a population of ~400, Gowdall ~320 and Ryther ~ 250.
- They were mainly located across Yorkshire and Lancashire, although we did try to make contact with groups across England.

Figure 1. Map Flood Groups contacted and the Index of Multiple Deprivation.



- Flood Groups are generally made up from local volunteers. We found these volunteers are experienced, often retired, professionals with diverse technical skills, such as engineers, hydrologists, academics, teachers, IT experts. Some groups have considerable expertise in organising meetings, planning flood mitigation measures, understanding RMA technical reports, and holding RMAs to account.
- All groups have very good local knowledgeable on flooding issues affecting their community. Many meet regularly and take walks around the area to inspect and resolve any potential issues.
- They are mainly focused on fluvial flooding (e.g. where river-level monitoring equipment exists or can be fitted). However, causes of flooding can be complex, including combined surface water flooding and fluvial. For example, Calderdale is increasingly facing surface water flooding issues, Aston Ingham has three small stream/ tributaries flowing from hills and agricultural land, while Pang Valley also includes groundwater flooding concerns.
- More recent flood groups have received strong assistance in establishing themselves (e.g. between 2015 and 2020) including some seed funding (from the EA, local authorities and, in one case, University of Chester). Two Lancashire groups highlight strong support from the County Council in initial stages. However, continuous core funding is an issue for some groups, and this is explored in the Challenges section.
- At least seven groups have strong connections to local parish council(s). The formal structure of parish councils can provide credibility, access to decision making structures, insurance cover and access to small funding amounts. However, this is not always easy and two other Flood Groups have more sensitive relationships with their parish councils.

- Many flood groups are well-established: e.g. Fishlake has 30 flood wardens including the chair of the parish council. Calderdale includes three very active flood groups: Mytholmroyd, Hebden Bridge and Todmorden through the valley. However, a small number of flood groups appear fragile, relying on one or two key volunteers, having to manage conflicts, finding it difficult to organise meetings, losing contacts within RMAs and losing momentum.
- All flood groups that we contacted that were using FEWS are solely dedicated to flooding. This finding suggests that it may require dedicated flood groups to use FEWS and tackle flooding issues (e.g. some flood groups report separating out of the parish council) and to formally access EA and other support. For example, we did not find examples of charities that focused on other activities as well as flooding.
- Two groups (Pang Valley and Aston Ingham) also focus on Natural Flood Management (NFM) activities on farmland which is a key issue in local flooding. Pang Valley has implemented two NFM projects and is planning one for 2025. Calderdale flood groups also have strong links to NFM activities including through charities such as Slow the Flow.
- In contrast to the other Flood Groups, Pang Valley Flood Forum (PVFF) is a forum of small flood groups from 10 villages across the catchment.

Use of Flood Early Warning Systems

- 10 out of the 14 flood groups/wardens we contacted are using Flood Early Warning Systems in some way.

Environment Agency Flood Early Warning System information

- Six groups use local EA river-level monitoring data: Calderdale (Hebden Bridge & Mytholmroyd), Fishlake, Gowdall, PVFF, Ryther. One group (Gowdall) also uses river-level information from the local Internal Drainage Board (IDB).
- Some groups were able to increase FEWS provision in critical locations from the EA after floods. For example, in Fishlake: *'After consultation with the Environment Agency after the flood of 2019, we managed to negotiate to get a new gauge put in, it gives us water levels in parts of the Ings, the low area the surrounds the village'*.
- Five Flood Groups also described how they access information from specific locations up-stream. Fishlake, Gowdall and Ryther use data/ share information with locations further up the catchments (e.g. Fishlake looks at Sheffield: 8 to 10 hours' notice; Gowdall - Malham: 12 hours, Ryther – Kettlewell: 24 hours). For example, in Fishlake: *'We can pick up all the Don gauges all the way up the Don above Sheffield so we know what's coming'*.
- Calderdale Flood Groups use council emergency notices for the Calder valley which tend to be the first concrete warning information received. They also have informal connections with Littleborough FG in Rochdale to track issues over the Pennines.

