The threat of slow changing disturbances to the resilience of African cities

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Abstract

Within rapidly urbanising South African cities, understanding the dynamics of change and the rate at which change occurs can be used to manage or regenerate parts of the urban system, and may provide effective tools for planning and monitoring 'resilient' development. A 'resilience' understanding may assist local authorities to transition toward cities that are more adaptive toward disasters, hazards and threats within flexible built environments. While most research conducted on the subject of urban resilience tackles issues relating to short-term disasters (pulse disturbances) like flooding, earthquakes, or terrorism, this paper focuses on the relationships between the more persistent issues or slow variables that occur over long periods of time (press disturbances). Examples explored within this paper include natural disasters, rapid urbanisation and urban poverty, environmental degradation, health and safety, crime, informal settlements, and lastly, policy implementation.

While change relating to press disturbances like informality, environmental degradation and urban poverty impacts all countries to some extent, the assumption is that Africa is most at risk since it is experiencing high rates of urbanisation within the context of pervasive poverty and inequality. These city environments may also not have the adaptive capacity to leverage these changes or steer their socio-economic and environmental systems beyond survivalist conditions. This paper tackles these topics from the perspective of an informal settlement called Plastic View in the City of Tshwane, South Africa – a country which has yet to regenerate its cities into integrated environments. It comprises of a desktop study of articles in the press to build an understanding of press disturbances affecting the focal system of Plastic View and their relationships and dynamics. The paper concludes with a motivation toward building a strategy for policy and housing management in the City of Tshwane that incorporates principles of resilience like adaptability, diversity and the acceptance of change as an important component for cities.

Keywords: Ecological resilience, Press disturbances, Slow Change, South Africa, Urban resilience.

1. Introduction

South African cities are characterised by complex and rapidly evolving environments within which the ideological legacy of past Apartheid planning still influences the functioning of the

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city, and where the new political regime has yet to inclusively repair and integrate the gaps left in the city fabric. Within the informality engendered by this transitioning society, niches appear in areas of opportunity and potential where a growing number of urban poor find their sources of livelihood and shelter. In particular, the City of Tshwane has seen the development of fast-growing informal settlements in close proximity to upmarket housing estates where the urban poor generate livelihoods from ad hoc job opportunities servicing the wealthy suburbs. Their presence has been the source of a tense relationship between stakeholders in the area, and efforts to resolve the situation through short-term interventions without a contextual understanding of the long-term pressures on the area, have failed. This poses the question whether broader issues are affecting these environments, and whether there is interplay between them that underlies the manner in which the system responds.

Framed in this background, this paper aims to understand the relationship between the various levels of press disturbances in the city panarchy from the perspective of an informal settlement called Plastic View. This understanding will be built from a desktop study of newspaper articles sourced over the last fifteen years, a time during which informal settlements have persisted in the city despite efforts to remove them. It is also based on observations of the focal area of Plastic View in order to build a deeper awareness of the complexity of the phenomenon.

1.1 A background to the concepts of resilience being discussed

Concepts of urban resilience are based on an understanding that as active components in city systems, human-beings are managers of various systems that are part of living systems comprising of humans and nature together, also referred to as a *social-ecological system* (SES) (Walker & Salt, 2006). The Tshwane SES is no different and as managers thereof, human beings have a responsibility to the city system. Viewing the Tshwane system as a holistic entity that is made up of various hierarchical scales of interaction and interrelation (Holling, Gunderson, & Peterson, 2002) proves useful. The interplay between various press and pulse disturbances therein, requires an understanding of where they sit in the various scales of the SES (the holarchy and panarchy) in which they occur. Looking for links between press and pulse disturbances in informal settlements is enriched by Koestler's holarchic understanding of the relationship between components which themselves are whole, as well as elements in a bigger system within which they operate according to rules and patterns that determine their behaviour (Du Plessis, 2011). System properties emerge from the structural relationships and interactions of the components across different scales. These multi-scaled relationships are part of adaptive cycles that make up Holling's panarchy, the theoretical framework that describes the multi-scaled dynamic relationships within the SES in question (Holling, Gunderson, & Peterson, 2002). Within the panarchy, the lowest scales undergo rapid change, while higher scales occur more slowly.

