

Environmental Science 301 Year Project

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The status and trends of plant biodiversity in public and private urban green spaces in three areas in Grahamstown with differing social-economic statuses

Group members:

Thomas Nunn

Sivuyisiwe Situngu

Nkosinathi Nama

Mzukisi Kuse

Lloyd McFarlane

Zimasa Mei

Supervisor: Charlie Shackleton

Introduction

Habitat loss and fragmentation mainly due to urban development and agriculture are important factors contributing to reduction in biodiversity (Rudd *et al*, 2002) and in the elimination of green spaces (Kong *et al*, 2010). The problem with urbanization is that it leads to transformation of natural environments and creates new, normally alien prone environments (Smith, 2005). Urban green spaces are defined as outdoor places with significant amounts of vegetation and exist mainly as semi-natural areas these are important harbours for remnant biodiversity (Kong *et al*, 2010). They maintain gene flow and facilitate dispersal, recolonization and migration of species (Kong *et al*, 2010).

Green spaces are important because this is the level of biodiversity at which people interact with nature hence monitoring measurements are best undertaken at this level (Tzoula and James, 2005). The interaction of people with nature is well documented in the paper by Tzoula and James (2005) and the subject is well linked to the effects of urban green spaces on human health and well being. Tzoula and James (2005) state that one link that is commonly recognized between green spaces and physical health is as simple as the opportunities for physical activities that green spaces provide.

In this State of the Environment Report, alien invasive species within both public and private green space and the biodiversity of both types of green space will be used as indicators for the state of the environment of Grahamstown. In our study of the urban green spaces the primary focus will be on how to maximize biodiversity within the town and management of alien invasive species in urban green spaces.

According to Lubbe *et al*. (2010) anthropogenic influences are the most dominant and persistent driving forces in species richness and biodiversity loss. South Africa has a political legacy of cultural separation and empowerment of the minority leading to wealth disparities which has created a social gradient by which gardens and public green spaces can be analysed.

Hypotheses:

It is hypothesised that human impacts on greenspaces (both public and private) lead to a decrease in native biodiversity and subsequent increase in alien plant invasion. Urban

greenspaces are acting as hubs for alien plant species. Furthermore there will be higher diversity in plant species within the affluent area than in the RDP and township areas.

Aims and Objectives

This project has posed a few questions and hypotheses which have been tested. Comparisons were made between private and public green spaces in the RDP, Township and Affluent areas of Grahamstown to identify whether there is a difference in biodiversity between the urban green spaces, and whether they are aiding an increase in native biodiversity or alien diversity. Previous studies have omitted gardens as they were seen to be semi-natural they were overlooked as being useful to ecological studies (Lubbe *et al.*, 2010). Lastly we will deal with human intervention in terms of the impact of humans on green space (both public and private) and whether it has led to a decrease in native biodiversity and a subsequent increase in alien invasion.

Study Area

Grahamstown was established by Colonel Graham in 1812, at the behest of the Governor of the Cape Colony, Sir John Cradock (Grahamstown handbook, 2011). This city is located at a latitude of -33.27 (33° 16' 0 S) and a longitude of 26.48 (26° 28' 60 E), it is situated in the Eastern Cape, and covers an area of 3,333,344 km² (Traveljournals, 2011). This is at the intersection of different climate zones which is why Grahamstown is characterised by very variable conditions (experience all four seasons in one day) (Grahamstown handbook, 2011). Grahamstown has a mean annual rainfall of 466mm and even though it has very variable climate, it still maintains moderate climate with temperatures ranging from 9 to 23°C (Grahamstown handbook, 2011), the mean temperature range during the time of collection was 24°C (SAexplorer, 2000). The hottest months are generally from December to March and the coldest are June to August (Grahamstown handbook, 2011). Due to the variability in climate Grahamstown supports a diverse flora as all major vegetation types of South Africa are found within a 150m radius of the city, there are four main biomes which border the city namely the Cape Fynbos, Karoo, subtropical thicket and grassland (Grahamstown handbook, 2011). The total population is 124,578 and 77.4% are black, 11.8% Coloured, 10% white, and 0.7% Asian, as of 2003 (Coega, development corporation, 2011). With the establishment of a few schools in the 1800s including the establishment of Rhodes University in the early

1900s Grahamstown has become a very important learning centre for the country (Grahamstown handbook, 2011). It is also an important legal centre with the Magistrates Court, Supreme Court and the Rhodes University Law School (Grahamstown handbook, 2011). Grahamstown has many challenges in terms of socio-economic issues which are mostly dealt with by a large number of volunteers (including Rhodes students) (Grahamstown handbook, 2011). There is definitely a legacy left by the apartheid era in terms of the distribution of the different races the blacks being more the less privileged mainly situated in the township and RDP area and followed by the coloured community and the more wealthier white community in the affluent area. According to the distribution mentioned services range from bad to best respectively.