Local Flood Early Warning System information

- For four locations, EA river level monitoring information is not localised enough and Flood Groups have developed bespoke information through private sector river level monitoring from the following providers: Previsico (Whalley & Billington), Andel (Aston Ingham), Aquasition (Repton and Wittle-le-Woods), and Kingspan GB (PVFF).
- Pang Valley Flood Forum uses a combination of EA and more local data to collect data on river levels, rain gauges, groundwater levels (boreholes) and the information is combined by the Flood Group into a dashboard with the latest EA flood warnings. Aston Ingham has also installed their own rain gauges.

- Two further groups using EA information are also considering establishing systems to monitor more local information: Ryther currently has visual measuring boards in the local river hotspot but is considering installing e-monitoring equipment and is looking at the different providers; Gowdall is also considering more accurate telemetry and vision on a specific area - (tipping point on bank) - where they are not sure RMA information is always correct.
- Threshold/ trigger points: Whalley & Billington has worked with Previsico to develop a trigger point on a culvert directly near a trash screen. The Flood Group receive an email warning which could indicate that action is required to clear debris, and this has prevented flooding several times. PVFF has developed its own trigger level/ warning system. Aston Ingham is working with Andel to develop threshold points and trigger email flood warnings.
- PVFF, Whalley and Billington, and Aston Ingham have carefully considered the placement of monitoring/ FEWS. Two other groups are using FEWS but discussions have indicated that the monitoring equipment could be placed further upstream to provide useful early warnings.
- The three private sector companies contacted during the study (Andel, Aquasition and Previsico) have proved responsive to community needs and have viewed their interventions/ support as both helping the community and developing products and credibility. Three of the four groups using these systems do not pay for the monitoring information.
- Funding for FEWS has been received from a variety of sources including local councils and the EA. For Aston Ingham, support from Dr Namrata Bhattacharya-Mis at the University of Chester provided seed funding and other support to continue its flood group (at a crucial time). Many groups are heavily involved in local fundraising (e.g. Hebden Bridge and the local Rotary Group).
- If groups were paying full price for monitoring equipment and support, this could cost approximately £100 to 1,000 per individual monitoring gauge/ sensor and up to £1,000 in support costs per year (including maintenance/ continued access to software and information). This could be out of reach for some flood groups, as they do not receive regular funding.

Figure 2. Volunteers with Aston Ingham Flood Group checking a monitor on a local stream



Actions in the community

- Flood Groups assess information and take a combination of actions on receiving warnings including:
 - inspecting and clearing problems at source (e.g. Whalley & Billington clearing a trash screen on culvert)
 - alerting other wardens and RMAs
 - assess alerting the wider community, attending roads, distributing sandbags and other

Figure 3. A volunteer from Hebden Bridge Flood Group in Calderdale inspects one of the equipment containers.



supplies, and helping vulnerable people if required.

- For example Flood Groups in Calderdale have a flood siren, attend to roads, deploy equipment from containers, and have strong links to local schools, and have places of safety (e.g. Hebden Bridge Town Hall).
- The Calderdale Flood Groups have extensive ongoing contact with the local community, making effective use of social media (Facebook).



Other FEWS information:

- Flood Groups use weather forecast data. This is mainly Met Office information and in particular checking for Amber Rain Warnings. No specialist nowcasting or other forecasting websites were strongly recommended.
- Flood Groups receive and analyse but do not fully rely on EA flood warnings. These are not always seen as very specific (location) or completely reliable but are used as part of a range of information to assess risk of flooding.
- Most groups are not using Flood Guidance Statements (FGS) although PVFF include the latest statement information on their dashboard. We found using FGS was not a priority for other groups as the information is not local enough.
- We also asked about whether flood groups were involved in developing or encouraging the use of flood plan apps in households or communities, but this was not identified as an area of concern/ priority, including due to connectivity issues in the event of a flood. Indeed, in one case an app developed by a private company for use by a school was not fully operational.

Key challenges faced by flood groups

- Several flood groups feel they have achieved as much as they can in terms of building flood resilience in their local community, unless they receive additional RMA support around improving flood defence and response. In addition, climate change and increasing housebuilding could provide additional stress on existing systems.
- Most locations visited are relatively small and are not prioritised for larger flood defences, which leads to disagreements with the EA. These challenges also come as flood groups/ wardens become more ambitious in their aims and objectives. This is with the exception of Calderdale: (Mytholmroyd and Hebden Bridge) which receive ongoing large scale flood defence improvements.
- Many Flood Groups (but not all) report declining contact with some EA teams. Frustration over lack of flood defences in some areas is not the only cause of declining contacts. Many Flood Groups feel that the EA has become less responsive recently (e.g. since Covid-19) and some flood groups have lost day to day contact with key contacts. Others find that they have good contacts within one team of the EA but not others. For example, in Yorkshire, Flood Groups welcome ongoing support from the EA Flood Resilience Team - a dedicated team to provide training and support, but may not have good contacts within technical teams focused on flood defences. It is reported that the EA faces considerable resource pressures which impacts on ongoing contacts.