Resilience perspectives can prove to be useful, as they emerge from the exploration of integrated, post-sustainability outlooks that embrace the dynamics of change as a natural process, within which finite limits to resources can shift current environments into a completely different system state, but not erase it. In order to build resilience, we require an understanding of the forces driving the context, by asking resilience of what to what and

triggered by which disturbances (Resilience Alliance, 2010). In doing so, we may be able to actively build the adaptive capacity of the focal system to innovatively leverage change to release captured energy and resources, to cross a threshold into another more desirable system state, or for a shock to be absorbed without resulting in a system collapse.

If the current focal system is desired to be made more resilient, then attention should be given to increasing the functional diversity, so that it is able to demonstrate a number of different responses to pressure in the system while still maintaining its functionality. Understanding the relationship between multi-scale press disturbances offers an opportunity to open our thinking about city planning in the City of Tshwane into a holistic, long-term and less efficiency driven approach; one that strives for constant evaluation and evolution of the city since "resilience is the great moral quest of our age" (Zolli & Healy, 2012).

2. Contextualising Plastic View

2.1 Informality, the other face of life in the city

Since the establishment of a democratic South Africa in 1994, the country's major cities have been experiencing an influx of migrants from rural areas and neighbouring African countries, into 'townships' and informal settlements on municipal lands (Soggot & Amupadhi, 1997). Within the Apartheid city planning strategy, racial segregation occurred by the deliberate separation of white, coloured and black neighbourhoods usually by natural features, industrial areas, or large distances. The word 'township' or 'locations' referred to 'non-white' neighbourhoods located in the city periphery and continues to be used in reference to these areas. Designed to be easily controlled as self-contained areas, they functioned separately from the 'white' city. 'Townships' played a crucial role in the formation of the apartheid city and embodied the complex process characterised as functional inclusion, spatial separation and political exclusion (Chipkin, 1998). After the system of control collapsed, South Africans of all races have been drawn to city life, however these urban areas are not always able to meet their needs for housing, employment and health within formal infrastructure frameworks - a trend prevalent the world over (Burdett & Sudjic, 2007). As the number of urban poor increases, so does the gap between the rich and poor in contemporary South African cities. Despite being dominated by strong African and global cosmopolitan influences the Afropolitan (Nuttall & Mbembe, 2008) the nature of our cities has been slow to bridge the social disconnect that continues in a number of forms like informal housing and trade, up-market security estates, car-dominant planning, increased crime and dwindling public amenities. Government investment into the 'townships' continues to be sustained with little affordable or alternative subsidised housing being provided in areas of the city where poorer residents want and need to be in order to sustain their livelihoods. In eighteen years of democracy, a high quality integrated housing scheme is yet to be realised in the eastern suburbs of Tshwane.

2.2 The eastern suburbs – home to Plastic View

Over the last fifteen years commercial and residential development and investment in the City of Tshwane has shifted eastward. The gated estate typology has been a dominant

response to the perceived security risk of living in older suburbs as well as a need for affordable medium density housing for middle income markets. A number of golf and equestrian themed estates have also drawn high-income earners to these suburbs that are characterised by large, physically cut-off and privately managed and serviced landholdings, which confine movement around them to car-dominated roads poorly serviced by public transport. They rely on malls, private schools and hospitals with little or no council led investment in amenities, infrastructure or public spaces. This typology results in pockets of left over land consisting of neglected municipal grounds, servitudes and natural areas. Socially and economically, the formation of at least ten fast-growing informal settlements developing in these 'left over spaces', are frustrating local communities (both in informal settlements and outside) who require clarity about the future. Most upmarket estates and households rely on a few low income workers to provide services as security guards, cleaners, domestic workers, gardeners, child minders, retail and construction workers and handymen. However, these estates offer no housing options for these marginal workers to live close to work nor has council provided alternative forms of housing in the area; workers are left to commute long distances to make their livelihoods, at high cost (Turok, Hunter, Robinson, Swilling, & van Ryneveld, 2011).

Development east of a suburb called Moreleta Park, has resulted in the emergence of informal settlements appropriating tracks of unmaintained, un-used, 'out-of-sight', yet well-located land in close proximity to estates. For the past few years tension between the Moreleta Park community and the growing number of vagrants has slowly been building up. The local community link criminal activity to the informal settlement, and cite the over-crowding and unsightly unhealthy living conditions, as reasons for their property investments declining (Roux, 2012). In turn, the vagrants cannot be legally evicted from the land without suitable alternative housing options being provided by council (Department of Housing, 1998).

