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RESEARCH ARTICLE

THE TYPOLOGY OF PUBLIC OPEN SPACES: CLASSIFICATION AND CHALLENGES FROM MACHAKOS MUNICIPALITY, MACHAKOS COUNTY, KENYA

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Abstract

Public open spaces form an important part of life, giving services to people and protecting the urban environment. Ineffective standards for establishment, of public open spaces have always been a stumbling block in ensuring their sustainability, hence the existence of non performing unplanned, and poorly distributed public open spaces. This study sought to establish the types of public open spaces in Machakos municipality, Machakos County. The study aimed to characterize the typologies of public open spaces in order to understand the underlying reasons for how they came to be. Primary and secondary data sources were used to get the information. Primary data gathered using questionnaires, interview schedules, observation schedules and photographs. Secondary data on the other hand was gathered through review of existing literature materials and documentations of public open spaces from the county government blueprints and policy documents. . The findings revealed that there are a number of public open spaces in Machakos Municipality, with Machakos People's park as the most popular of these open spaces.

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Introduction:-

According to Swanwick et al. (2003), there is a general public opinion that public open spaces can aid in creating a solution to social and environmental challenges facing current urban areas and enhance their sustainability. Considering that according to the UN-Habitat (2010), an estimated 70% of the world's population will be living in the urban areas by 2050, with figures above 90% being in Northern Europe and Northern America, while 67% will be in developing countries. Blanco et al (2009) observe that many cities face challenges associated with congestion and pollution due to increased population. As areas urbanize, the pressure to establish appealing and healthy urban public open spaces increases and range from small gardens to large woodlands (Lovell and Taylor, 2013).

In Africa, UNFPA (2007) highlights that the urban population will hit the 742 million mark by 2030, posing a threat to the public open spaces which always become easy targets (Esbah et al, 2009 and McConnachie et al, 2009).

Haq (2011) notes that depending on the type of development, public open spaces increase property value and returns between a range of 5% and 15%. Public open spaces have also been found to be useful to public health,

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human wellbeing and also key in provision of a stable urban ecology system and also support biodiversity (Marshall & Corkey, 2011; Konijnendik et al., 2013).

The County Government of Machakos has made significant efforts to increase and improve the public open spaces within the municipality. The study therefore sought to find the typology of the open spaces in Machakos Municipality.

The history of public open spaces

Public open spaces have been fundamental setting for cultural, political, and economic way of life for a long time. Early Greek urban spaces and democratic practices therein represent a good starting point, where the Greek agora becomes a mark of the public sphere life (Crouch, 1981; Carr et al., 1992; Madanipour, 2003; Carmona et al., 2008). Roman-planned forums and religious plazas also belong to this category of ancient public open spaces (Ward-Perkins, 1974; Wycherley, 1976; Owens, 1991). In feudal Europe, plazas were commonly found alongside Christian churches, and held a broad range of socio-economic and recreational purposes (Zucker, 1959; Carr et al., 1992; Carmona et al., 2008). During renaissance where emphasis was on secular and private values, this new interpretation of space was reflected within the urban open spaces. As Carr et al. (1992) and Carmona et al. (2008) argue, urban squares planned solely for neighboring residential usage were to be found in specific spaces, like the Place des Vosges in Paris, the Bloomsbury squares in London, and in downtown parts of Philadelphia. Specialized urban parks, first flourished in the 19th century (Crouch, 1981; Cranz, 1982; Carr et al., 1992).

Recent focus has been on public open space themed along functions. In the United States of America protection and enhancement of natural resources that relate well with the recreational spaces in the urban areas is a common practice (Portland and Vienna, Stadtplanung Wien, 1996). The street, in addition, as a public space, has evolved to make it more appealing and usable by the wider community (Gehl, 1987).

The situation is different in Africa. Many of African nations' public open space creation is spontaneous and dynamic. The aim in planning of the spaces is primarily to solve problems that have been identified with short-term goals being set without considering the future needs of the spaces as well as the users. Evidence of this short term planning can be seen in Abuja in Nigeria, Cairo in Egypt and Johannesburg (Abegunde, 2008; CCG, 2008).

Types of public open spaces

As Francis (1987) states, public open spaces are built for people and people related undertakings in built-up areas. Kitha and Lyth (2011) further hold that open spaces exist as pieces of land that are either developed or undeveloped. These vary, from walkways and private yard gardens to more broad urban landscapes like green parklands, woodlands, unused vegetated allotments and neglected fields.

