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The green adaptation-regeneration nexus: innovation or business-as-usual?

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ABSTRACT

There are divergent visions and practices of sustainable urban design in the context of contemporary processes of climate adaptation and infrastructural change. However, the key influences on what trajectory is adopted in different instances have yet to be explored in depth. This article highlights and explores an emerging connection between climate adaptation, sustainable urban design and regeneration or what is termed the 'green adaptation-regeneration nexus'. This is identified as an ambiguous phenomenon which could instantiate more integrated and collaborative models of planning or, alternatively, denote an intensified economic focus. The implications of the green adaptation-urban regeneration nexus are explored through two case studies of combined climate adaptation and regeneration projects in Sheffield and Copenhagen. The key finding is that both projects' institutional setting within pre-existing regeneration planning frameworks has been a key influence in both enabling and constraining community participation. The article's key contribution is to highlight the inadequacy of inherited and often flawed planning frameworks from the perspective of realizing innovative, socially and ecologically sustainable approaches to design in an increasingly important sector of urban planning and design practice.

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1. Introduction

Contemporary ideals of urban development and modernization are characterized by a distinctive combination of urban greening, climate change adaptation and infrastructural change. As described by De Block (2016, p. 368), 'green' and 'ecological infrastructures' feature as 'the object about which new visions [of] urbanization can be assembled'. The expanded scope for adaptation and infrastructure design is particularly well illustrated by the example of New York post-Hurricane Sandy. In the aftermath, a series of exhibitions and competitions were organized which presented a vision of conjoined urban development and climate adaptation along principles of multifunctionality, greening and resilience as illustrated by Bjarke Ingels Group's proposal for the 'Big U', an area of

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raised parkland intended to provide coastal protection, new green spaces and opportunities for regeneration and development (DuPuis & Greenberg, 2019; Fleming, 2017).

However, the widespread embrace of green approaches to climate adaptation obscures the fact that sustainable urban design in this context can originate with different interests and can have widely divergent social and ecological implications (Shokry et al., 2020). On one hand, there is an emerging literature concerned with radical or critical approaches to sustainable design (Chatterton, 2019; Davis, 2018; White, 2019). According to Davis (2018, p. 220), this would require identifying potential synergies between social and ecological agendas, based on 'collaborations between architects, engineers, ecologists and activists'. White (2019, p. 197), in particular, highlights a need for institutional (rather than technical) innovation, referring to the democratization of the design process and 'new configurations of expert-lay relations'. However, in contrast to such radical models, arguably more widespread are what Cohen (2017, p. 143) terms 'luxury ecologies', or marketized enclaves of high-quality sustainable design and infrastructure available to a select few. In such instances, designers arguably function as 'imagineers' (Davis, 2018, p. 220), involved in the greenwashing of market-driven urban development.

This is a recent and evolving field and while some broad trajectories have been identified, there is a lack of in-depth empirical research on the detail of planning and design processes and the influences upon them. In response, the overall aim of this article is to explore what conditions the scope for socially and ecologically sustainable urban design and community participation in this context and, particularly, how this relates to questions of planning and institutional context. This emphasis on planning is of key relevance due to what is termed in this article the 'green adaptation-regeneration nexus' which refers to an emerging tendency to frame green approaches to climate adaptation as questions of urban regeneration. In its clearest manifestation (as in the case studies investigated in this article), this green adaptation-regeneration nexus entails the realization of adaptation projects through existing planning frameworks related to urban regeneration. This is identified as a new discursive and institutional context for climate adaptation and associated practices of sustainable design. The key corresponding objective of the article is to understand whether the green adaptation-regeneration nexus represents an example of the institutional innovation (White, 2019) necessary to provide integrated responses to social and ecological challenges or, alternatively, a further step in the approximation between green adaptation and 'business-as-usual land use planning practices' described by Anguelovski et al. (2016, p. 333).

In terms of the article's structure, Section 2 draws on the urban design and political ecology literatures to set out an understanding of sustainable urban design as 'situated' and embedded in specific institutional, urban and structural contexts. It then explores an emerging connection between green approaches to adaptation, sustainable design and regeneration or what is termed the green adaptation-regeneration nexus. This is identified as an ambiguous phenomenon with the potential to instantiate more integrated and collaborative models of planning or to denote an intensified economic focus. The remainder of the article presents two case studies of green, sustainable stormwater management in Copenhagen and Sheffield, both of which represent instances of green climate adaptation being progressed through pre-existing planning frameworks related to urban regeneration. The key finding of the research is that this formalization, in institutional terms, of the green adaptation-regeneration nexus has important implications for the organization

of the design process through both enabling and constraining community participation. The key contribution of the research is to highlight the inadequacy of inherited and flawed planning frameworks from the perspective of ensuring meaningful community participation in design.

2. The green adaptation – urban regeneration nexus

This article is concerned with practices of sustainable urban design in the context of green approaches to climate adaptation and infrastructure. As previously noted, there are divergent design visions and practices in this setting but, rather than studying these visions in isolation, the understanding of design in this article is that it is a 'situated' process which reflects both the ideals and strategies of designers and other individual actors but also broader institutional and structural pressures and power relations (Cowley et al., 2018; Sunley et al., 2011). In the urban design literature, this issue has been approached through the concept of 'opportunity space' (Carmona et al., 2010, p. 290) which describes how the scope or agency of different actors can be enhanced or constrained by diverse influences including planning and other institutional frameworks which can, for example, require community consultation and potentially enhance the scope for community actors to influence decision-making.

