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Can green city branding support China's Sponge City Programme?

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ABSTRACT

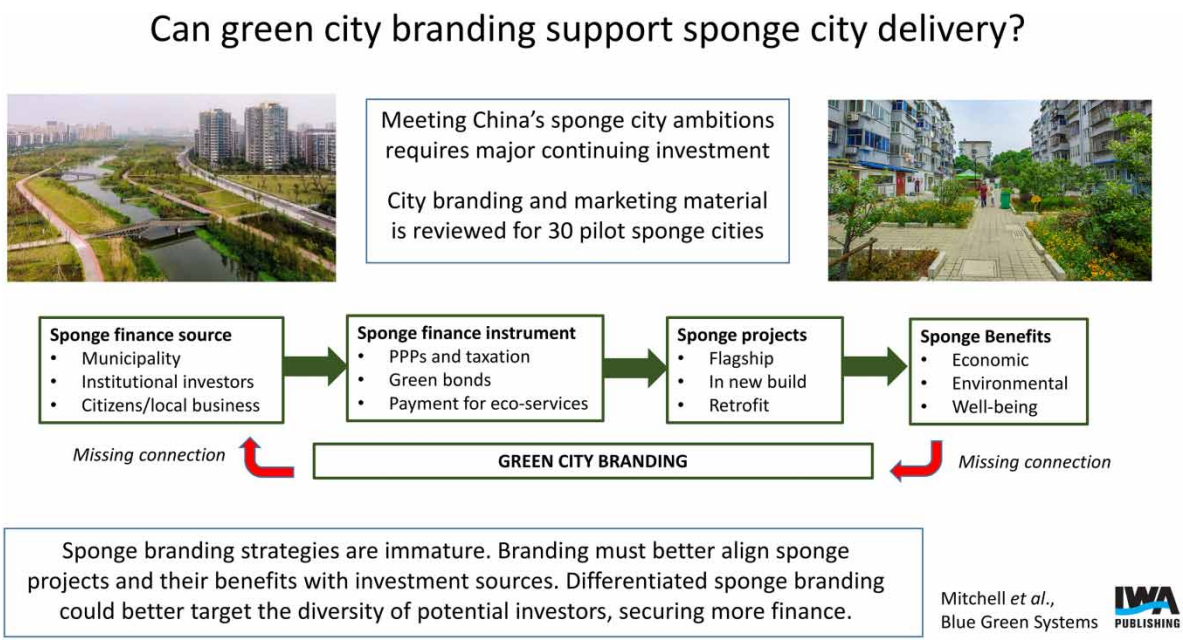
China's Sponge City Programme (SCP) is one of the world's most ambitious sustainable urban drainage programmes. By 2030, Chinese cities must have 80% of their land drained by Blue–Green Infrastructure (BGI) to build critically needed flood resilience. Costs must be met from municipal and private finance, but BGI lacks the revenue streams of public assets like utilities, so has limited appeal to public–private partnerships. Finance options, including Green Bonds targeting institutional investors, and Payment for Urban Ecosystem Service schemes targeting local citizens and businesses, need developing. Green city branding could lever such finance but despite widespread use of green branding to attract investment, sponge branding strategies are immature, and alignment is needed in green branding between sponge project type (e.g., flagship and retrofit), financial instrument, and target financier, to develop differentiated brands that appeal to a diversity of SCP investors. With little grassroots input into city branding, and SCP problems of green gentrification, local support for SCP implementation may be at risk. This is concerning, because cities need local citizens and businesses to invest in the SCP to achieve the extensive retrofit needed, as retrofit (using small-scale BGI such as stormwater planters, de-paving, and raingardens) has little appeal for institutional investors.

Key words: Blue–Green Infrastructure, city branding, Payment for Ecosystem Services, sustainable drainage, urban competitiveness

HIGHLIGHTS

- The SCP is critical to climate adaptation of Chinese cities.
- Major investment is needed to deliver the necessary BGI.
- Green city branding exploiting Sponge City BGI in 30 cities is reviewed.
- To secure finance, city branding and financial instruments must be better aligned.

GRAPHICAL ABSTRACT



1. INTRODUCTION

China has experienced rapid development in recent decades (Fang & Yu 2016) with unprecedented urbanisation characterised by degraded urban ecosystems and serious environmental problems that threaten human wellbeing (Kabisch *et al.* 2017; Lyu *et al.* 2018). Blue–Green Infrastructure (BGI) is a proven solution to mitigate some of these impacts and has a key role to play in adapting cities to climate change and the extreme weather it brings (Ghofrani *et al.* 2017; Li *et al.* 2020). BGI development places natural and semi-natural components that are 'blue' (e.g., rivers, streams, ponds, and wetlands) and 'green' (e.g., green roofs, raingardens, and parks) within and around urban areas. These provide ecosystem services, build resilient urban ecosystems, and contribute to the health and quality of life of local people (Hamin *et al.* 2019; Yang *et al.* 2020a). Recognising these benefits, China's central government has actively promoted a BGI-based 'Sponge City Programme' (SCP) since 2013.

The SCP seeks to integrate BGI with conventional 'grey' drainage infrastructure to lower the risk of pluvial flooding, purify stormwater for subsequent beneficial use, and provide new public spaces to connect communities with nature (Chan *et al.* 2018a). BGI projects have been implemented in 30 pilot cities prior to extending the practice more widely (Zhang *et al.* 2019). Better urban water management is the purpose of the SCP, but 'Sponge City' (SC) also has potential to function as a green city brand, attracting investment, businesses and labour, as well as domestic and international tourists (Chan *et al.* 2015), and thus foster a city's regional and international competitiveness. In turn, an effective green brand could act to support further investment in BGI.

Drawing on the field of commercial marketing (Pike & Page 2014), city branding and the broader concept of place branding have attracted considerable academic and policy interest (Dinnie 2011; Lu & de Jong 2019). City branding exploits a city's characteristics to form a positive identity that differentiates the city from others, allowing it to jostle for greater recognition and gain a competitive advantage (Vanolo 2008; Acuti *et al.* 2019). Municipalities use city branding as a strategic tool to build and improve their image and reputation (Anttiroiko 2015; Biösen *et al.* 2018; Ma *et al.* 2021). This includes Chinese cities where branding is used to maintain the impetus for urban development (Ye & Björner 2018; Lu & de Jong 2019). Urban parks and green spaces feature strongly in some city branding strategies (Gulsrud *et al.* 2013), recognising that abundant high-quality green space enhances place and attracts people (Braiterman 2011; Björner 2013). For example, Guangzhou, provincial capital of Guangdong, developed its 'Flower City' brand to exploit its traditional green culture and build an identity as an ecologically competitive city (Zhengbo 2011; Ma *et al.* 2021).

Much less attention has been paid to blue spaces and particularly interconnected BGI in city branding. In this context, the SCP 'Sponge City' is distinctive and represents a new city brand name, despite originating in central

government policy. It differentiates itself from existing Chinese green brands (e.g., 'Eco-City', 'Garden City', and 'Forest City') that emphasise the attractions of green infrastructure and also highlights the integration of blue and green spaces in enhancing urban liveability, resilience, and sustainability. The SC is a manifestation of how China's industry-oriented urbanisation is transitioning towards 'Ecological Civilisation' (EC) (*Shengtai wenming,* 生态文明 *in Chinese*), a paradigm recently embedded in the national constitution that promotes a Chinese vision of a sustainable society (Geall & Ely 2018; Hansen *et al.* 2018). Central to this vision, the SC reflects how nature-based solutions can be used to address urban environmental problems by constructing ecologically advanced, modern, and beautiful cities without compromising economic goals (Pow 2018; Oral *et al.* 2021).