Plastic View, the focal system of this paper, is an informal settlement located just east of Moreleta Park and is so dubbed because of its appearance when viewed from the major roads on its edges, as it seems to be made largely from salvaged plastic (Venter, 2012). It contains Woodlane Village, a settlement that was 'organised' by some of the informal settlers with the support of a local NGO group in 2008; and which comprises 856 households and roughly 3000 residents. Plastic View's physical characteristics and location inform its emergence and resilience (Figure 1). The municipal land on which it is situated is roughly 9ha in size, of which portions are occupied by informal settlements (Woodlane being the largest) with the rest used for illegal dumping or left unattended. The land is confined by large roads on two of its edges (a regional road leading out of the city, as well as a neighbourhood connector) and various residential security estates along its remaining edges. It contains a perennial stream that connects to a larger open space system that runs through the eastern suburbs and connects to the large Rietvlei nature conservation area.
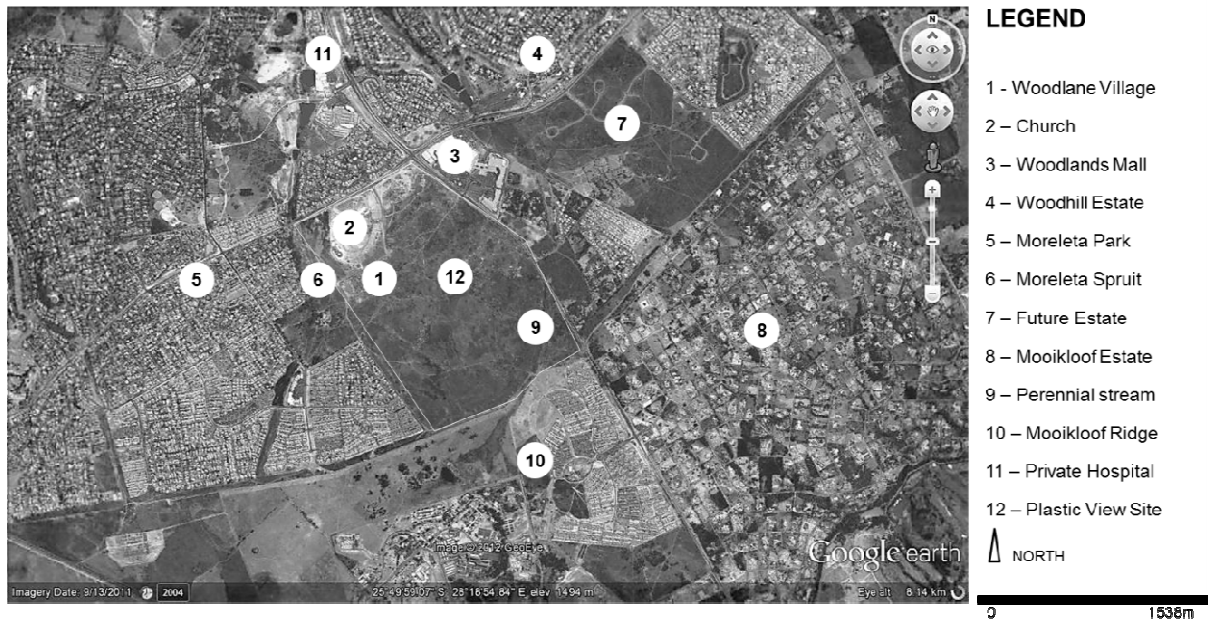
Figure 1: An aerial photo of Plastic View and the surrounding context (Authors, 2012); base image courtesy of Google Earth.

Residents of Plastic View say they have been living there since 2001, indicating that they settled there because of the need to be closer to job opportunities (Hlahla, 2010). It is also conveniently located next to wealthy estates, a large local church, a mall as well as an NGO. In the middle of 2012, the municipal land on which Plastic View is located was allocated for subsidised housing. This court decision resulted from persistent objections by the greater community against the rising number of vagrants in the areas, the effect on their investments (Roux, 2012), their subsequent concerns about the risk of a poor quality RDP housing scheme being built on the land, and human rights organisations protecting the settlers from eviction without suitable relocation as required by law (The Bill of Rights of the Constitution of the Republic of South Africa, 1996) (Department of Housing, 1998).