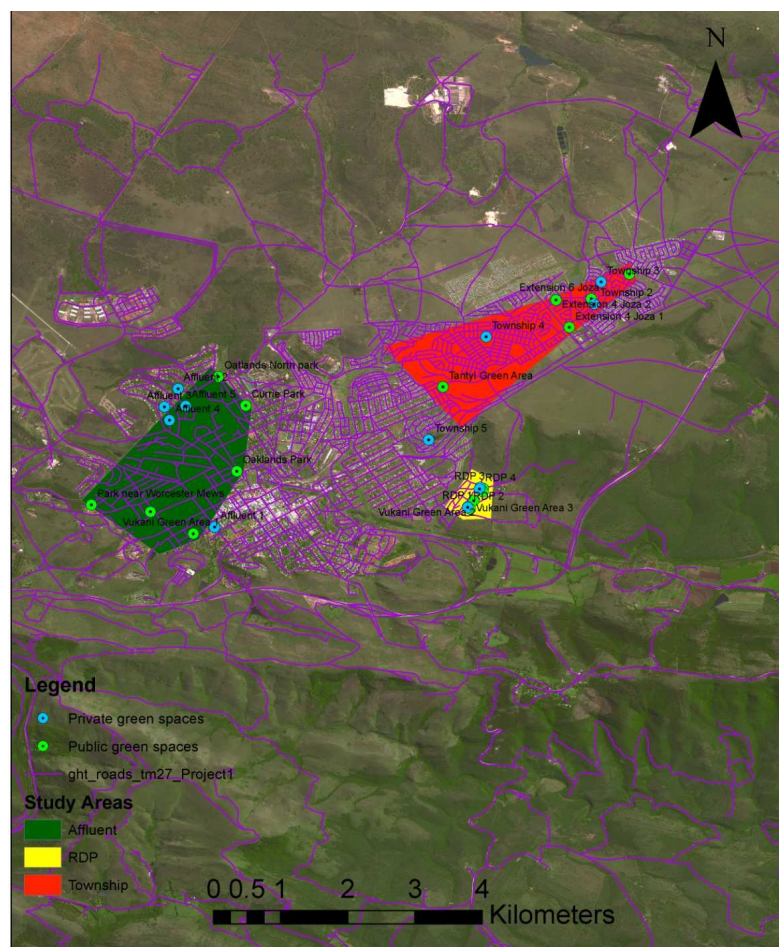


Figure 1: A GIS map of the study areas in Grahamstown

Methods

The study was carried out in three areas in Grahamstown, namely the affluent, township and RDP area. GPS points were collected for all the sample sites in the various study areas (Appendix 1). The GPS points were utilised to demarcate the varying sample sites within the three different areas in Grahamstown (Figure 1).

Data Collection

Five public green spaces and five private green spaces were sampled in each area. A 1m x 1m quadrant was outlined and percentage herbaceous species within the quadrant was estimated. The woody species were measured by the means of counting the number of trees in the area. The number of quadrants measured in each green space were done in proportion to the area of the green space, 4 quadrants for an area more than 1000m², 3 quadrants for an area less than 1000m² but more than 500m², 2 quadrants for an area less than 500m² but more than 100m² and 1 quadrant for an area less than 100m². All the samples collected were pressed in a plant press for later identification and determination of whether it's alien or indigenous.

Knowledge, attitudes and practices regarding biodiversity

A Knowledge, Attitude and Practices (KAP) approach to questioning was used as opposed to a formal questionnaire and three questions were asked for all the five houses from the three sites.

Questions asked:

1. Do you know about biodiversity, if you do please explain what you think it means?
2. What is your attitude towards biodiversity?
3. What practices do you do to conserve biodiversity?

For analysis a scale was used to compare the answers: Ranging from High, medium and low for knowledge and practices used to preserve biodiversity and positive, negative and neutral were used for scoring attitudes.

Data analysis

A Shannon diversity index, using the equation $H' = -\sum (P_i * \ln P_i)$, was calculated for each site as an indicator of the diversity of the green space, the five public and private sites in each area were then used to get an average of the Shannon diversity index for the public and private green spaces in each area. A two-factor ANOVA test was conducted to look for significant differences between the herbaceous and woody diversity within each area. The social interviews were used to correlate the KAP of private green space stakeholders with the diversity of each green space using a post-hoc Principle Component Analysis. The percentage abundance of alien herbaceous and woody species was calculated for each site and these values were used to get an average of the percentage abundance of alien species for public and private green spaces within each area. A two-factor ANOVA test was conducted for this data to look for significant differences of woody and herbaceous alien species within the public and private green spaces of each area.