This paper examines the relationship between the SCP and green city branding, which could be instrumental in supporting the delivery of the SCP, and hence the wider EC paradigm. We first review the origins of the SCP and its implementation to date, and outline the financial challenge of delivery now that the pilot phase, and its central government grant support, has concluded. A survey of SC identity in the branding activity of the SCP pilot cities is explored, followed by a discussion of BGI financing and the role of green city branding. Finally, we raise questions exposed by green city branding, addressing social equity, and the extent to which green city branding can simultaneously support both the environmental objectives of the SCP and those of urban competitiveness and growth.

2. CHINA'S URBANISATION, ECO-DEVELOPMENT, AND SCP

2.1. Grey to green urbanisation

Following its 'Open Door Policy' of 1978, China began a period of unprecedented urbanisation (Taylor 2015; Feng *et al.* 2019), with many cities developing at a pace not seen since the European Industrial Revolution. There are now 130 cities of over 1 million people, and the national urban population increased from 17.9% in 1978 to 60.6% in 2019 and is expected to reach 70% in 2030 (Yu *et al.* 2018). Cities developed as dense high-rise agglomerations centred on congested business districts and where industrial premises have dominated (Yang *et al.* 2010; Guan *et al.* 2018). Economic growth was the main goal, and while growth was rapid and transformative, environmental and quality of life issues were marginalised (Ng 2002; Li *et al.* 2017; Shao *et al.* 2020). Urbanisation was characterised by escalating energy use, habitat loss, biodiversity decline, gross air pollution, exacerbation of urban heat island effects, and serious hydrological problems (Guan *et al.* 2018; Wang 2018).

These environmental problems are limiting the ability of many Chinese cities to compete with their peers in attracting investors, businesses, talented labour, and tourist revenue (Han *et al.* 2018; Ma *et al.* 2021). The problems extend to major financial and innovation centres like Shanghai and Shenzhen, key parts of the national Belt and Road Initiative intended to attract international investment (Wong *et al.* 2016; Chan *et al.* 2020). Potential investors express concern over environmental deterioration, fearing that it reduces city attractiveness resulting in a loss of competitiveness against regional cities such as Hong Kong, Singapore, Seoul, and Tokyo (Li *et al.* 2019; Luo & Shen 2012). Swiss Re (2009) judge that flood and climate change will further severely limit future investment in Chinese (and other Asian) cities and predicts shortfalls in investment due to rising flood risk, insufficient flood risk mitigation, and lack of access to flood insurance. Lamond *et al.* (2019) report that flood insurance is unpopular in most Chinese cities or simply unavailable, whereas both residences and small- and medium-sized enterprises lack access to financial support needed in the event of flood emergencies.

Environmental pressures, especially those relating to floods, were recognised as adversely impacting development objectives, as represented in regional and local master plans to 2030, and outline strategies to the 2050s. The central government, therefore, sought to introduce measures tackling urban flooding. This was approached through the Ecological Civilisation concept discussed at the 2013 National Congress, and written into the national constitution following President Xi Jinping's address to the 2017 National Congress (Kuhn 2019). In this address, Xi signalled a commitment to a green, low-carbon circular economy, something that many environmentalists in the West would like to see from their national leaders, as well as major initiatives on afforestation, and wetland conservation and restoration.

The EC concept draws on traditional philosophies (particularly Daoist, Confucian, and Buddhist) where adherents recognise the purpose of life is to seek harmony with nature, to which people are intrinsically connected (Freya & Guo 2011). The EC aims for a symbiosis of society and nature, and is presented as an alternative path to liberal environmentalism where development takes precedence if the costs of environmental protection are too high. The EC vision represents the 'Sinification' of sustainable development, such that China's

environmental policies are not solely a response to external international pressure but build upon domestic culture and tradition. It is debatable whether this 'environmentalism with Chinese characteristics' is just another form of greenwash or a serious attempt to reorient China to ecological living. However, what is evident, is that attempts to harmonise environmental and commercial interests have led to competition among municipalities to be brand ambassadors for the EC concept, so as to realise commercial value. For example, Li Jun, the former mayor of Guiyang, capital of Guizhou province, observed that: 'the positioning of the city as an Ecological Civilization City correlates with 5 years of the city's fastest economic growth in the past six decades' (Wang-Kaeding 2018, no page).

2.2. The SCP

Chinese urbanisation has been accompanied by much transformation of blue and green space into residential and commercial development (Ren *et al.* 2018). For example, 26.3% of blue–green spaces (wetlands and vegetated areas) in the Shenzhen River catchment were lost between 1988 and 2008 to the construction of financial centres and transport hubs (Xie & Ng 2013). The associated surface sealing generates pluvial flooding, diffuse water pollution, and loss of groundwater recharge, the latter being significant as many Chinese cities lack adequate dry season water storage (Zhang *et al.* 2011; Yang *et al.* 2020b). Flood protection infrastructure is minimal, and most Chinese cities, including critical city centre and old town areas, have drainage systems designed to cope only with 1-in-1-year to 1-in-5-year flood return periods compared with the (still modest) 1-in-50 year protection standard of Hong Kong and Singapore (Zhang *et al.* 2011; Yang *et al.* 2020b). Storm events are more intense and frequent with climate change, and in the last decade, urban floods (e.g., Beijing in 2012, Shanghai in 2013, Ningbo in 2013, Shenzhen in 2014 and 2018, and Wuhan in 2016) have caused personal injuries, home and workplace damage, and inundation of road and rail networks with substantial disruption to economic and social activities (Chan *et al.* 2018b; Liu *et al.* 2018). Furthermore, despite the rich legacy of China's river-based cities (many were founded on riverbanks), urban rivers themselves have progressively disappeared during successive waves of development (Shannon & Chen 2013). Many became hard-engineered structures, channelised and/or covered to serve as foul and stormwater sewers (Chen *et al.* 2018; Cai *et al.* 2019). Boats and ships, much river-based recreation, and the everyday commotion of living with rivers disappeared (Shannon & Chen 2013).

In response to development pressures, the construction and preservation of urban green spaces, and recently urban river restoration, have become integral to China's urban landscape planning and governance. As early as the late 1980s, urban green spaces were referred to as 'the face of the city' (Li 1987), a Chinese metaphor emphasising the external appearance reflecting a city's social and economic status, and probably an early impulse of city branding. City brand names were established to convey positive city images drawing on this green infrastructure. Cities could brand themselves as a National Garden City (Shi *et al.* 2018), a National Eco-City (Chang *et al.* 2016), or a National Forest City (Thadani *et al.* 2020; Zhang *et al.* 2021). These brands align with national development programmes and campaigns (Lu & de Jong 2019), and share a strong state-led characteristic (Ye & Björner 2018), but lack sufficient uniqueness to distinguish themselves from their peers.