As Plastic View is poised for transition, the question is posed, how will formalisation affect its internal resilience as well as that of the broader community? The recent court order sets a precedent for the city; its response to informal settlements, alternative subsidised and affordable housing integration, and transformations to housing or planning policy will be interesting to follow. This phase of the Plastic View adaptive cycle offers a window of opportunity, a threshold between an existing system state and, possibly, a new improved one. Ignoring the interplay between deeper issues affecting the focal system in a hasty planning process may destroy the positive qualities of the landscape and place. Instead, alternative ways of proactively managing, coping and adapting to unpredictable change without having to reactively crisis manage, are required.

2.3 The Tshwane Panarchy, from the perspective of Plastic View

Gaining insight into the patterns of change and adaptation in Plastic View and the panarchy in which it sits, provides a platform to recognise where the linkages between press and pulse disturbances exist and their forms of interaction. Increasing this knowledge shapes awareness that settlements like Plastic View are not isolated from bigger forces, but are connected to both large scale issues pressuring the city, as well as small scale needs of its

citizens. To achieve this understanding, the panarchy of the City of Tshwane is divided into three scales; the Plastic View focal scale, the intermediate scale consisting of surrounding suburbs like Woodhill, Mooikloof and Moreleta Park, and lastly the highest scale consists of the Tshwane City Region and beyond. Within each of these scales, a chosen focal area may both respond to a disturbance and exert pressure on the system. In the case of Plastic View, it has emerged out of press disturbances from the City region scale, but also has pressured the intermediate scale of the surrounding neighbourhoods, as illustrated below:
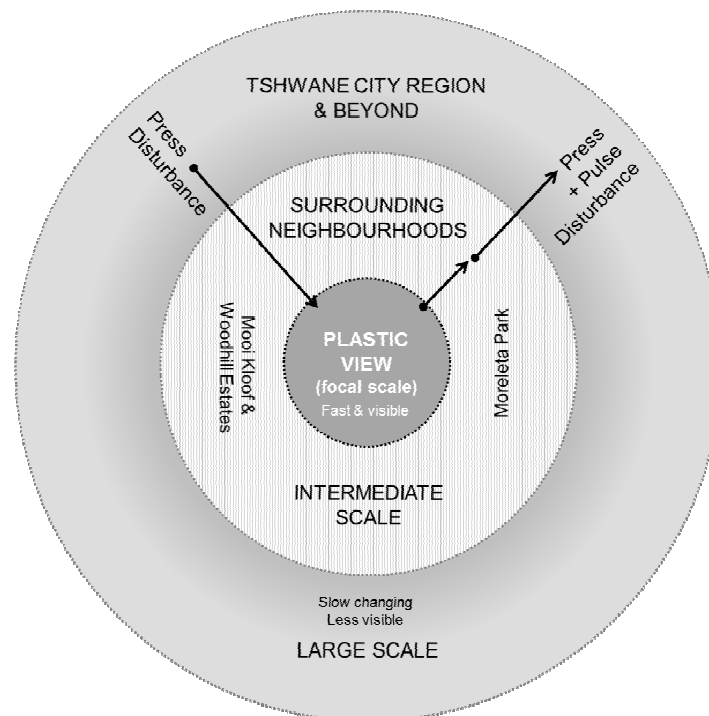

Figure 2: A diagrammatic representation of the Tshwane Panarchy, with Plastic View as the focal scale (Authors, 2012)

3. Understanding multi-scale disturbances in the Panarchy

The Plastic View case study provides a useful way to appreciate the interaction and relationship between drivers and their influence on events across the panarchy of the city. This interlinked web shows strong connections between seemingly unrelated components, such as the emergence of informal settlements next to middle to high income suburbs in Tshwane. A deeper awareness of these intertwined issues may help in changing the perceptions of the community as a whole regarding their responsibility to each other and nurturing a respect for nature as an ecosystem of which they are a connected and integral part. This will be built out of the press disturbances impacting upon Plastic View over the three scales of the panarchy shown in Figure 2; the focal scale, the intermediate scale, and the large scale. A few of the most prominent disturbances will then be looked at to understand their system dynamics and multi-scale dynamics (Resilience Alliance, 2010).

3.1 Large-scale press disturbances that created Plastic View

To build an understanding of the multi-scale dynamics of the city panarchy, the first step begins with the forces driving the city- and national system and have led to the gaps formed in the city, which are points of vulnerability and opportunity. In Plastic View there are many press disturbances that have created its emergence; however a review of newspaper articles has narrowed the list down to three main issues.

