Human Activities and Urban Green Spaces of Slum-Dwelling Areas. A Case of Dandora Estates, Nairobi County

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Abstract

Rapid urbanization, coupled with population influx in many developing countries worldwide, is a prominent cause of the depletion of urban green spaces (UGS). These beautiful, green, and tranquil areas within urban forms are being depleted due to increased human interference in cities and urban areas globally. This paper examines the implications of various human activities that dominate the urban green spaces of Dandora by engaging with household heads and those found undertaking activities within the UGS. The results indicate that residents' participation in social and economic activities had a positive correlation (0.18 and 0.304, respectively) with the negative effects on UGS, while residents' participation in environmental activities had a negative correlation (-0.502) with the latter. The findings establish that the primary positive effect resulting from human activities practiced in the UGS in Dandora was increased UGS users who increased utility and made use of these spaces. Some of the recommendations include: the county government should reclaim and rehabilitate any open space that may have been encroached upon to facilitate other unplanned and haphazard developments. This move will tend to increase the green space size as they originally were, making them more functional, usable, and accessible to the public. The Ministry of Land needs to invest in a centralized land information system and Geographic Information System as a tool in innovative land use planning to reduce encroachments. There is a dire need for architects, engineers, and environmentalists within the country to advise and educate real estate developers on the importance of biophilic design to the contemporary urban form.

Keywords: Urban Green Spaces (UGS), Human activities, Slum dwelling areas, Dandora

Introduction

UGS are facing depletion at an alarming rate due to increasing incompatible interests exhibited by developers and conservationists, particularly with the world's urban population now standing at 4.4 billion, which is 55.7% of the total human population (World Bank, 2021). The World Bank (2021) projects that by 2030, there will be a further 4.3% increase in the urban population. Several studies have shown and predicted the implications of population influx and urbanization on the availability of UGS. The World Bank (2021) concurs with Twumasi and Merem (2020), Essel (2017), and UN-HABITAT (2012) that if the population rise in these cities remains unchecked, then more and more UGS will be sacrificed to provide the surplus population with spaces for constructing settlements and other human-made structures. Adjei (2014) and Che Khalid (2014) report that UGS occupy a small portion of the total urban landmass in several urban areas, especially in Third World countries. In industrialized countries, rigorous restoration and reclamation actions are taken on the available UGS. These efforts have been successful due to active land-use planning and the high regard for managing these spaces by the urban municipal administration (Koomen & Dekkers, 2013).

A study carried out in 386 European cities on change in land use found a decline in the coverage of UGS by Fuller and Gaston (2001) attributed urbanization as a major cause of the problem. In Britain, the parks and the community gardens are facing a great danger due to the reduction in their maintenance budget (Benjamin & Aletha, 2016). They are now exploited commercially by the private sector and community associations around them (UK Paliament, 2017). The consequences of these actions have led to the parks becoming shabbier and untidy. In some other parks there is random deforestation of the trees and increase of herbicides usage, which leave the latter compromised and forcing some to be shut down (Kristoffersen, Rask, & Grundy, 2011). Increased commercial activities such as mobile fast-food units are dominant inside these spaces but again with most of them lacking appropriate waste management procedures. The result of indiscriminate solid waste management in urban green spaces results include decreased ecosystem value, disruption of peace and a compromising health status of both humans and animals that live in the park's vicinity (Moore, 2017).

Newest and largest public green space, Vacaresti National Park in Bucharest, has a bit of anomaly as well; the national park is wild and untamed (Hickman, 2016). The presence of the park in the city and the nature of increased urbanization has led to tradeoffs with investors willing to pay more to get land and erect their premises and naturalists needing the space to be protected and conserved for the benefit of the natural ecosystem and man-made ecologies (Tribillion, 2016). In 2014 the Vacaresti Park was subjected to small-scale logging and illegal dumping (Hickman, 2016). These unsustainable issues in the park exhibit the failure of the law and policy making and lack of government support.

The degradation of UGS is a more pressing issue in developing nations than in developed countries. Studies conducted by Fawape and Onyekwelu, (2011); Mpofu, (2013) and Mensah, (2014) on urbanization and land use change in selected African cities, including Abidjan, Lagos, Dakar, Accra, and Freetown, indicate that UGS lands are being converted into spaces suitable for human development only. This trend is largely driven by the growing urban population's demand for infrastructure development, resulting in a low coverage of UGS landmass in most African cities. In many cases, available UGS covers less than 10% of the total urban landmass.