- Some Flood Groups report a lack of response from RMAs (e.g. the EA and/ or LLFAs) on key local issues such as land and asset ownership if they need to address a specific problem (blockages, overgrowth). Four groups report not being given access to technical reports such as cost benefit options for flood defences. For example one respondent stated: *'So in a way the EA, they're trying to hide behind the fact they've got complex reports and complex kind of system, computer systems and, yeah, and you lot won't understand it'*. However, each of these groups have experienced volunteers with technical skills within their Flood Groups.
- Flood groups also identify that RMAs could be more responsive to the needs of flood groups around FEWS including: encouraging feedback on existing FEWS; discussions over where new river level monitoring/ rain gauges could be placed; and support for accessing funding if they require private sector provision. In addition, some of the measures put in place by RMAs to improve FEWS or flood defences are 'temporary' and may be removed by RMAs (e.g. rain gauges, non-return gates between river and drain).
- Other key issues include continuous long-term funding (e.g. for FEWS and response equipment) and additional support for actions in the community. Issues Flood Groups face supporting communities include: 1) litigation (e.g. if taking measures in the community, or providing advice); 2) diminishing interest and support from the community during periods where there is no flooding; 3) hostility from some members of the community if wanting to take measures (e.g. road closures); 4) insurance cover for actions – wading through water, clearing drains, attending to roads; 5) extent of roles and responsibilities (e.g. road closures); 6) reliance on sandbags instead of more expensive specialised flood barriers.
- A small number of groups could be considered fragile, relying on one or two key volunteers (sometimes elderly), having to manage conflicts, finding it difficult to organise meetings, losing contacts within RMAs, losing momentum.

Indicators of success for flood groups

A matrix in Appendix 2 captures good practice and success indicators for the Flood Groups explored (anonymised). This includes governance aspects (including technical and organisational expertise, access to start-up funding, regular meetings and strong links to parish councils) and the use of FEWS (EA, Met Office or Community-led/ Private sources). This could be used as a guiding framework to help develop and support flood groups, although we emphasise that it will not be a one size fits all approach.

Conclusions

Given increasing climate change and flooding, and limited resources in public services and RMAs, there is an increasing need for households/ communities to take responsibility for how they prepare and respond to flooding. We have found that flood groups can play an essential role in helping communities and households prepare and respond to flooding – adding value to the work of RMAs.

Our findings also suggest that FEWS (1) enable flood groups to have accurate information and act and (2) galvanise flood groups around concrete, interesting and valuable actions. However, flood groups need: more support from RMAs through:

1. Help accessing small amounts of funding (e.g. for FEWS, flood response equipment, insurance)
2. Named key contacts in RMAs
3. Help feeding back on existing FEWS information, implementing more local FEWS (from public and private sources) and providing technical support,
4. Help with organisational support (e.g. insurance and resolving internal/ external conflicts)

5. Support for actions in the community (e.g. clarity over road closures and sandbags).

Funding and technical support for FEWS is particularly important where flood groups/ locations are not able to access local EA FEWS information and/ or does not cover the type of flooding experienced by the local community.

Additional funding and long-term support will also be essential to develop Flood Groups in new areas. For example, to help establish a flood group and activities including FEWS. The Flood Groups we were able to contact were mainly in small towns and villages, and generally in more affluent areas. Establishing new groups in other types of areas would be challenging. For instance, some local communities will not have access to local volunteers with the type of skills that proved important (e.g. retired engineers, hydrologists etc).

