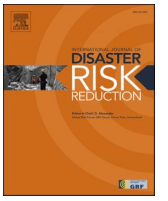
International Journal of Disaster Risk Reduction 128 (2025) 105755

Contents lists available at ScienceDirect

International Journal of Disaster Risk Reduction

journal homepage: www.elsevier.com/locate/ijdrr



'Resurrection' of a flood action group through co-learning

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A B S T R A C T

This paper examines the 'resurrection' of a flood action group following a decade of inactivity, through a 'co-learning' lens. Flood action groups play a crucial role in UK flood risk management, yet many struggle to maintain activity, particularly without sustained external funding. This is, in fact, a common challenge in community-based DRR worldwide. While DRR research often prioritises high-impact/low-frequency hazards, 'small-scale disasters' are increasingly recognised as equally significant. Selforganisation is often essential for sustainable DRR in resource-constrained contexts. The paper develops a preliminary co-learning framework to analyse the flood action group's revival. While 'co-learning' and 'co-creation' are widely used in DRR research, the conceptual interrogation of the terms remains underdeveloped. After clarifying the relationship between these concepts, the paper identifies five key characteristics of colearning from the existing literature in the field of education as follows: solidarity, equal power balance, reciprocal learning, new knowledge creation, collective action for social change. These are then applied as a tentative framework in analysing the case. The paper concludes by reflecting on the framework's limitations but also exploring its potential to advance co-learning research in DRR.

1. Introduction

This paper examines the 'resurrection' process of a flood action group (FAG) after a decade-long gap through a 'co-learning' lens as part of an ongoing study. Flooding is a significant climate risk affecting many UK regions. The 2004 Civil Contingencies Act established a framework for emergency planning and response in the UK, designating the Environment Agency as the lead organisation for flood risk management. In relation to climate change, the Climate Change Act 2008 introduced the UK's framework [1], which includes risk assessment through a National Adaptation Programme every five years [2]. The 2010 Flood and Water Management Act designate some local councils as Lead Local Flood Authorities (LLFAs) responsible for managing flood risks within their areas. The UK government supports 'all of society engagement' and 'community resilience' as advocated in international agreements, including the Sendai Framework for Disaster Risk Reduction 2015–2030 [3]. However, flood risk management within communities is predominantly organised voluntarily by community members [4]. The National Flood Forum, established in 2002, plays a vital role in supporting and representing communities at risk of flooding. The charitable organisation helps establish FAGs and provides practical support to communities [5]. Usually, FAGs have been formed in response to significant flooding events. FAGs often advocate for measures to mitigate flood risks, for example, better flood defences and drainage systems [6]. Today, FAGs are a key component of flood risk management across the UK.

Over time, many FAGs struggle to remain active [7], a challenge seen in countries promoting community-based DRR [8]. Two factors contribute to this: declining participant enthusiasm after the initial 'popular' phase post-disaster [9], and difficulties maintaining impact once externally funded projects end [10]. St Denys FAG (DFAG), formed in the City of Southampton, faced similar issues. Southampton is a port city located on the south coast of England. The St Denys district is located 2.4 km north of the city centre along the River Itchen. Under the Flood and Water Management Act 2010, Southampton City Council (SCC), as a Lead Local Flood Authority, manages local flood risk alongside major authorities. SCC has implemented and monitored its Local Flood Risk Management

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https://doi.org/10.1016/j.ijdrr.2025.105755
Received 3 April 2025; Received in revised form 3 August 2025; Accepted 7 August 2025
Available online 9 August 2025

Strategy through projects, including those targeting the St Denys district [11]. The National Flood Forum helped establish a FAG in St Denys during one project, but the group became largely inactive after the project ended. My initial intension was to investigate an inactive FAG probing why it had become inactive, and how it might be reactivated, as part of a broader inquiry into sustainable community-based DRR. When I reached out to DFAG, they were coincidentally in the process of resuming regular meetings. This auspicious timing enabled me to document their revival and examine the challenges associated with sustaining DRR efforts in communities.

Another reason for focusing on the St Denys district is their flooding experiences is tidal, and its impact is localised. DRR experts have tended to focus on high-impact/low-frequency hazards [12,13]. Meanwhile, there is an increasing recognition that inquiries into DRR for 'small-scale disasters' are equally important [14–17]. Coastal communities that have been informed about the harsher impacts of climate change are facing the need to step up their risk strategies. The St Denys community is one of them as indicated on their website: 'Sea level will continue to rise and high tide levels will be higher in future …. For the south coast of England the most likely sea level rise … is estimated to be around half a metre [18].' Moreover, when external resources are scarce, 'self-organisation' [17] becomes a viable approach to DRR for communities facing small-scale hazards.

Why addressing 'learning' is, as argued elsewhere, DRR activities involve learning given they aim to change people's behaviour, perception and emotion [19–22]. Adopting a learning-based approach to DRR places emphasis on education and collective knowledge-building as key mechanisms for strengthening resilience. It goes beyond information-sharing by fostering reflection, dialogue and action, empowering communities to co-create solutions. Accordingly, meaningful engagement with the field of education is beneficial in developing effective DRR strategies. Rooted in critical and social learning theories, it bridges technical and social aspects of disaster risk and aligns with global frameworks like the Sendai Framework. Particularly, I explore co-learning approaches, which are relevant to participatory DRR, given its emphasis on reciprocal and collective knowledge generation. 'Co-learning' has been used in DRR studies, but a conceptual interrogation of the term has been absent. For example, reporting the curriculum development of a disaster education course at a high school, Shiwaku and Shaw claimed that 'the high awareness and actions in the students shows the success of the proactive co-learning process' ([23], p. 197) as per the survey results. The paper, however, neither defined nor discussed the concept of 'co-learning'. More recently, Delima et al. [24] proposed 'serious games' as an enabler of 'a collective recognition of societal issues and co-learning' as opposed to 'topdown communication of risk and expert-centered knowledge' ([24], p. 1). The term's use was however limited to the learning experiences of the diverse participants of the game in the existing DRR governance system.

There remains a significant gap in the DRR literature concerning the concept of 'co-learning'. This paper seeks to advance its understanding. Prior to engaging directly with 'co-learning', the paper outlines the distinction and relationship between 'co-learning' and 'co-creation' – a widely adopted approach in participatory research and practice. The paper then moves on to extract the key characteristics of 'co-learning' to formulate a tentative analytical framework. This is followed by a methodology section. The paper then analyses the case of DFAG using the tentative framework. The conclusion reflects on the analysis and suggests that 'co-learning' needs to integrate temporal dimensions in its conceptualisation.

2. Co-creation and co-learning

'Co-creation', or its synonyms such as 'co-production' and 'co-construction', has become the mainstream methodology for community-based DRR [25–29]. Compared to 'co-learning', 'co-creation' appears more frequently in DRR literature and beyond, as evidenced by the volume of available publications. By placing the target population at the centre of the project, co-creation encourages collaboration among diverse stakeholders to develop knowledge, tools or measures for DRR. Co-creation research has made some theoretical advancements as well. Parviainen et al. [28], for example, developed the Risk-Tandem framework, which combines risk management approaches with co-production processes amongst stakeholders to enable fit-for-purpose solutions and strengthen risk governance. Vollmer et al. [29], p. 2) delved into the concept itself by defining that co-creation 'aspires to increase the levels of co-operation and collaboration between different stakeholders that are relevant to a certain decision-making process'. Co-creation hence requires a democratic, deliberative and dialogic format to engage citizens in consensus-building by giving them an equal voice and reciprocal communication [30].