Other categories include forest covers, streetscapes, parks and spaces such as parking lots. Kitha and Lyth, (2011) opines that they can also occur in the form of green infrastructure, which comprises of an interrelated system of green spaces that offer natural ecosystem values and services consisting of trees, parks, green roofs.

According to Byrne and Sipe (2010), public open spaces can also be categorized in terms of the size, usage pattern, location and its intended function.

The creation of public open spaces

Kong et al. (2010) conceives public open space systems to include the creation of fresh spatial forms, safeguarding of present ecological volumes, renewal and maintenance of connectivity within varied ecosystems in urban areas. To achieve this, environmental planners choose the most ideal ecosystem and possible corridors by considering distances and other challenges posed by the land use to ensure user satisfaction. Easy access, quality, quantity and uniform distribution aspects of the public open spaces are important considerations in place when creating and planning for the public open spaces according to Haq (2011).

Public open spaces are essential in residential areas, recreation and in commercial settings as Baycan-Levent (2008) observes and therefore they should be considered even during water and power network infrastructure installation as suggested by Schaffler and Swilling (2012).

Theoretical framework

Political economy theory

Political economy theory is explained as a government's involvement in dealing with the economic needs of the community. It posits that the formulation of a government's economic program, be it free market, command or mixed, determines the way resources, in our case, type of open spaces is availed and shared. Inequitable sharing or entitlement to open space resources will result as a burden created by social and political customs (Weaver, 1996).

Dimitris and Ben (2009) observes, and rightly so, that the increase of unplanned dwellings in Africa is as a result of poorly managed urban environments. This has a genesis from poor funding by the relevant governmental institutions. They further indicate that to get to the root of this failure is pivotal in explaining the slum situation in Africa. In such a situation, it is not difficult to see why open spaces will be appropriated for use, uses that are individualized and seen primarily from economic lenses.

The story even gets more complicated. The slow pace and poor urban development in many Africa countries are also be attributed to influential individuals' whose nuanced political and economic interests, and which are fueled by the coincidental emergence of anti-urbanization preferences, behind who are foreign entities and organizations (Caporaso and Levine, 1992). Locally, the loss of open spaces in Kenya can be as a result of political and social needs and greed by the elite who, wrongly, appropriate these spaces, in part or as a whole, for primarily financial gains as the government remains silent.

Study Area

The study was carried out in Machakos municipality, Machakos County. The municipality coordinates are as follows: latitude $1^{\circ} 29' 59''$ South, longitudes $39^{\circ} 14' 60''$ East with the altitude at 1138m above sea level (Figure 1). The size is 925.3Km² with a population density of 215 persons every square kilometer (KNBS, 2013). The public spaces in Machakos Municipality are shown in figure 2 and some are further detailed in figure 3.