The first relates to the Apartheid City plan and its structural legacy affecting the contemporary functioning of Tshwane (Herve, 2009). Its major effects are visible in the extensive distance between affordable housing located in former 'townships' and work opportunities within the wealthy suburbs. Tshwane is the metropolitan region with the longest commuting time (Turok, et al., 2011). The second is linked to the first, and deals with the lack of alternative affordable housing options for unskilled and semi-skilled workers in newer suburbs. Perhaps as a result of security estates not providing onsite staff accommodation (previously most homes in South Africa had staff quarters on the property). There is also the lack of council investment in integrated housing outside of the peripheral 'townships' (Herve, 2009). Thirdly, there is policy, which in practice has been slow to encourage the implementation of integrated human settlements close to job opportunities. The conditions related to the allocation of housing subsidies and legislation that prohibits the removal of settlers without providing alternative accommodation offers an opportunity for informal settlers to 'jump the queue' and get RDP housing after invading municipal land from which they cannot be evicted without receiving alternative housing (Department of Housing, 1994).

3.2 Press disturbances that Plastic View places on the larger system

The second step in understanding the panarchical relationships begins with an analysis of the pressures exerted by the focal system on the intermediate scale and also the large city scale. Progressively, Plastic View has grown and resisted a number of disturbances to its internal resilience (Roux, 2012). Concurrently, articles refer to the pressure that its presence is placing on surrounding communities and the overall system has grown too. Predominantly local communities have been concerned about the uncertain future of Plastic View; would it be removed, maintained or formalised? This is one of the drivers behind fragile market perceptions that adversely affect property prices in the area (pre-recession) and alienate local communities (Roux, 2012). The second driver is that the informal settlements are linked to criminal activity in the surrounding neighbourhoods, triggering higher security measures as responses and subsequently higher criminal violence. The third driver is the loss of ecosystem services and reduced quality of the natural environment. Lack of sanitation and increased water use from the streams on site for cleaning and washing has led to pollution of the water courses and has negatively affected the overall environmental quality on site including the open space systems to which these streams connect in the intermediate and city-wide scale. Lastly, the recent court decision to formalise Plastic View creates a precedent for the city regarding its response to other informal areas within the region (Venter, 2012).

3.3 Press disturbances that created pulse disturbances within Plastic View

The last step looks at pressures that have led to pulse disturbances occurring within Plastic View which have thus far been overcome by the community. The first pulse disturbance deals with seasonal natural disasters. Winter shack fires are a reality due to a lack of building controls, shacks are built too close to each other without fire breaks or insulation; and due to a lack of municipal investment in clean or alternative energy for poorer communities, paraffin lamps and open fires are sources of heat in winter (SAPA, 2012). In summer, floods are a source of crisis. Plastic View is located on a flood plain with two streams running through part of the site. During heavy rains, the Rietvlei Dam upstream, as well as the storm water runoff from vast expanses of hard surfaces surrounding the site compounds the increased water flow (Mail & Guardian, 2008). Executed by the local authority, forced evictions have been a source of pulse disturbances; rising tensions from the local community propelled forced removals of a number of informal settlements in the area. For example in 2006 a clean-up project carried out by Metro Police resulted in shacks and their belongings being burnt in an effort to remove the Plastic View informal settlement and the homeless without any alternative accommodation provided, nor a court interdict (Venter, 2012). Another incident was repeated in a nearby informal settlement in 2010, this time carried out by the 'Red Ants' joint venture security guards (Hlahla, 2010). In turn, this resulted in another pulse disturbance, that of local non-government organisations intervening on forced removals by organising and offering assistance to the affected community, propelling a court case to secure the informal settlement onsite until alternative housing could be provided. The last pulse disturbance identified in the desktop study is the court decision to formalise Plastic View, leaving the informal community excited to have 'real homes at last' (Du Preez, 2012). Thus far, the internal resilience of the informal community has been strong, showing high degrees of adaptability and capacity for the continual process of change that is one of the often ignored positive characteristics of informal settlements (Huchzermeyer, 2008). How formalisation will impact on this resilience remains to be seen.