Both 'co-creation' and 'co-learning' emphasise a process that is about collaboration, more than outcome. It could be suggested that 'co-creation' and 'co-learning' are the two sides of the same coin. The former tends to look at 'what' is being created, while the latter is about participants' collective 'learning'. In the field of higher education, co-creation has been discussed and theorised to address academic development. For example, Cook-Sather and Luz [31] suggest an equal 'partnership' between academics and students for them to define themselves as both learners and teachers [31]. Such an environment enables both parties 'to be co-learners and co-creators of knowledge' (Bovill, Cook-Sather, & Felten, 2011); they are both 'co-learners' and 'co-creators' at the same time [32]. This conceptualisation supports the point that 'co-creation' and 'co-learning' are inseparable notions.

3. Characterising 'co-learning'

Co-learning is often used interchangeably with 'collaborative learning' and 'cooperative learning' despite subtle differences, particularly regarding reciprocity. 'Collaborative learning' encompasses all types of learning processes where more than two individuals work together towards a common goal. Collaborative learning perspectives consider learning to have both personal and social dimensions emphasising mutual engagement and shared responsibility [33]. Such collaborative models stand out as an appropriate approach for community-based DRR, compared to didactic 'knowledge transmission' models [26,34]. A variation of collaborative learning, 'cooperative learning,' is typically applied in formal education [35]. Developed as a counter to competitive

individualised pedagogical methods, it involves students collaborating to complete group tasks, with evidence showing both academic and social benefits. In both collaborative and cooperative learning, knowledge is socially constructed within the group, rather than transmitted from a teacher to students. The role of the 'teacher/expert' remains as a task-giver or facilitator. In contrast, 'co-learning' refers to a more informal learning process, with everybody being a student and a teacher at the same time. This reciprocity does not necessarily exist in collaborative and cooperative learning [36].

To identify the key characteristics of 'co-learning', this is how I came to draw on the works of Brantmeier [37], Curry and Cunningham [33] and Wei [38]. Using Scopus, I searched for journal articles with the keywords 'co-learning' and 'education' under the field of 'social sciences', given the unavailability of the education-specific category. As mentioned earlier, I aimed to prioritise literature from the field of education to ground learning-based approaches to DRR. From the 47 articles retrieved, I excluded those originating from the public health field, narrowing the selection to 34 articles published in education journals. As my focus centres on learning pedagogies, I further excluded articles with a curriculum development orientation, resulting in 23 articles. I then excluded pieces that referenced co-learning without engaging in theoretical discussion. This refinement yielded four articles, two of which were subsequently excluded due to their limited engagement with the concept and the specificity of their framing, as follows. Heron et al. treated co-learning narrowly, as a means of linking teaching and research in the context of geography education [39]. Brekken et al. used co-learning as the title of one of the teaching models, in which teachers foster group collaborations [40]. The remaining two articles contributed to the definitional discussion [41,42], drawing in part on overlapping sources of some fundamental works by Brantmeier [37], Curry and Cunningham [33] and Wei [38]. These had not surfaced in the initial Scopus search, so I subsequently identified them through a targeted search via Google Scholar.

Upon further investigation of their works, I found their analyses both relevant and valuable for examining co-learning in the context of community-based DRR. The following presents the preliminary characterisation of 'co-learning' developed through the integration of insights drawn from their analyses. To note, Brantmeier and Wei refer to 'co-learning' in their research concerning university and school hence formal education, whereas Curry and Cunningham's work and this paper focus on an informal setting of community. This difference, however, did not seem to affect how the authors characterise the concept, apart from the teacher's role emphasised in the formal settings.

The foundation of co-learning is ***solidarity***, which entails three aspects. One is participants are ***agentive*** and responsible for their learning [38]. ***Inclusivity*** is valued to 'care for each other as people' [43] and bring people together. Solidarity involves ***social learning*** prioritising the collective while still supporting individual development [37].

Secondly, co-learning is based on ***equal power balance*** with ***shared responsibility***. Participants accept 'non-appropriation' and 'respect in a profound way how people collectively make meaning in their lives' ([33], p. 76). 'Socially constructed privilege or the privileging of one knowledge over another' is denied ([33], p. 75).' This is why co-learning is done in an informal setting without 'a teacher' who validates the group's knowledge.

> *After all, each has knowledge … the responsibility belongs equally to all involved* ([33], p. 75).

The requisite of co-learning, therefore, is 'unlearning of cultural conditioning' to dismantle the traditional power relationships of dominant and subordinate parties [37,38].

The third characteristic is that a group environment which respects and values each participant's culture and knowledge enables mutual learning but also, ***reciprocal learning***. Participants are 'knowledge sharer' ([43].), who constantly monitor and adapt their perceptions and behaviours through learning from one another [38]. Reciprocity allows experiential learning – learning by doing – and dialectical mutual learning – learning from one another through dialogue and discussion.

Such a creative space stimulated by reciprocal learning enables ***new knowledge generation***, the fourth characteristic of co-learning. In Wei's [38], p. 208) words, co-learning

> *aims to build a genuine community of practice, by overcoming the teacher and the learner dichotomy or divide, moving towards a more 'dynamic and participatory engagement' in knowledge construction.*

Curry and Cunningham [33] (p. 76) consider co-learners as 'knowledge makers, not simply as knowledge consumers'.

Lastly, Curry and Cunningham [33] go on to argue that the process of knowledge construction is ***collective action for social change***. This is inherent to co-learning but not to collaborative and cooperative learning. Co-learning is therefore linked to emancipatory theorists like Freire and Giroux, who seek to empower individuals to identify and challenge the social, political and economic contradictions that shape their reality [44,45]. Through critical thinking, dialogue and reflection, co-learners become active agents to make positive changes in society [36,37].

These five identified characteristics of 'co-learning' – ***solidarity, equal power balance, reciprocal learning, new knowledge generation, collective action for social change*** – can serve as a foundational framework for deeper exploration of the concept.

4. Methodology

I visited the St Denys community four times between 2024 and 2025 to gain an understanding of the FAG with the following research questions: 1) What are the major issues and challenges that the St Denys community faces concerning flood risk? 2) What prompted the group's revival, and through what processes has it unfolded? 3) How does the process of DFAG's revival reflect the characteristics of co-learning?