However, what the structural context for green climate adaptation might be has arguably been most fully explored in the urban political ecology and related critical literature on urban greening, which is concerned with exploring the role of social and economic processes in the production of urban landscapes and green spaces (Gandy, 2006). This literature highlights, in particular, the contemporary economic significance of urban greening, including in the context of climate adaptation (Shokry et al., 2020), from the perspective of improving the reputation and symbolic capital of cities, to attract tourists and the creative class and for the purposes of local place branding and increasing property values (Lang & Rothenberg, 2017). According to Gould and Lewis (2018, p. 12), high-profile forms of green resilience planning frequently originate with what they term a 'green growth coalition' referring to 'public officials and private investors who appropriate unrevitalized environmental resources (like the waterfront), restore them, develop them, and repackage them for sale to the sustainability class'. Associated with this, there is evidence that green approaches to adaptation and infrastructure often entail relatively superficial, rather than substantive, improvements to ecological conditions and can have socially inequitable outcomes including through increasing housing costs and consequent displacement, what is termed 'green gentrification' (Anguelovski, Connolly, Garcia-Lamarca, et al., 2018).

Overall, this literature suggests that green approaches are becoming subsumed into business-as-usual approaches to urban development but, as highlighted by Anguelovski, Connolly, Garcia-Lamarca, et al. (2018, p. 1076), there are important remaining research gaps including a lack of understanding of how the relationship between greening and gentrification plays out in different urban contexts and whether there are differences between post-industrial 'recovering' cities (with the authors identifying Sheffield as one example of this category) and those who are more firmly established 'in the global competition for attracting new creative or educated residents' such as, perhaps, Copenhagen (the second empirical case study investigated in this article). Hitherto, research on this topic has also focused on distinct typologies such as private commercial developments

(Gandy, 2010, 2011) or high-profile forms of public sector-led development such as New York post-Hurricane Sandy (Fleming, 2017). As such, there are questions regarding how the convergence of greening and business-as-usual urban development is occurring in more everyday cases.

One important manner whereby climate adaptation and related processes of sustainable urban design are converging with mainstream approaches to urban development relates to an emerging tendency to frame climate adaptation as linked (either explicitly or implicitly) to urban regeneration. For example, UK policy on green infrastructure, which is often linked to adaptation efforts, claims that the advantages include 'regeneration' (Wright, 2011). This is equally the case in recent EU statements on 'nature-based solutions' (European Commission, 2015). An implicit connection between adaptation and regeneration is particularly apparent in the academic and policy literature on climate adaptation and urban water management in Denmark (where the second empirical case study is located). For example, the ongoing 'climate city' project in Middelfart is described as 'urban development through climate adaptation' (The Climate City, 2016) while, according to Hoffmann (2016a, p. 16), the value of new sustainable urban water management techniques being deployed in Denmark relates to the creation of 'greener and more pleasant urban spaces with added benefits such as increased real estate values, increased biodiversity, increasing traffic safety and more recreational opportunities'.

This intersection or nexus of climate adaptation, sustainable design and regeneration is clearly a complex phenomenon with various possible outcomes. Despite its ubiquity, there has been no detailed analysis of its implications. It is possible that there could be positive outcomes given that, as noted by Raco (2005, pp. 333–334), the model of sustainable regeneration in the UK is, in principle, an integrated or 'holistic' approach whereby 'local economic, social, political and environmental problems are tackled simultaneously', based on a 'commitment to engagement and participation by local people'. As such, linking climate adaptation, sustainable design and regeneration could potentially provide the basis for more integrated and locally adapted responses. It could disrupt the tendency towards technocratic, expert-led planning associated with climate adaptation (Gaillard, 2012) by reinforcing the idea that local people should be involved in adaptation planning and have influence over the transformation of their local environment. As such, linking adaptation and regeneration could provide one practical response to the need, identified by White (2019), for new institutional models to ensure stakeholder and community participation in sustainable design and adaptation.

On the other hand, the regeneration literature provides plentiful evidence of obstacles to meaningful community engagement arising from a focus on economic objectives (Robinson et al., 2005). There is also an extensive critical literature on sustainable urban regeneration which highlights a tendency of for economic aspects to prevail over social and environmental dimensions (Evans & Jones, 2008) or, alternatively, for ecological issues to be considered only insofar as they contribute to an economic growth agenda, for example through a focus on densification, liveability, quality of life or improvements to city centre environments linked to attracting tourists (Jonas & While, 2007; While et al., 2004). Further, there is evidence that such market-driven forms of sustainable regeneration have a range of problematic socio-spatial implications including exacerbating issues of affordability and gentrification. As such, there is a clear possibility that a

connection to regeneration could denote a reinforced emphasis on economic development and the further subsuming of adaptation to business-as-usual land use planning.