Results

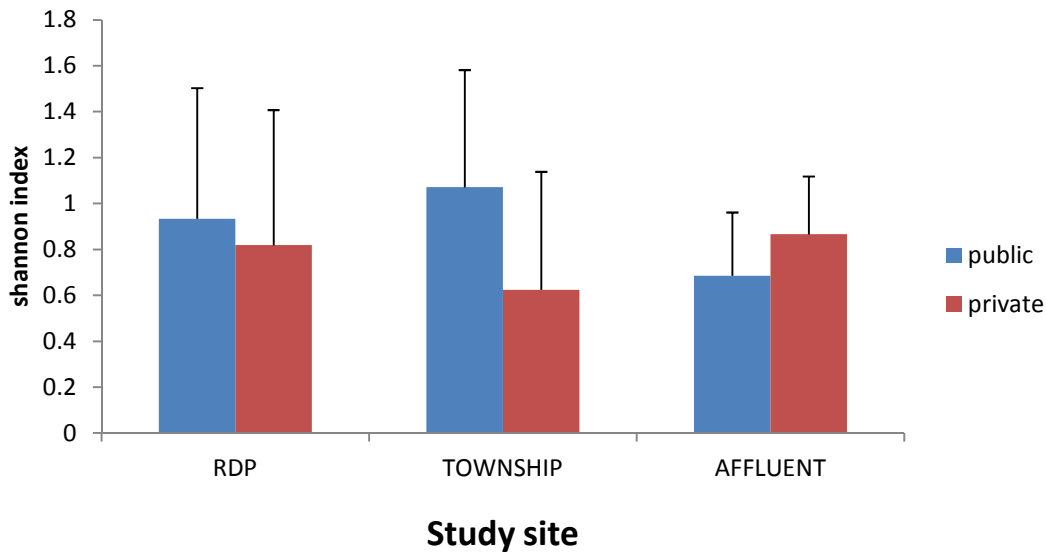


Figure 2: Herbaceous species diversity in private and public green spaces

The diversity of herbaceous species is significantly higher in the public green spaces of the township (p-value: 0.072) and the private green spaces of the affluent area (p-value = 0.0008). The high diversity of herbaceous species in the township is presumed to be because of the low diversity of woody species due to degradation of the public green spaces by the grazing of livestock, formation of foot paths and dumping of litter. These factors would have allowed for more herbaceous pioneer species to colonize these green spaces due to the open niches provided.

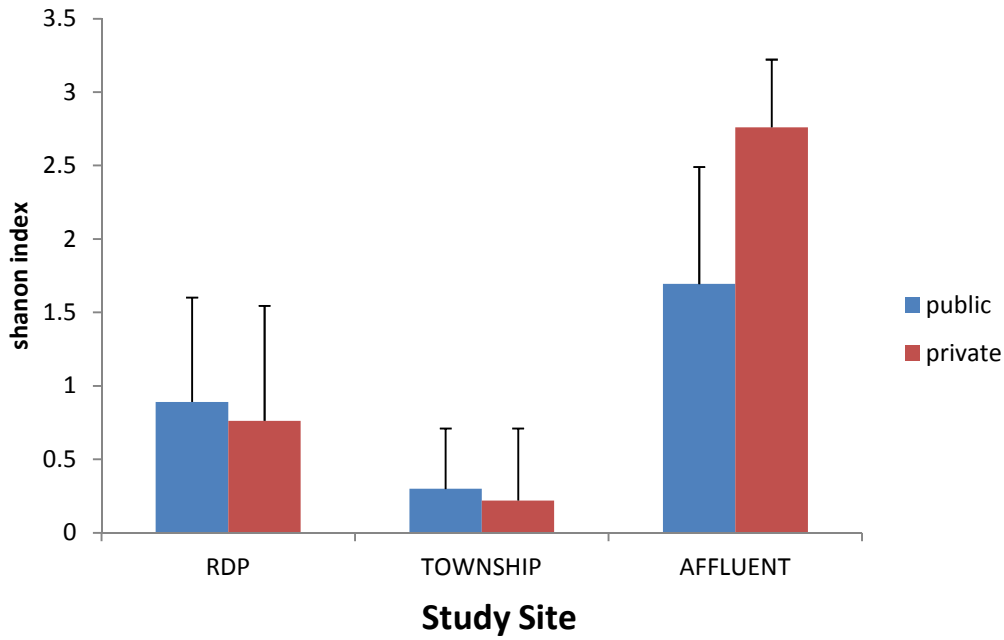


Figure 3: Woody species diversity index in the private and public green spaces

There was a higher diversity of woody plants in the affluent area than in the township and RDP areas, according to the results (see figure 3). The study carried out by McConnachie *et al.* (2008) also came forth with the issue of woody plants being unevenly distributed in favour of the wealthier areas in a town. The reason for this uneven distribution is that residential plots sizes are usually less in size in poor suburbs and therefore there is less chance to have proper green spaces (McConnachie *et al.*, 2008).

