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Research paper

Multiple benefits and values of trees in urban landscapes in two towns in northern South Africa

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HIGHLIGHTS

- Residents from distinctive low income neighbourhoods value trees in different ways.
- Regulating and provisioning services declined in importance in formal townships.
- Trees in public spaces are viewed with more ambivalence than in private space.
- Products from trees in the urban periphery are critical for the poorest residents.

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ABSTRACT

Cities and towns can be conceptualised as complex social-ecological systems or landscapes that are composed of different spatial elements. Trees in urban landscapes provide a variety of tangible and intangible benefits (ecosystem services) that may be valued differently across diverse households and individuals. Here, we consider how the benefits and values of trees to urban residents vary across public and private spaces in three low income neighbourhoods in two medium-sized towns in northern South Africa. We find that the most asset poor residents in informal settlements derive significant benefits from the provisioning services offered by trees in natural green spaces on the 'urban periphery'; in particular they value supplies of wood for energy, whilst also recognising the importance of regulating services such as shade. Trees in such spaces help these immigrants cope with a lack of infrastructure, services and disposable income after their move to the city. In new, low-cost housing neighbourhoods, the importance of trees in providing shade and shelter in gardens is emphasised due to the hot and dusty nature of these settlements, while residents in older township neighbourhoods make more mention of the aesthetic value of trees in private spaces as well as the fruits they provide. In all neighbourhoods, attitudes towards trees in public spaces were mixed because of their perceived association with crime, although low income households did make extensive use of tree products from natural areas. The relevance of the results for urban planning and greening in low income areas is discussed.

1. Introduction

Cities and towns can be conceptualised as complex social-ecological systems or landscapes that are composed of different spatial elements ranging from the built to the natural, and zoned into areas for business, industry, residence, recreation and nature. Biological elements such as trees occur across these zones, although are typically found in higher densities in natural areas along water courses, parks (publicly designated and managed green spaces), remnant lands, private gardens and commonages (municipal owned land, typically on the periphery of towns, with unrestricted rights of access and often used for grazing, recreation, cultural activities and collection of biological resources). These areas collectively contribute to the 'urban forest'; all tree stands and individual trees in and around urban areas (Konijnendijk, Ricard, Kenney, & Randrup, 2006).

Urban landscapes can be thought of as dynamic, multi-layered, and complex (Alberti et al., 2003; Ramalho & Hobbs, 2012). They are shaped by the people who live in and use them, as well as by political processes and the institutions that govern use (Alberti et al.,

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2003). For instance, trees within urban landscapes are found in both public and private spaces, and their benefits, values and meanings for residents may vary with time, property rights and associated formal and informal rules (Mincey et al., 2013). These social dimensions of the natural component of urban landscapes have received limited attention (Coles & Bussey, 2000; Dinnie, Brown, & Morris, 2013; Heynen, Perkins, & Roy, 2006), particularly in the global south. Furthermore, there has been little exploration of how residents from different neighbourhoods and historical, cultural and social-economic backgrounds may use, value and place meaning on different elements in the landscape, including trees and green spaces (Dinnie et al., 2013).

Understanding how residents of cities and towns relate to the urban forest and benefit from and value the ecosystem services provided by trees and the spaces these trees occupy is, therefore, critical for urban policy and planning that promotes social justice, equity, well-being and sustainability. This is particularly so given the rapid pace of urbanisation in sub-Saharan Africa and the need for urban environments that secure a meaningful and quality life (UN Habitat, 2006).

1.1. Conceptualising urban landscapes

'Landscape' as an integrating concept refers to both "the material-physical reality, originating from a continuous dynamic interaction between natural processes and human activity, and to the immaterial existential values and symbols of which the landscape is the signifier" (Antrop, 2006). Such a definition draws on both social and natural science perspectives. Central to a social science perspective is the attribution of agency to social actors; for instance in the way they control, transform, construct, use, understand, value and give meaning to landscapes (Dinnie et al., 2013; Long, 2001). Landscapes also have clear historical dimensions, and are partly the materialisation of culture, power and politics (Cosgrove, 1998; Heynen et al., 2006), as well as the product of institutional arrangements (e.g. laws, property or tenure rights; Batterbury & Bebbington, 1999). This perspective contrasts with that of landscape ecologists who view landscapes as consisting of abiotic resources, such as soils, nutrients, air, and water, and biological resources functioning together in a specific geographical space through dynamic interactions. More recently, however, natural scientists have also sought a broader understanding of landscape dynamics by giving more prominence to the human dimensions of ecosystem processes (McIntyre, Knowles-Yanez, & Hope, 2000; Wu & Hobbs, 2002). Spatial relationships among natural phenomena are thus seen as modified by human use and settlement patterns. Merging such insights with a social science perspective leads to a notion of (urban) landscapes as social-ecological systems that are living, dynamic and continuously evolving entities. It is this dual framing we use in this paper.