What is notable here are the parallels between previous analyses of 'sustainable regeneration' and recent critical literature on green adaptation and gentrification, although the latter has not as yet incorporated an analysis of the 'regeneration' dimension. Is regeneration an empty signifier, a more palatable term for gentrification as suggested by Quastel (2009)? Or does regeneration planning, and associated institutional logics and consultation procedures, influence how greening and sustainable urban design play out in different urban contexts and, if so, with what effect? Broadly corresponding to a new institutionalist perspective, the perspective of this article is that the nexus of green adaptation and regeneration is likely to provide a framework of 'shared understandings, norms and practices' (Healey, 2007, p. 64) through which certain approaches to adaptation and design might become 'locked in' (Davies, 2004, p. 571), but that this remains an ambiguous phenomenon which could either lead to pro-growth, market-driven sustainable design or facilitate more integrated and collaborative approaches. What approach is ultimately adopted will therefore likely depend on various factors including the varying models of regeneration in different cities. Drawing on two empirical case studies, the following sections of the article discuss the implications of the nexus, particularly in terms of how this conditions opportunities for community participation.

3. Methodology

The remainder of the article explores two case studies of combined climate adaptation and regeneration projects in Sheffield and Copenhagen. In both instances, climate adaptation and the development of new ecological infrastructures are being progressed through pre-existing planning frameworks related to urban regeneration. The two case studies are 'Grey to Green' a combined sustainable urban drainage (SUDs) and regeneration project in Sheffield, UK, and the ongoing redevelopment of Hans Tavsens Park in Copenhagen, an example of what is termed 'climate adaptation based on urban nature' (KK and SLA, 2016, p. 8) which has been progressed through the city's existing 'integrated urban renewal' ('Områdefornyelse') programme. In both cases, the analysis focuses on the implications of the formal connection between urban adaptation, sustainable design and regeneration and associated models of financing which is achieved in part through attention to the continuities and divergences with previous approaches to sustainable regeneration in each city. The choice of these two cases, that of Sheffield, which is more fiscally constrained and struggling to position itself in inter-urban competition, and that of Copenhagen which has already established itself as a leader in sustainable urban design and green climate adaptation (Roy, 2018), provides for an illustrative juxtaposition and analysis of the role of different regeneration and community engagement practices and urban development contexts in influencing greening and sustainable urban design. The analysis draws on a range of different sources. These include semi-structured qualitative interviews with key project stakeholders including community activists and public and private sector professionals of different disciplinary backgrounds (see Table 1). The analysis also draws on documentary sources and academic literature which are used to

Table 1. Interview participants.

	Sheffield	Copenhagen
Public sector planners	2	3
Landscape architects and other designers	2	7
SUDs specialists and hydraulic engineers	3	3
Other consultants	2	4
Local residents, community activists and other consultees	3	5
Total	12	22

situate the contemporary projects within broader trajectories of sustainable regeneration in each city.

4. 'Grey to Green', Sheffield

'Grey to Green' is a SUDs system located close to the centre of Sheffield which was planned and developed by Sheffield City Council (SCC) and was completed in 2015. In infrastructural terms, it comprises a series of planted basins or 'swales' which capture stormwater from nearby streets during heavy rainfall, allowing some water to infiltrate into the soil while the rest is purified and ultimately led into the River Don. The project is simultaneously the central feature of an urban greening and regeneration initiative and, corresponding to this regeneration focus, follows what was described by interviewees as a 'layered approach' referring to the combination of new stormwater infrastructure with other changes to urban and landscape design such as new public seating, improved cycling and walking facilities and a distinctive 'naturalistic' (Dunnett & Hitchmough, 2004) wildflower planting scheme (see Figures 1 and 2).

It terms of its significance, the project is one of the most extensive urban SUDs 'retrofits' in the UK which refers to the fact that, while small-scale SUDs projects are

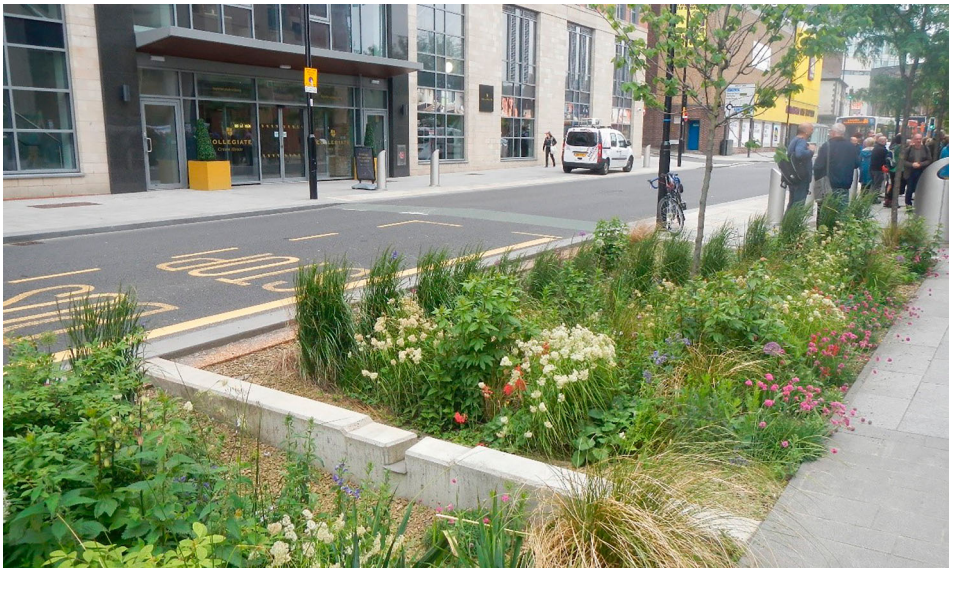

Figure 1. Planted swale on Bridge St., part of Grey to Green (credit: the author).

