CONSIDERING THE VALUE OF COMMUNITY ENGAGEMENT FOR (CO)-PRODUCING BLUE-GREEN INFRASTRUCTURE

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ABSTRACT

This paper considers the now seemingly widely-recognised importance of engaging communities in the co-development and maintenance of sustainable approaches to flood risk management (Blue-Green Infrastructure, BGI). The potential value in maximising and deepening engagement is briefly outlined: more community buy-in, improved treatment of facilities, lay maintenance and clearance as well as potentially greater willingness-to-pay all improving the function and so sustainability of systems; increased multiple felt benefits through heightened awareness and understanding, and hopefully improved community coherence and cohesion developed through the engagement process. Engagement is now generally accepted as a 'good thing', but it risks becoming an *empty signifier* that is problematic to implement effectively, unless we begin to break down and analyse the various component parts; the strategies more and less likely to work with different communities and the how, what, where and when employed within different approaches. We argue that approaches to and patterns of engagement should be dependent upon the wider context of the development under consideration; retrofit or new-build, scale of user-base, demographic characteristics, etc. Three case-studies in Bristol, UK are considered in respect of their characteristics and engagement histories using analysis of publically available documents and websites. This information is further supplemented through site inspection and stakeholder interviews. These case studies are seen to exhibit differences that demonstrate the value in seeking careful and differentiated approaches over the longer-term in an effort to cultivate a truer and deeper sense of ownership by local communities.

Keywords: Community Engagement; Flood-risk management; Blue-Green Infrastructure; Co-Production; Bristol, England.

1 INTRODUCTION

This paper will explore and consider the potential values in engaging local communities in the development of 'Blue-Green Infrastructure' (BGI), which is used to help manage flood risk and improve water quality, as well as delivering a range of further benefits. It will consider a number of different ways in which this engagement might be approached, as well as some of the limits or potential disadvantages or risks encompassed.

Three case studies will be presented to explore how involvement, voice and creative input from local communities could help in producing more effective and sustainable approaches to flood risk management.

This paper focuses upon the use of 'BGI components', or the blue-green end of Sustainable Drainage Systems (SuDS) components. The term refers to efforts at reducing flood-risk, creating better water quality and simultaneously improving biodiversity and amenity (so a field of multiple benefits [1]). This is achieved by installing components in the built environment to recreate a more naturally-oriented water-cycle; bringing together water management and green infrastructure by means such as green roofs, swales, ponds, usable green spaces and more [2].

Establishing or retrofitting BGI will always affect communities living around it in some way, however, and it is important that this is borne in mind. Communities might dislike BGI because of fears for health and safety, loss of land and allocation of maintenance costs [3], lack of awareness about the argued 'multiple benefits' [4, 5], or simply differing views, values and interests around the use of the designated spaces.

Practices around BGI installation have been criticised for not being open to public voice and influence in shaping proposals [6], yet the authors would argue that seeking to maximise the felt benefits and outcomes of such work will require this engagement [7].

The paper is divided into five sections. Section 2 outlines the methods used conducting the research, Section 3 gives a brief overview of engagement approaches and community perceptions and Section 4 outlines and analyses three case studies of installations around residential developments in the Bristol, England area. Section 5 then discuss what we can learn from the different approaches adopted at the sites and concludes the paper.

2 METHODS

The work employs an illustrative case-study approach. Three sites in the Bristol area were selected to represent components at different levels of maturity, differing between new-build and retrofit and varying in types of BGI and engagement strategies employed. This was done to facilitate comparison and contrast across sites, extending previous work analysing mainly retrofit BGI components [4, 5] to ones including new development.

Extensive research was conducted around planning documents for the sites, where available, to learn more about the rationale for installation and gain insight into community engagement performed in their development. A series of conversations were initiated with relevant stakeholders and community representatives, to learn more about this and any further engagement that had been undertaken. These conversations were recorded and transcribed, where possible; otherwise, notes were taken and written up in diary form, for later analysis.