4.1. Case selection

Adopting an interpretivist stance, this study examines community-led efforts to address climate risks through a case study approach. The initial criteria for the selection of a case were: 1) a community that faces 'small-scale disasters', and 2) a community DRR group that has not been active for some time. While searching for FAGs in the regions affected by 'small-scale disasters', I discovered the FAG in the St Denys district from their community website 'ItchenTides – Community Tide News' [46]. The FAG was seemingly inactive over the past decade. I made an inquiry using the contact email available on the website. The contact person was one of the core members of DFAG, who informed me of their plan to reconvene regular meetings after a prolong period of inactivity. As such, the timing of DFAG's revival coincided with the commencement of my research. This enabled me to follow the revival process of a FAG, which has not been done enough in DRR research. Concurrently, the relevance of 'co-learning' to DRR efforts in communities became increasingly evident, given its emphasis on reciprocal and collective knowledge generation. The term 'community' is used as a geographical unit in society but also to mean 'both a feeling and a set of relationships among people. People form and maintain communities to meet common needs' [47].

4.2. St Denys district and flood history

Fig. 1 indicates the location of the city of Southampton in the UK [48]. The River Itchen is tidal for eight km from the estuary, and the St Denys district is in the tidal zone. As of March 2021, the St Denys district's population is probably around 3,500[1] with a diverse mix of younger working families, long-term residents and students [49]. Being riverside along the River Itchen provides easy access to water activities. Some properties have a slipway, jetty or pontoon at the back allowing the use of boats at a high tide. The St Denys Boat Club as well as the St Denys Community Centre are the focal points of the small waterfront community [50,51]. To note, I refer to 'St Denys' or 'the St Denys district' to identify the community in concern, even though only those roads and properties close to the River Itchen are susceptible to flood risk, not the whole district.

St Denys has experienced tidal flooding in the past few decades: unknown date in 1990, December 26, 1999, March 10, 2008, November 4, 2013, February 14, 2014, January 3, 2018, January 15, 2020 and April 8, 2024 [52]. The Associated British Ports Tide Tables list high tide water levels in metres above Chart Datum.[2] The St Denys district is likely to be impacted if the water level reaches more than 5.4m [52]. Particularly, when a high tide and a storm surge coincide, the River Itchen's water level rises higher than usual causing flooding in St Denys. Water overtops the riverbank, and water from the road drains often upwells. The major roads close to the river and low areas have shallow flooding causing minor disruptions. Most houses and businesses in the St Denys area are above the level of any flooding, but a certain number of properties are at risk. It is also a characteristic of tidal flooding that it passes quickly within an hour or two because it is controlled by the tide [46]. Compared with the long-term impacts that fluvial and pluvial floods bring in many parts of the UK, water recedes much quicker in St Denys. Once a property is flooded, however, residents have to deal with the aftermath. Fig. 2 is the land height map of the St Denys district. The area indicated as 'the Belsize Project' is the community that the FAG works closely with ([52], p. 7).

Previously, 5.6m in 2008 and 2014 was the record high water level. Higher water levels mean more damage to properties, often internally and gardens [52]. The most recent flooding on April 8, 2024 was the severest. During the night of the 8th, *the tide was augmented by a storm surge to produce record high water levels at Dock Head and Woolston [the estuary of the River Itchen] of 5.70m (all heights are relative to Chart Datum). This was 0.88m higher and 45 min earlier than the Environment Agency values for the astronomical high tide* [53].

Fig. 3 [53], created by one of the core members of DFAG, illustrates the extent of flooding observed during the first high water peak. This information is overlaid onto 'the Belsize Project area land height map', as previously introduced.

> *It suggests that the flood water in the road only reached about 5.5mCD [Chart Datum] …. At around midnight water levels in the gardens [were] observed to be lowering despite water still flowing into the road. This is in agreement with the tide gauge peak at 23:45BST. It suggests that there was not time for the water level in the road to reach the peak level which occurred in the river* [53].

As shown in the figure, Priory Road and Adelaide Road, located near the River Itchen, are the roads most susceptible to flooding in the community. Figs. 4–6 [53] present images documenting how the flood progressed along these two roads, as recorded by the core member of DFAG.

4.3. Data collection

Three qualitative data collection methods employed were documentary analysis, observation and semi-structured interviews. St Denys' well-established website 'ItchenTides – Community Tide News' provided me with detailed and scientific information on the

[1] This is an estimate judging from 13,100 being the population of the Portswood Ward that comprises four districts including St Denys.

[2] 'Chart Datum is the plane to which all tidal heights are referred. It is also the plane below which all depths are published on a navigational chart, so that adding the tidal height to the charted depth the true depth of water is determined. By international agreement it is defined as being a level so low that the tide will not frequently fall below it.' In the UK, 'this level is normally approximately the level of Lowest Astronomical Tide (LAT). LAT is the lowest level which can be expected to be predicted under average meteorological conditions and under any combination of astronomical conditions; this level will not be reached every year. LAT is not an extreme level, as storm surges may cause considerably lower levels to occur' [74].

Fig. 1. Location of Southampton.

community's flood risk, as well as the historical background of DFAG. The website has been managed by one of the core members, who is a retired oceanographer. He also shared with me some resources regarding the recent flood in St Denys. Broader information on relevant laws, strategies and plans for flood risk management was obtainable from the SCC website. Email correspondences with the DFAG core members are also used as data. For observation, I joined the monthly FAG meetings between October 2024 and March 2025 and also attended the public event held in February 2025. I took notes focusing on people's interactions and decision-making process. The minutes of every meeting were also made available to me. For interviews, I spoke to the following key stakeholders in the community to obtain balanced views on flood risk management and DFAG: 1) the DFAG leader; 2) a DFAG core member; 3) the SCC Flood Risk Management Team Lead. The interviews were a mixture of in-person, online and via email. I also planned to interview

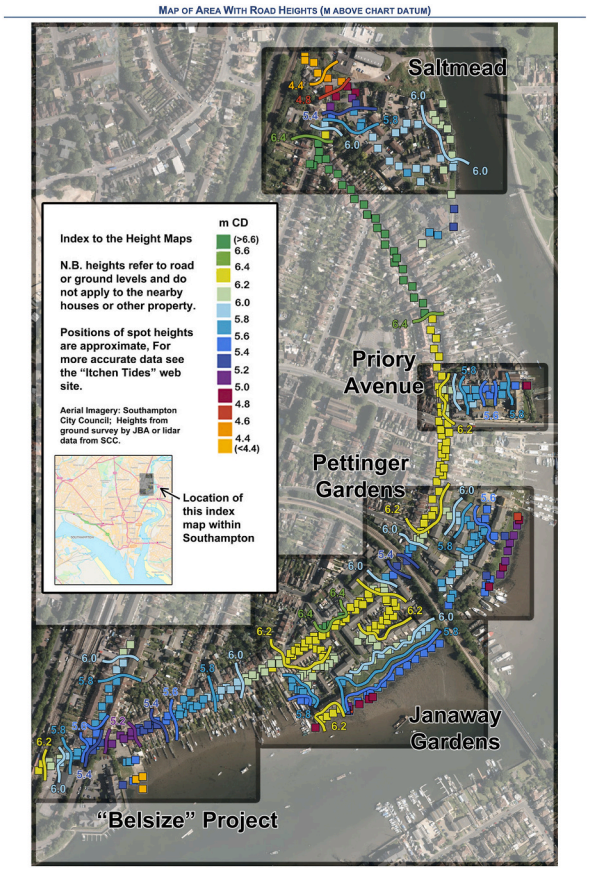

Fig. 2. The Belsize project area land height map.