In Kenya, the issue of increased human activities in UGS is a common occurrence in many towns, and the overall impact has been negative, as noted by George (2009). In Kisumu, for instance, several UGS parks, including Maendeleo, Taifa, Market, and Jamuhuri Park, exhibit very poor environmental conditions, such as littering and illegal dumping of solid waste, which are attributed to the economic activities that take place in them (George, 2009). This situation is linked to the lack of environmental education programs and the failure of urban planning and management within the town, as observed by Owino, Hayombe, and Agong', (2014).

In Nairobi, urban green spaces (UGS) are under significant threat from investors who prioritize their own commercial interests. Numerous playgrounds in schools and other UGS, intended for social amenities, have been subject to land-grabbing. This situation has arisen due to a combination of factors such as poor planning, corruption, non-enforcement of laws and uncoordinated constructions, which have all contributed to the destruction of public and UGS in Nairobi County. (Mgunda et al., 2022; Kenya Alliance of Resident Association, 2017; Greenspace-policies-Tobiko, n.d.)

This paper presents a study conducted to evaluate the implications of human activities carried out in UGS in Dandora Estates of Nairobi County, Kenya. The study aims to capture the status of a developing country where rapid urbanization and a significant population influx have been witnessed. To ensure sustainability, this study also aims to provide appropriate mitigation strategies that will conserve and preserve UGS, while permitting their limited use that does not negatively impact existing green spaces.

The findings of this research are expected to make a significant contribution to the protection, conservation, and management of UGS in Dandora and other areas with similar characteristics. The research will inform control measures that could be adopted by county governments in Kenya to manage human activities that may lead to degradation of green spaces in their respective towns. The study results will also aid in the development of strategies to ensure appropriate location and activities for UGS in urban towns. The Urban Planning and Design department of Nairobi County could use these findings to design suitable plans for green spaces in other growing towns within the county to achieve Sustainable Development Goal 11, which pertains to sustainable settlements of cities and communities. Furthermore, the study aims to encourage institutions such as the National Environmental Management Authority (NEMA), the United Nations (UN), and other Non-Governmental Organizations (NGOs) to uphold the necessary policies and legal frameworks for the establishment and maintenance of UGS.

Materials and Methods

The study was be conducted in Dandora estates. Dandora is an eastern suburb in Nairobi, Kenya. It is part of the Embakasi North Division. Surrounding neighborhoods include Kariobangi, Baba Dogo, Gitare Marigo and Korogocho. It lies 1.2483°S, 36.9026°E (LATITUDE, 2018).