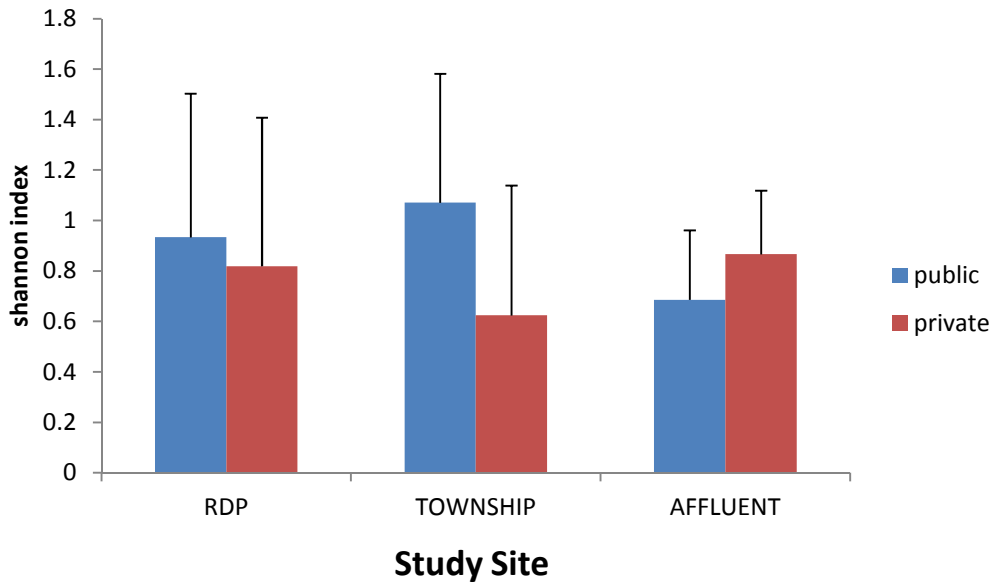


Figure 4: Percentage of alien herbaceous species in private and public green spaces

With regards to Figure 4, it appears that there are more herbaceous alien plants in the public green spaces in the township (16.1%), but there are more herbaceous alien plants in the private green spaces in the affluent area (13.8%). The abundance of alien herbaceous species in the private green spaces of the affluent area is presumably due to the selective introduction of these species by stakeholders for aesthetic purposes. The reason for abundance in herbaceous plants in the township area is because there is less maintenance of public green spaces and there are less woody species in the township.

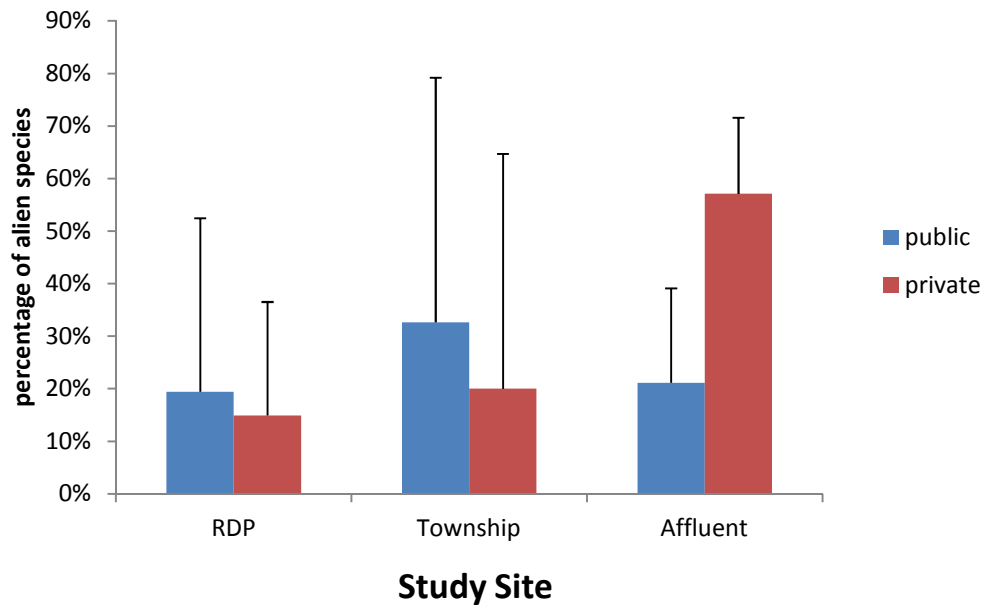


Figure 5: Percentage of alien woody species in private and public green spaces

According to the results there are more woody alien species in the private green spaces of the affluent area (57%) than in the township and RDP area (Figure 5). The abundance of woody alien plants in the affluent area can be explained by two factors (1) the introduction of ornamental plants in order to make gardens aesthetically pleasing and (2) the introduction of exotic fruit trees for food.

The results show that the affluent area has the more woody species in the private and public greenspaces when compared to the RDP and township.