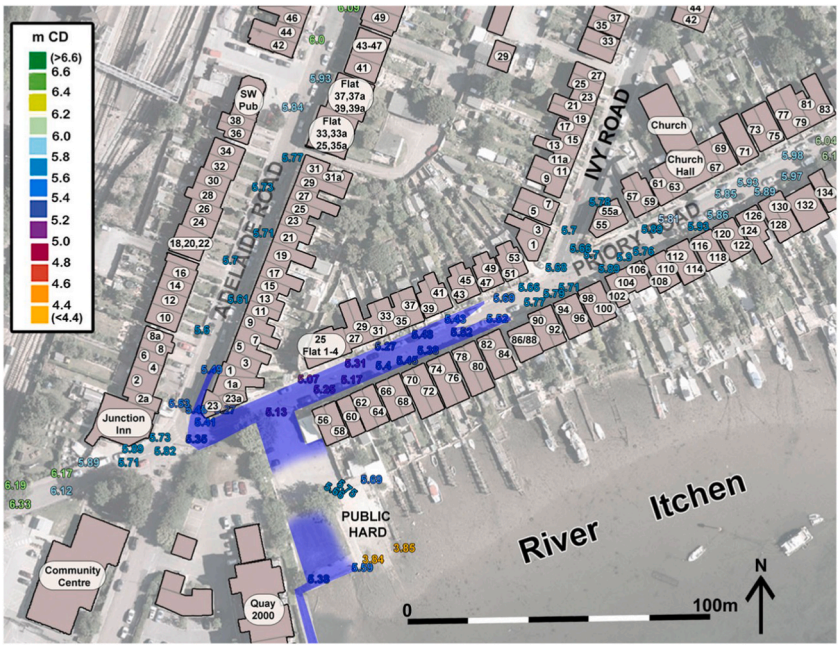

Fig. 3. Extent of road flooding in April 2024.

Fig. 4. 23:28–23:31 At this time water was lowing rapidly into the road from the side alleys having topped the riverside garden walls.

Fig. 5. 23:42 Water still flowing from the gardens into the road.

Fig. 6. 23:49 Looking south along Priory Road from about No.72 towards the Public Hard showing the flood water.

another resident who was not an active member of DFAG, but no one was available. I accept this limits 'the balanced views' intended to be achieved. This will be addressed later in the paper.

Written consent was obtained for each interview. The interviewees were informed about the limitation of anonymity and confidentiality as they may be recognised in the local context. Each interview comprised about ten questions, including 'how do you describe the St Denys community?', 'what are the key activities of DFAG?' and 'what are the challenges in undertaking those activities?'. The online and in-person interviews lasted between 60 and 75 min, and with their permission, they were recorded and summarised. Although the sample size for the interviews was small, it was complemented by observation data from the meetings. Together, these sources effectively facilitated the exploration of co-learning perspectives, particularly in discussing the 'highs and lows' of a FAG. I refer to three types of DFAG members: 'core' members are those three who were involved in the previous projects and 'resurrected' DFAG in 2024; 'active' members are the other three members who are engaging in DFAG particularly after the resurrection; 'non-active' members occasionally participate in DFAG activities. According to one of the core members (email correspondence), as of March 2025, the number of members has grown to 20–30 individuals, although most of them hold a 'non-active' membership.

4.4. Data analysis

Guided by the research questions, thematic analysis was applied to identify, analyse and interpret meanings within the collected qualitative datasets. The flexibility of this method enabled both deductive and inductive engagement with the data, which was valuable for uncovering contextual insights [54,55]. Broadly following Braun and Clarke's [54] six-phase procedure, I conducted 'a theoretical thematic analysis' [55] informed by the five tentative characteristics of co-learning identified in this paper: ***solidarity, equal power balance, reciprocal learning, new knowledge generation, collective action for social change***. A narrative of the revival of DFAG was developed with a deductive engagement of the five characteristics in the following section 'Emergence and development of St Denys FAG'. The analysis also involved an inductive process to work the data from the 'ground-up' [56] to be open to new themes which were not identified in the existing literature on co-learning. Thematic analysis facilitated triangulation to interpret the shared experiences, perceptions and values expressed in DFAG's documentation, observation notes and interview summaries.

In the following narrative, the interviewees are referenced by their roles as follows: the DFAG leader as 'Leader', a DFAG core member as 'Member' and the SCC Flood Risk Management Team Lead as 'Officer'. I also refer to three types of members in DFAG as 'core', 'active' and 'non-active' members.

5. Emergence and development of St Denys FAG

As a coastal city, Southampton has participated in large-scale climate change projects. According to SCC's Flood Risk Management Team Lead (Officer), DFAG is the city's only FAG, based in a residential area vulnerable to flooding on the River Itchen's bank. Other waterfront areas, primarily industrial or commercial, do not typically foster such groups due to differing needs. Understanding DFAG's origins requires examining previous St Denys projects.

From 2011 to 2014, Hampshire County Council participated in the Coastal Communities Adapting to Change (CCATCH) project,[3] pioneering community involvement in regional climate change adaptation [57]. Among the six locations chosen for 'Local Engagement Groups' was 'Southampton, Upper West Itchen,' which includes St Denys ([58], p. 3). Key outputs included a community adaptation plan [58] and a flood risk guide [59]. The adaptation plan recommended individual property-level protection (PLP) measures.[4] A St Denys resident, later a DFAG core member, demonstrated PLP measures by allowing them to be installed in his home [60].

In 2012, the Department for Environment, Food and Rural Affairs (Defra) launched the Community Flood Resilience Pathfinder Scheme to assist flood protection projects across the UK. Under this scheme, SCC secured a grant for the St Denys district, leading to the Belsize Flood Resilience Project in 2013. The project targeted tidal flood risks on Priory Road and Adelaide Road, identified in the 2012 Southampton Coastal Flood and Erosion Risk Management Strategy [61],[5] which also recommended individual PLP measures [62].

The Belsize project facilitated close collaboration between SCC, the National Flood Forum and the St Denys community to better understand local flood risks and mitigation. The project's achievements ranged in various aspects. During this project, a St Denys FAG (DFAG) was established with support from the National Flood Forum [63]. Together, they created a community flood resilience plan outlining flood sources, the history of major floods, DFAG's role, and a list of flood wardens [52].

The Belsize project funded the installation of PLP measures, with 26 households participating. Figs. 7–9 are some examples of PLP items [46].

Many opted for flood-proof doors, while some added garden walls and gates. Other devices included air bricks, which close

[3] **T**he CCATCH project was part of an EU funded initiative led by the Environment Agency called **Coastal Communities 2150 and Beyond (CC2150)**. The project was run by a partnership of the Hampshire County Council, the Environment Agency, Natural England, Solent coastal authorities, Channel Coastal Observatory and the Solent Forum.