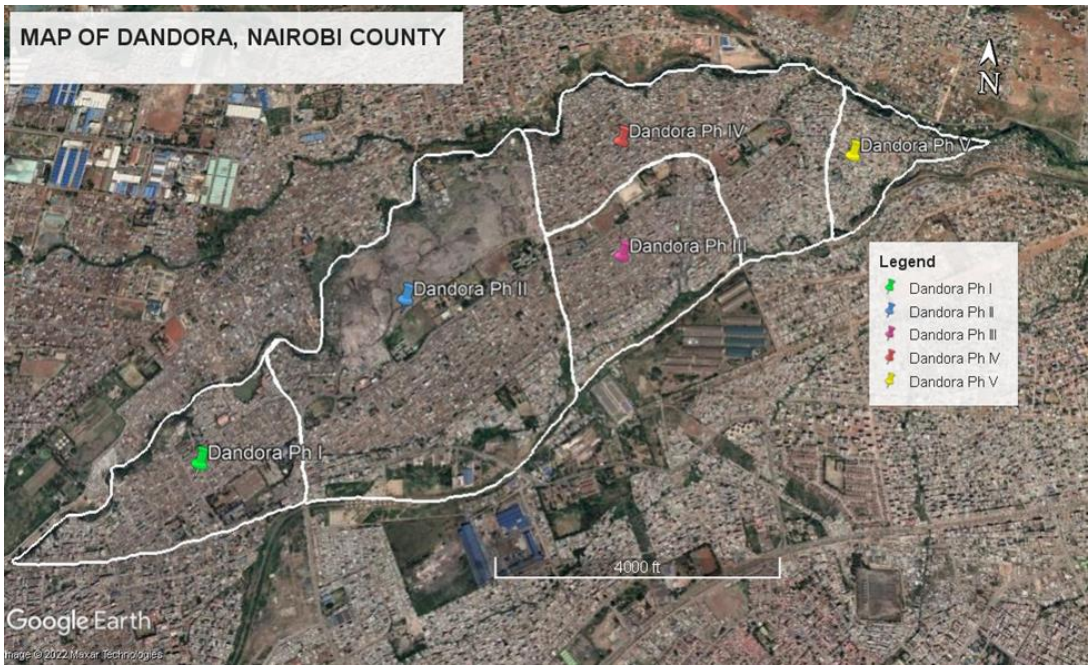

Figure 1: Map of Dandora Estates, Nairobi County

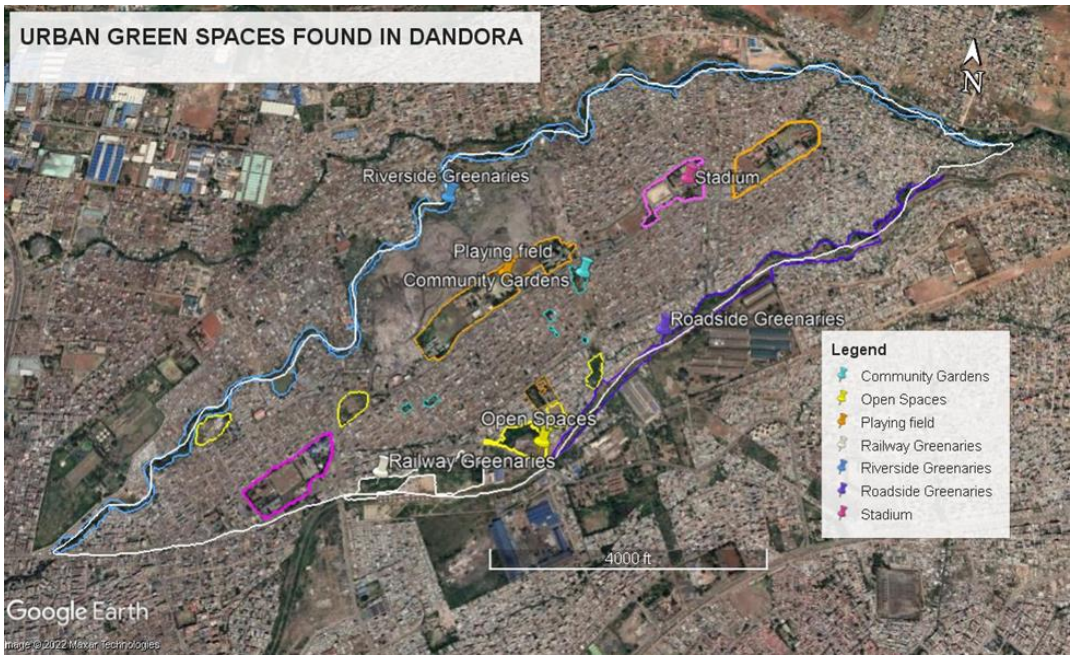

Figure 2: Map of UGS found in Dandora Estates

The study employed both qualitative and quantitative research methods to investigate the various impacts of human activities on UGS. Qualitative analysis explored activity diversity, their effects on UGS, and informant attitudes, while quantitative data quantified various actions and opinions, and check the relationship between human activities and their effects on UGS. Using a sample survey design, observation and questionnaires were conducted.

The study was conducted among resident of Dandora and targeted the households as special respondent group in the study because they have high likelihood of possessing past and present knowledge of activities carried in and out of the green spaces which surrounds them. Dandora has a population of 295,5670 residents (KNBS, 2019). The sample size for this research was be calculated using the formula by Naissuma (2000) below:

$$n = \frac{N \times Cv^2}{Cv^2 + (N-1)(e)^2}$$

Where:
n = sample size
CV = coefficient and variance 50%
N = population size
e = allowed error +5%
1=the desired level of precision

$n = \frac{(295{,}670)(0.5)^2}{(0.5)^2 + (295{,}670-1)(0.05)^2}$=99.999665=**100**

A structured questionnaire was used to collect data randomly from 100 respondents (household heads), proportionally among the 5 stratas (wards). The questionnaire was be separated into three major segments: i) socio demographic information ii) diverse types of human activities carried out in the UGS iii) positive impacts of human activities in UGS iv) negative impacts of human activities in UGS v) Overall impression of the UGS. Data collection was carried out within a span of one month, August of 2022. A maximum of 20 minutes was given to respondents to allow them to answer the questions. Visits by the researcher on the UGS necessitated interview with those found undertaking different activities within. Thirty of such businesspeople were interviewed. Observation checklist and use of photography were employed to supplement the questionnaires with more information.