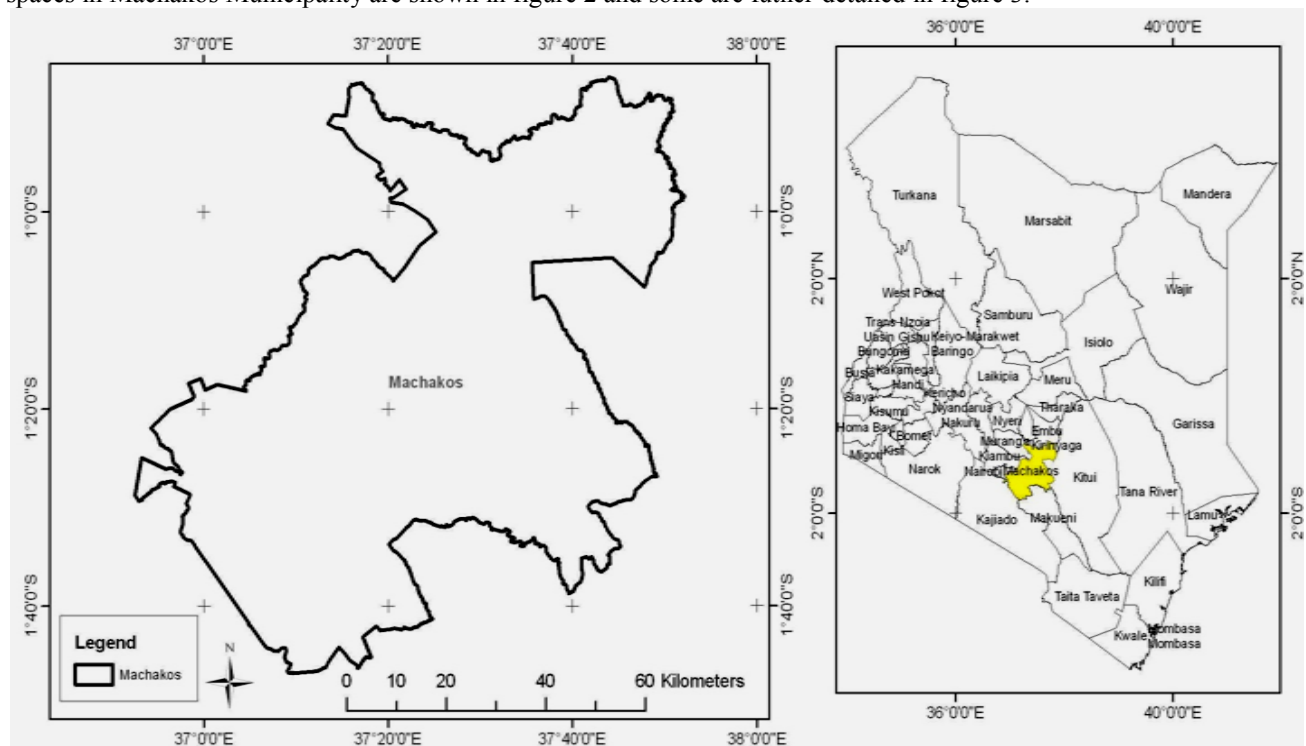


Figure 1:- Machakos County in Kenya.

Source: ArcGIS, 2016.

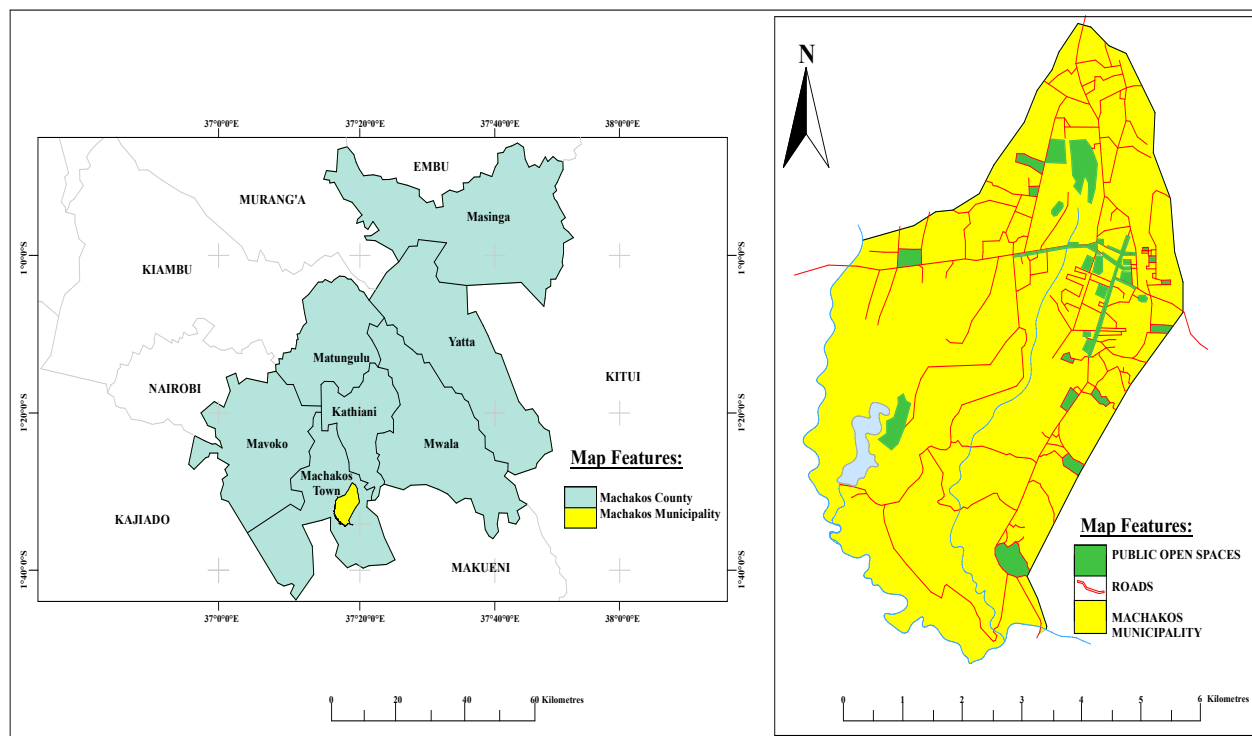


Figure 2:- Public open spaces in Machakos municipality

Source: ArcGIS, 2016, ArchiCAD 16, 2017.