[4] The properties in St Denys having a slipway, jetty or pontoon at the back was a determining factor to install PLP to houses on the river side of Priory Road, rather than to install a higher and stronger river wall, and to have a flood resistant garden wall on the other side of the road.

[5] The strategy is a non-statutory document of the long-term management of the 22 km coastline between Woodmill and Redbridge. The strategy formed the basis for the River Itchen Flood Alleviation Scheme, which identified the west bank of the River Itchen in the St Denys district as at current and future risk from tidal flooding.

Fig. 7. Front door barrier.

Fig. 8. Air bricks.

Fig. 9. Pump unit.

automatically during floods, and sump pumps to remove water from underfloor spaces before reaching floor level. Flood doors and gates required manual placement, whereas other measures were permanently fitted [60]. According to SCC's flood risk manager, despite full funding, the uptake rate was only 45 %, partly due to limited suppliers, stigma over property devaluation and uncertainty about the effectiveness of PLP. Nationally, similar projects in 2015 saw an uptake rate of 35 % (Officer).

Community engagement was central to the project, raising awareness, acceptance and ownership of flood risks in St Denys [64]. Events such as the 2014 Flood Fair provided insights into flood risks, PLP measures and home insurance advice. In 2015, DFAG and the National Flood Forum organised a 'Dry Run' to test the flood resilience plan, showcasing devices like the water-gate flood barrier, as shown in Fig. 10 [46], and street pump, followed by a social barbecue at a local pub [65].

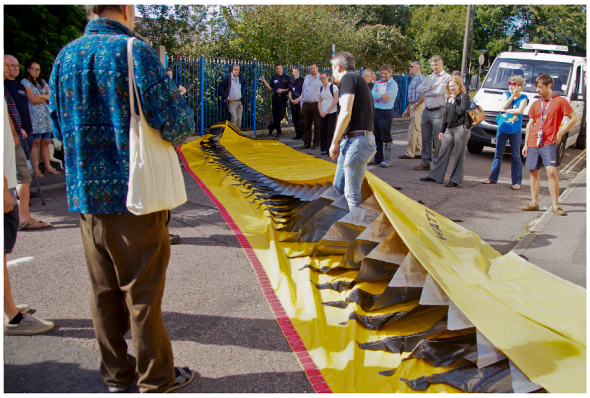

Fig. 10. Water-gate flood barrier.

The Belsize project also led to the continuation and augmentation of a community website (initially set up during the CCATCH project), 'ItchenTides – Community Tide News', providing a platform for learning and communication on flooding and flood risks [46]. Since funding ended in 2016, one of the core members of DFAG who is a retired oceanographer has maintained the website using free hosting [64,66]. The site offers detailed, accessible information, including Southampton tide tables, guidance on their use and land height maps to assess property flood risk. It also serves as a message board for flood alerts and warnings and community announcements.

After the Belsize project, the installation of PLP had the second phase through the Southampton Local Levy funded project called St Denys Flood Resilience Project [66]. In 2018, another 27 properties in the high-risk areas in St Denys had PLP items installed. The uptake rate of PLP rose to 93 % as those who had installed items through the Belsize project spread the word (Officer).

The St Denys community clearly benefited from a series of funded projects aimed at developing flood risk management measures. DFAG, however,

> *didn't continue after the Belsize project …. None of 'the wardens' etc [that the community flood resilience plan indicated] worked* (Member).

The community flood resilience plan developed in 2015 has never been updated. An informal meeting to discuss flooding was held only once in 2022 (Email correspondence). As the leader pointed out,

> *the problem is people fit [PLP] and forget. [They think they] don't have to do anything once fitted* (Leader).

It is common in community-based DRR initiatives for members to disengage from activities once projects conclude, as noted earlier. DFAG's efforts to resume their activities after reaching such a stage of disengagement are analysed using the tentative co-learning framework.

6. Resurrection and co-learning of St Denys FAG

6.1. Trigger

'St Denys is, to some extent, defined by the river' – the leader of DFAG describes that the geographically constrained space 'bounded by a road and the river' has generated a 'community'. The small number of houses means 'you get to know people, so there is a sense of belonging and mutual support' (Leader). In another core member's words,

> *St Denys is a bit like a village …. There are two pubs and a community centre – a good community sense …. We have a Facebook group … freebies group, garden sale every summer* (Member).

These comments suggest the community of St Denys has had a certain degree of ***solidarity***. As happened in many places, however, the pandemic had an impact on the community.

> *Every Friday before Covid, people went to a pub. Not reestablished yet. It has fallen away* (Member).

Some of the residents were looking to rebuild the community. This probably coincided with the timing when the core members of the original DFAG – the leader, the retired oceanographer and the third member who is an SCC councillor – began to worry 'to the extent that it [the flood group] had lapsed'. This was just before the severest flood of April 2024.

> *We used to know who lived in which houses, and we've got the list of flood protections they have …. New people have moved in, some people have died, and the population has changed …. 10 years is long enough for people to forget and move on* (Member).

What was achieved and learned through the Belsize project was fading away.

It was probably the time to invigorate some sort of knowledge about who lives where and what happens if there is a flood (Member).

This is a responsibility shared amongst the core members that they had to take action to prepare for future floods.

The thought of my mind is how would I feel if there was major flooding and several houses were flooded, and if I hadn't done anything? I am feeling very responsible (Leader).

Having lived in St Denys since 2003, the leader experienced flood events before PLP was put in place.

Now retired for eight months, I have … some time to put into it [DFAG] …. Something needed doing to make people aware of flood risk, how they could deal with, and to benefit other people and community. It's a good community in many ways. We know many of our neighbours …. I feel loyalty towards the community (Leader).

This reflection highlights how the leader's sense of belonging, combined with his loyalty to the community, has shaped his sense of responsibility towards it.

The three core members were also highly aware of the increase in flood risk in the last decade due to the accelerating impact of climate change.

The sea level is rising 3–4 mm per *year … the land of south of England gradually sinking.*[6] *There is a likelihood of storms or violent storms increasing. Climate change is affecting us, gradually increasing the risk* (Leader).

Recognising the critical need for flood risk management within the community, the three members 'resurrected' (Member) DFAG to address this challenge collaboratively. 'We wanted to hold these meetings again – once a month (Member).' The resurrection of the group itself was agentive and collective action aiming to bring positive change to the community.

Then the flood happened with the highest water level of 5.8m in April 2024. This experience reconfirmed the urgency for preparedness action and highlighted the need for DFAG to contribute to it (Email correspondence).

6.2. Signature activity

On April 8, 2024 when the possibility of flooding was identified, DFAG applied their two-step flood warning. They began the warning system during the Belsize project in 2014. In fact, they did continue this self-organised activity during those inactive years in 2018, 2020, 2021 and 2023, even though the flood was not serious on the latter two occasions. The first step is to identify a risk as early and accurately as possible. One of the core members, the retired oceanographer, and one of the active members who has his flood prediction system liaise with each other in issuing a flood warning.

The Environment Agency only issues warning for the next tide, which is too late for many people. So how [DFAG's warning system] works is … if there is a risk, [the active member] issues a warning … and I check NTSLF's[7] *website. In April, I issued a warning before the Environment Agency [on the ItchenTides website]* (Member).