Transcriptions and notes were analysed using a Qualitative Data Analysis framework and software (NVivo). Recurrent themes were noted, and analysed in assessing and evaluating the strengths and weaknesses of approaches observed.

3 LITERATURE REVIEW

It is widely accepted in the 21st Century that community engagement is important in all matters affecting the populace [8], and this understanding would appear to have been developed latterly in thinking through effective approaches to installing and managing BGI [9]. Such engagement is especially important with the retrofit installation of BGI components, because of the degrees to which they can affect the use and change the aesthetics of space, and require changes in, or the adoption of different, behaviour to enable their safe use and sustainable performance over time [10, 5]. However, creating attractive and liveable new neighbourhoods where BGI components are part of the landscape from day one will need to involve a different range of dynamics and engagement strategies. These may involve adjacent neighbourhoods in advance of development and new residents as they move in to the new spaces, to understand their use, and the behaviour required around them.

In contemporary design guidance for the UK, amenity and biodiversity have now gained independent standing alongside water quality and quantity as benefits of Sustainable Drainage Systems (SuDS) or BGI [see the 2007 SuDS Triangle and 2015 SuDS Square, 11, 12]. The guidance contains a substantial chapter on *Designing for Amenity* and technical design notes. However, the term remains under-defined, an open referent until content is supplied by the referee, and installation-users.

It is tempting to presume that because BGI is designed to improve amenity, and biodiversity, it will therefore be willingly accepted and appreciated by any and all communities. Yet if open green and blue spaces lessen parking opportunities and/or threaten to increase littering, dog-mess or safety risks due to water-bodies or poor lighting and antisocial behaviour [4, 3], acceptance may be more difficult to achieve. Further, the meanings different groups attach to spaces and so the amenity they can gain may differ, and

such socio-cultural variations need to be accounted for in looking to design for maximal satisfaction [13].

A number of studies have found that increases in green space within the built environment are perceived positively [14, 15, 16]. Increased vegetation coverage could also develop wildlife corridors, leading to greater biodiversity [17, 18], and help ameliorate air-quality [19, 20]. Green infrastructure can also contribute to overall health and physical and mental wellbeing [21, 22, 23, 23, 25].

BGI might be perceived negatively however, for example, if people were financially or physically liable for upkeep and maintenance, if they did not like choices of fauna and flora, if they did not understand purpose and function or if components suffered from mismanagement or maltreatment, reduced functionality and negative aesthetics [4].

Similarly, biodiversity should not simply be presumed as a community positive. Jarvie [14] conducted postal online surveys of SuDS ponds in Edinburgh, finding they were valued for their biodiversity; however, perceived disadvantages also included biodiversity in the form of increased numbers of insects [26].

The above alerts us to the complexities surrounding perceived and actual amenity, and so the value in deep, meaningful and longer-term community engagement to understand levels of awareness, current and potential future practices and preferences. Little work has been done in this field so far; the most significant pieces of work is a set of reports for practitioners by Daly et al. [27, 28]. Daly et al. [27] firstly outline the principles and potential benefits of engagement, and a framework for such, and then detail a range of techniques and present some very brief case-studies [28]. One of the main messages from Daly et al. [27] is that professionals in the field need to move beyond the decide, announce, defend (D-A-D) model whereby they select their preferred solutions before communicating with the public, to an engage, deliberate, decide approach (E-D-D) whereby the public are maximally involved in developing mutually preferred solutions. What is now needed is more in-depth qualitative case-study work exploring how different approaches have or have not been effective in various cases, something this paper will begin to explore.

4 CASE STUDY ANALYSIS

4.1 Case Study 1: Embleton Road, Bristol

Embleton Road is a residential street in an urban development in Southmead, Bristol. Southmead is constituted in the main by pre- and post-war estate developments undertaken by Bristol Corporation (now Bristol City Council) in the early-mid Twentieth Century.