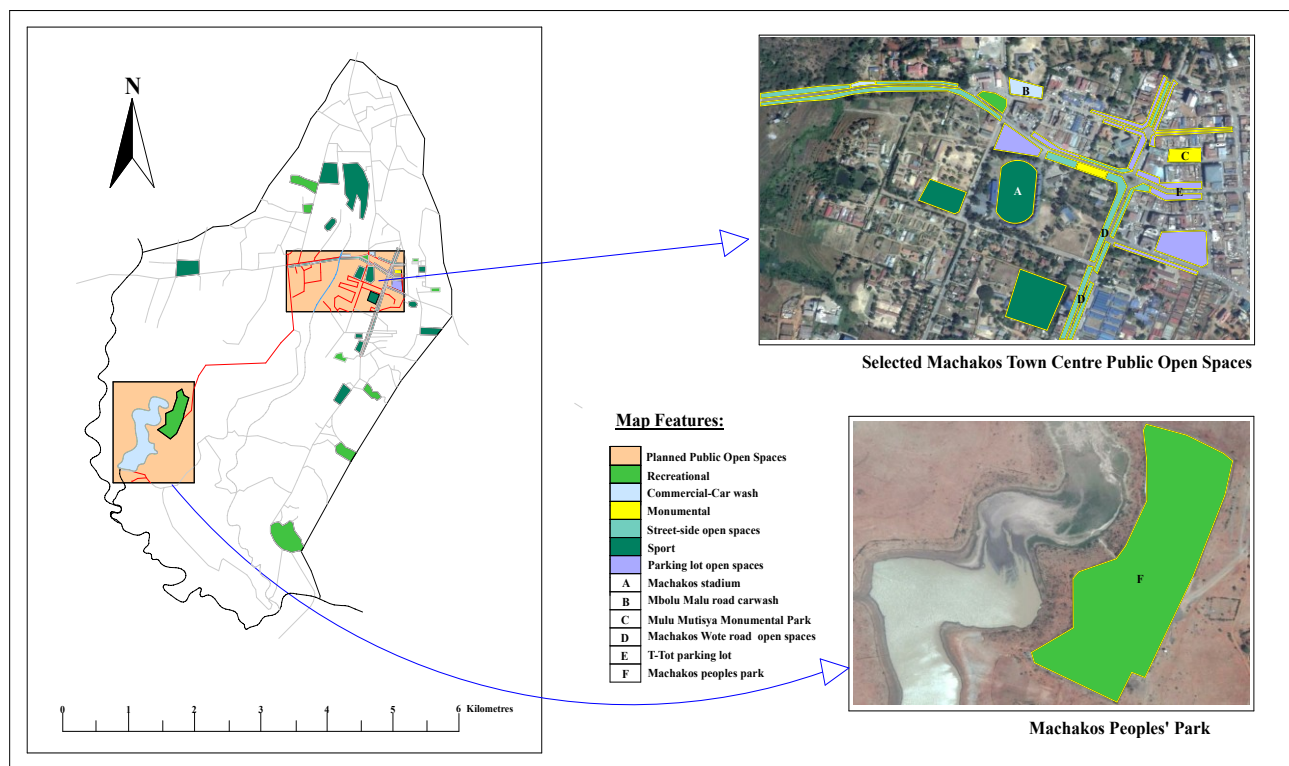


Figure 3:- Selected Public open spaces in Machakos municipality planned area.

Source: ArcGIS, 2016, ArchiCAD 16, 2017.

Climatic Conditions

Rainfall and Temperature

The climatic conditions of the study area are semi-arid, with monthly temperature ranging from 12.2°C between the coldest month of July and August to 25.1°C between the hottest month of October and March and a total annual rainfall ranging between 400 mm and 800 mm. Depending on altitude and aspect, mean rainfall and temperature vary widely. The average rainfall is between 500 mm and 1300 mm, with short rains falling in October and December while the long rains fall in March to May. Temperature-wise, July is the coldest month with October and March being the warmest. Since the Municipality does not experience rain throughout the year it then means that there are months that experience dry spells. These months are mainly February to March and August to September. This means that there is need for installation of water points or irrigation network for watering plant materials in the public open spaces. Shading is also necessary when the sun is hot.