The second step of the warning system was until 2020, door-knocking high-risk households in the community letting them know of the risk. In December 2021, DFAG came up with a new system to deliver a warning note to high-risk properties. Once the warning is issued, the core members discuss 'the wording to go out to people' (Leader). The leader creates a warning note and prints it out. Knowing that not every resident subscribes to warning messages or pays attention to them even if their property is at risk, the core members deliver the note to the letterboxes of the high-risk houses.

Both steps involve ***reciprocal learning***. As the Environment Agency's warning does not give residents enough time to act on the flood risk, the retired oceanographer and the active member use the active member's flood prediction system. It however tends to 'overestimate than the Environment Agency's estimate' (Member), the retired oceanographer confirms using other public sources. This process generates new knowledge – a refined version of the warning. This new knowledge is then shared with the community via the ItchenTides website. The core members *further* create new knowledge by rephrasing the warning to make it accessible to laypersons. They deliver it in a different medium – an A5 note – to selected households.

Equal power balance is also observed in this warning activity. The retired oceanographer has expert knowledge and professional experience in the field. There is no doubt the contribution he makes to DFAG's activities is huge (Leader). Nevertheless, he is a 'knowledge sharer' [43] without imposing 'socially constructed privilege' [33] on others.

Probably other residents rely on the Environment Agency. I have a feeling of responsibility that if there is a large flood, more warning ahead than the Environment Agency is needed (Member).

As the water begins to recede, he takes the initiative to go out and check on others, ensuring 'everyone is OK' (Member), and demonstrating genuine care and concern for his neighbours.

The two-step warning system is DFAG's agentive and collective action for the public good making sure those who should receive the

[6] GeoClimate UKCP18 projections by the British Geological Survey indicate the south of England is one of the regions to experience a significant rise in subsidence susceptibility from 2030 to 2070 [75].

[7] National Tidal and Sea Level Facility, National Oceanography Centre, University of Liverpool. NTSLF provides sea level monitoring, coastal flood forecasting and the analysis of sea level extremes.

warning receive it. This activity demonstrates DFAG's strong sense of care and responsibility towards the community. Simultaneously, this activity has given DFAG ***solidarity*** – as the leader indicates 'flood risk brought us together' (Leader). The collective nature of the warning activity made the members feel 'there is a flood group' (Member) even during the period DFAG did not have regular meetings. The members recognise this activity is an important contribution they make to the community (Leader; Member).

6.3. New concern

The 2024 flood revealed inappropriate installation of the PLP items at some of the properties in St Denys (Leader; Member). To make matters worse, repairing them turned out to be difficult because the original installers had closed their business.

> *Different gates were not installed very well. Firms were short lived. Something installed, but you cannot go back to them. The problem across the country* (Member).

> *One that fitted ours went bankrupt!* (Leader)

There was also worry over the malfunction of PLP due to wear and tear after 10 years.

> *Air bricks are self-closing, but are they self-closing?* (Member)

This process of discovering and understanding the flaws of the existing PLP can be deemed as ***new knowledge generation*** through ***reciprocal learning***. The DFAG members exchanged information about the types of failings of different PLP items and investigated which properties had installed those items. This process will be discussed further in the following section. Ultimately, the DFAG leader wanted

> *to see somebody fixing defects of self-closing air bricks, pumps, like an annual boiler service. This is a service needed. Also there is a need for a certificate like an energy performance certificate that lasts for five years. That would help to keep insurance costs down. Peace of mind* (Leader).

To resolve the PLP's problem, a certificate would be ideal. It is however a long-term goal involving the whole industry. In St Denys, a faster solution was required as some defects in the existing PLP had already been detected. 'Identifying flood protection defects and upgrading them' (Leader) became an important agenda for the reunited DFAG. Their ***collective action*** of 'identifying flood protection defects and upgrading them' will protect the properties enabling ***positive change*** in the community. At the same time, the group was aware of some residents' reluctance to 'announce' flood risk in the area due to its possible impact on property valuing. DFAG was hopeful that 'having a flood group might help property valuing and insurance' (Member). In late April after the flood, a meeting was reconvened – the active members of DFAG, joined by a few new members, gathered to discuss flood preparedness in the community.

6.4. Monthly meetings

DFAG meetings have been held almost monthly since the resurrection. By October 2024, the members agreed that DFAG's aims were: 1) to raise awareness of the flood risk in the area and the importance of PLP, particularly to new people; 2) to identify defects of the existing PLP measures; 3) to offer maintenance options to them; 4) to spread the word about DFAG (Minutes 18/10/24). DFAG's intention for ***collective action for social change*** can be seen in these aims. They also agreed on their action plan as follows.

> *We need to publicise the fact of the flood area and move towards a newsletter and bigger meeting to spread the word* (Minutes 18/10/24).

One of the new active members, who moved to St Denys six years ago, offered to create a newsletter. The leader joined to help with the newsletter, one core member suggested using the photos from the 2024 flood and the other core member offered delivery of the newsletter (Notes 18/10/24). ***Reciprocity*** *among members in* ***generating new knowledge*** – the newsletter – shows the responsibility is shared. DFAG also agreed to a wider public meeting as the next step forward in pursuing the above aims of the group (Minutes 18/10/24). Subsequently, the newsletter became a 'leaflet' for advertising the public meeting. A few members offered to distribute the leaflet, particularly to lower-lying properties in the area. The public meeting was to be held at the community centre on February 14, 2025 when SCC's Emergency Preparedness, Resilience and Response Team Officer (emergency officer) as well as the flood risk manager were available to attend (Minutes 10/1/25).

PLP – one of the main agendas of DFAG – was discussed intensively at DFAG's monthly meetings.

> *We need to do some door knocking … about this issue. We should also let new people know they are in a flood zone and that the gate needs to be shut and why* (Minutes 18/10/24).

Seven residents, including a few DFAG members, showed interest in a professional inspection (Notes 18/10/24).

> *Most houses have some issues with their flood protection,* e.g. *broken sump pumps, failing gates. Some of this [are] poor installation and some of it [are] poor maintenance* (Minutes 29/11/24).

DFAG members were agentive in figuring out how to solve the problem. As original installers did not exist any longer, DFAG had to find a new specialist company, which could undertake inspection and repair. The leader took up this task, which turned out to be challenging.

> *I made a lot of phone calls to companies who install and maintain flood protection hoping to find who can do an annual check and fix flood protection defects* (Leader).

His phone calls resulted in one company's quote of '£1000 one-off appraisal' per property; the company later offered a group discount (Leader). At the October and November meetings, the DFAG members exchanged their views on this option. 'A group discount cannot happen if one refuses', 'semi-detached houses need to work together' and most importantly, 'adding repair fees will become too expensive'. Nobody was keen to pay such an amount (Notes 18/10/24, 29/11/24). This dialogue was the crucial ***reciprocal learning*** process for democratic and collective decision-making. The group decided to look for an alternative method. The leader came up with an experimental idea 'to use somebody locally and use our knowledge' (Leader) to ***generate the community's own knowledge***.