Recommendations and next steps

General Recommendations

In high-risk areas/ areas of persistent flooding, flood groups should be supported to develop and have access to FEWS. Flood groups should be:

- **Supported in their use of FEWS**, including through feedback on existing EA FEWS information, discussion on installation of new EA FEWS, funding support for private sector local monitoring equipment (where flood groups are not able to use EA information), and potentially (if requested) technical support including interpreting information from FEWS and establishing trigger levels/ warnings.
- **Provided with continuous support** including contact with named key people in RMAs; organisational support for roles and responsibilities, insurance cover, and internal and external conflict resolution; support for actions in the community
- **Provided with additional support to establish flood groups in more deprived areas** (including establishing activities such as FEWS, how to work in communities, learning from other flood groups).

Due to funding issues within RMAs, this would require support from central government.

WYFLIP Recommendations

For the West Yorkshire Flood Innovation Programme (WYFLIP) this could include developing a new flood group in West Yorkshire where there is persistent flooding.

In the WYFLIP Board on 05 December 2024, local RMA representatives identified that they have little revenue funding to support flood groups and therefore any work could need to be included in ongoing WYFLIP projects such as the LoRaWAN project (which combines FEWS and the use of Long-Range Wide Area Networks to provide smart digital surface water flood monitoring and warnings); the Property-level flood resilience project, the Flooding and Mental Health project, and/ or the Meanwood Valley Blue Green Demonstrator project. The EA Yorkshire Flood Resilience Team would be keen to provide support to a new flood group. In addition, Pang Valley Flood Forum has offered to support Flood Groups develop their own FEWS Dashboards.

Potential further work

From this scoping exercise, three potential projects were identified which could be led by WYFLIP:

- a) Support for developing flood groups in deprived areas vulnerable to flooding (including learning from where these flood groups exist).
- b) National Survey to comprehensively map existing use of FEWS in the UK with results compared to flood risk, levels of deprivation etc (since this project other examples of FEWS have emerged).
- c) Explore impacts of compound emergencies such as flooding and Covid. Several Flood Groups contacted were flooded in 2019 or 2020, just before the beginning of the Covid-19 lockdowns. A key question would be could there be useful learning from exploring the risks and impacts of compound emergencies or do flood groups and RMAs feel it is better to move on?