Figure 2. Wildflower meadow planting and new public seating (credit: the author).

relatively common in greenfield developments, there are fewer examples of large-scale city centre projects (Stovin et al., 2007). It has also been identified in national policy as an example of 'best practice' which could be replicated in other UK cities because its combination of water management with urban and landscape design has created opportunities to access regeneration funding and thus opened up new streams of finance for urban water management (DEFRA, 2016). In addition, Grey to Green is described by Sheffield City Council (SCC, 2014, pp. 4–5) as 'an attractive new linear public space incorporating perennial meadows, sustainable drainage, rain gardens and walking and cycling routes … high-profile and innovative but low maintenance … Sheffield's own take on Manhattan's High Line Park', highlighting, in particular, the global scramble to replicate what has been termed the 'High Line effect', referring to the significant boost for tourism and property values created by that project (Lang & Rothenberg, 2017, p. 1744). This raises a particular question of why and how this example of seemingly innovative design has been realized in Sheffield given an overall context of financial austerity which has led to controversial and widely contested funding cuts for the maintenance of green spaces elsewhere in the city (Rotherham & Flinders, 2019). More generally, it suggests the need to further explore the project's value and implications and how these issues relate to the regeneration focus.

4.1. Policy and urban development context

SCC's (2014, p. 5) own description of Grey to Green situates the project in a broader trajectory of regeneration and urban design in Sheffield, stating that

> [f]or the past 15 years, Sheffield City Centre has experienced a significant transformation … The 'Grey to Green' project uses a similar approach, albeit adapted to an era of scarce resources and greater sustainability … [It] is a key step towards the vision of where the City wants to be over the next 10–15 years.

As such, Grey to Green is perceived as representing both continuity and change in the approach to urban regeneration in Sheffield in response to both ecological and fiscal pressures, specifically the loss of EU funding for which the city previously qualified in the context of de-industrialisation and acute rates of unemployment (Dabinett, 2005).

Further, the 'vision' referenced above alludes to SCC's strategy to restructure the economy and transform the city from a site of post-industrial decline into one of high-value employment in legal, financial and 'creative' industries, which is conceptualized by SCC as a question of urban and landscape design (Dabinett, 2004; Madanipour et al., 2018). The 2013 City Centre Masterplan (SCC, 2013a, p. 12), for example, states that

> Sheffield's economy has significantly transformed over the last two decades … The changes in the city centre over the last 15 years have played a substantial part in that transformation becoming the main focus of the key growth sectors of knowledge, higher education, business services and creative-digital sectors offering an attractive place to work, play and live.

Similarly, according to the Sheffield City Region's economic strategy (SCR, 2014, pp. 29–31), the primary source of funding for Grey to Green, the city centre should become 'a key engine for growth in the wider city region' and a hub for high-value employment in 'innovative and knowledge-intensive sectors'. More specific to Grey to Green, the 2013 masterplan (SCC, 2013a, p. 24) envisaged the area surrounding the scheme as a site of high-value employment in legal and professional services, but its attractiveness for such employers was judged to depend on 'public realm improvements' such as reclaiming road space and improving pedestrian links. These plans were linked to a set of specific 'development opportunities', in particular the site of the former Castle Markets shopping centre, described by SCC (2018, p. 61) as an 'exciting opportunity … to become a distinctive new focus for tech and creative start-up businesses'.

Overall, correspondence with these economic development objectives was the project's key priority. This is reflected in the fact that the project was planned and managed by SCC's Regeneration Division and that funding was secured under the Sheffield City Region's economic development strategy which, according to one regeneration planner, is 'the only game in town' in terms of accessing funding for public-sector regeneration schemes. It is further notable that, in contrast to the importance of these economic development objectives, the connection between the project and the city's climate or flood management policies is much more tenuous. While some research to date has demonstrated the project's success in mitigating urban heat island effects (Lhomme-Duchadeuil, 2018), the benefits of, or indeed the need for, the project from a flood management perspective are unclear given that Sheffield's Flood Risk Management Strategy (SCC, 2013b) notes that stormwater is not one of the primary sources of flood risk in the city or the area surrounding Grey to Green. While this area was affected by serious flooding in 2007 and was, on this basis, identified as a 'flood zone' in SCC's (2014, p. 5) description of the project's rationale, this event was in fact caused by the River Don overtopping its banks rather than by stormwater runoff.

4.2. Opportunistic innovation and new design strategies

While these economic development objectives provide a key aspect of the context for Grey to Green, this does not fully account for the use of SUDs or the naturalistic planting scheme which are not, at least on the surface, direct products of an economic focus (nor are they linked to substantive flood management problems). Exploring these

contingent aspects of the project provides important findings regarding the 'opportunity space' of the designers while, nevertheless, ultimately leading to a diagnosis of a relatively professionalized design process characterized by technical rather than institutional or social innovation. In terms of the origins of the SUDs and the planning, the evidence suggests a significant degree of opportunism as illustrated in quote below from one of the project's designers:

> The origin of the project was regeneration I suppose and then water came in as another layer … I think the origin of the water is that there is a bit of history of water being a part of regeneration in the fountains in the rivers, access to rivers, water being an asset in new development, so there is a bit of SUDs history in the city anyway.

