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What might 'just green enough' urban development mean in the context of climate change adaptation? The case of urban greenspace planning in Taipei Metropolis, Taiwan

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ABSTRACT

This paper argues that climate change adaptation through strategic greenspace planning requires scholars and planners to think differently about what equity means in an urban greenspace context. We use the heat mitigation potential of greenspace and the case of Taipei Metropolis in Taiwan to assess challenges arising from thinking about fairness in terms of distribution of benefits from greenspace functions, as opposed to fairness in greenspace accessibility and availability. Urban greening to foster 'resilient' communities arguably deflects from – or even exacerbates – structural causes of vulnerability, with benefits accruing disproportionately to more affluent or empowered groups. Yet the need for practical action on climate threats in cities is urgent, and for heat, strategic greenspace use considered systematically across a city may mitigate effects through the cooling effect of vegetation. The challenge is thus to balance the justice concerns associated with urban greening with this tangible risk reduction potential.

We undertake content analysis of articles from two Taiwanese newspapers – the *Taipei Times* and the *China Post* – to assess how heat and greenspace issues have been discussed in urban governance debates within Taipei. We suggest change adaptation through urban greening raises three challenges for equity thinking: (a) guiding planning and governance processes with scientific understanding of how greenspace functions are delivered, even in the face of urban development pressures and site-specific controversies; (b) tempering the social cohesion and practical deployment benefits of neighbourhood-level greening with the need for specific understanding at the city-wide level to most effectively realise ecosystem services; and (c) linking targeted adaptation actions with broader rationales for urban greening, whilst not diluting justice concerns. We caution that pragmatism towards all urban climate adaptation via greening as intrinsically 'good' must not serve as a blinder to the need for accompanying social policy measures to reduce unequal vulnerability to climate risks.

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1. Introduction

This paper elaborates questions raised by climate change adaptation for addressing equity issues in urban greenspace planning. We take the heat mitigation potential of greenspace as a point of departure to consider the challenges and complexities that may arise when considering equity in terms of distribution of benefits arising from greenspace functions, as opposed to purely issues of access and availability.

Greenspace planning of course considers many factors, of which cooling service is only one. However, the urban heat island (UHI) effect – higher temperatures in urban areas than their rural surroundings – is one of the crucial issues for urban climate change adaptation (Gill, Handley, Ennos, & Pauleit, 2007; Roszenweig, Solecki, Hammer, & Mehrotra, 2011). Development patterns lead to uneven distribution of physical exposure and societal vulnerability to heat across cities, with recognition that more vulnerable people – elderly, low-income or marginalised groups such as migrants or ethnic minorities – may be disproportionately exposed to heat risk (Byrne et al., 2016; Harlan, Brazel, Prashad, Stefanov, & Larsen, 2006). Greenspaces can have a cooling effect through the lower radiance, increased evapotranspiration and greater shading provided by vegetated surfaces (Bowler, Buyung-Ali, Knight, & Pullin, 2010). This may be realised through preservation and development of urban greenspace, thinking about cooling as one of the functions greenspace provides (e.g. heat mitigation, water storage,

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air purification) beyond its recreational potential (Hebbert, 2008; van Leeuwen, Nijkamp, & de Noronha, 2010) (see Table 1 for definitions). Nonetheless, urban development processes may also influence how greenery is distributed within a city, potentially accruing towards more affluent areas (Apparicio, Pham, Séguin, & Dubé, 2016) and/or displacing more vulnerable groups through processes such as environmental gentrification (Dooling, 2009). Due to its cooling function – and the fact greenspace is an important measure in urban planning – heat mitigation through greenspace is therefore a useful starting point for a conversation on how climate change adaptation might require scholars to think differently about greenspace equity in urban development.

Our case study is Taipei City in Taiwan. Global warming and rapid urbanisation are significantly increasing temperatures in Taipei (Bai, Juang & Kondoh, 2011; Hsu et al., 2011). The thermal comfort-increasing potential of green infrastructure has been evaluated in the national-level Adaptation Strategy to Climate Change in Taiwan (Council for Economic Planning and Development [CEPD], 2012). However, development and deployment of green infrastructure for UHI mitigation in Taipei has thus far not been as fully developed as it could have (Huang et al., 2012). The inadequacy of guidelines for addressing heat mitigation via strategic green infrastructure planning at the local-level could arise due to lack of awareness on how the heterogeneity of heat exposure is influenced by urban development; inadequate evidence to develop land use strategies for mitigating heat exposure; low policy priority compared to other climate impacts; and limited integration of climate change adaptation into existing urban planning systems (e.g. Chang, Seto, & Huang, 2013; Mabon & Shih, in press).