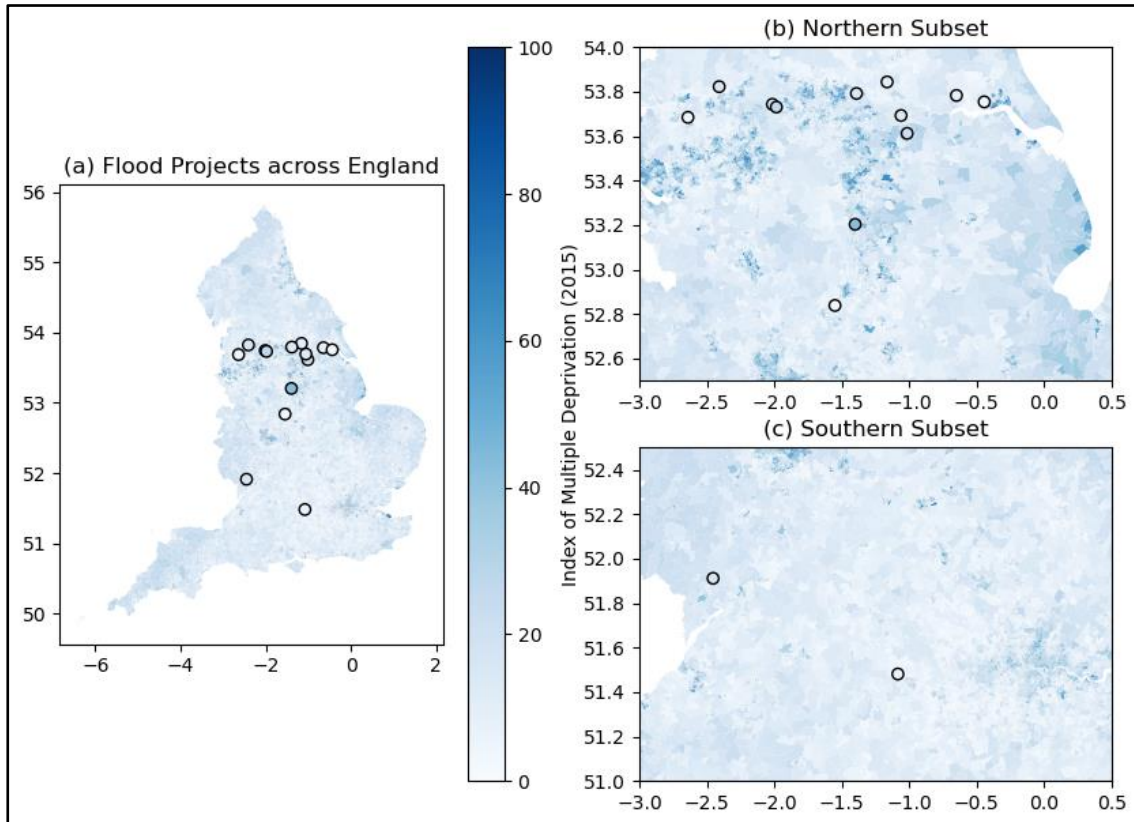
Next steps

WYFLIP will consider the results of this scoping exercise to support flood groups in priority locations. The WYFLIP Board also requested further work to map existing national Flood and Coastal Resilience Innovation (FCRIP) projects using FEWS with a focus on understanding the type of FEWS being installed (FCRIP projects do not necessarily work with flood groups). Funding has been received for a mapping exercise within the LoRaWAN project and this work will take place from April 2025.

We will also present the results and recommendations from this work nationally.

Appendix 1: Flood Groups & Indices of Multiple Deprivation

The maps below show the different communities and flood groups contacted in the research and their relative score on the Indices of Multiple Deprivation (IMD). We contacted 14 of which 10 used FEWS.



From the 10 groups using FEWS, only one of these communities/ Flood Groups were above the mean IMD score indicating that most flood groups contacted had developed in more affluent areas.

Mean is 21.669 (Median is 17.398)

Flood Group	IMD 2015 Score
Repton	2.866
Wittle-le-Woods	3.633
Pang Valley (Pangbourne)	6.135
Ryther	9.594
Gowdall	13.614
Whalley	15.545
Aston Ingham	15.662
Hebden Bridge	15.753
Fishlake	21.488
Mytholmroyd	26.117

Appendix 2: Matrix - Indicators of success for case study flood groups using FEWS

Flood groups/ Areas of success:	FG1	FG2	FG3	FG4	FG5	FG6	FG7
Focused on flooding	ü	ü	ü	ü	ü	ü	ü
Skills: (technical, organisational)	ü	ü	ü	ü	ü	ü	ü
Regular meetings	ü	In regular contact	ü	ü	In regular contact	ü	In regular contact-
Start-up Funding	ü	ü	ü	?	ü	ü	ü
Continued support of RMAs	ü	ü	Mixed support	Mixed support	Mixed support	Mixed support	Mixed support
Strong links to Parish Council	ü	No	ü	ü	ü	ü	No
Size (smaller villages below 1,000)	ü	Larger villages (4,000 plus)	ü	ü	5 x Mixed size villages	ü	Larger villages (4,000 plus)
Type of flooding: (fluvial)	Mix pluvial/ fluvial	ü Fluvial	ü Fluvial	ü Fluvial	Mix Groundwater, Fluvial & pluvial	ü Fluvial	ü Fluvial
Using FEWS	ü	ü	ü	ü	ü	ü	ü
• EA/ Met Office FEWS	<i>Not local enough</i>	ü EA info (RLM/ RG), Met Office (incl upstream)	ü EA info (RLM/ RG), Met Office (incl upstream)	ü EA & IDB (RLM/ RG), Met Office (incl upstream)	ü EA (RLM/ RG), FGS, Met Office (Dashboard)	ü Use EA info (RLM/ RG), Met Office (incl upstream)	Not local enough
• Private e.g. Rivel-level monitoring (RLM)	ü Private: sensors on streams and RG				ü Own RLM, RGs and Groundwater monitoring	Local river level boards on stream. Looking at sensor from private contractor	ü (Private company sensor & camera)
Group started bottom-up in response to floods	ü 2020 (after floods)	ü started in 2000s but grew after 2015 floods	ü Historic but grew after 2019 floods	ü 2020 floods	ü Villages began getting organised from 2006/ 07 floods (group est 2013)	ü From 2011 floods	ü From 2015 floods
Size of group (good support)	ü 5	ü 25	ü 30	ü 8	ü 11	ü 6	ü 20
Good comms with community	ü	ü	ü	ü	ü	ü	ü