3.4 Multi-scale disturbance relationships

Having found press disturbances that have, and continue to affect the focal system of Plastic View, we move toward building an understanding of the multi-scale relationships that exist between them and the specific pulse disturbances that drive the study area. As pressure on the system intensifies over a long period of time, a release or collapse is usually an opportunity for reinvention, but only if a deeper consideration of the interplay between forces is understood. In the following section we begin by looking at the relationships between disturbances by referring to Figure 3, and describing these in narrative form.

LEGEND

1 – Planning Legacy
2 – Alternative Housing
3 – Policy
4 – Property Prices
5 – Crime
6 – Pollution & Loss of
    Biodiversity
7 – Flooding
8 – Fires
9 – Court Precedent
10 – Evictions
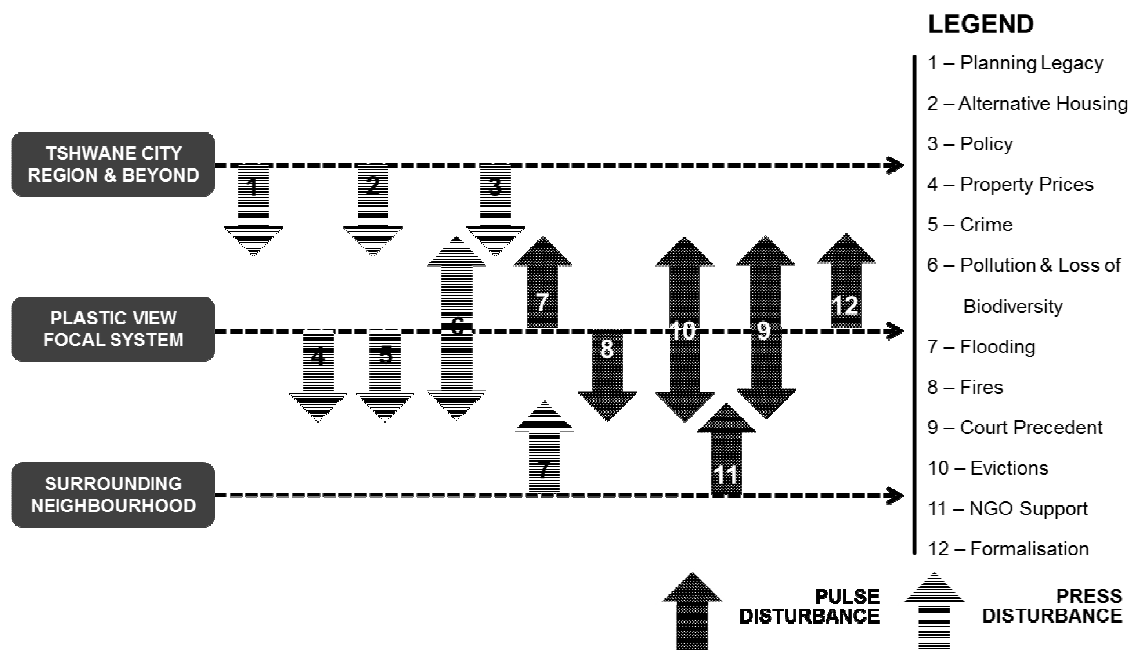11 – NGO Support
12 – Formalisation

Figure 3: A diagrammatic representation of the relationships between press and pulse disturbances across the Tshwane Panarchy as seen from Plastic View (Authors, 2012)

The Apartheid city plan continues to influence the functionality of the South African urban landscape (Issue 1), most prominently through limiting access as the 'townships' continue to be disconnected from other areas in the city. The nearest formal 'township' where many marginal workers live, is called Mamelodi and is located at least 20km away, too far to walk and too expensive to drive. The cost and time required to use public transport consumes a large percentage of disposable incomes, especially when many only have temporary jobs in Moreleta Park and need to be in the area in order to get more work or to cut their travel expenses (Hlahla, 2010). In addition, despite investment by most tiers of government from national to local to provide affordable housing (Issue 2) for the poor, it has largely been located in the traditionally 'black townships', adding to the difficulties faced by poorer people in getting to places of employment and generate livelihoods (Herve, 2009). With current policy promoting subsidised housing, as well as laws protecting tenants and squatters alike from eviction (Issue 3), the informal market has filled an essential gap in the city: providing flexible housing opportunities close to work opportunities. Unless there is a revision to planning schemes, and potentially the subsidised housing and eviction policy, innovative solutions for alternative affordable quality housing solutions for marginal urban South Africans are limited, unlike Elemental's Quinta Monroy in Iquique, Chile (Elemental, 2001).