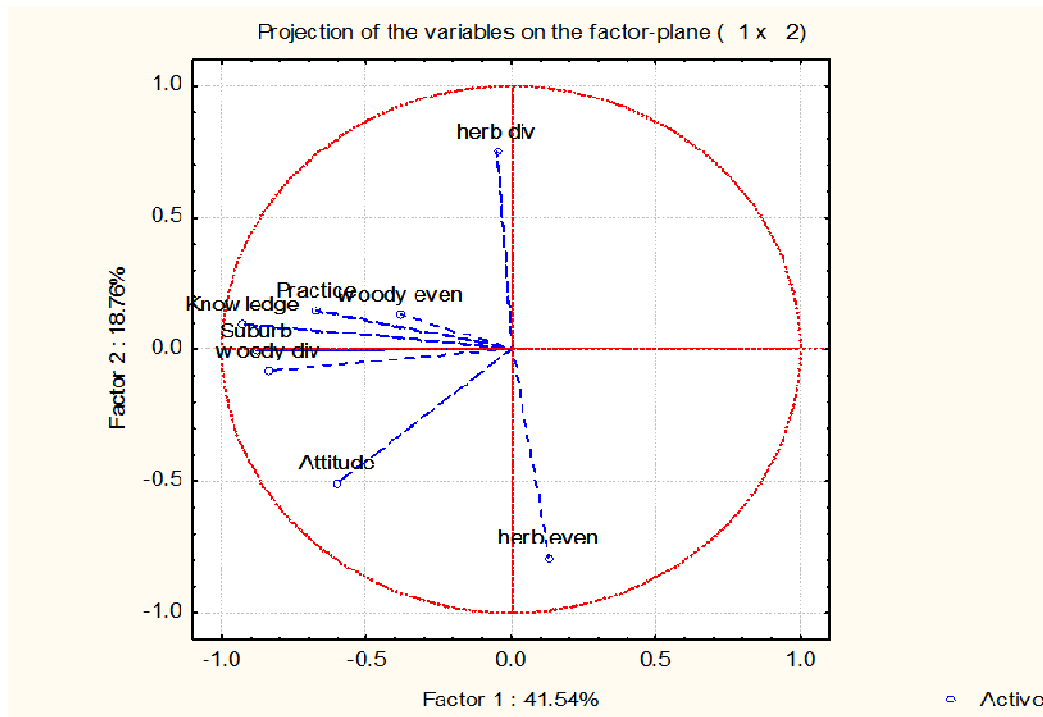


Figure 7: PCA showing correlations between the KAP, site location and species diversity

The post-hoc Principle Component Analysis (PCA) show the relationships between the knowledge, attitudes and practices (KAP) of the stakeholders, the location of the private green space and the biodiversity found in the private green spaces. Knowledge and practices are in the same quadrant in the graph and show a positive correlation between these factors and the biodiversity found in the private green spaces. This shows that stakeholders who have knowledge about diversity are practising what they know. This shows that practise is influenced by knowledge. The location is also shown to correlate with knowledge and practise. However attitude falls on the other side of the graph, and therefore has a negative correlation with biodiversity. Knowledge does not necessarily influence attitude however attitude is likely to influence practise. Woody diversity is strongly related to suburb, being highest in the affluent, lower in the township and least in the RDP. Herbaceous diversity and evenness are strongly negatively correlated, i.e. when one is high the other is low.

Discussion

Lubbe *et al.* (2010) show that there are clear indications of the effects of Social Economic Systems (SESs) on the plant species distribution patterns in the RDP, township and affluent areas within South African cities. Domestic gardens show larger species diversity this is a result of the luxury concept which states that resources can enable people to change their environment, while resource shortages can limit such changes (Lubbe *et al.* 2010). Cultural influences need to be considered as well. Land occupied by predominantly white Europeans is the most fertile as a result of the original white settlers and land laws (Lubbe *et al.* 2010). Non-fertile land is occupied by a different culture and class altogether. African cultures such as the Batswana, believe the area in front of a house should not have vegetation to reflect tidiness which leads to a loss of biodiversity in private green spaces (Lubbe *et al.* 2010). Affluent areas had considerably high species diversity and alien abundance values. This is attributed to historic cultural preferences and the amount of available resources that enable affluent people to create intensively managed vegetative environments. These inequalities are well known throughout South African cities, affluent houses with large plots and poor African suburbs with high housing densities (Lubbe *et al.* 2010).

Utilitarian plants are plants that can be cultivated for particular use values such as food or medicine (Lubbe *et al.* 2010). People of European origin rarely included utilitarian plants. For example poor households grow more fruit trees to prevent people from becoming dependant on market products. The poorer classes of the RDP and affluent have been noted to make use of utilitarian plants as a means to improve livelihood or increase income (Lubbe *et al.* 2010).