This illustrates that amongst its designers there was a shared understanding that the project's main focus was regeneration but that there were also contingent opportunities for creativity and innovation. More specifically, the project was regarded as an opportunity to replicate and expand an established local model of sustainable regeneration and design which has sought to achieve ecological objectives while also improving access to urban waterways and maximizing the aesthetic and cultural value of water in urban space (Wild et al., 2008). Previous projects in the city were cited during research interviews as influential precedents including Manor Fields park and the more recent Nursery and Matilda Street pocket parks, all of which involved a combination of improvements to flood and water management alongside the creation of new urban green spaces. This continuity with previous examples of sustainable design in Sheffield was attributed to the project's reliance on in-house expertise whereby SCC's own landscape architects and SUDs engineers were its primary designers. One particular example of experimental design highlighted by two interview participants was the use of an impermeable lining to create a wetland habitat in certain sections of the SUDs which they described as driven by an aspiration to provide 'proof of concept', to generate transferable knowledge and as having no financial or economic rationale. As such, despite an overall focus on economic regeneration, the project has created opportunities for experimentation and risk-taking that would not otherwise have been available.

4.3. Regeneration and business-as-usual urban development

However, despite these opportunities for technical innovation, the extent to which any aspect of Grey to Green, including both its material configuration and management of the design process, is unrelated to its financial and economic context should not be overstated. The project can also be understood as following an established model of green regeneration in Sheffield intended to boost competitiveness whereby, according to Wild et al. (2008, p. 3),

> [e]nhancements to public spaces and the restoration of riverside environments have been put at the heart of a broader strategy for stimulating economic growth and social cohesion, driven by the need to … provide a high quality of life for skilled and mobile employees in the global knowledge economy,

thus providing an example of the global phenomenon of cities attempting to attract the 'creative class' through improvements to liveability, greening and resilience (Anguelovski, Connolly, and Brand, 2018).

Notwithstanding this pro-growth model of green regeneration, there are previous examples of sustainable design in Sheffield which have sought to deliver social benefits and been based on community engagement, but the idea of continuity between Grey to Green and such previous examples is arguably misleading. This is illustrated by the contrast between Grey to Green and the aforementioned example of Manor Fields Park, a new urban park in a deprived suburb to the East of the city centre built between 2003 and 2004. The park incorporates a SUDs system to treat surface water from new housing in a series of basins and swales and, according to Kennedy et al. (2007, p. 426), 'offers maximum visual, community and wildlife benefits' associated with new wetland habitats and improvements to biodiversity, water quality and access to recreational amenities. In addition, the design of Manor Fields involved a similar unconventional naturalistic landscape aesthetic to Grey to Green, but this emerged as a response to the local context and previous uses of the site and was seemingly supported by local residents (Tylecote & Dunnett, 2012). The project also involved consultation with residents to understand how its social value could be maximized which resulted in the establishment of a social enterprise to manage the park and SUDs system (Kennedy et al., 2007). According to Bray and Nowell (2005, p. 284), this has meant both 'local employment and ownership and the spreading of an understanding of the scheme'.

In contrast, the social dimension of Grey to Green has been a secondary consideration and, associated with this, the design process did not involve any significant form of community or citizen participation either at the local or urban scale. During the planning process, it was stated that the creation of new green space, despite its location in primarily commercial district, was sufficient proof of its social value due to its proximity to deprived residential areas to the North of Sheffield city centre (SCC, 2015). There was, however, no attempt to consult such hypothetical users of the space regarding their needs or whether development on an alternative site might be more beneficial. In addition, there has also been an absence of debate about the connections between Grey to Green and another controversial development, namely the redevelopment of the nearby Castle Markets shopping centre, which Grey to Green is intended to facilitate through increasing the area's attractiveness for private investment. This has been widely criticized for its replacement of an important social resource, of particular value to residents of adjacent deprived areas, with a tourist attraction and new green amenities (Madanipour et al., 2018). According to Hatherley (2011, p. 86), writing before the building's demolition, 'the thing that unites Castle Market's visitors is that they are all working-class, which does not sit well with Sheffield's intent to make itself as yuppie-friendly as Leeds or central Manchester'. As such, the drive to attract high-value industries, the 'creative class' and tourists, is linked to the loss of important social and cultural resources and the diversion of funding to speculative development projects. At the same time, while clearly detrimental, there are differences between these outcomes and green gentrification in other more 'successful' cities, in the sense that greening in Sheffield has not yet been linked to increasing property prices and displacement.

A further practical example of the exclusion of community actors from decision-making regarding Grey to Green is provided by a conflict over the provision of cycling and walking facilities. This refers to opposition to Grey to Green from a local sustainable transport advocacy group who criticized the project's focus on the creation of green space at the expense of more substantive improvements to cycling and walking infrastructures,

labelling it an example of 'greenwashing' (Cycle Sheffield, 2017). Cycle Sheffield had actively campaigned for changes during the planning process but, according to one member, SCC was unwilling to engage with their criticisms:

> Once the council has decided they're going to do something, they're not particularly interested in what anyone else thinks.