> *This flood group can advise each household what needs to be done. The resident then instructs [the highly skilled resident] to fix it. No liability if we individually arrange* (Notes 29/11/24).

The members received this proposal favourably having looked at the pros and cons of different options through ***reciprocal learning***, as recorded in the minutes.

> *We can spot things that are wrong ourselves … supporting homeowners to identify issues and then homeowners can employ someone to put things right … we could ask [the highly skilled resident] for help although he is very busy … we should ensure he is not doing it out of kindness but is offered the proper rate for the job* (Minutes 29/11/24).

Instead of hiring a company paying a lot of money, the group reached a conclusion to involve one of the residents in the community who has the skills to fix the faults of PLP items. The ***power balance was equal*** in the decision-making process between the new members and the continuing members who were more knowledgeable about the flood risk and PLP. Every piece of information offered was appreciated whether it was about whose PLP was failing, or if someone needed a pump installed (Notes 29/11/24). DFAG collectively arrived at a self-sufficient solution to PLP issues. This experimental approach is a process of ***generating new knowledge*** to see whether the skilled resident can fix every defect, cope with the number of demands and agree with the pay rate with the homeowner. The plan was made at the November meeting to start with the floodgate of one member's property, which had not been sealed properly when tested recently.

Meanwhile, two members (one active and one non-active) offered to collate information about the properties with PLP – a database of what they have and what is failing – this is ***new knowledge generation***. With the database, DFAG can approach households and offer repairs by the skilled resident. One core member said she would send them the original flood plan that had information on what was installed by the previous projects. One active member offered advice on testing the PLP if residents want it. Checking on vulnerable residents was also mentioned (Notes 29/11/24). This was an important dialogue for the two particular aims of DFAG: 'to identify defects of the existing PLP measures' and 'to offer maintenance options to them'. ***Reciprocal learning*** under an ***equal power balance*** can be observed as participants' ideas and knowledge were shared and respected, enabling joined-up thinking (Notes 29/11/24, 10/1/25). Using the community's Facebook, one of the active members uploaded a post asking the state of residents' PLP and if it needs maintenance (Minutes 10/1/25). DFAG's self-sufficient approaches are ***collective action for social change*** to protect the community from the possible impact of flooding.

There was an exchange at one of the meetings, which illustrated a strong sense of collective responsibility within DFAG. One of the non-active members raised whether SCC would provide any help with the inspection and maintenance of PLP. The leader firmly responded,

> *we cannot wait for somebody to help us. We cannot afford that. We need to start ourselves. I just want to get on with it. See what happens next year when it floods* (Notes 29/11/24).

Fig. 11. Public meeting on February 14, 2025 at the community centre.

Another core member supported his position.

> *We need to take responsibility* (Notes 29/11/24).

DFAG is aware that no resources from SCC can be expected (Leader; Officer). There is a determination in their conversation that flood risk management is something the community must deal with.

6.5. Public meeting

The public meeting on February 14, 2025 was the first tangible outcome of DFAG since its resurrection. Fig. 11 is the original photograph taken by the author. The event was well attended: 18 residents, six DFAG members and two council officers.

The 90-min meeting covered the following agenda.

1) Introduction and the flood issues in St Denys by the DFAG leader
2) Flood and flood risk management history in St Denys by a DFAG core member
3) Current and future flood risks in Southampton, multi-agency flood risk management and flood insurance by SSC Flood Risk Management Team Leader (flood risk manager)
4) Emergency planning by SCC Emergency Preparedness, Resilience and Response Officer (emergency officer)
5) PLP measures, procedures for maintenance and testing by a DFAG active member
6) Q&A

Three insights could be drawn from the public meeting. Firstly, the public meeting was an opportunity to reconfirm the necessity for self-organised flood risk management in the community. SCC led the previous projects to install PLP to high-risk properties in St Denys, but currently, there is no financial support available for DFAG's activities. The two officers who attended the meeting were there to explain the council's current policy and strategy and to offer advice and suggestions. The strong message from them was that the flood risk in St Denys was 'changing'.

> *St Denys … will require strategic flood defences in future to safeguard people, homes, businesses and critical infrastructure* [67].

The Business Case is being developed by the SSC Flood Risk Management Team for such large-scale structural measures. Meanwhile,

> *in the short term, Property Flood Resilience is the preferred solution to mitigating flood risk. This includes flood barriers, flood doors, airbrick covers …. Property and land owners hold main responsibility for safeguarding their property or land against flooding* [67].

Creating 'a household emergency plan' was recommended because

> *knowing what to do and when during a flood incident can help reduce the risk of harm to you, other people in your household and your belongings* [67].

SCC officers' message was clear that the community members would have to take responsibility and start mitigation action themselves. This validated what had been discussed at one of the previous DFAG meetings: 'We cannot wait for somebody to help us. We need to start ourselves.'

Secondly, the public meeting was a space for social learning, which brought together different stakeholders who have varying levels of knowledge on flood risk and PLP (Notes 14/2/25). Some residents were concerned about the flood risk they might have, while others were keen to learn more about PLP. When the active member completed the presentation regarding PLP's procedures for maintenance and testing, one attendee raised the point that neighbours, particularly those who were new to the area, did not necessarily know whether PLP items had been installed on their properties. The flood risk manager responded by asking them to contact the council as the information on SCC-funded PLP was available (Minutes 14/2/25). Other attendees raised concerns that they were not aware of the responsibility of maintaining their PLP and that the original manufacturers of the PLP no longer exist. One active member offered advice to use petrolatum tape as an emergency means of sealing possible entry points for flood water (Minutes 14/2/25; Notes 14/2/25). Knowledge was shared and ideas were exchanged in building wider collective action.

Thirdly, the public meeting provided DFAG with a valuable chance to evaluate the community's readiness to engage in flood risk management efforts. When the issue of vulnerable neighbours was discussed, the attendees were in agreement that neighbours would need to look out for each other when a flood warning was issued (Notes 14/2/25). Although brief, this discussion was a sign of shared responsibility and care for others in the community beyond the DFAG active members. There was also a willingness to have 'a flood trial run' in the coming summer, which had not been carried out since the Belsize project (Notes 14/2/25).

From the SCC flood risk manager's point of view, 'the large turnout' indicated

> *there is an interest in the risk of flooding and a willingness of the community to come together to support each other, and learn about how they can better prepare and better protect themselves* (Officer).

On the other hand, the DFAG leader said, 'I would have liked 50 people to come' (Notes 14/2/25). He is keen to get more residents involved in flood risk management, however, there are two challenges: 'lack of understanding' and 'complacency' (Leader). Those residents who recently moved to the area have 'no knowledge of flood risk or imperfect knowledge of it'. Them not talking to neighbours does not help either. There is also a 'paradox'. While people's general interest in climate change has increased, the

particularity of this area's flood risk – a high tide combined with a storm surge – is not necessarily understood by the residents.

> *A lack of understanding is closely connected to complacency …. [Flooding is] something historically happened occasionally, mostly hasn't caused too much of a problem. It's going to be OK, not a big deal. But the reality is the event can be more serious. The recent one reached 5.8m. The previous one was 5.6m. What was found was flood protection partly didn't work* (Leader).