Biodiversity concerns in urban ecosystems can be divided into three major groups: (1) those related to the impact of the city itself on adjacent ecosystems; (2) those dealing with how to maximize biodiversity within the urban ecosystem and (3) those related to the management of undesirable species within the ecosystem (Savard *et al.*, 2000). The results showed no significant difference for both the herbaceous and woody species diversity between private and public green spaces of the different suburbs. Urban woodlands are an important component of the urban landscape in terms of bird species diversity. The larger the woodland the more species it can support. In a park, shrub abundance and distribution will influence the presence and abundance of bird species nesting in shrubs whereas park distribution, size and

abundance in a city will affect bird diversity (Savard et al., 2000). Savard *et al.* (2000) go on to say that greenways act not only as movement corridors but can also provide breeding habitats for several edge species. An increase in the volume and diversity of vegetation in a city would increase bird abundance and diversity. The biodiversity of plants in green spaces can be applied to invertebrates and small mammals too. Fuller *et al.* (2007) showed that there is a positive relationship between the number of woody species and the psychological wellbeing of individuals (Figure 6). Therefore bigger green spaces will have more woody species which will ultimately lead to the psychological well being of the users.

In common with other studies done on this topic, the study conducted showed that the distribution of plant species richness is not evenly distributed amongst the different township, RDP and affluent areas. Spatial heterogeneity can be observed in urban areas due to socio economic differences within each area (McConnachie and Shackleton, 2010). Although woody species richness was the highest in the affluent private green spaces (Figure 6), this high number was characterised by a high number of alien plant species (Figure 5). The abundance of woody alien plants in the affluent area can be explained by two factors (1) the introduction of ornamental plants in order to make gardens aesthetically pleasing and (2) the introduction of exotic fruit trees for food. McKinney (2006) and McConnachie *et al.* (2008) state that replacing of native plant species with invasive alien plant species creates a phenomenon called biotic homogenisation. The study carried out by McConnachie *et al.* (2008) also came forth with the issue of woody plants being unevenly distributed in favour of the wealthier areas in a town. The reason for this uneven distribution is that residential plot sizes are usually smaller in size in poor suburbs and therefore there is less space for woody species to colonise the areas (McConnachie *et al.*, 2008). Zipperere (1997) states that in comparison to rural forests, urban public green spaces have an increased presence of exotic plants which results in high species richness. The use of land also has a profound effect on the distribution of plant species. As stated earlier the RDP area is a fairly new housing establishment on the fringes of Grahamstown, there is therefore not much land vegetation change in this area in terms of both public and private green spaces. Figure 4 illustrates indicates that less than 20% alien invasive plants both for the woody and herbaceous plant species in the RDP area when compared to township and affluent areas. Pickett *et al.* (2001) state that the types of land use in urban stands affects the composition of plant species in the area. The interior urban green spaces usually have more exotic plant species than those on the fringes (Moran, 1984). This statement is further strengthened by Kowarik (1990), who

states that the presence of native plant species decreases from the fringes to the centre of the city.

McConnachie and Shackleton (2010), state that both public and private green spaces are influenced by the level of education and wealth. The affluent area has many more exotic species and higher species diversity specifically in private plots (Figure 2, 3, 4, 5, 6) than the township and the RDP areas and this correlates with this statement. The residents in the affluent area are wealthier and more educated than those in the township and RDP areas which are far more denser, therefore greater diversity is found as exotic species are bought and planted in this area and there is more land area per capita as the housing is far less dense (McConnachie and Shackleton, 2010). Pickett *et al.* (2010) also states that in a study done in Argentina it was found that at a given housing density, more affluent areas had a higher percentage of exotic species than no affluent ones. The correlations between knowledge, practise and biodiversity found in the PCA (Figure 7) support this statement.

Conclusion

Biodiversity conservation within towns and cities has a significant role in minimising both species extinction and the extinction of the human experience with wildlife. Parks and reserves remain the focus of urban nature conservation; private gardens offer extensive, unique resources for enhancing biodiversity. Gardens can be viewed as specific habitats. Gardens could be managed collectively as interconnected patches or networks of green space that can act at multiple scales across the urban landscape. This could be prominent in future urban development scale and this needs to be emphasised, in this case one must act locally but think globally (Goddard *et al.*, 2009).

Salvard *et al.* (2010) states that well vegetated residential areas constitute aerial corridors through their tree canopy. Such corridors are especially useful for migrating birds which use them extensively as they provide food and protection against aerial predators. Vegetation corridors linking urban green areas between themselves with natural habitats are important to maintain and enhance urban biodiversity (Salvard *et al.*, 2010). They facilitate movements and ensure colonization of isolated natural areas. Size and shape of green areas is important in

determining the number of species they attract (Salvard *et al*, 2010). These patches of natural habitats can greatly enhance local bird diversity. Riparian areas along streams provide important corridors for wildlife in urban areas. Preservation of the vegetative integrity of these natural greenways can significantly enhance urban biodiversity. Degraded urban habitats can be restored and contribute to local biodiversity, as well as to the development of restoration techniques for natural ecosystems.