This limited responsiveness to external perspectives can be linked directly to the fiscal context. According to one of the project's planners, the need for improvements to cycling and walking infrastructures was recognized but would have led to a reduction in the extent of planted swales and new green space, which was a key component of the project from a regeneration perspective and whose loss would have put the availability of funding at risk. Overall, this illustrates a high level of continuity with the expert-led model of regeneration described by Madanipour et al. (2018, p. 477) whereby 'the views of Sheffielders have been to a large extent absent from the debate' and the barriers created by, in institutional terms, subsuming the delivery of greening, resilience strategies and infrastructure, whether transport or SUDs, within existing planning frameworks which have been proven to adopt a technocratic approach and to prioritize economic development to the exclusion of social and ecological objectives. In more general terms, the following quote from a Sheffield City Region officer describes the project's significance from the funding agency's perspective:

> The Grey to Green project was really just a public realm scheme that made an area more attractive. In terms of the sustainable side, whilst that's nice to have we don't have any scoring criteria that looks at that. It's irrelevant what we're funding if you like.

This refers to the fact that the expected regeneration benefits, specifically commercial office development and job creation, were the sole rationale for funding being made available and an emphasis on 'sustainability' was possible insofar as it complemented or at least did not actively detract from these strategic objectives. Associated with this, while the project has created opportunities for innovation, this has been limited to technical experimentation rather than attempts to maximize the social value of SUDs. Overall, the existence of a common understanding of the project's objectives as economic regeneration accounts for the professionalized character of the design process.

5. Hans Tavsens Park, Copenhagen

The second case study is the redevelopment of Hans Tavsens Park in Copenhagen, a combined urban water management and regeneration project. This project, which is currently in the mid-stages of planning and design, involves the reconfiguration of an existing urban park and surrounding streets to manage stormwater during periods of heavy rainfall. This corresponds to a vision set out in the city's Climate Adaptation (Københavns Kommune [KK], 2011) and Cloudburst Management (KK, 2012a) strategies of 'climate adaptation based on urban nature' (KK and SLA, 2016, p. 8) involving the use of new and existing green spaces to store and infiltrate water into the soil rather than the expansion of underground stormdrains. The Cloudburst Management Plan (KK, 2012a) proposes the construction of up to 300 new stormwater management projects over the next twenty years

and has therefore been recognized as having enormous implications for urban development and public spaces. For example, according to one local government planner:

> The way that Copenhagen will be developing in the next 20 years will be through these projects

In terms of its implications, the new model of stormwater management has been widely identified as offering important opportunities for improvements to urban design through the creation of new 'blue and green oases' (KK, 2012a, p. 2). This vision of combined climate adaptation, infrastructural change and greening is reflected in the case of Hans Tavsens Park where major changes to urban and landscape design have been proposed, including water features, community managed green spaces and a naturalistic landscape aesthetic described as 'wild urban nature' (KK and SLA, 2016, p. 141). These proposals are the work of landscape architectural consultants SLA Landscape who were recruited following a major international design competition called the Nordic Built Cities Challenge. The present configuration and proposed future landscape of Hans Tavsens Park are illustrated in Figures 3 and 4.

Hitherto, the plans for Hans Tavsens Park have been positively reviewed by Peters (2017, p. 25) for their aesthetic value and by Kortesoja et al. (2018) for their supposed responsiveness to community demands. They are, however, more critically assessed by Tubridy (forthcoming) as underpinned by entrepreneurial logics which function as an impetus towards new forms of spectacular green, resilient infrastructure. As documented in that study, the plans include new above-ground water features which, contrary to their representation, would have negligible technical and ecological benefits, requiring, for example, an underground pumping system to keep them permanently water-filled which would mean significant additional energy consumption and financial costs. Further, this can be linked to aspirations to rebrand the area surrounding Hans Tavsens Park as green and attractive and bring in new middle-class residents. However, in contrast to that study, the analysis

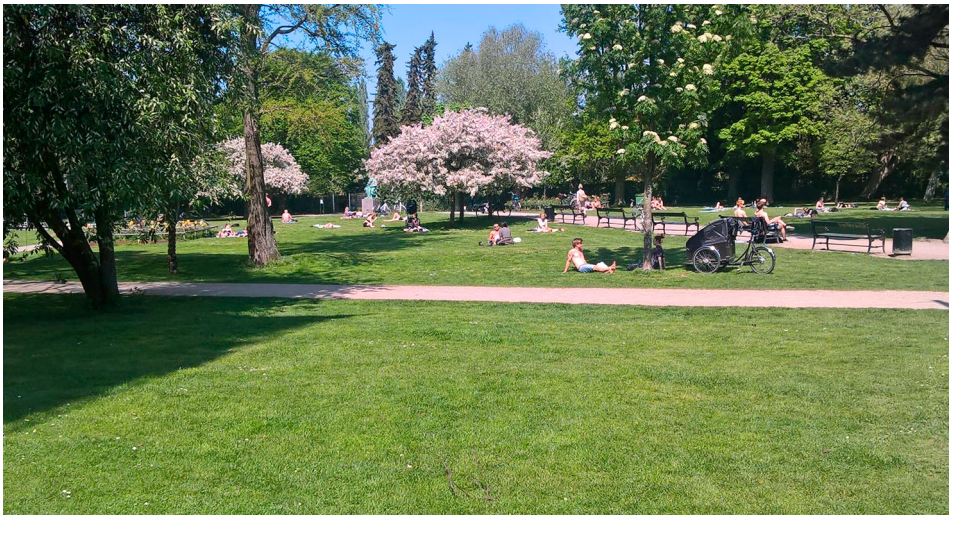

Figure 3. Present day landscape of Hans Tavsens Park (credit: the author).