As general press disturbances intensify, they create conditions that make settlements like Plastic View possible. The presence of informal settlements next to high-income residential suburbs links back to Issues 1-3; these suburbs offer places of employment and opportunities to build a livelihood, as well as the possibility of 'jumping the queue' to get access to subsidised housing. As a consequence of its emergence, Plastic View has started placing press disturbances of its own on the surrounding community; property prices have become fragile (Issue 4), perceptions that crime in the area emanates from the informal settlement (Issue 5), and the increasing pollution and degradation of the city-scale watercourses and their biodiversity (Issue 6).

The ripple effects of built up press issues are felt up to the city-region scale. Tension in the surrounding community has led the council to disrupt Plastic View on a few occasions through attempted land evictions (Issue 10). However, eviction policy (Issue 3) and the assistance of local NGO's protecting and supporting the settlers (Issue 11), has meant that there has been little change to the growth and longevity of the informal settlement. Natural disasters like seasonal flooding and fires (Issues 7 & 8) have not collapsed the settlement. Instead, they emphasise the connection to issues 1-3; since estate typologies and the commercial boom resulted in developments with expanses of hard surfaces, increasing storm water runoff and putting pressure on natural streams and storm water systems.

As press and pulse disturbances continue to impact on the panarchy, a recent pulse disturbance may have the greatest effect on the focal system. The recent court decision to formalise Plastic View (Issue 9) and permanently locate its legal residents in the area, sets a precedent for other similar instances of informality in the city (Issue 12). This will also have consequences for Issues 1-3: a) it will be an opportunity to integrate lost spaces in the disjointed city (Issue 1), by locating marginal workers closer to places of employment and spatially stitching communities together; b) it offers the poor alternatives to housing close to where they need to be to generate livelihoods (Issue 2) and c), it offers an opportunity to revisit current policy and find innovative ways to build adaptability and resilience into planning strategy (Issue 3). Issue 9 also affects the Plastic View community. It offers an opportunity to build resilience against natural disasters by applying methods that integrate natural processes and alternative planning, and also to build social resilience, strengthening the quality of educational, health, food security and recreational amenities for the informal settlement. Lastly, pulse Issue 9 has consequences for surrounding neighbourhoods; it offers the certainty of a workforce close to home and the possibility to build symbiotic networks of livelihoods that not only benefit the marginal workers in the informal settlement, but also most of the neighbourhoods around it.

Narrating these multi-scale relationships has highlighted the interconnectivity of disturbances in the panarchy and offers insight into understanding that as a system most events have an effect on the system as a whole, whether over a long period or suddenly, and that this effect filters through to other scales of the system (Capra, 1996). Further investigation of these relationships may enrich the research into mapping urban resilience of the City of Tshwane and may highlight that a necessary change is required in the way we think about development and planning for the future of South African cities. It shows that professionals, practitioners, academics and government officials involved in the built environment, need to rethink how we view change in urban systems (Wilkinson, Porter, & Colding, 2010) and identify potential therein for positive growth of urban systems in aspirational cities.

4. Conclusion

Having looked at the systemic pressures affecting the Tshwane city panarchy, from the perspective of an informal settlement called Plastic View, the understanding gained has shown that not only are the pressures exerted on the system multi-scaled, but also highly interconnected and interrelated. This understanding has led to the conclusion that current models of development are insufficient in dealing with press disturbances placed on

transitioning urban systems in South Africa while trying to cater for the demands of an increasingly Afropolitan society. This stems from lack of awareness about the interplay between press and pulse disturbances and their effects in the city. This understanding could assist in building resilience across the panarchy. Plastic View has demonstrated high levels of internal resilience while the surrounding neighbourhoods demonstrated weaker levels of resilience, partly due the uncertainty regarding the future of Plastic View. However, given the recent court decision to make it permanent, the integration of a lower income settlement close to wealthy suburbs may build diversity and capacity for overall system resilience, because its cross-scale networks are strengthened. This perspective offers an adaptable, dynamic and robust approach for assimilating changes into regenerative processes in the urban social-ecological system. Systemic change cannot be viewed as a linear concept, but rather as a dynamic framework (Wilkinson, Porter, & Colding, 2010) of interconnected and interdependent processes that collectively increase or decrease resilience.

Acknowledgements

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