The city brand that is most focused on hydrological issues, and aligned with the EC concept, is the SC. This concept developed from earlier ones of 'Green-sponge', 'Eco-sponge', and 'City in sponge' (Xia *et al.* 2017). The 'sponge' idea arises as the aim is to absorb urban stormwater, cleanse it, and retain it for later reuse, thus addressing urban flood and drought in an ecologically friendly manner (Chan *et al.* 2018a, 2018b; Tang *et al.* 2018). This is achieved using a range of nature-based drainage infrastructure, including vegetated roofs and walls, raingardens, swales, ponds, artificial wetlands, as well as river restoration and urban forestry (Xia *et al.* 2017; Griffiths *et al.* 2020). The approach has much in common with those that have emerged elsewhere, including Low Impact Development (North America and New Zealand), Water Sensitive Urban Design (Australia and Europe), Sustainable Drainage Systems (UK), Best Management Practice (North America and Europe), BGI (USA), and is part of the wider move to Nature-Based Solutions. Fletcher *et al.* (2015) review the historical development of these similar practices and note how the varied terminology not only reflects the local understanding of drainage practice, but also how in setting a vision for a more sustainable approach, terminology drives local practice. While the approach of the SCP has much in common with those elsewhere, its scale is very much greater, and its pilot phase alone has an unrivalled degree of ambition in terms of the extent of sustainable drainage implementation.

To promote SCP uptake and BGI construction, 30 cities across China were selected by central government as pilot cities for experimentation and demonstrating SCP/BGI effectiveness. Lower levels of government were incentivised to adopt sponge measures through basic laws and regulations relating to BGI infrastructure, by outlining compulsory standards and targets, and by providing technical guidance, direct funding and opportunity for peer-to-peer learning across cities (Oates *et al.* 2020). The pilot cities (Figure 1) represent climatic zones (addressing geographically diverse annual rainfall), topographical features (coastal flood prone areas, valleys, continental floodplains, and lowlands), and population size (Griffiths *et al.* 2020). The government encouraged each city to collect and reuse 60–85% of annual urban runoff from 1-in-30 years return period rainstorms. This gives an ability to withstand small to medium rainstorms, but not intensive storms typical of the typhoons and summer low-pressure rainstorms that occur in Southern China (Yang *et al.* 2020a). Subsequently, the central government published official 'Sponge City Construction Guidelines' (MHURC 2014). These required SCP cities to design urban drainage infrastructure with capacity to store excess water and to cope with extreme wet season/typhoon rainfall events across China's climatic zones. Pilot areas had to be over 1.5 km^2 where annual average rainfall exceeds 400 mm (Xia *et al.* 2017). By 2030, 80% of the area of a SC should absorb 70% of the rainwater that falls on it. To meet this goal, sponge 'construction is required in new city districts, industrial parks and development zones, while the construction of old city areas will be coordinated with renovation of shantytowns, dilapidated buildings and old communities' (State Council of PRC 2015).

Ningbo (# 21 in Figure 1) is one of the world's most vulnerable cities to flooding (Hallegatte *et al.* 2013), due to the risk of coastal inundation, river rise and pluvial flood arising from intensive rainstorms and typhoons characteristic of the eastern seaboard (Griffiths *et al.* 2017, 2020). Urban development from the early 20th century, particularly from the 1980s, led to the disappearance of its historic canal system and many riparian green spaces. The city's low-lying floodplains are now particularly at risk as storm surges reduce capacities of surface water drainage channels when needed most (Griffiths *et al.* 2017), whereas the engineered urban drainage system was designed to cope with, at best, a 1-in-5-year rainfall event (Chan *et al.* 2012). Recognising that pumps and hard-engineered infrastructure lacked the capacity to

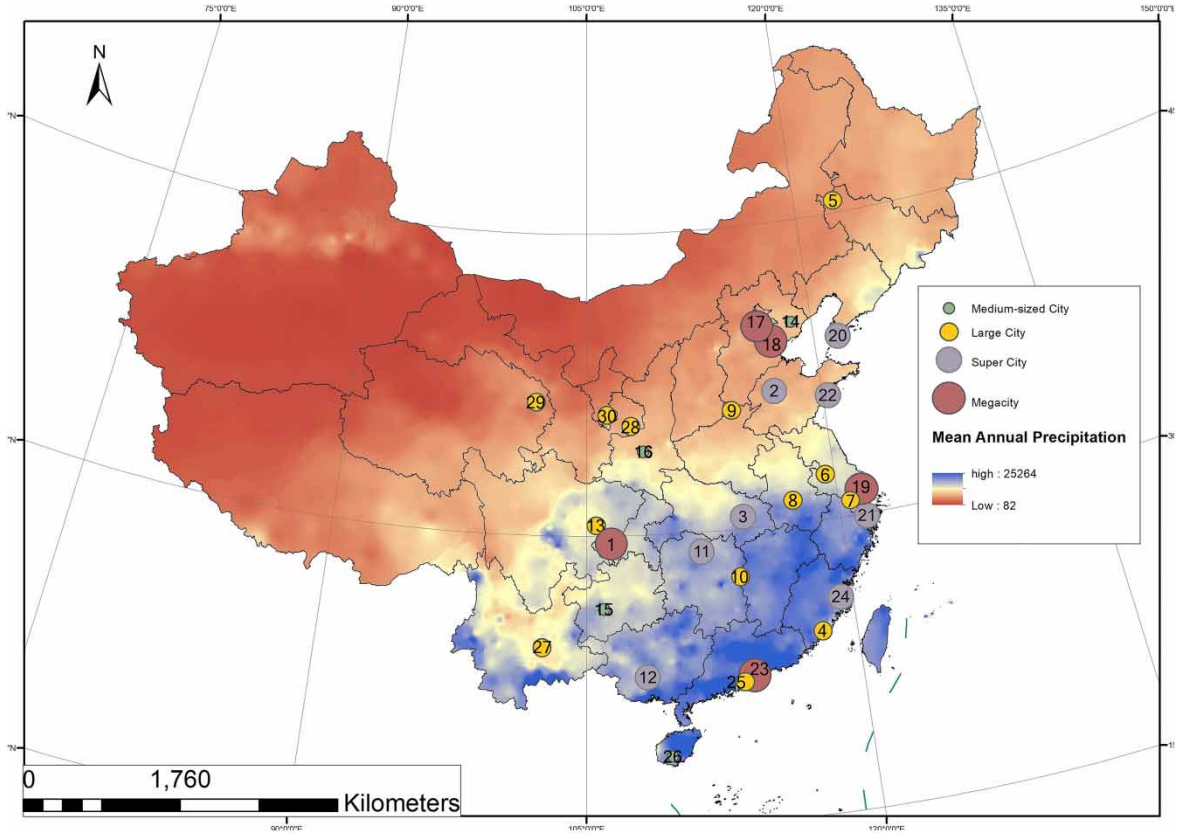


Figure 1 | Distribution of mean annual precipitation in China and location of the 30 SCP pilot cities. City numbers match names in Table 1. Megacity has >10 M people, Super City is 5–10 M, Large City is 1–5 M, and Medium-sized City is 0.1–1 M (Source: National Bureau of Statistics of China 2021).

reduce water levels quickly enough to prevent the extent of surface water flooding experienced in 2013, the municipality aligned itself to the World Bank's 'Climate Resilient Cities' programme, and subsequently enrolled in the SCP.