Vegetation

Vegetation in the area is mainly drought resistant, consisting of mainly semi-arid acacia and thorn bushes. The vegetation mainly consists of Acacia's and other thorn bushes such as Terminalia combretum (Borst & Haas, 2006). The settled and agricultural active areas have exotic trees such as blue gum and gravella. Forestland covers less than 18ha, serving mainly as water catchment areas within the area and this has been affected by urban development (mainly housing) Most of the hills that used to be forested have been cleared for agriculture purpose and charcoal burning which has resulted in large areas of bare land, which are more vulnerable to erosion. The plant materials for the public open spaces should be selected carefully to ensure sustainability and low cost of maintenance. They should be adaptive to the climate.

Geology and soils

The soils are well drained with black cotton soils covering particularly the Municipality system in the town and the Municipality as a whole consists of intensely folded Basement Rocks of gneiss and schist which include limestone, amphibolites and quartzites as well as the predominating biotite granitoid gneisses (Howard Humphreys, 2009). The eastern part of the municipality has sand, murram and lateritic soils which overlay the folded basement rocks while the Western part of the Municipality has phonolite rocks consisting of lava of Miocene and most part of this area is covered with black cotton soil. Due to the presence of black cotton soils, there is need for careful selection of plant materials that do well under this, and also make sure that there is enough manure to enrich the soil. In worst situation, red soil should be imported to support healthy vegetation. For the foundation of public open space structures foundation and bases, the black cotton soils have to be excavated and this brings the cost of implementation high.

The public open spaces in Machakos Municipality

The study focused on different categories of public open spaces within the municipality namely recreational, sport, monumental, transport corridors, commercial and parking lots and then narrowed down to selected public open spaces in the categories above which lie within the planned area of the town. Public open spaces selected here are the Mulu Mutisya Park, the Machakos People's Park, the Machakos stadium, the main Nairobi-Kitui, Mua and Makueni Street side public open spaces, main parking lot public spaces and car wash yards.

Research Methodology:-

A survey study design was employed to help collect data and establish the types of public open spaces in Machakos town. Mulusa (1990), asserts that 10-30% of the total population is sufficient sample. However, to determine the sample size, the formula below (Nassiuma, 2000).

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

Where n= Sample size

N= Population

Cv = Coefficient of variation (take 0.5)

e= Tolerance of desired level of confidence, take 0.05% at 95% confidence level

Since Machakos municipality has a population of 199,211 as per 2009 national housing and population census, the formula was applied as follows:

$$n = \frac{199,211 (0.5)^2}{\text{---}}$$

= 100 respondents.

Primary and secondary data sources were used as follows:

The primary data was derived from the opinions issued by the three main public open space participants which include the users, management and the regulatory organs (Zube, 1986). They included various public open space visitors like residents, institutional and key informants within Machakos County physical planning, lands and the tourism and parks management department. Both Qualitative data and quantitative information was gathered through structured questionnaires, interview schedule and direct observations. The above data was in line with the objectives of the study and entailed the different types of open spaces in Machakos town.

Relevant documentations from Machakos County's Department of Physical planning and lands on different types of open spaces and available maps and plans were the main sources of secondary data. The Machakos county integrated development plan of 2015 was very useful in this situation. To add on the above, further information was gathered from journals, policy papers, technical reports and strategic plans from relevant departments like Machakos town administration, NEMA and Ministry of Lands and Urban Development. A map was obtained showing the physical layout of the Machakos town and contained the public open space lots under study. These include the Mulu Mutisya Park; the streets open spaces, the Machakos stadium, and the parking lot open spaces.

Sample frame

The study sample frame entailed park users, park management and regulatory arms of the county government of Machakos. It also involved the Public open spaces themselves. The park users were further subjected to simple random sampling as outlined in Table 1, the park management and regulatory arms to Purposive Sampling while the public open spaces were further subjected to Stratified Random Sampling as outlined in table 1.

Table 1:- Number of respective Public Open Space Users Interviewed.