Table 1: Summary of Data Matrix (Sources, Collection Methods, Analysis and Presentation) for the Objective

Research objectives	Data needs (Variables)	Data sources	Data collection methods	Data analysis method	Data presentation methods	Expected outcomes
To determine impacts resulting from human activities on urban green spaces in Dandora.	Positive effects on the UGS observed by the residents resulting from human activities carried in UGS. -Negative effects on UGS observed by residents resulting from human activities carried in UGS -Overall impression of the UGS - Current pictures on status of UGS	Field Survey	Observation Questionnaires	Descriptive analysis (SPSS & MS Excel)	Charts Tables Descriptive report	A detailed descriptive report indicating effects resulting from human activities carried on the UGS.
H0; There is no relationship between human activities (social, economic, environmental activities) and the effects on UGS.	Relationship between social, economic, environmental activities and effects on UGS.	Field survey	Questionnaire	Spearman's Correlation Analysis (SPSS & MS Excel)	Tables	Comprehensive inferential report to disapprove or to agree with this null hypothesis.

Results and Discussion

Effects of Human Activities on UGS

Positive Effects of Human Activities on UGS

The respondents were given a list of positive effects that human activities have on UGS so as to rate on a 3-point Likert scale. 1-Lowly Significant extent, 2-Moderately significant, 3-Highly significant extent. Based on the study findings, the respondents agreed that the following is the extent of positive effects that human activities pose to UGS; Reduction of pollution of rivers , streams and drainage system (M=1.36, SD=.689), Sustainable solid waste management (M=1.24, SD=.622), Soil conservation (M=1.36, SD=.628), Stable security (M=1.15, SD=.435), Increased wildlife species population (M=1.53, SD=.834), Afforestation (M=2.27, SD=.777), Green grabbing (M=1.52, SD=.785), Provision of children play area (M=1.50, SD=.718), Increased aesthetics (M=1.40, SD=.752) as well as effective management and maintenance (M=1.42, SD=.684). Afforestation was the highest positive impact as a result of human activities on UGS in Dandora.

The aggregate mean for sub variables under positive effects of human activities on UGS recorded at 1.48 with a low standard deviation of 0.76. Based on the measurement scale, the values translate to lowly significance. This implies that majority of the respondents agreed that positive effects of human activities on UGS to be lowly significance. (Table 2) and Figure (Figure 3) below.