Today Ningbo is recognised as a leading SC, following 1.8 billion RMB (US$ 0.28 billion) investment in BGI from 2015 to 2018 (Tang *et al.* 2018). Cicheng Town in the Jiangbei District developed rainwater infiltration sites, bio-swales, stormwater storage ponds, and artificial wetlands (Figure 2), and the 'New East Town' development area introduced parkland to meet drainage, landscape, and ecological objectives. This includes a 3.3 km by 200–400 m wide 'Eco-corridor', with extensive open water and green space (Figure 3), and wetland vegetation that removes 30–40% of urban diffuse pollution in the corridor (Tang *et al.* 2018). As a result, the city drainage system was upgraded to handle 1 in 30-year rainstorms (30 mm within an hour; 189 mm within 24 h), a higher flood protection standard than many other Chinese cities (Yu *et al.* 2015). The SCP's BGI also delivers habitat and amenity value. Such practices led to Ningbo brand itself as 'The champion of urban water management' building on an earlier image of 'Historical water city' (Tang *et al.* 2018).

China's engineered urban water management dates to the Tang Dynasty (618–907 AD), and its large-scale construction of canals, extraction of groundwater and building of dams, and water storage tanks. This approach has dominated until very recently, with Cheng (2005) reporting that 97,000 dams and reservoirs were built in the decade after World War II alone to provide urban water resources, hydroelectric power, and flood control. Under the umbrella of the EC concept, the SCP thus represents a radical departure from this pervasive hard-engineered water management practice. It uses BGI to address conventional urban water management goals of flood protection, water purification, and groundwater recharge. Sponge infrastructure is not a solution to the most extreme rain events (of the type seen in Henan province in 2021), but is able to reduce the impact that would otherwise occur, and to eliminate those arising from the more frequent smaller events. Sponge BGI also delivers co-benefits of carbon sequestration and air pollutant removal, and provision of habitat, amenity, recreational and cultural services (Sun *et al.* 2019). As such, it is valued for its role in promoting public health and wellbeing, an aspect that has been drawn upon to convey a positive city image ('Healthy City') in city branding and marketing (Ng *et al.* 2011; Li *et al.* 2020; Thadani *et al.* 2020).

3. SC BRANDING

3.1. Green city branding

The SCP is large and has potential to play a role in city branding. The purpose of city branding is to differentiate cities from their regional, national, and international competitors based on strengths and competitive advantages,

Figure 2 | SCP infrastructure in Jiangbei District, Ningbo. Bio-swale (left) and artificial wetland (right) (Source: Authors).

Figure 3 | The Ningbo Eco-Corridor (Source: NET, Ningbo Government, with permission).

so as to attract investment and social capital. City branding is distinct from city marketing in that it seeks to develop an identity that attracts people, whereas the latter seeks to meet known demands (Thadani *et al.* 2020). City branding thus often has an association with urban planning, and urban-regional development policy, and can exert a significant influence on the development or regeneration of a city. City branding often adopts a coherent focus, such as high tech, the arts, or sport. For example, following decline as a blue-collar industrial powerhouse in the north of England, Manchester renewed itself, partly through sports branding, drawing on the global brands of football clubs Manchester United and Manchester City, its international cricket stadium at Old Trafford, and national centres for Olympic cycling, squash, basketball, and aquatics. Sport features prominently in the city's branding and benefits the regional economy, especially via the development of service industries (e.g., accommodation, transport, restaurants and bars, and retail) (Smith 2010).

Green branding commonly adopts one of two forms, loosely characterised as comprehensive or biophysical. The former draws on a 'green' image portrayed from a broad range of environmental attributes, such as environmental targets and policies, clean energy, public transport, pollution control, recycling, and green space. For example, Copenhagen styles itself as an 'eco-metropole' (Gulsrud *et al.* 2013) that aims to be the first carbon-neutral city in the world, whereas through the promotion of clean technology, electric buses and river revitalisation Seoul has sought to build a green image to promote the city as an attractive regional business centre (Braiterman 2011).

Biophysical green branding is more narrowly focussed on ecological assets such as green space, parks, wetlands, and forests. Singapore styles itself as The Garden City, and to complement its 'Active, Beautiful, Clean Waters' programme, promoted biophysical greening through the establishment of over 600 community gardens, its iconic 'Supertrees' structures in the Garden by the Bay, and a policy whereby loss of ground-level green space is compensated for with vertical greening of buildings, such as that showcased by the Bosco Verticale in Milan. Hong Kong has also built a city brand drawing on its green spaces. In analysing this branding strategy, Chan & Marafa (2016) adapt Anholt's popular City Brand Hexagon framework to address domains of green status, quality, accessibility, opportunity, citizenship, and stakeholder willingness to pay. They conclude that a disconnection exists between the green space and branding strategies which limits the success of each. For example, visitors lacked knowledge of Hong Kong's extensive green spaces, as these tended to be promoted to residents not international visitors who might otherwise visit in greater numbers and stay for longer.

3.2. Green city branding through the SCP

We surveyed the 30 pilot sponge cities for evidence of identity and branding based on the SCP. For each city, we examined marketing and promotional materials available via a web search, and also scrutinised municipal master development plans (regarded as suitable documents to reveal city branding; Han *et al.* 2018), for SCP BGI visions

Table 1 | Green city branding through China's SCP

SCP pilot	City level	City type	Province	Does SCP feature in city branding?	Source
1. Chongqing	Municipality	Megacity	–	Yes. Creating a city image of '*Scenic Town*'. There are up to eight public space projects being constructed, including Coral Park Area, Jiangbeizui River Beach Park, and Ciqikou Riverside. SCP is supporting Chongqing to develop a new city image.	Jintai (2021)
2. Jinan	Sub-provincial	Super City	Shandong	No	
3. Wuhan	Sub-provincial	Super City	Hubei	No	
4. Xiamen	Sub-provincial	Large City	Fujian	No	
5. Baicheng	Prefecture	Large City	Jilin	Yes. Baicheng is in west Jilin Province where arid windy conditions mean it is often called a '*Sand City*'. Through SCP construction rainwater is captured and the water shortage problem solved. The city now has green space and water everywhere, and is now known as a '*Water Town in the northeast*'. Through the SCP, social wellbeing and perception of the standard of living are improving.	Jilin Daily (2020), Li (2018)
6. Zhenjiang	Prefecture	Large City	Jiangsu	No	
7. Jiaxing	Prefecture	Large City	Zhejiang	Yes. Jiaxing is an unremarkable city that has plenty of water but suffers from flooding, surface water pollution, and low-quality aquatic ecology. Through the SCP it is focusing on water purification and drainage improvement and the greenery has led to them styling themselves as the '*Breathing City*'.	Zhang (2019), Zhejiang News (2017)
8. Chizhou	Prefecture	Large City	Anhui	Yes. Implemented many SCP projects in regeneration of old communities, and urban park restoration to raise living standards of residents. Is rebranding as a '*City of Happiness*'.	Xu (2019)
9. Hebi	Prefecture	Large City	Henan	No	
10. Pingxiang	Prefecture	Large City	Jiangxi	Yes. A resource-exhausted industrial and mining city, now developing tourism, commerce and service industries through the SCP. It is estimated that over 100 companies have been attracted by sponge city development, with annual production value over 8 billion RMB.	Xinhua Net (2018), Zhou (2019)
11. Changde	Prefecture	Super City	Hunan	No	
12. Nanning	Prefecture	Super City	Guangxi	No	
13. Suining	Prefecture	Large City	Sichuan	Yes. An established reputation as a green city, and leader in pursuing 'ecological civilisation' and sponge city concepts. Has developed innovative approaches to SCP asset	Yang (2019)