4.1.1 Reason for selection

The site was chosen as it represents a work of retrofit within an existing community looking to mitigate risks of flooding as part of a city-wide plan. It was put in place with a view to scaling out to neighbouring streets and areas of the city, so represents an interesting study of the city's longer-term approach to flood risk management.

4.1.2 Design Choice

The Bristol Surface Water Management Plan [29] identified areas of Southmead with surface water management problems and at a risk of flooding in a 1:30 event. Embleton Road sits on an incline, meaning that stormwater landing on it runs downhill and feeds into a Combined Sewer Overflow (CSO) pipe. Modelling suggested that the CSO is at risk of overtopping and flooding properties in times of heavy rainfall. For this reason, it is of concern to Bristol City

Council and they are keen to find a way to alleviate pressure on the CSO. Embleton Road is one of a number of roads in the surrounding area that do this, and so was chosen as a test-case, with the intention to roll out successful solutions to surrounding streets.

Bristol City Council (BCC) worked with Sustrans, a UK charity focussing on safer journeys and streets, 'empowering people to make travel choices which are good for them, their neighbourhoods and the environment' [30], equally concerned with place-making and amenity. Sustrans was formed in Bristol in 1977; although it now works nationally, it has a long-standing and productive relationship with BCC due to its origins in the city. A significant concern within the Bristol Local Flood Risk Management Strategy (BLFRMS) is to understand local flood risk awareness, to raise this and to encourage people to take action to manage the risks, as well as to encourage natural solutions like SuDS [31].

Rain-gardens were eventually chosen by BCC as the best means to slow stormwater-flows and contribute to local place-making; making the area greener, improving aesthetics and reducing the number of parked cars. On one side of the street is a primary school, so slowing traffic by narrowing the road at points was considered a safety improvement.

4.1.3 Engagement Strategy

Both BCC and Sustrans wanted to involve local residents in the components' design and development as much as possible. For Sustrans, this is core to their modus operandi, with their focus upon 'empowering people'. BCC were aware of historic feelings of disengagement and disempowerment amongst local residents in North-West Bristol, and wanted to help alleviate these feelings by giving local residents a voice in what might be seen as an imposition that removed parking spaces. A co-design approach was taken by the Council and Sustrans, and a variety of engagement tactics employed, to greater and lesser relative success.

Because of Sustrans' decades-long experience and expertise in such work, they took the community outreach lead. This began with door knocking, explaining problems faced and their proposed solution, and inviting feedback. This had limited results; a Sustrans employee, explained that it was hard to get people interested at the proposal stage because they appeared to feel it was BCC 'talking shop'.

The local school were much more easily engaged, with interested teachers, pupils and parents and an 'eco-council'. For this reason, leverage of the school's interest became an enabling device for mobilising and engaging other residents. Three workshops were held considering the potential of SuDS/BGI and the value in controlling traffic, then thinking about the design of adaptations. Plans were mocked-on paper, shown to local residents and put on display in the school to invite feedback.

Once plans had been developed further, a scaled-down 1:50 version of the street was laid out on tables in the road for residents and pupils to discuss rain garden placement and desired aesthetics (plant choices, etc.). This won full engagement from all members of the school, although getting a large number of residents out of their houses to show voice was more difficult. Design ideas developed from the day were taken by the design managers, Arup, and developed into workable plans brought back to the school and residents to gauge satisfaction.

Some residents, and a large number associated with the school, got involved and helped co-create design and placement of the rain gardens, such that BCC and Sustrans could legitimately claim to have worked with the community and raised sense of ownership. In November 2016, the BLFRMS [31] noted as an 'action completed' work to 'increase public awareness and encourage communities to take action' and to 'understand communities' flooding concerns and priorities'.

Figure 1: Embleton Road, idealised vision (*Source: Bristol City Council 2015.* [32])

Figure 2: Embleton Road site-visit, May 2017

4.1.4 Post-Installation

Post-installation, there was no more funding for ongoing education or consultation work. Following a site-visit in April 2017, the authors can confirm that the rain-gardens seem well capable of traffic calming, but look neglected, which limits the visual appeal and presumably amenity functions (and biodiversity value) (see Figures 1 & 2 for design visualisation and 2017 site-visit photograph). This may be due to budgetary restrictions authorities face in the current UK economic climate restricting capacity for maintenance work. Whatever the reason, the BGI components now look somewhat forgotten, and so new site-engagement might help improve ownership, lay maintenance and so amenity and water-related benefits.