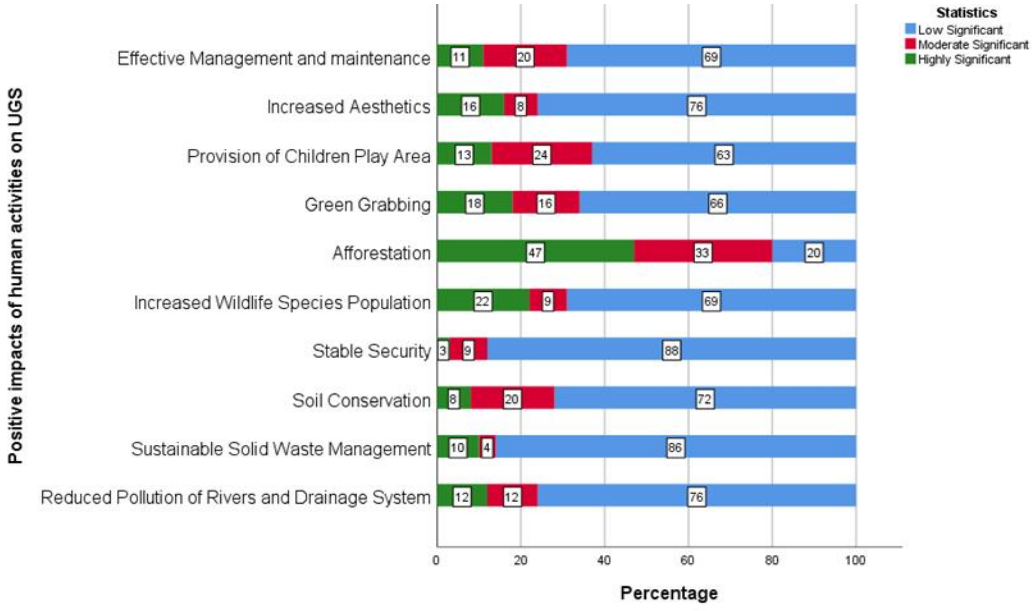

Figure 3: Percentages of positive effects of human activities on UGS

Table 2: Positive Effects of Human Activities On UGS

Positive effects of human activities on UGS	Mean	Std. Deviation
Reduced Pollution of Rivers and Drainage System	1.36	.689
Sustainable Solid Waste Management	1.24	.622
Soil Conservation	1.36	.628
Stable Security	1.15	.435
Increased Wildlife Species Population	1.53	.834
Afforestation	2.27	.777
Green Grabbing	1.52	.785
Provision of Children Play Area	1.50	.718
Increased Aesthetics	1.40	.752
Effective Overall Management and maintenance	1.42	.684
Aggregate	1.48	

Negative Effects of Human Activities On UGS

The respondents were given a list of negative effects that human activities have on UGS so as to rate on a 3-point Likert scale. 1-Highly Significant extent, 2-Moderately significant, 3-Lowly significant extent. Based on the study findings, the respondents agreed that the following is the extent of negative effects that human activities pose to UGS; Pollution of rivers and streams (M=1.87, SD=.812), Poor solid waste management (M=1.44, SD=.715), Reduced vegetation cover (M=1.97, SD=.687), Soil erosion (M=2.12, SD=.798), Idlers/Insecurities (M=1.51, SD=.798), Reduced wildlife species population (M=1.90, SD=.759), Deforestation (M=2.25, SD=.592), Land use change/ land grabbing (M=1.63, SD=.812), Limited children play area (M=1.48, SD=.731), Reduced aesthetics (M=1.27, SD=.584) as well as Poor management and maintenance (M=1.70, SD=.870). Reduced aesthetics was the highest negative impact as a result of human activities on UGS in Dandora. UGS were lowly impacted in terms of deforestation as seen in the table (Table 3) and (Figure 4) below. The aggregate mean for sub variables under negative effects of human activities on UGS recoded at 1.73 with a low standard deviation of 0.76. Based on the measurement scale, the values translate to high significance. This implies that majority of the respondents agreed that negative effects of human activities on UGS to be highly significance.

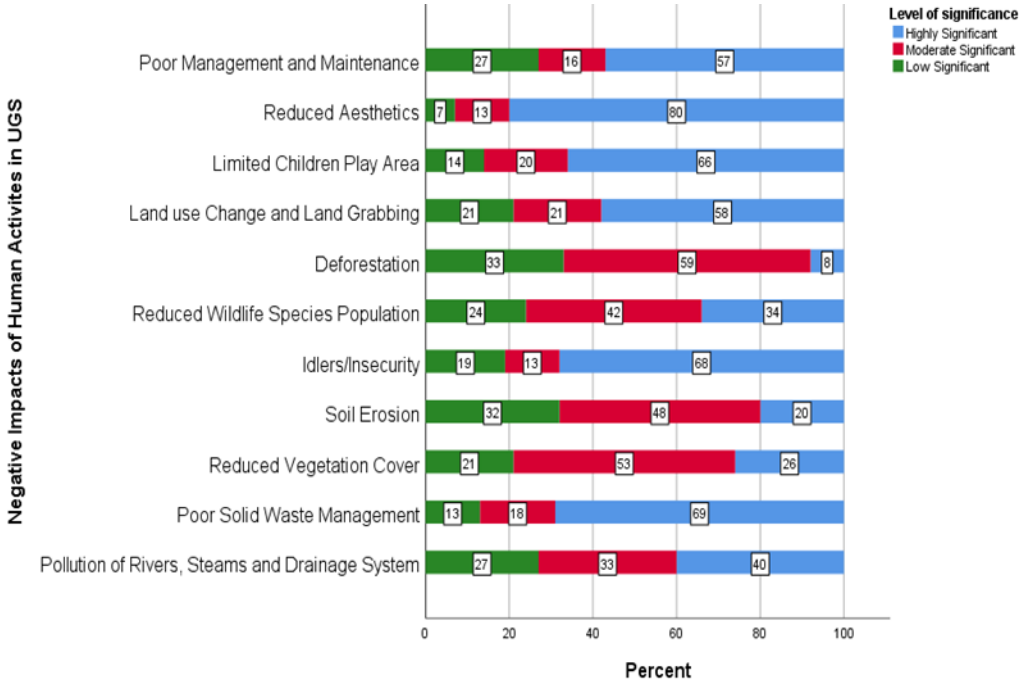

Figure 4: Figure 4: Percentages of negative effects of human activities on UGS Percentages of negative effects of human activities on UGS