(*Continued.*)

Table 1 | Continued

SCP pilot	City level	City type	Province	Does SCP feature in city branding?	Source
				management and financing, including attraction of inward investment through urban greening. Acted as exemplar for other SCP pilot cities.	
14. Qian'an	Sub-prefecture	Medium-sized City	Hebei	Yes. As the smallest and only sub-prefecture pilot city Qian'an has developed SCP as site specific projects not major area developments. Nevertheless, SCP has become an important element in branding Qian'an too as a city with a more liveable urban environment.	Hebei (2018), People's Daily (2018)
15. Gui'an (Guiyang)	New town/ area	Medium-sized City	Guizhou	Yes. Gui'an district in Guiyang is a newly emerging city adopting SCP green development and ecological principles to create an ecological civilization area. Its pleasant living environment has been instrumental in attracting visitors and building a tourism economy.	Guizhou Government (2019); Liang (2019)
16. Xixian (West Xian)	New town/ area	Medium-sized City	Shannxi	Yes. A new town where SC concepts were embedded in the urban plan from the outset. The 2018 city promotional film highlighted sponge city projects and pitched city Xixian as an ecological city, and also presented a construction example of SC for cities in northern China.	Du (2018), Soho News (2016), Wen (2019)
17. Beijing	Municipality	Megacity	Capital	No	
18. Tianjin	Municipality	Megacity	–	Yes. '*Sino-Singapore Tianjin Eco-City*' is located in the Binhai New Area of Tianjin, which is Jointly built by the governments of China and Singapore, and it has been awarded the honour of '*Global Green City*' by the Global Forum on Human Settlement.	Xinhua Net (2020)
19. Shanghai	Municipality	Megacity	–	No	
20. Dalian	Sub-provincial	Super City	Liaoning	Yes. Dalian built a sponge park to control stormwater runoff, form ecological coastal pathways and improve river ecology, creating an improved living space for residents. Dalian intends to become a '*green city*' through SCP practices. In 2019, Zhuanghe, in the northeast of Dalian, developed a green city image following SCP projects to address flooding, pollution and stormwater reuse.	Liaoning Daily (2018), Liaoning Daily (2020)
21. Ningbo	Sub-provincial	Super City	Zhejiang	Yes. The construction of SC allows Ningbo to brand itself as 'The champion of urban water management' and as a 'water town.'	Tang *et al.* (2018)
22. Qingdao	Sub-provincial	Super City	Shandong	No	
23. Shenzhen	Sub-provincial	Megacity	Guangdong	Yes. Shenzhen has held SCP-related artwork competitions and educational activities to spread the sponge city idea and involved citizens to brand its city profile in SCP.	The Nature Conservancy (2019)

24. Fuzhou	Prefecture	Super City	Fujian	Yes. In May 2018, Fuzhou was highlighted as one of five typical sponge cities in the national '*2018 China SCP white paper*'. Fuzhou offered experience on innovative SCP financing, systematic design, continuous maintenance and SCP operation and construction.	Fuzhou Government (2018)
25. Zhuhai	Prefecture	Large City	Guangdong	Yes. A coastal city with beautiful living environment, insisting on the importance of ecological sensitive development. Often regarded as the national model environmental city. SCP is enhancing Zhuhai's ecological civilization image, and attracting more tourism.	Zhu (2019)
26. Sanya	Prefecture	Medium-sized City	Hainan	No	
27. Yuxi	Prefecture	Large City	Yunnan	Yes. The Yuxi government ran a SCP logo design competition in 2017, using public input to brand its city image in SCP. Via SCP construction Yuxi has developed as a garden-style plateau city identity that is 'breathing, natural city'.	Yuxi Government (2017), Yunnan Daily (2020)
28. Qingyang	Prefecture	Large City	Gansu	Yes. Through SCP 90% of rainwater is retained, stormwater pollution has been reduced by 60% and the rainwater utilization rate is 30%. Qingyang will be devoted to the development of establishing a new city identity, variously 'Plateau Lake City', 'Plateau Forest City', and 'Plateau Sponge City', named by the media.	China News (2020)
29. Xining	Prefecture	Large City	Qinghai	No	
30. Guyuan	Prefecture	Large City	Ningxia	No	

Note: Cities 1–16 started SCP projects in 2014, all others in 2015. Data were drawn from city master plans and by searching for the city name and BGI/Sponge and brand keywords using the Bing search engine.

and images. Table 1 summarises whether, and how, the pilots use the SCP in ecological (re)branding of the city. The SCP started in 2013 with about half the cities (1–16 in Table 1) implementing SCP practices in 2014, and the remainder in the following year. Thirteen cities have no obvious branding activity, but most municipal governments have put effort into raising public awareness and understanding of the SCP via news broadcasts, social media, films, on-site physical models, and SCP-related artwork competitions. For example, Beijing promoted their SCP as 'Urban water management'; Shanghai emphasised that 'sponge control' better managed urban stormwater; Hangzhou extolled the benefits of integrating SC development with the existing West Lakes and Thousand Lakes area; and Shenzhen promoted the SCP developments in the Guangming district as transforming the city towards ecologically friendly approaches. Such public engagement was seen as important in gaining public acceptability for SCP projects (given the cost and disruption involved), in conveying the wider social and environmental benefits, and in some cases, in supporting project co-design.

A general absence of SCP branding activity to date might be because BGI projects in some pilots are piecemeal or relatively small scale, and not yet of sufficient significance to counter existing negative images associated with past industrialisation and urbanisation. That is, further SC implementation is needed to justify a green city brand. For others, SCP branding is likely absent so as not to compete with an established and well-recognised brand identity. For example, Shenzhen styles itself as a globally competitive 'International City' that seeks to maintain a distinctive reputation as one of the earliest and most successful Special Economic Zones (Lu *et al.* 2017). Introducing an additional city identity concerning Shenzhen's SCP and BGI might blur the city's long-established image and reputation, which have achieved a high level of awareness and recognition, nationally and internationally. Similarly, the Special Economic Zone of Zhuhai and its surroundings is an established garden city with a long-held reputation as the 'most liveable' city in China.

In some cities, the SCP engagement work has gone further, such that the target audience was not simply internal to local citizens but had an external facing aspect. These cities were beginning to use the SCP investment and associated benefits to reimagine their identity, and deliberatively 'rebrand' the city along ecological lines, with the aspiration of attracting investment, businesses, labour, or tourists. Interestingly, of these, only one city, Fuzhou includes 'Sponge City' explicitly in its city brand; it positions itself as an exemplar of the SCP and a model of sustainable urban water management for other cities to follow. For others, more generic green branding is used, such as Green City (Tianjin, Dalian, and Suining) and Eco-City (Xixian New Area). These cities/city regions tend to align their visions and identities with the EC policy guidance from central government, most likely so as to generate recognition and support from government (Lu *et al.* 2017; Ma *et al.* 2021). However, these brands barely distinguish one area from another in terms of urban image (Ma *et al.* 2020).