With Embleton Road, significant efforts were made to understand local feelings around rain-garden placement and design. However, no real choice was offered, in that the decision to implement rain-gardens had been taken and no alternatives were proposed; Daly's mentioned D-A-D model [27]. Ideas from public consultations were developed into plans and then presented back to the community for further feedback, increasing involvement and voice. Residents would not however have been around the table when final decisions were made, and the technical requirements for reducing run-off would have restricted permitted variability within designs. Nonetheless, sincere efforts at co-design were made. The shortfall was a lack of post-hoc engagement and maintenance funding leaving the rain-gardens now looking dilapidated, and potentially having reduced capacity to fulfil their multiple purposes.

4.2 Case study 2: Emersons Green, South Gloucestershire

Emersons Green is a town to the north-east of Bristol situated under South Gloucestershire Council (SGC) (it is a part of 'Greater Bristol', an unofficial entity commonly referred to but with no governance structure), that was under development roughly 1990-2005. It is heavily linked by employment opportunities and transport networks to the city of Bristol, sitting as an extension on the north-eastern edge of the city's growth, with a BS16 postcode.

4.2.1 Reason for selection

The site was chosen to illustrate a mature site where BGI components were installed to enable a large-scale mixed-use development without increasing the chances of downstream flood risk in central Bristol.

4.2.2 Design Choice

In response to initial planning applications for the first sector of Emersons Green developments, restrictions were placed on development around where the Folly Brook flows, because of the potential for increased run-off into the River Frome (of which the Brook is a tributary), placing areas downstream in Bristol at flood risk, where the river passes at points in limited capacity culverts. As one SGC employee explained, 'the ponds are there to control flow from the development area into the Folly Brook … the drainage strategy was to ensure no further flood risk to Bristol city centre.'

Negotiations culminated in the area being designated a community park and several retention ponds as well as swales being installed to help reduce run-off and river-flows (see Figures 3 & 4) [33]. The park was intended to function in reducing downstream flood risk, providing an amenity space, offering a wildlife corridor and a space of natural habitation for biodiversity. The area has become a valued community amenity, regularly used by walkers, dog-owners and cyclists, an often busy children's play area and an orchard. Various paths run through the area, increasing connectivity.

4.2.3 Engagement Strategy

Community engagement pre-development was very difficult because the park and its components were all developed and installed prior to and contiguous with the housing, so no communities existed pre-development.

From Autumn 2014 – Spring 2015, SGC conducted maintenance work on the ponds; dredging and desilting, removal of foliage to ease flows of water and prevent backup, and the felling of selected trees to allow for desilting machinery access. Notice was placed on the SGC website, and signs were placed around the park to inform users. An SGC employee said of the engagement work: 'We have … liaised with and kept the community informed and involved'.

Figure 3: Emersons Green pond 1 site visit, May 2017

Figure 4: Emersons Green pond 2 site visit, May 2017

However, there was no more active conversation with park-users to negotiate what was happening, and this caused some dissatisfaction with SGC's actions. As one concerned resident commented: 'The workmen went through with brush cutters … and took down some substantial trees – many people were very upset by the work being done'. They noted that some people quite liked making the area more open, but others felt aggrieved at the 'wholesale destruction' of natural areas. In response, a Friends group was established so that SGC would have a body of local residents to communicate with and consult, rather than them feeling 'passive recipients of whatever decrees had been made'.

4.2.4 Post-Installation

SGC have sought to conduct post-hoc community engagement, facilitating and encouraging the Friends group. A Community Engagement Officer noted they were invaluable, since they could apply for smaller pots of funding for specific park maintenance. The Group have since organised community clearance activities and founded a Community Orchard Group.