Table 3: Negative Effects of Human Activities on UGS

Negative effects of human activities on UGS	Mean	Std. Deviation
Pollution of Rivers Steams and Drainage System	1.87	.812
Poor Solid Waste Management	1.44	.715
Reduced Vegetation Cover	1.95	.687
Soil Erosion	2.12	.715
Idlers/Insecurity	1.51	.798
Reduced Wildlife Species Population	1.90	.759
Deforestation	2.25	.592
Land use Change and Land Grabbing	1.63	.812
Limited Children Play Area	1.48	.731
Reduced Aesthetics	1.27	.584
Poor Management and maintenance	1.70	.870
Aggregate Mean	1.73	

This study confirms conclusion by Maingi and Shitindo (2021)and Martínková and Parry (2011) that most of the sporting events and economic activities tend have enormous amounts of negative effects on the green spaces due to the high production of wastes.

Relationship Between Social, Economic, Environmental Activities and Effects on UGS

Relationship Between Social, Economic, Environmental Activities and Positive Effects on UGS

From the Spearman's correlation results it is clear that there is a negative correlation between positive effects on UGS and residents' participation in social and economic activities, this means that whenever there is a positive change in residents' participation in social activities, there is a decrease in positive effects on UGS. Since the p in Table 3 is less than α=0.05, this confirms that there is a valid relationship between positive effects on UGS and residents' participation in social activities and economic activities.

It's also clear that there is a positive correlation between positive effects on UGS and residents' participation in environmental activities, this means that whenever there is a positive change in residents' participation in environmental activities, there is a increase in negative effects on UGS. Since the p is less than α=0.05, this confirms that there is a valid relationship between positive effects on UGS and residents' participation in environmental activities.

The correlation tables revel that the residents' participation in social and economic activities had a weak negative correlation of (.24) and (.401) respectively with positive effects on UGS. On the other hand, residents' participation in environmental activities on the other hand had moderate positive correlation of (.568). This outcome indicates that the engagement of residents in social and economic activities has played a role in the adverse impacts on the Dandora Urban Green Space (UGS), whereas environmental activities appear to have had a positive influence on the UGS.

Relationship Between Social, Economic, Environmental Activities and Negative Effects on UGS

The Spearman's correlation results reveal a distinct positive correlation between adverse impacts on UGS and residents' engagement in social and economic activities. This implies that any positive shift in residents' involvement in social activities leads to an increase in negative effects on UGS. With the p-value in Table 4 being lower than α=0.05, it verifies a substantial connection between adverse effects on UGS and residents' participation in social and economic activities.

Furthermore, there is an evident negative correlation between detrimental impacts on UGS and residents' participation in environmental activities. This indicates that a positive change in residents' engagement in environmental activities results in an unfavorable increase in negative effects on UGS. The p-value, again lower than α=0.05, affirms a meaningful association between adverse UGS effects and residents' participation in environmental activities.

The correlation tables below Table 4 reveal that the residents' participation in social and economic activities had a weak positive correlation of (.018) and (.304) respectively with negative effects on UGS. On the other hand, residents' participation in environmental activities on the other hand had moderate negative correlation of (.502). With this result it is clear that somehow residents' participation in social/economic activities has been contributing to the negative effects on the UGS found in Dandora while environmental activities seemed to have positively impact the UGS.

Table 4: Correlation Analysis to Show Relationship Between Social and Environmental Activities and Positive Effects 0n UGS.

Correlations				
		Residents' participation in social activities	Residents' participation in Economic Activities	Residents' Participation in Environmental Activities
Positive Effects on UGS	Spearman's Correlation Coefficient	-.24*	-.401*	.568*
	Sig. (2-tailed)	.007	.013	.044
	N	100	30	100
	*. Correlation is significant at the 0.05 level (2-tailed).			

Table 5: Correlation Analysis to Show Relationship Between Social and Environmental Activities and Negative Effects on UGS

Correlations				
		Residents' participation in social activities	Residents' participation in Economic Activities	Residents' Participation in Environmental Activities
Negative Effects on UGS	Spearman's Correlation Coefficient	.018*	.304*	-.502*
	Sig. (2-tailed)	.007	.013	.044
	N	100	30	100
	*. Correlation is significant at the 0.05 level (2-tailed).			