In contrast, several cities have chosen brands more strongly rooted in characteristic local features linked to or enhanced by SCP BGI. This form of eco-branding adds specific local colour to improve visibility and gain economic opportunity (Lu & de Jong 2019). Chongqing labels itself as a 'Scenic Town' emphasising a natural heritage enhanced by construction and restoration of blue–green spaces. Baicheng labels itself as the 'Water Town in the Northeast' to highlight abundant blue–green spaces, and a transformation from its former negative 'Sand City' image, rooted in its frequent sandstorms. Similarly, Ningbo adopts a 'Historical Water City' brand rooted in a traditional water culture that has been rejuvenated by SCP BGI, whereas its SCP improvement to its public realm has led Chizhou to brand itself as 'City of Happiness' drawing on the perceptions of improved quality of life.

These results suggest that to date, BGI has featured in city branding, but mostly in an indirect manner, as part of other eco-brand identities. The goal of the SCP is to tackle the severe flooding, pollution and lack of green space that impact on quality of life, and thus it is local people that are most often the target of explicit SCP promotion. However, several SCP cities (e.g., Tianjin, Fuzhou, Qian'an, and Xining) have developed SCP design, finance, maintenance and operation experience for their particular context which when exported to comparable cities, has generated a sponge identity for these cities within their region. Often, work intended to promote the acceptability of SC construction to local people, or to promote SCP ideas to other cities (e.g., as for Shenzhen, Sanya, and Yuxi) has had an unintended spill-over effect of developing a more ecological profile for the city. For a few cities, there is evidence that SCP initiatives are also actively being used to attract business (e.g., Pingxiang and Suining) and tourism (e.g., Gui'an and Zhuhai). It appears, however, that SCP branding strategies remain relatively basic, and more in-depth consideration, perhaps drawing on Chan & Marafa's (2016) green branding framework, could better identify how to maximise city value from SCP developments.

4. COULD GREEN CITY BRANDING SUPPORT FUTURE SCP IMPLEMENTATION?

4.1. Investment needs and options

The scale of SCP delivery is already impressive. The central government has provided substantial funding for construction and maintenance, 1.2–1.8 billion RMB (US$ 0.19–0.28 billion) for each pilot city, amounting to grant support for the programme of over 50 billion RMB (US$ 7.73 billion) (Chan *et al.* 2018b). However, the goal is that 80% of the urban area in China's cities are drained by SCP measures by 2030 (State Council of PRC 2015). This is a very challenging task for cities now that the grant support available in the pilot programme has concluded. Li *et al.* (2020) estimate that the investment required will be 100–150 million RMB (US$15.5–23.2 million) per km^2, based on 2015 Ministry of Finance data. Thus, while Shenzhen, for example, has completed 2,273 SC projects so far, covering 210 km^2 (The Nature Conservancy 2019), this is only about 21% of the urban built area, and implies a remaining cost for this city alone, of US$9.1–13.6 billion. Municipal SCP offices must now lead on securing project finance, and given the loss of central grant funding, are interested in exploring other financing mechanisms. We discuss the more prominent options below, then consider their implications for green city branding.

The public–private partnership (PPP) is the Central Government preferred financing model for the SCP (Li *et al.* 2017) and is already used for other environmental work, such as developing recycling infrastructure (Xiao *et al.* 2018). PPP offers an advantage to municipalities in that they can share risks and costs, accelerate SCP delivery, and free funds for other services. However, to date PPP use has been rather limited in the SCP, mostly used just to support sponge measures in new private housing developments which might otherwise be built without them (Zhang *et al.* 2019), with the state supplying the bulk of SCP finance in the pilot phase. Private investors appear reluctant to enter into a PPP solely for SCP delivery, particularly at the scale required, due to perceived high costs and uncertainty, and assumed low returns (Dai *et al.* 2018; Griffiths *et al.* 2020; Li *et al.* 2020). High opportunity costs arise as BGI takes space that might otherwise be used for commercial or rental property. Also, to meet the 80% target much BGI retrofit will be needed, but this can be more complex or costly than BGI for new builds, so even less attractive. A further problem with SCP PPP's is that private investors often dominate the decision making, so financial goals take priority over environmental objectives.

SCP infrastructure might also be financed through Green Bonds (Tuo & Guo 2011; Wang & Zhi 2016). Bonds are a fixed-income instrument where the issuer owes the holder a debt to be repaid with a fixed interest, by a set date. They are typically asset-linked and backed by the issuing entity's balance sheet, so carry the same credit rating as the issuers' other debt obligations. Green Bonds are designed to fund environmental projects, and are commonly issued by national and municipal governments and corporate bodies like investment banks. Most Green Bonds relate to climate projects, often for assets with obvious financial returns (e.g., renewable energy infrastructure), or used in other ways, for example, in supporting carbon offset schemes. Globally, this market has grown quickly, with US$ 1.7tn of bonds issued between 2006 and 2021 (Climate Bonds Initiative 2021), but concerns over government debt have led to deep cuts in rates which makes for nervous bond markets. Green Bonds could finance BGI, through for example the action of land value uplift on real estate, or increased business tax revenue from improved city competitiveness. From 2012 to 2014 China's central government allowed local governments to issue municipal bonds which, along with revenue from rolling development, have come to dominate urban development financing (Jiang & Waley 2021). Green Bonds have also been issued in China, but not yet for SCP financing, and could be viable for retrofit programmes as well as signature BGI projects. They could be sold nationally and internationally, as well as to household investors who currently have relatively buoyant savings but limited opportunity to diversify investment beyond housing stock.

Payment for Ecosystem Services (PES) is a further innovative financing model, designed to support the creation, restoration, and maintenance of ecosystems. It has already been applied at a large scale in China (Chen *et al.* 2015), but here, and indeed worldwide, its use is almost entirely limited to rural areas, because ecological projects cannot compete with more profitable alternative urban land uses (e.g., commercial or residential development). Nevertheless, urban ecosystems may deliver required services very cost effectively. For example, Oates *et al.* (2020) calculate Wuhan's SCP projects were RMB 4 billion (c. US$ 600 million) cheaper than an alternative grey infrastructure-based approach to building flood resilience.

Richards & Thompson (2019) explain the potential of payment for urban ecosystem services (PUES), such as whereby water utilities pay for their reduced water treatment costs following de-culverting of streams. In particular, they highlight the potential of PUES for encouraging widespread, small-scale interventions, such as

homeowners paying for improved stormwater management from de-paving work, and business proprietors paying for street tree installation and maintenance to provide shade and reduce air conditioning costs. This is significant in the context of the SCP because to reach the SCP 80% coverage goal, retrofit of BGI into existing built areas will be required, and much of this must come via small-scale but numerous BGI interventions such as permeable paving, raingardens, stormwater planters, tree pits, and green roofs. Figure 4 illustrates such a scheme, and shows part of a 26 ha retrofit project in Zhenjiang, designed collaboratively with residents, where 2 years of monitoring demonstrated 95% of water retention on site without flooding, and 98% pollutant load removal via BGI. 'Unsustainable drainage' is a death by a thousand cuts issue, and enabling citizens to finance or even implement micro-scale disconnection projects, could be as beneficial as large signature projects like Ningbo East, for which fewer ready opportunities will exist.