In late 2017, the Council performed more community engagement, convening a meeting attended by 15 people as well as an author'; two from the Friends group, a second group interested in the park (Friends for an Inspirational Life), three local residents and a BugLife employee. Attendees were informed that the Council had been tasked with spending remaining Section 106 (S106) developer money, and wanted community feedback to facilitate this (S106 is a legal agreement between developers and Local Authorities linked to ensuring developments do not have negative effect upon the existing area's facilities, amenity, etc.).

At the meeting it became clear that attendees did not know the ponds were for flood risk management downstream of Emersons Green. As one attendee commented, 'Everyone I'm speaking to, even in this room, is coming up with a different reason of what the ponds are for and where they're draining to'. They felt a lot of local people believed they were for managing local risk, and authoritative information was needed, 'I'd be interested in a serious map of drainage'.

SGC presented on a consultation they had conducted; only 21 responses had been received, but some distinct themes had come through around the park needing more tidying, more shrubs beds and more benches. SGC said they would like more feedback, but had decided to work with these as a representative sample. A small number of issues were raised by attendees concerning maintenance of flap-valves and back-up of stagnant water, and a need for more desilting and the planting of reeds and irises, to improve water quality. Overall, the Friends chair stressed that *we should remember over 1000 people enjoy the park, it has a good balance of wild and controlled areas and caters for a range of different interests*. In later correspondence, the main Council representative explained that they felt they had done enough consultation and from the meeting had identified a number of issues to work with.

With this site, pre-hoc engagement was not possible because of lack of residents pre-development. SGC then made some efforts with post-hoc engagement. In the first instance, this was one-to-many information dissemination, with no attempt at listening. This produced some dissatisfaction amongst residents who disagreed about what should happen to the ponds. Ideas may not have been practical, but with conversation, SGC may have won some around to its work.

With the second engagement, SGC made efforts to listen to a broader swathe of the public, although take-up was very low. In the meeting, a few attendees observed that it not been well-publicised and they had only heard by chance. Holding one meeting on a weekday evening may have excluded people who otherwise might have wished to attend. The level of engagement appeared be minimal, and given that feedback was taken by SGC to produce

their own actions with no further consultation, public involvement felt nominal. Intentions were sincere and staff all very committed to their work, but the resources and so time allocated by SGC was not enough to achieve meaningful engagement. Funds are allocated for maintenance work on the ponds, but with seemingly no corresponding funding (and so time and resources) for community engagement that could facilitate and encourage more lay maintenance, negotiate more understanding and so improve opinion of work undertaken.

4.3 Case Study 3: Hanham Hall

Hanham Hall was the first UK government Carbon Challenge development (led by English Partnerships on behalf of the Department of Communities and Local Government), a 6.6ha site with around 185 homes built in an 'eco-village' style around the historic Hanham Hall Hospital, situated in the once independent village, now suburb of Bristol known as Hanham (again in South Gloucestershire) [34, 35].

4.3.1 Reason for selection

The site was selected to demonstrate the integration of BGI components within a new development that also embraces wider sustainability goals and a water-cycle approach to stormwater management. It was intended to produce the country's first zero carbon community, with efficient heating systems, rainwater harvesting and the encouragement of cycling, amongst other features. The site was assessed as being in Flood Zone 1 by the Environment Agency; less than 1:1000 chance of flooding, although with potential for localised flooding around the site pond in heavy rain. The development was assessed as having a potential negative impact on flood risk downstream; as such, it was proposed that it should not discharge any surface water into the existing public sewer system [36].

4.3.2 Design Choice

A surface water drainage strategy was developed incorporating permeable paving, soakaways, a central swale linked to the existing pond (treated to improve its capacity) and improving drainage on a local ditch system (see Figures 5 & 6).

Figure 5: Hanham Hall pond site visit, May 2017

Figure 6: Hanham Hall swale site visit, May 2017

The pond links to the ditch system, effectively providing one large infiltration basin. The swale sits in the central spine of the main road, providing amenity in wet and dry conditions [36].