Nevertheless, the leader acknowledges complacency was expected given the scale of the risk is small 'in one end of a street in a small area of St Denys' (Leader). 'It takes a lot of discussion and education to change people's mindset' to learn

> *how to calibrate risks … to be not fearful …. How to communicate the correct assessment of risk and also … possibility of controlling that risk* (Leader).

The public meeting offered DFAG reassurance regarding the importance of a FAG while reaffirming the ongoing challenge of effectively engaging community members in flood risk management efforts.

7. Highlights of co-learning

The narrative above portrays the resurrection of DFAG through an engagement with the five tentative characteristics of co-learning. Three key highlights are explored in depth here. The first is ***equal power balance***, individually and collectively. The core members often referred to them as feeling 'responsible' despite their participation being entirely voluntary. For the leader, his commitment to DFAG derives from his care and loyalty towards the community. For the retired oceanographer, his knowledge and experience drive him to contribute to improving flood preparedness in the community. The other core member is a SCC councillor, who clearly has a political role to represent the community. This 'core-ness' becomes shared responsibility, which is strong and solid having been collaborators since the previous projects. This is evidenced by their signature activity – the two-step warning system – which they have continued since. As some DRR research has shown, it is the 'shared memories' of being affected by disasters that bond residents and keep them working together [7]. The shared responsibility among the core members appears to foster an equal power balance within the group, enabling wider members to exercise agency – for example, by creating a leaflet for the public meeting or collating a PLP database. The collective grew, and so did their sense of ***solidarity***. By assigning clear roles among themselves, the members worked closely to ensure the public meeting took place.

The second characteristic to draw attention to is ***new knowledge generation***. Finding a solution locally for 'identifying PLP's defects and upgrading them' is not only cost-effective but sustainable. The immature industry meant high pricing and no quality assurance. There was no prospect for a mechanism of 'a certificate' to be introduced. DFAG was confident enough to draw on the knowledge accumulated over the years and involve the skilled and trustworthy resident for maintenance. During the process of generating new knowledge, the members were ***learning reciprocally*** about types of faults, methods of repair, as well as which items had been installed in which properties. As presented at the public meeting, DFAG was able to share such knowledge with wider community members. What should be emphasised here is that DFAG has grown as a self-organised and self-sufficient group during this resurrection process. The lack of external resources, including those from SCC, did not hinder the members' progress. On the contrary, it created opportunities to explore alternative solutions. Self-organising groups develop 'alternative ways of being and doing'. Such alternatives are bound to be experimental and built through collaboration [19,68].

On ***collective action for social change***, while the narrative identified numerous instances of collective action, 'social change' has yet to materialise. This is inevitable given the resurrected DFAG remains in its early developmental stage. One of the challenges DFAG faces for social change is the leader's concern – there are indifferent residents despite their properties being at high risk. The interview with a resident who does not engage in DFAG's activities may have indicated how a dialogue could start. This challenge is shared in many communities, and DRR research has identified reasons why people may not engage in DRR efforts. One factor is the lack of resources and time. Another is 'complacency' in the DFAG leader's words, 'denial' or 'normalcy bias,' as described by Omer and Alon – the belief that 'a disaster won't happen to us' or that 'life will remain unchanged even after a disaster' [69]. Additionally, indifference or reluctance can arise when DRR activities are perceived as imposed by authorities and delivered by a small group of experts [70]. Such top-down approaches often limit community members' sense of agency, resulting in passive participation without fostering ownership of the initiatives [8]. However, DFAG's commitment to the public good was clearly articulated, encompassing efforts to enhance flood preparedness and resilience within the community, as well as to empower the broader community. The flood risk manager's comment after the public meeting confirms this point.

> *I am really pleased that 10 years on, the FAG is still running and includes new faces demonstrating community cohesion and the efforts that have gone into ensuring everyone is equipped with information. The group has some really proactive members who have a genuine interest in the risk of flooding …. With a strong foundation it is really inspiring to see* (Officer).

The resurrection stage of DFAG has concluded with the effective delivery of the public meeting. Building on this strong foundation, they aim to continue mobilising local resources to address PLP issues while actively working to expand their membership.

8. Conclusion

The five characteristics of co-learning explored in this paper appear to align with the relevant domains, and no additional themes emerged from the empirical data. However, the tested framework requires refinement, particularly in relation to the first characteristic: ***solidarity***. This element encompasses three interrelated dimensions – agency, inclusivity, social learning. The analysis did not

adequately address the mechanisms through which solidarity was cultivated via group members' agentive and inclusive behaviours and their engagement in social learning processes. It may also be necessary to distinguish between individual and collective dimensions within the framework. For instance, individual traits such as agency and a strong sense of responsibility were clearly identified in the narrative and may represent a distinct characteristic of co-learning by themselves. This in turn, pauses the question of the relationship between 'the individual' and 'the collective' within co-learning.

This point leads to the other area for improvement, which is a need to deepen an understanding of the relationships between the characteristics. In doing so, temporal aspects of learning should be taken into consideration as learning is about 'change' over time. What can be confirmed from the above analysis is the five characteristics do not necessarily refer to linear 'stages' of progression, i.e. 'a group with solidarity equalises power balance to enable reciprocal learning which leads to new knowledge generation and such collective action ultimately changes society'. DFAG's resurrection process was back-and-forth between characteristics, rather than moving one to another, e.g. reciprocal learning enhancing the group's sense of solidarity.

This suggests that co-learning may need to be examined alongside broader learning theories that incorporate the temporal dimensions of learning, such as 'single/double-loop learning' [17,71], 'small/large-loop learning' [72] and 'an ecological model of community learning' [73]. These theories explore the dynamics of community learning across past, present and future contexts. Additionally, some include a third dimension of 'meta-learning,' which pertains to the transferability of acquired knowledge. Preston et al. [73], p. 750), for example, specifically examined disaster contexts and proposed the following framework:

> NAVIGATION: Incremental, small loops of learning, experimentation and learning from events as they arise. The current paradigm of community learning for a disaster predominates.
>
> ORGANIZATION: Experimentation leads to new methods of resource allocation and mutuality in an incremental fashion. This leads to new ways of self-organization.
>
> REFRAMING: The disaster is *reframed*, either through drawing parallels with historical events or adopting new paradigms of disaster management, even questioning the ways in which disasters are managed.

In DFAG's case, their resurrection phase aligns with the concept of 'organisation' under this framework. They generated alternative and experimental knowledge to address the issue of PLP, fostering a 'new way of self-organisation' based on equal power balance and reciprocal learning. The 'reframing' phase would involve DFAG envisioning all high-risk properties with PLP either repaired or newly installed, as well as an increase in the number of 'active' members. DFAG remains focused on progressing towards this goal.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Kaori Kitagawa reports financial support was provided by Keio University. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgement

I would like to express my gratitude to Keio University for supporting this research. I am also deeply thankful to the members of the St Denys Flood Action Group in the City of Southampton for their valuable cooperation in my research.

Data availability

The data that has been used is confidential.

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