No.	Name of Public Open Space	Size in Acreage	Number of Users Interviewed
1.	Machakos peoples' park	40	30
2.	Machakos stadium	4.45	15
3.	Mulu Mutisya park	0.99	10
4.	Machakos-Wote road open spaces	5.09	20
5.	Mbolu Malu road Car wash yards	2.4	13
6.	T-Tot hotel parking lot	1.79	12
Total			100

Table 2:- Sampled public open spaces in Machakos Town Municipality.

Category of the public open space	Names of the public open spaces	Name or the public open space selected
Recreational	Machakos peoples' park Machakos golf course Club.	Machakos peoples' park
Sport	Machakos stadium. Machakos university playground. Machakos boys playground. Machakos Muslim school playground. Machakos teachers training playground. St marys boys school playground. Machakos primary playground	Machakos stadium
Monumental/historical	Mulu Mutisya park Muindi Mbingu monument garden	Mulu Mutisya park
Transport	Machakos-kangundo road	Machakos-Wote road open spaces

corridor	Machakos-Kitui road Machakos-Wote road Machakos Nairobi road	
Commercial	Mbolu Malu road Car wash yards Machakos-Wote road Car wash yards Machakos- Nairobi road Car wash yards	Mbolu Malu road Car wash yards
Parking lots	Mwatu wa ngoma street parking lot. T-Tot hotel parking lot Mbolu Malu road parking lot Machakos bus terminus parking lot	T-Tot hotel parking lot

Study findings and discussions.

Knowledge of respondents on types of public open spaces in Machakos Municipality

Respondents were asked to mention the various categories of public open spaces that exist in Machakos Town Municipality. The study found out that there are different types of public open spaces in Machakos Town Municipality. The categories include recreation spaces, monumental areas, sport facilities, commercial and transport corridor spaces. The Machakos People's park the Mulu Mutisya garden, the Machakos stadium, the Mbolu Malu road carwash yard, the Nairobi-Wote road side public open spaces and the T-Tot parking lot open spaces (Table .3).

Table 3:- Public open spaces in Machakos municipality.

Source: Field Survey, 2016.

Public Open Space	Frequency of visit	Percentage
Machakos peoples' park	95	95
Machakos stadium	79	79
Mulu Mutisya park	85	85
Machakos-Wote road open spaces	54	54
Mbolu Malu road Car wash yards	25	25
T-Tot hotel parking lot	70	70

The Machakos People's Park

Majority of the respondents, 85%, mentioned Machakos Peoples park as one of the key and known public open spaces found in Machakos town Municipality. Part of the reasons that it is known is due to the diversity of a wider number of landscape features within it. The size of the park as well as the way in which it is managed are additional reasons as to why it is known by many of the residents. It was further rated very good in terms of general status of cleanliness by 26% of the respondents, good by 64% and only poor by 10%. The 10% poor rating is associated with a primary challenge, access. Residents felt that the park was far away from the town centre (figure 4).

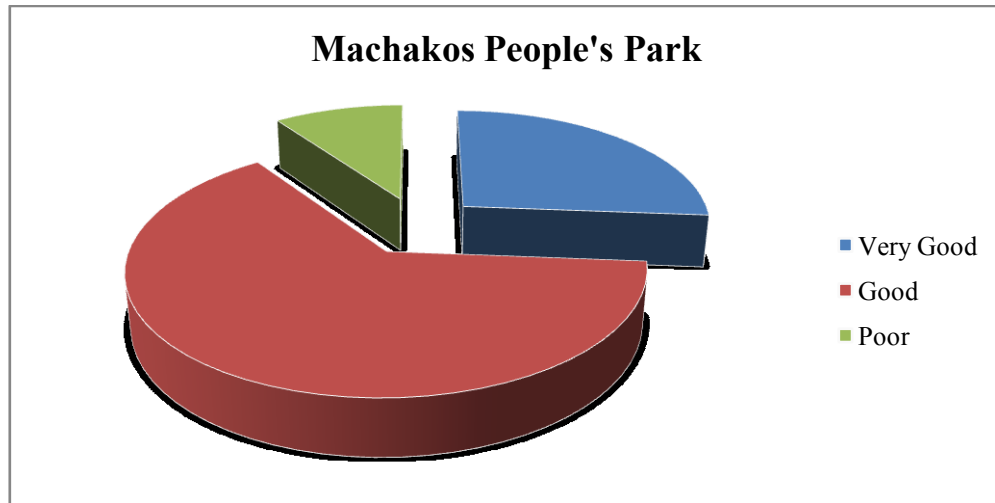


Figure 4:- Machakos people's park general status user ratings.