Recommendations to increase biodiversity

In urban areas home-owners can take various actions on the scale of their lot. It is important to realize that it is the concerted efforts at various scales that produce the best results. It is essential that home-owners realise that their own local action can contribute to a larger collective effort that would culminate in the creation of a real biological corridor that facilitates the movements of several species throughout the city. Such collective efforts proved quite powerful in Belgium (Savard *et al.*, 2000).

Urban planners can act on a larger scale to incorporate biodiversity conservation in their plans, urban growth must now take into consideration the creation of large recreational areas and these must remain as natural as possible (Savard *et al.*, 2000). In this case the Grahamstown municipality needs to start up projects for planting trees and maintaining of urban greenspaces in the RDP and Township areas as they do in the affluent area (differences in appearance due to maintenance or lack thereof are illustrated in appendix 2).

The restoration of degraded green spaces through planting of indigenous vegetation, clearing of dumped rubbish and the fencing off of designated green areas will help to increase vegetation volume and plant biodiversity which would thus increase invertebrate, mammal and bird abundance and diversity.

References

Coega, development corporation, Grahamstown: Makana municipality, 2011. [Online]. Available: <http://www.coega.co.za/> [08/09/11].

Fuller, R.A., Irvine, K.N., Devine-Wright, P., Warren, P.H., & Gaston, K.J. 2007. Psychological benefits of greenspace increase with biodiversity, *Biology Letters*, 3:390-394.

Grahamstown Handbook, 2011. [Online]. Available: <http://www.grahamstownhandbook.co.za/> [13/10/11].

Goddard, M.A., Dougill, A.J., Benton, T.G., 2009. Scaling up from gardens: Biodiversity conservation in urban environments. *Trends in Ecology and Evolution*, 25(2): 90-98.

Kowarik, I., 1990. Some responses of flora and vegetation to urbanization in Central Europe, *Sukopp*: 45–74.

Lubbe, C.S., Siebert, S.J., Cilliers, S.S., 2010. Political legacy of South Africa affects the plant diversity patterns of urban domestic gardens along a socio-economic gradient, *Academic Journals*, 5(19): 2900-2910.

McConnachie, M.M., Shackleton, C.M., 2010. Public greenspace inequality in small towns in South Africa, *Habitat International*, 34: 244-248.

McConnachie, M.M., Shackleton, C.M., and McGregor, G.K., 2008. The extent of public green space and alien plant species in 10 small towns of the Sub-Tropical Thicket Biome, South Africa. *Urban Forestry & Urban Greening*, 7: 1-13.

McKinney, M.L., 2006. Urbanisation as a major cause of biotic homogenisation. *Biological Conservation*, 127: 247-260.

Moran ,M.A., 1984. Influence of adjacent land use on understory vegetation of New York forests. *Urban Ecology*, 8: 329–40.

Pickett, S. T. A., Cadenasso, M. L., Grove, J. M., Nilon, C. H., Pouyat, R. V., Zipperer, W. C. and Costanza, R., 2001. Urban ecological systems: Linking terrestrial ecological, physical, and socioeconomic components of metropolitan areas. *Annual Review of Ecology, Evolution and Systematics*, 32: 127–57.

Rudd, H., Vala, J., and Schaefer, V., 2002. Importance of Backyard habitat in a comprehensive biodiversity conservation strategy: A connectivity analysis of urban green spaces. *Restoration Ecology*, 10(2): 368-375.

SA explorer. Grahamstown climate, [Online]. Available:

http://www.saexplorer.co.za/south-africa/climate/grahamstown_climate.asp [08/09/11].

Savard, J.L., Clergeau, P. and Mennechez, G., 2000. Biodiversity concepts and urban ecosystems. Landscape and urban ecosystems. *Landscape and urban planning*, 48: 131-142.

Smith R.M., Gaston K.J., Warren P.H., and Thompson K., 2005. Urban domestic gardens: relationship between land cover composition housing and landscape. *Landscape Ecology*, 20(2): 235-253.

Smith R.M., Warren P.H., Thompson K., and Gaston K.J., 2005. Urban domestic gardens (VI): environmental correlates of invertebrate species richness. *Biodiversity and Conservation*, 15: 2415-2438.

Traveljournals, 2011. Grahamstown. [Online]. Available:

http://www.traveljournals.net/explore/south_africa/map/m1802709/grahamstown.html

[08/09/11].

Tzoulas K, and James P., 2005. Surrogate measures for urban biodiversity, and human health and well being, in: 5th International Postgraduate Research Conference, 14th-15th April 2005, University of Salford.

Zheng , D., Chen, J., 2000. Edge effects in fragmented landscapes: a generic model for delineating area of edge influences. *Ecological Modelling*, 132: pp. 175-190.