4.2. Investment challenges

While there is a willingness to pay (WTP) for ecologically-based flood protection in China (Zhai *et al.* 2006), only 4% of people surveyed felt the public should be the main source of SCP finance (Wang *et al.* 2017). This suggests a difficulty for using PUES to support SCP implementation. To strengthen citizen-led financing, it is important that the public view sponge projects favourably. Transparency would thus be required (e.g., on sponge performance, and on how revenue traced to BGI investment is spent) and involving the public in SC development and maintenance would be beneficial. Note also that, to date, the SCP has been delivered mostly via large-scale and signature projects (like Ningbo East) that are more attractive to commercial investors. Small-scale BGI retrofit offers benefits (e.g., amenity, mitigation of urban heat island effect) that are more obvious to local citizens and businesses than city flood protection and it is reasonable to expect there would be a higher WTP for such BGI. Richards & Thompson (2019) explore the challenges of the PUES approach, highlighting issues of measurement, understanding what projects are viable in different contexts (density, land value, land tenure), and a need to identify who might be interested to pay for urban greening, so as to link them to owners and maintainers of green spaces. They conclude that because of high densities, co-location, and the wide variety of stakeholders that live in cities, PUES has potential to become an innovative funding source for urban ecosystem management.

Regardless of the financial instrument used, financiers will want confidence in SCP delivery. In this regard, the establishment of a national SCP quality assurance standard (Wang *et al.* 2020) is significant. However, the standard is limited to hydrological performance criteria (e.g., for runoff attenuation, groundwater variation, water quality) and there is no obvious requirement to consider the effects of climate change, or to apply the standard to small-scale retrofit. Furthermore, beyond this hydrologically focussed assessment, there is little attention to any broader appraisal of the quantity and value of ecosystem services delivered, which may be important when making investment decisions.

Figure 4 | Retrofit of permeable paving and raingardens in Jianger neighbourhood, Zhenjiang (Source: Green Earth Ops/Nian She, with permission).

4.3. Aligning green city branding with SC investment

The different opportunities and risks of these financial approaches mean that they vary in how each might appeal to potential financiers, and therefore how green city branding should be developed to secure the desired investment (Table 2). Private investors in a PPP scheme are taking a relatively higher investment risk so seek higher returns, which are usually only possible where BGI features as part of a broader project – a 'sponge housing development', for example. To better attract such investment, a green branding strategy is likely to promote and differentiate the city from its competitors by emphasising how BGI enhances business opportunities. Alternatively, if a city issues Green Bonds to support its SCP, then a green branding strategy might emphasise the probity of the municipal authority and its commitment to environmental issues. In both cases, the green branding would be outward-facing so as to attract inward investment. However, if a PUES approach is used, then the branding needs to be oriented towards local people and businesses, perhaps by highlighting collective action and the community benefits that can be accrued.

Chan & Marafa (2016) showed that to make the most from branding, there needs to be a good alignment of branding and financial strategies. In SCP pilot cities, such alignment is weak or absent, probably due to the rather limited attention given to SCP branding opportunities to date (Table 1). Branding strategies to support the SCP in the future will need to give attention to the alignment of: the type of SCP works to be delivered (e.g., flagship project, retrofit); the financial instrument intended to support that work; and who is targeted as the most likely financier of the work. A green city branding strategy that gives good support to the SCP is thus likely to be one that develops messages for different target audiences, based on good alignment of project type, financial instrument, and financier. With respect to technical delivery of urban drainage, the SCP has catalysed a move away from centralised municipal water management (by the Ministry of Water Resources) to more collaborative institutional working (multi-functional, multi-level, public–private) (Chan *et al.* 2018b). This suggests that there is potential to extend the reach of such collaboration to finance and marketing functions, so as to develop the necessary project-finance-brand alignment.

Differentiation is a critical success factor in city branding, and if all SCP cities were to brand in a similar way (and note the 30 SCP participants are only pilots), then the power and effect of that brand would be diluted. In practice, cities in China adopt many brands, and there is much differentiation even within green branding – in a study of ecological modernisation, de Jong *et al.* (2018) identified 52 separate brand identities in three Chinese megacity regions. An explicit SC brand may be powerful but by implication, only for a limited number of cities per region, and fewer still at the international scale, thus we should not expect such branding to drive

Table 2 | Implications of SCP financing for green city branding

Financial instrument	PPP	Green bonds	PUES
Source of funds	Private sector debt financing partnered with municipal funds (e.g., tax)	Institutional investors Individuals with savings	Local community – businesses & households
Financier goals	Return on investment is the priority	Low risk guaranteed returns Carbon offset scope Reputation	Amenity, health and environmental benefits from local area greening. Uplift in property value or business activity.
Financier concerns	More certain returns available elsewhere Limited appeal unless BGI enhances returns from investment in other assets (e.g., house construction) Risk and liability	Capturing return from SCP investment (e.g., via land value uplift or business development tax) Low bond rates; returns relative to 'vanilla' bonds Complexity, few standards, transparency, greenwashing	Uncertainty due to lack of PUES experience Uncertain WTP for local retrofit (known to be low for large SCP schemes) Transaction costs Free riders
Green branding focus	Highlight improved financial returns possible from investing in development areas enhanced by SCP BGI	Highlight SCP investment as secure/low risk and supporting fight against the climate crisis	Promote health and wealth benefits to local citizens and businesses. Highlight contribution made to the community

Note: This table is illustrative not exhaustive. Financial instruments are not mutually exclusive for SCP financing.

widespread uptake of SCP practice. However, the need to align SCP project types with financial instruments and associated financiers greatly increases the opportunity for brand differentiation, and hence for more cities to benefit from branding that draws upon sponge projects.

5. WHAT AND WHO IS SC BRANDING FOR?

The lack of alignment between SCP project type and location, how it is financed, and by whom, is an important challenge for SC branding to address, but is essentially a technical problem that can be resolved. However, the consideration of branding foregrounds harder, more political questions, that revolve around what the sponge branding is ultimately for, and who it benefits.

First, there are limits to how far branding strategies can be developed before exposing the tension between the objectives of the SCP and those of the urban economy. City branding is a profile-raising activity intended to make a city more attractive, drive inward investment, and raise competitiveness. SC branding exploits natural capital, such as BGI, to do this (the more generic green city branding may also draw on a wider set of environmental initiatives). Conversely, the purpose of the SCP is to build water resilient cities – doing so should deliver spin off economic benefits, but the city resilience objective may conflict with the usual purpose of city branding, which is to promote growth. For example, branding that targets PPP investment is likely to see finance used for projects where BGI is a feature, but not the focus, of development. Cities are already using sponge branding at the district level, where 'New sponge districts' represent attractive urban development opportunities with investment in new buildings, utility and transport networks, along with BGI. In such cases, sponge branding is employed in support of economic growth objectives. Here the tension with the resilience objective is exposed, because to meet the ambitious targets of the SCP, BGI must be distributed very widely across the city. This incompatibility problem could be mitigated by promoting finance options that facilitate a diversity of BGI delivery, including retrofit.