Source: Field Survey, 2016.



Plate 1:- Access road to Machakos People's Park.

Source: Field Survey, 2016.

The park is accessed by a tarmacked road (Plate 1).

The park is used for both active and passive recreation ie jogging, children play and relaxation respectively. A number of landscape features which include good expansive lawns, trees and flowers and water fountains, children's play area, and miniature golf, restaurants, and solar exhibition stand and conference facilities dot the facility. Political rallies are frequently staged at this facility. In addition religious gatherings find an appropriate home at this venue. Not to forget music concerts and entertainment of artists who find the park ideal for both day and night performances.



Plate 2: A section of the children playing area within the park
Source: Field Survey, 2016.

The presence of a designated children's area acts an attraction for families to the park. It has play swings, trampolines, mazes, slides and camel riding (Plate 2).

The park has adequate seating arranged in an amphitheater design (Plate 3). This seat arrangement guarantees the audience maximum view of the stage. Planted terraces have been used in the amphitheater for aesthetics as well as a mitigation measure against soil erosion.



Plate 3:- An amphitheater within the park.
Source: Field Survey, 2016.

Machakos Stadium

Many respondents (79%) mentioned this as one of the public open spaces that exist in Machakos Town Municipality (Plate 4). Its popularity is due to its proximity to the town centre making it easily accessible. Its largeness enables it to accommodate many users. The well-manicured turf for sports is aesthetically pleasing making it an attraction to behold. These two additional reasons further explain why the park is known. Local, national and international soccer matches are frequently held in this stadium. Another usually must attend sports bonanza is the Masaku Sevens, a rugby duel that brings many fans into the town in general, and into the stadium in particular. The stadium is therefore known well beyond Machakos Municipality. Other uses include athletics, political and religious rallies. However, since it is located near some residential areas and a school, the stadium is a source of noise when in use. An entry fee is payable to the authorities before one accesses the stadium and this hinders some open space users from easily utilizing it.



Plate 4: A bird's eye-view of Machakos Stadium.

Source: Field Survey, 2016.

Mulu Mutisya Gardens

A large number of the respondents (85%) mentioned Mulu Mutisya Gardens, as one of the public open spaces, is within in Machakos Town Municipality (Figure 5). Its strategic position within the town centre makes it easily accessible, hence its popularity (Plate5). It is characterized by garden seats, trees for shade and for relaxation. It is busier during the weekends and popular for staging political and religious rallies. The name of the park derives from a legendary Kamba leader who inspired the community to take leadership and participate in governance at the national level. It gets muddy during the rainy season due to poor lawn cover. It was rated good by 38% of the park users, very good by 31%, while 31% rated it poor. The close trend in rating percentages could be due to few merits accompanied by demerits like limited landscape features, poor maintenance and its small size. However, the garden is faced by a number of challenges. There is poor lighting especially at night making it unsafe. There is poor solid and liquid waste management. Cars park haphazardly endangering the park users.