Chu, Anguelovski, and Roberts (2017) suggest that in such situations of demonstrable potential but a challenging socio-political context, urban environmental planning targeted strategically at climate adaptation gains may transcend traditional sectoral barriers to climate action. We therefore use one particular goal, heat mitigation, as a point of departure to evaluate the extent to which 'strategic action' may balance up with the risk of overlooking or reinforcing existing inequalities in the rush for short-term adaptation gains. Specifically, we assess the potential of existing 'just green enough' (Curran & Hamilton, 2012; Wolch, Byrne, & Newell, 2014) and 'equity planning' (Metzger, 1996; Zapata & Bates, 2015) frameworks to safeguard equity within strategic climate adaptation responses. Thus far, these concepts have largely been applied in relation to accessible usable greenspaces such as playgrounds (Talen & Anselin, 1998) and nature walks (Curran & Hamilton, 2012) as opposed to areas such as agricultural lands, rivers and wetlands which are not planned for the use of people yet are crucial to delivering ecosystem function. Like Talen and Anselin (1998), we understand spatial *equity* to mean 'equality' in the context of how questions of need, fairness or justice are addressed across space. We look at how potential equity issues have arisen over time in Taipei in relation to (a) which locations in the city are getting attention in greenspace discussions; (b) whose voices are most prominent in discussions around heat and greening; and (c) what current rationales and pathways to greening are and how well suited they may be to equitable climate adaptation. We argue that maintaining equity thinking within strategic action for climate adaptation may require: recognising that controversy over greenspace access and allocation may not sit with the manner in which greenspace functions like cooling are delivered and distributed; acknowledging the value of neighbourhood-scale actions but also their potential limitations in delivering ecosystem services; and ensuring more broad-based rationales for greening actions do not dilute or sideline justice concerns.

2. Theoretical and conceptual background

Recent critical social science scholarship indicates that urban planning responses to climate change – including greening – are not value-neutral and may if adopted uncritically perpetuate or exacerbate existing inequalities (e.g. Anguelovski et al., 2016; Castan Broto, 2017). This paper speaks to this literature by considering the additional complexities that arise from considering equity within the full suite of greenspaces across a city (e.g. agricultural lands, rivers, wetlands) which deliver ecosystem functions.

2.1. Green inequality, resilience and consensus

Different approaches have sought to consider how greening is distributed within a city. Concepts such as 'luxury effect' (Hope et al., 2003; Liu & Hite, 2013) and 'green inequality' (Apparicio

Table 1
Terminology and definitions.

Term	Definition	How and when used in this paper
Greenspace	"(N)atural greenspaces in an urban context [...] many types of land in an urban setting from formally designated areas such as parks, areas set aside under legislation such as allotments, to more natural areas such as nature reserves and corridors along river banks" (Comber, Brunsdon, & Green, 2008: 103). Given the dense city context, we also include very small-scale spaces e.g. rooftop gardens, neighbourhood parks, street trees within this (Tan & Jim, 2017)	We use *greenspace* when discussing sites or locations for vegetation within the city. Given our interest in greenspace function we consider both 'planned' and 'unplanned' greenspaces
Green infrastructure	"(A)n interconnected network of natural areas and other open spaces that conserves natural ecosystem values and functions, sustains clean air and water, and provides a wide array of benefits to people and wildlife" (Benedict & McMahon, 2002: 1)	Our focus within this paper is on greenspace and greenspace function, however we refer to 'green infrastructure' when citing the work of others using this term, in situations when vegetation is created or managed with a stated strategic purpose as part of a network
Urban greening	Any process which increases the abundance or cover of vegetation in a given area within a city (after Bowler et al., 2010)	We use *greening* or *urban greening* to refer to any actions which may increase vegetation within the city
Urban greenery	"[E]ssentially either a human creation or a human modified form of natural vegetation." (Tan and Jim, 2017: vii)	We use *greenery* to broadly refer to any piece of vegetation created, modified or managed by humans at any scale

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