4.3.3 Engagement Strategy

Hanham Hall is a new development on the grounds of the Hall, but because it is situated within the conurbation of Hanham it was possible and important to conduct community engagement; this was performed by Avril Baker Consultancy (ABC) and Barratt Homes that Julie sorry to hear that Julie. The ABC Statement of Community Involvement [37] explains that two rounds of public consultation were conducted with local stakeholders and members of the public. Four events, a lunchtime stakeholder session on a Friday daytime followed by an open public session in the afternoon and on Saturday. In total, around 260 people attended these events.

Concerns noted included potential impact on parking, schools and health facilities, dangers of increased traffic, and the loss of green space and views. Matters concerning flooding and water management do not appear at any point in the document nor in replies from the developer. It would seem these issues, and proposals for their management, were not presented to the public in the consultation, and so no engagement was conducted.

4.3.4 Post-Installation

During the first meeting attended, according to one Residents Group attendee, on completion of the site the first generation of owners and occupiers were very environmentally-conscious, drawn by the publicity of a 'carbon-zero' living opportunity. They expressed a mild disappointment that they felt later residents had moved in more simply because of relatively affordable properties in a desirable location. The group includes members who have developed different areas of environmental expertise throughout their careers, and at the second session attended, two new arrivals emphasised that their professional interest in water management and ecology had drawn them to the Hall.

With Hanham Hall, dynamics with engagement seem to be flipped around; the Residents Group are interested and engaged with the environmental management of the green spaces within and around the site, but struggle to engage the land-owners. The group have produced an environmental management plan to maintain and improve biodiversity in all the natural areas. However, because the land is still under the ownership of Homes England (a non-departmental public body), the group are restricted in action they can take. In the meeting, it was mentioned several times by attendees that they had been waiting over a year for transferral of property rights to a Hanham Hall management company from Homes England, but were feeling deeply frustrated with the struggle to get meaningful communication. The Group's concerns with the spaces would in any case appear more focused on biodiversity, water quality and green spaces than site run-off. Although if these were brought to their attention, we presume they would be of interest.

In this third case, as can be seen, engagement pre-development around matters of water management was not observed, and as with Emersons Green could not be with the current residents. Engagement post-development with the current land-owners around ecology matters has been attempted unsuccessfully by the residents, although with little focus upon water management.

5 DISCUSSION AND CONCLUSION

The differences in approach exhibited across the three presented case studies are very apparent; this might be partly explained by their levels of maturity, whether they were new

or retrofit and the types of BGI components that were involved. The Local Authorities (Councils) and other partners involved such as Sustrans may also have steered approaches to engagement significantly.

There is also a strong sense of continuity amongst them, however, in the apparent lack of strategy and protocols for budgeting and planning of ongoing post-hoc engagement, and seemingly also maintenance. With Embleton Road we saw significant attempts at resident engagement, but following installation no further work and seemingly very little maintenance by the City, leading to the deterioration and apparent disowning of the BGI. At Emersons Green, a very small but committed group of local people are undertaking a limited amount of work. This was initially facilitated and encouraged by SGC, but possibly due to budget constraints the role is no longer occupied. Engagement since has seemingly been dependent on remaining S106 money. With Hanham Hall, organised and willing residents are actively looking to assume management of the BGI, but they are currently struggling to get meaningful engagement from the land-owners and so their hands are somewhat tied. It is likely that these interested residents could benefit from working with SGC's flood risk management, as their priorities at present are focussed solely around the biodiversity.

In concluding, the authors would argue that for as much as community engagement has now made it onto the radar of natural flood risk management works, longer-term efforts at developing and maintaining a sense of site ownership by local people are still not being addressed. This is absolutely fundamental to both the sustainability and performance of these sites, and to realisation of the hoped-for multiple benefits that provide a significant part of the reasoning for choosing a sustainable flood risk management approach over and above traditional grey infrastructure.

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