Figure 4. Designers' visualization of spectacular green, resilient infrastructure ©The Soul of Nørrebro by SLA. Image by SLA / Beauty and the Bit.

here focuses on the more specific issue of the constraints and opportunities arising from the project's management through Copenhagen's regeneration planning framework.

5.1. The green adaptation – urban regeneration nexus in Copenhagen

Linked to the identification of opportunities for urban design and greening, there is an emerging formal interdependency in Copenhagen between practices of stormwater design and those related to urban regeneration. This refers to the fact that significant projects within the stormwater plan including Hans Tavsens Park and Tåsinge Square, another recently completed project in Østerbro, have been coordinated and managed through the city's pre-existing 'integrated urban renewal' ('Områdefornyelse') programme. This programme has, under different names, been an established feature of urban development policy in Copenhagen since 1996. It operates primarily in disadvantaged areas of the city with the objectives of 'promot[ing] development in local areas encompassing physical, social, cultural and environmental aspects' (KK, 2012b, p. 4).

Further, this institutional context has important consequences; as highlighted by several interview participants, rather than an urban regeneration agency simply implementing a pre-defined stormwater management programme, both adaptation and regeneration practices are being transformed through the process of implementation. This dialectical relationship was described as follows by a local regeneration planner involved in the Hans Tavsens Park project:

> The macro thing here, that's climate change adaptation. You will see in this case how an urban regeneration project is transformed in that macro movement but also transforming it.

In practical terms, the implications of the interdependency between adaptation and regeneration include the creation of opportunities to leverage funding from different sources through what is termed the 'co-financing' system whereby funding from the water

utility for infrastructural upgrades can be aggregated with that available from the local government for urban design and regeneration (Leonardsen, 2012). A full discussion of this system is beyond the scope of this article, but this does highlight an important feature of both case studies, namely that the green adaptation-regeneration nexus is in part a response to the common challenge of finding means of funding green approaches to adaptation (e.g. Droste et al., 2017). A further important implication of the interdependency between infrastructure and regeneration, upon which the remainder of the analysis is focused, is that it has both enabled and constrained the scope for community engagement in the design process.

5.2. Institutional context and community engagement

In general terms, the overall vision of stormwater design in Copenhagen promotes the active participation of citizens in stormwater design following a 'co-creation' model (KK and SLA, 2016). This is typically described as an outcome of the new model of stormwater management and greening because the increasingly direct implications of decisions regarding stormwater management for urban spaces have been taken to require participation by residents and others affected by such changes (Hoffmann, 2016b). However, rather than wholly the result of the new stormwater management paradigm, the model of 'co-creation' can also be understood as representing the extension to a new field of established approaches to community engagement associated with the city's existing regeneration programme. For example, according to one local government policy-maker:

> We have a high degree of community engagement wherever we do projects in the city.

This quote highlights that the model of co-creation builds on established institutional practices of community engagement within urban regeneration projects. This refers to what Larsen and Hansen (2008, p. 2437) term an 'inclusive planning approach' which originated in response to major opposition to 'whole-sale, top-down' slum clearance programmes in the late 1980s. Practical features of this 'inclusive' approach include the constitution of 'project groups' of stakeholders who represent local interests and the establishment of a local secretariat and office in the areas undergoing regeneration to facilitate exchanges between communities and professionals (Larsen & Hansen, 2008; Savini, 2011).

Significantly, despite being rebranded a 'co-creation' process, this was also the basic structure for community engagement in the case of Hans Tavsens Park (as well as that of Tåsinge Square). A project group of local residents and activists was established and this group contributed to developing the design brief and had a definite, albeit limited, role in selecting the lead design consultants. These measures originated with the local regeneration plan which, prior to the establishment of a consultation process for stormwater design, had already set out a framework for community engagement to be followed across all local regeneration initiatives, including the stormwater sub-project (ON, 2014). This is not intended simply as a critique because, amongst interview participants, the approach to community engagement was generally regarded as, in principle, an improvement on conventional, technocratic models of infrastructure planning. Rather, highlighting this continuity in approaches to community engagement is important because it demonstrates that the active participation of community actors in stormwater design in

Copenhagen has not emerged in isolation but rather has only been possible due to pre-existing cultural and institutional structures.