1.2. South Africa's urban landscapes: History, segregation and inequalities

In South Africa, the legacy of racial segregation has created highly uneven urban landscapes that continue to persist today (Hendler, Forthcoming). Under apartheid, land ownership and residency was racially segregated, with most black South Africans expected to live in ethnically defined, geographically separate Bantustans, while residency in urban 'white' South Africa required proof of employment in the form of a 'labour pass'. This suppressed urbanisation for several decades. The few black South Africans that lived in urban areas were confined to racially separate residential areas known as 'townships' (a term that endures) (Wilkinson, 1998), unless they, mostly men, were housed in hostels serving the mines. Townships were (and still are) characterised by relatively high density housing, poor services, limited commercial opportunities, few recreational green spaces or aesthetic features like street trees and other plantings, and widespread poverty (Beall, Crankshaw, & Parnell, 2000). In contrast, white South Africans resided in well serviced and maintained leafy suburbs (Hendler, Forthcoming). These features of the South African urban landscape are still distinguishable today and tend to be reinforcing.

With the lead up to and after the South African democratic transition (just prior to and post 1994), two rapid changes took place that altered the face of most urban landscapes (Shackleton et al., 2014). The first was the establishment of a national housing programme (part of the post-apartheid Reconstruction and Development Programme (RDP)) to address the racially defined and experienced backlogs of service provision and housing created during apartheid (Wilkinson, 1998). This programme aims to deliver large numbers of houses for the homeless and indigent at as low a cost as possible (Gilbert, 2004), resulting in an almost one track focus on providing 'a roof over people's heads' rather than sustainable urban living. Most houses are single storey, on a 40 m^2 foundation with a small plot. These are built in planned, high density settlements on bulldozed land to form the so-called 'RDP areas', and, like township development in the past, generally lack planning attention to recreational green spaces and visually appealing elements (McConnachie, Shackleton, & McGregor, 2008; McConnachie & Shackleton, 2010).

The second change was the repeal of the laws that restricted where black South Africans could live and work, resulting in large numbers of people moving to urban areas and the rapid growth of informal settlements, frequently around the outskirts of towns (Hunter & Posel, 2012). These areas are characterised by high density living, low service provision and shelters built of scavenged materials, but may have ready access to ecosystem services given that these settlements are often on 'unused' peri-urban land.

Consequently, the urban landscape in many South African cities and towns has taken on new characteristics with the addition of RDP and informal settlements, often close to townships. These planned and unplanned low-income neighbourhoods have different compositions of trees and green spaces, influenced by historical and current political planning processes, resulting in different patterns of use and meaning that coexist and potentially shape one another.

1.3. Ecosystem services and benefits from urban forests and trees

It is now widely acknowledged that trees and green areas provide multiple goods and services (Chen, Adimo, & Bao, 2009) that contribute not only to ecological functioning, but also to the quality of life and health of urban residents (Arnberger & Eder, 2007). These ecosystem services include provisioning (such as firewood and fruit) (Kaoma & Shackleton, 2014a), regulating (such as shade, noise abatement and carbon sequestration) and cultural services (such as opportunities for recreation) (Hassan, 2005). Together they provide a host of tangible and intangible ecological, social, health (physical and psychological) and economic benefits (Chen & Jim, 2008; Chiesura, 2004; Seth, 2004; Tyrväinen, Pauleit, Seeland, & De Vries, 2005), contributing to more resilient social-ecological systems. Trees and green spaces also present some disservices such as pollen allergies, invasion of infrastructure by roots, and the blockage of drains by leaf litter (Agbenyega, Burgess, Cook, & Morris, 2009). These services and disservices may arise in different places in the landscape, including various types of public green spaces, street trees, vacant lands or private gardens. Furthermore, they may be viewed in different ways depending on the neighbourhood and needs of residents. Recognising that urban landscapes are shaped by social actors, delivery of these various services and disservices, are likely to be constantly altered through