Overall impression of UGS

The study sought to find out the overall impression of the UGS according to the residents in terms of their level of satisfaction. The overall impression is important because it tends to summarize the image of the UGS in Dandora. 28% of the respondents were displeased with the overall impression of the UGS while 17% were pleased. 27% of the residents were very dissatisfied while 6% were very satisfied. Lastly 22% were neither satisfied nor dissatisfied with the overall impression of the UGS.

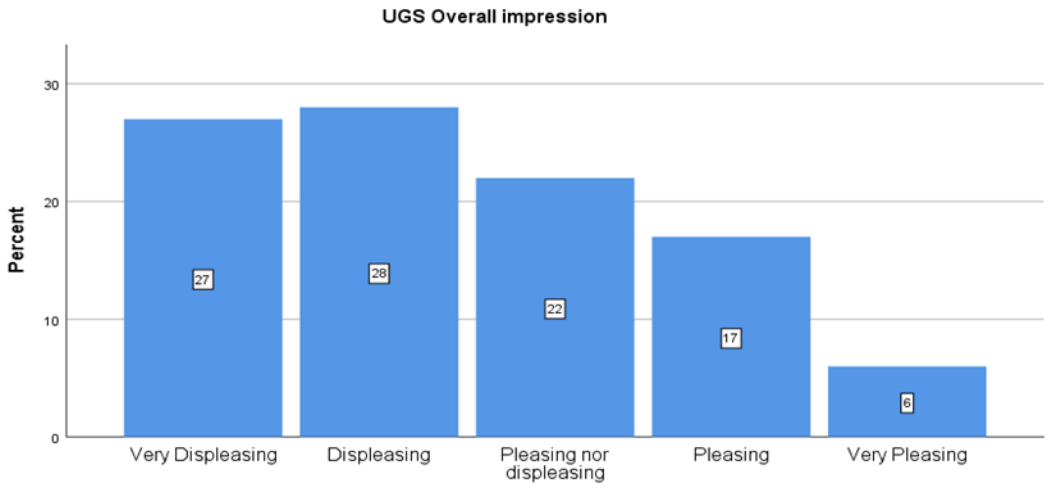

Figure 5: Overall UGS Impression

Conclusion and Recommendations

With the increasing rates of population growth and urbanization coupled up with ineffective policy, legal and administrative frameworks responsible in planning and management of the UGS within the urban areas, UGS are compromised. Uncontrolled human activities practiced in or around UGS unsustainably and unmanaged would have a high chance of impacting these spaces negatively.

The study finding's and literature review's knowledge informed the study recommendations. Which included.

Development of Specific UGS policy, regulations and standards.

- NCC should ensure effective and timely waste collection and disposal as this will reduce the chances of waste reaching the UGS vicinity.
- The county government should reclaim and rehabilitate any open space that could have been encroached to facilitate other unplanned and haphazard developments. This move will tend to increase the green space size as they originally were and hence be more functional, usable and accessible to the public.
- To reduce encroachments, the ministry of land can invest on both a centralized land information system and Geographic information system as a tool in innovative land use planning. This move will tend to create realistic databases that will aid estimate the future urban requirements.
- The county government in collaboration with the NGOs, CBOs, schools, and the society should engage in tree planting, community gardening to increase the aesthetic and beauty of Dandora.

- The county government in collaboration with the relevant NGOs and CBOs should participate in giving the community teaching and practices of importance of maintenance and conservation of the current green spaces that they have within their vicinity; these can be done through workshops and seminars.
- There is a dire need for architects, engineers, and environmentalists within the country to advise and educate the real estate developers on the importance of the biophilic design to the contemporary urban form.

Areas for Further Research.

This study was limited to investigating the human activities in UGS of Dandora and their effects. It however recognized certain aspects of the UGS could add more value to the understanding and thereby improve the spaces in any urban area of Kenya, apart for Dandora. The following further research areas can aid in the improvement of UGS:

- Crimes in and around UGS of Dandora and similar settlements
- Solid waste management in UGS.
- Specific standards and guidelines for UGS so as to promote proper planning and management of land uses.
- Innovative and integrated approaches to UGS management that could be inclusive to the community, private sector and local UGS users in Dandora.

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