However, this continuity does have negative as well as positive implications because it introduces the possibility to continue to apply superficial approaches to community engagement. This refers to the fact that, within the Hans Tavsens Park case study, there have been important constraints on the scope for community actors to influence decision-making some of which can be linked to the continuity with established (and flawed) approaches to engaging communities in regeneration initiatives in Copenhagen. In general terms, previous literature on urban regeneration in Copenhagen highlights that this has often been oriented towards place branding and increasing the desirability of disadvantaged areas for property investors and middle-class residents rather than substantive attempts to address socio-spatial problems (Larsen, 2013; Larsen & Hansen, 2008; Savini, 2011), (although Agger & Jensen [2015] provide a less critical perspective). It has further been argued that, in this context, processes of community engagement function to defuse opposition and provide the appearance, rather than reality, of attending to the priorities of existing residents (Larsen & Hansen, 2008). Related to this, Larsen (2013, p. 401) identifies a tendency to develop and trial new governance processes, such as new approaches to community engagement, which are unaccompanied by substantive change in the focus on branding and thus provide an example of what the author terms 'innovation in vain'.

These critiques continue to apply in the context of Hans Tavsens Park where entrepreneurial logics related to local place-branding and to positioning Copenhagen as a global leader in green climate adaptation have resulted in aspirations to realize high-profile, landmark forms of urban greening contrary to the demands of residents and community activists and, despite the co-creation model, the scope for these groups to influence decision-making has not been significantly enhanced in the face of such structural pressures. One particular example is that of the judging process for the Nordic Built Cities Competition, described by the local authority as a key example of the role of 'local power' in the design process (KK, 2016).[1] However, in reality, there were only two community representatives included in a jury of nine members (ON, 2016) and, according to those residents and community members involved in the consultation process, their views regarding the best competition entry were not taken into account due to countervailing fiscal and competitive pressures:

> They have their professional interests … They said yeah but because of this and that, it has to be this project.

These pressures and issues are, to some extent, particular to the current economic significance of greening, resilience and climate adaptation, which has been reflected in an emphasis on high-profile forms of greening. For a full analysis of the design and planning process for Hans Tavsens Park, the role of entrepreneurial logics therein and its connections to a process of 'green gentrification', see Tubridy (forthcoming). Notably, that study highlights that the co-creation process has primarily engaged middle-class residents, an issue which has also been highlighted in previous research on community engagement in urban regeneration in Copenhagen (Agger & Larsen, 2009). This reflects a common tendency for more powerful sectors of the community to exert most influence in the context of inclusive planning processes. However, for the purposes of this analysis, the key point is that the broader dynamic remains one of place-branding and that this has

been a barrier to meaningful community participation. There are, thus, clear parallels with previous superficial practices of community engagement in regeneration in Copenhagen and, from this perspective, the adoption of the co-creation concept arguably represents a further iteration of the 'innovation in vain' diagnosed by Larsen (2013).

6. Discussion and conclusions

There are many ways in which sustainable urban design and greening can be approached in the context of climate adaptation. While different models and trajectories have been identified, there are significant knowledge gaps regarding the role of institutional and structural pressures in determining what approach is adopted in different urban contexts. This article began by identifying one potential influence, namely the emerging discursive and institutional connections between processes of urban climate adaptation, sustainable design and regeneration. A corresponding research objective was to explore the implications of this green adaptation-urban regeneration nexus, specifically whether it represents a productive form of 'institutional innovation' or a formalization of the connection between urban climate adaptation and a business-as-usual approach to urban development.

The key finding is of a new tendency to deliver new climate adaptation projects through existing regeneration planning frameworks. This represents a formalization of the idea that green approaches to climate adaptation and infrastructure can be leveraged to address contingent social and economic urban development objectives. This formal interdependency between infrastructure and regeneration has important implications because planning frameworks related to urban regeneration impose 'shared understandings, norms and practices' (Healey, 2007, p. 64) and are a key influence on the 'opportunity space' (Carmona et al., 2010, p. 290) or scope for sustainable urban design. In both empirical case studies the approach to design represents the product of interactions between new ideals and demands related to climate adaptation and urban greening and established place-based practices of urban regeneration, including the sources and rules regarding investment which they impose and particular practices of community engagement (or a lack thereof). In the case of Sheffield, the fiscal context and necessity to seek funding through the city-regional planning framework resulted in the key focus being economic development and this has precluded any meaningful participation on the part of citizens. In contrast, the different regeneration context in Copenhagen has enabled broader community participation albeit constrained by an (equally characteristic) overemphasis on place-branding and superficial physical improvements to the built environment.

In conceptual terms, the research has further developed on the emerging critical literature on green climate adaptation and sustainable design (Anguelovski, Connolly, Garcia-Lamarca, et al., 2018; Fleming, 2019; White, 2019) by identifying key influences on which of the different approaches is adopted in a given context. It has identified one important way in which climate adaptation efforts can be situated, specifically in particular urban institutional practices related to regeneration. This highlights that understanding variations between green climate adaptation efforts in different places requires attention to their histories and contemporary realities of urban regeneration or, more generally, the role of place in shaping approaches to urban climate adaptation and

sustainable urban design. Related to this, a key contribution of the research is to highlight the inadequacy of existing institutional and fiscal frameworks from the perspective of ensuring community engagement in planning and design in this context. It has shown that the alignment of regeneration and climate adaptation represents the continuation of a business-as-usual approach. There is, consequently, an urgent need to reimagine the organization of the design process to engage the collective social imagination and leverage ongoing transformations of urban spaces associated with climate adaptation in the interests of people and places.

Note

1. 'Det er en opgave, der har krævet stort lokalt kendskab, og hvor det lokale greb samtidig har et globalt potentiale' (author's translation).

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