Zipperer, W.C., Foresman, T.W., Sisinni, S.M., Pouyat, R.V., 1997. Urban tree cover: an ecological perspective *Urban Ecosystems*, 1: 229-47.

Appendix 1

The details recorded for each greenspace measured.

PUBLIC GREEN SPACES						
Point ID	Date of Capture	Y_Coord Value	X_Coord value	Type1	Name	Other Attribute Data
1	2011/08/24	33.31429	26.51963	PGS RDP 1	Vukani Green Area 1	RDP houses surrounding, cows, litter and worn paths
2	2011/08/24	33.30988	26.5572	PGS RDP 2	Vukani Green Area 2	RDP houses surrounding, litter and worn paths
3	2011/08/24	33.31099	26.5567	PGS RDP 3	Vukani Green Area 3	Huge amounts of litter, huge amounts of aloes and other small shrub-like plants
4	2011/08/24	33.30823	26.55847	PGS RDP 4	Vukani Green Area 4	Few aloes and small amount of litter as well as worn paths
5	2011/08/24	-33.3087	26.55841	PGS RDP 5	Vukani Green Area 5	Lots of aloes, medium litter and worn paths
6	2011/08/24	33.29462	26.55305	PGS Township 1	Tantyi Green Area	Low amounts of rubbish, many small shrubs
7	2011/08/24	33.28659	26.56998	PGS Township 2	Extension 4 Joza 1	Very worn paths, dry river canal running through middle, little

						rubbish and shrubs
8	2011/08/24	33.27947	26.57802	PGS Township 3	Extension 7 Joza	Very flat, shrubs and lots of litter and near primary school
9	2011/08/24	33.28297	26.5682	PGS Township 4	Extension 4 Joza 2	Donkeys present, small shrubs, lots of mud and litter, near Shield of Faith church
10	2011/08/24	33.28279	26.57293	PGS Township 5	Extension 6 Joza	Lots of litter and concrete rubble, opposite Mr Nice spaza shop
11	2011/08/24	33.31137	26.51389	PGS Town 1	Park opposite HKE Department	Short grass and no shrubs, only disturbances are molehills and electricity conductor
12	2011/08/24	33.30591	26.52546	PGS Town 2	Oaklands Park	Short grass with concrete pathway and large amount of tall trees
13	2011/08/24	33.29711	26.52665	PGS Town 3	Currie Park	Cow, short grass and a few shrubs and trees, extremely large park
14	2011/08/24	33.29324	26.52301	PGS Town 4	Oatlands North park	Lots of mud, donkey, litter, short grass next

						to river with large number of high reeds
15	2011/08/24	33.31043	26.50597	PGS Town 5	Park near Worcester Mews	Short grass and a few trees
PRIVATE GREEN SPACES						
Point ID	Date of Capture	Y_Coord Value	X_Coord value	Type1	Name	Other Attribute Data
16	02/09/2011	-33.3107	26.55636	RDP 1	Vukani Green Area 1	Mr Cheap's shop, China Manana street
17	02/09/2012	33.31077	26.55637	RDP 2	Vukani Green Area 2	9725, China Manana street
18	02/09/2013	-33.3081	26.55804	RDP 3	Vukani Green Area 3	10062, near tshangisa's spaza
19	02/09/2014	33.30831	26.55796	RDP 4	Vukani Green Area 4	Makana veleni street
20	02/09/2015	-33.8087	26.55767	RDP 5	Vukani Green Area 5	Near no. 80
21	02/09/2016	33.03082	26.54447	Township 1	Tantyi Green Area	Ext 4, 3739
22	02/09/2017	33.28349	26.57333	Township 2	Extension 4 Joza 1	Ext 6, flats on the road, near no.4925
23	02/09/2018	33.28053	26.57425	Township 3	Extension 7 Joza	Ext 6, greenhouse, near

						shop in road
24	02/09/2019	33.28789	26.55883	Township 4	Extension 4 Joza 2	Opposite PP school, green and joined
25	02/09/2020	-33.3017	26.55114	Township 5	Extension 6 Joza	Hlalani, mud house
26	02/09/2021	-33.3134	26.52248	Affluent 1	Park opposite HKE Department	John's house, near dam
27	02/09/2022	33.29485	26.51758	Affluent 2	Oaklands Park	Nigel Barker, house no. 2
28	02/09/2023	-33.2973	26.51574	Affluent 3	Currie Park	Fred's house, 15 Dulverton street
29	02/09/2024	33.29908	26.51646	Affluent 4	Oatlands North park	Saskia Fourie, 5 Dulverton street
30	02/09/2025	33.29714	26.51862	Affluent 5	Park near Worcester Mews	Charlie Shacleton, no. 3, opposite Graeme College

Appendix 2

Pictures of examples of the greenspaces found in each of the three studies areas



Picture of one of the greenspaces sampled in the RDP area.



Picture of one of the greenspaces sampled in the township area



Picture of one of the greenspaces sampled in the affluent area.