Second, the benefits and costs of the SCP are not distributed uniformly, a social inequality that is amplified by branding. The main concerns are related to the property market. Faced with limited investment options, rising house prices and low property taxes, China's middle- and upper-classes have speculated on property, with developers prioritising luxury housing, often boasting 'green credentials', for higher profits (Glaeser *et al.* 2017). Hong *et al.* (2014) found buyers in Nanjing valued property with green construction standards in low pollution areas, but that this was unaffordable for most people. Similar findings are reported for Shenzhen (Bach 2010), Shanghai and Beijing (Zhang 2019). This effect is known for amenity green space in China (Chen & Li 2017; Zheng *et al.* 2020) and BGI projects, as seen in Newcastle (UK) and Portland (USA), where property prices increased after BGI enhancement such that housing areas are known as 'health and wellbeing developments' (Netusil *et al.* 2014; O'Donnell *et al.* 2020). In Ningbo's New East Town, the eco-corridor increased prices c. 40–50% relative to similar apartments in adjacent districts. Branding, often drawing on signature BGI projects, acts to amplify this housing inequality. Ye & Björner (2018) observed this with 'The Heart of Pearl River', a brand drawing on Guangzhou's high-quality green developments, many with western architectural motifs and designs, intended to present a global city with appeal to elites.

Factors specific to the SCP also operate to amplify inequality. SCP projects may require removal of residents from the required land (e.g., old city shantytown areas). For example, located in the Ningbo Eco-corridor, Xinshi village had about 300 residents, mostly in-migrant households, whose homes were demolished to make way for Phase III of the project. While compensation was provided, some households disputed the process, and were forcibly relocated (Anon 2021). While state-driven 'Ecological Migration' (EM) has been a feature of China's efforts to restore degraded rural ecosystems since the 1990s, the extent to which it has occurred with respect to the SCP is undocumented. However, Rodenbiker (2020) describes how EM has extended to China's cities and peripheries, where millions of small-scale EM projects, such as wetland parks, displace people.

Cessation of state funding for the SCP is generating a reliance on PPP financing, with developers influencing the siting and design of SCP projects, so as to maximise profit. Low-income residents and migrant workers find this housing less affordable and are the least likely to enjoy the amenity and health benefits of SCP developments (Wu 2010). Equity issues also occur with SCP costs. For example, a BGI-based drainage system typically has higher maintenance costs relative to a piped system due to the regular maintenance required (e.g., vegetation management, permeable pavement sweeping, periodic siltation removal). Without a PUES approach, equity issues can arise as residents close to the BGI enjoy the greatest benefits, yet running costs are borne by everyone (typical with PPP projects).

There is thus clear potential for the SCP and its branding to trigger green gentrification and amplify social inequality (Kwon *et al.* 2017; Loughran 2020). This problem is not limited to the SCP of course (Curran & Hamilton 2012; Wolch *et al.* 2014; Gould & Lewis 2016; Bonakdar & Audirac 2020) and Campbell (1996) argues that planners must be alert to such problems and confront inequality in green city development. Exactly what solutions might look like is uncertain until community conflict resolution techniques are tried within the context of the SCP. However, embedding BGI throughout communities (e.g., via small-scale but widespread retrofit) could do much to advance the SCP in future, yet with a more equitable geographical and social spread of costs and benefits than experienced with signature SCP projects (Hamin *et al.* 2019; Finewood *et al.* 2019). Equity issues are unlikely to dent investor confidence if the more visible benefits of BGI are successfully promoted, but attention should be given to how equity issues are addressed in SCP planning, financing, and indeed branding. If not, any claim that China's Ecological Civilisation concept is a departure from western liberal environmentalism will lack credibility.

6. CONCLUSION

By 2030, China seeks to capture and reuse 70% of the rainfall that falls on 80% of the land area of its cities, making the SCP the most ambitious sustainable drainage programme anywhere. The costs are great and are to be shared between the state and the private sector. However, there are stumbling blocks to securing the required private finance, including that private investment in China has shrunk as state-backed financing of projects has grown; local governments are unwilling to cede their flagship projects to the private sector; and investors are hesitant about the financial returns from sponge projects – transport and utility projects have much more obvious routes to profit for PPP investors than does urban drainage (Economist 2016). SCP financing is a problem that needs to be overcome given how much more cost effective BGI drainage can be than conventional grey drainage infrastructure, even before consideration of the wider multiple eco-service benefits (Oates *et al.* 2020).

Securing sufficient private finance for SCP projects is challenging, but as BGI transforms China's cities, green branding could play a role in attracting the necessary people and capital (de Jong *et al.* 2016, 2018). Revenue from enhanced property and sales taxes, service charges, and land value uplift around sponge projects could then be used to finance more sponge construction. To date, such economic returns from sponge BGI are unknown, but if quantified, could provide assurance to prospective investors in the city and to sponge project investors.

While sponge branding could support green growth, it has been little used to date, and is mostly directed at local citizens to gain support for sponge projects (but without any mechanism to develop citizen-based SCP financing). The necessity of a brand to differentiate a city from its competitors means that an explicit SC brand is likely to remain only one of many green city brands used in China, and hence will have limited uptake. However, the requirement for adoption of sponge practice in all China's cities means sponge BGI will likely become key elements of other green city brands, while also playing an important role in reversing the negative environmental image that actively deters inward investment in many Chinese cities.

The SCP and city branding have the potential to be mutually supportive, raising city competitiveness and delivering on environmental objectives. Branding strategies that support future delivery of the SCP will be more effective if they give attention to the alignment of the SCP project to be delivered (e.g., flagship project vs. retrofit), the financial instrument intended to support that project, and who is targeted as its most likely financier. A green city branding strategy that supports the SCP well is thus likely to develop messages for different target audiences (both geographically and by investor goal), based on clear alignment of these elements. Such alignment is currently missing because in its pilot phase the SCP has focussed on large-scale, PPP-financed projects, so it lacks the diversity needed for more differentiated branding. As the SCP must be implemented throughout China, strong competition for finance available at the national level can be expected. A differentiated strategy will help to grow the total available finance, by better tapping into a wider set of funding sources, from international investors to local citizens.

A city brand should truthfully reflect the city and resonate with local citizens, but local people are rarely considered in city branding which tends to be outward-facing – promoting the opportunity for 'high-quality eco-living' to external elites, for example. With little grassroots input into building a brand identity, and equity problems such as green gentrification, support for SCP implementation may be compromised. This is a concern, because cities need local citizens and businesses to invest in SCP BGI if the extensive retrofit required is to be achieved. Given the scale of ambition of the SCP, it is important to maintain the support of local people as brand ambassadors

(Kavaratzis 2020; Thadani *et al.* 2020) but also to develop them as investors. The generally favourable public response to SCP BGI projects to date may enable municipalities to ignore the social equity concerns that have been raised by the SCP, at least for now, but continuing to do so may threaten an important future source of SCP finance, and also throw into doubt the credibility of China's Ecological Civilisation conception of sustainable development.

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DATA AVAILABILITY STATEMENT

All relevant data are included in the paper or its Supplementary Information.

CONFLICTS OF INTEREST STATEMENT

The authors declare there is no conflict.

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