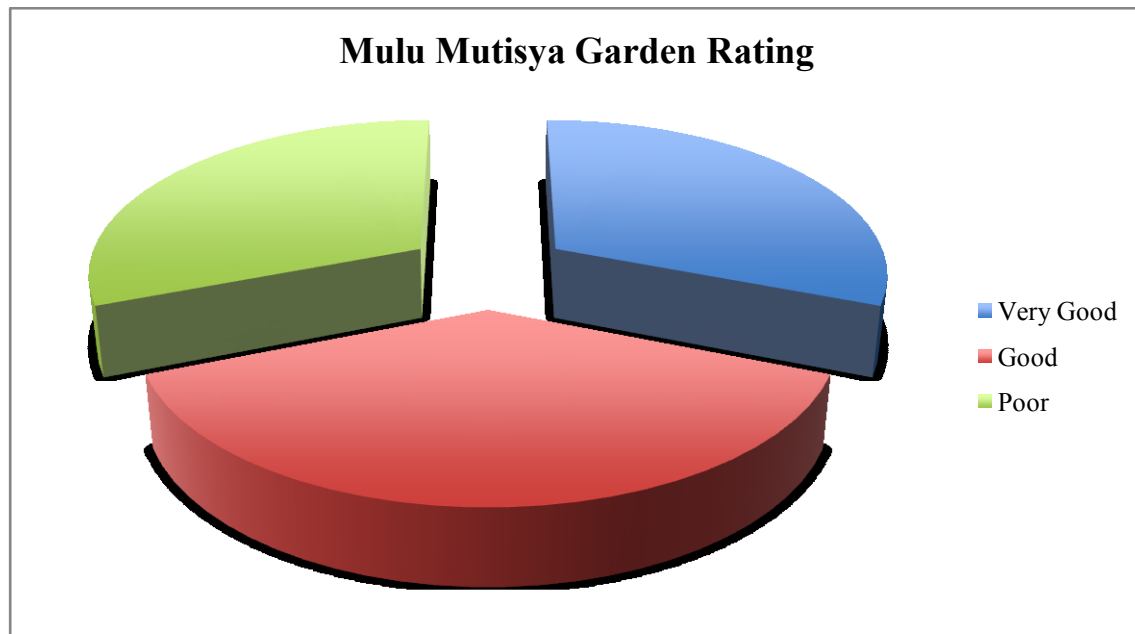


Figure 5:- Mulu Mutisya park general status user ratings.

Source: Field Data, 2016.



Plate 5:- A section of the Mulu Mutisya garden in Machakos Town.

Source: Field Survey, 2016.

The Machakos-Wote roadside public open spaces

A moderately number of the respondents (54%) mentioned this as one of the public open spaces that exist in Machakos Town Municipality. The relatively low percentage in respondent mention is attributed to its location off the main Kitui -Machakos road (Plate 6) which is used by majority of the town visitors. Another reason is the fact that many users don't really consider the roadside spaces as public open spaces but as mere transport corridors. They comprise of walkways, street furniture, street lighting, drainage, kiosks, litterbins, trees, shrubs flowers and signage. They average six to twelve meters in width and are maintained by the County Government of Machakos. They

however face the following challenges; solid waste management, encroachment by hawkers and retailers' shops, poor drainage, undesignated parking, poor beautification practices and vandalism of street furniture.



Plate 6:- Public open spaces along the Machakos –Wote Road.

Source: Field Survey, 2016.

The T-Tot parking lot

A fairly large number of the respondents (70%) mentioned it as one of the public open spaces that exist in Machakos Town Municipality. It is popular because of its central location, at the heart of the town. Its large size also explains its popularity allowing for diverse activities therein

It is used as parkin area for cars (Plate 7). The park is maintained and managed by the county government of machakos. Since it is the main parking lot in the town, it inevitably faces challenges of poor solid and liquid waste management , insufficient seats and poor lighting. Trees for shade are also insufficient for the benefit of the pedestrians. The few seats found are dusty, not well designed anthropomorphically and ergonoimcally, thereby beating the purpose for which they are placed in the park, seating.



Plate 7:- T-Tot parking lot in Machakos Town.

Source: Field Survey, 2016.

Mbolu Malu Car Washyard

A paltry number of the respondents (25%) mentioned Mbolu Malu Car Washyard as one of the public open spaces that exist in Machakos Town Municipality. The low percentage is due to its poor state of infrastructure (Plate 8), as well being located off the main road. It is however one the main and busiest carwash yards in the town. As a result it's characteristically overcrowded and unplanned. The yards are a source of income to many youths and are managed by private operators, from whom the County Government of Machakos collects operation fees. They have trees within and also have informal seats for clients. Some kiosks sell beverages. The yards are however faced with the challenge of muddy surfaces and wastewater disposal. Most of the wastewater is directed to open drains, which in turn drain to the streams polluting them.



Plate 8:- Mbolu Malu road car wash yard.

Source: Field Survey, 2016.

Summary of the Findings

The findings revealed that there are various categories of public open spaces in Machakos Municipality. The categories include recreation, sport, monuments, commercial and transport corridors, streets side open spaces, carwash yards, parking lot open spaces, abandoned fields and unused vegetation settlements among other pockets of open spaces. Machakos People's park is the most popular of these due to its large size, variety of landscape features and better maintenance.

These public open spaces are mainly used for relaxation, meetings, physical exercise and are aesthetically appealing. The spaces are mainly used during weekends that is Saturdays and Sundays.

Conclusion:-

Public open spaces are important not only for leisure and recreation, but also for economic and political functions. They are key areas for social interaction and community development Machakos town is endowed with a number of these public open spaces. As Aesthetics, social wellbeing and recreational needs of an urban neighborhood or town can be enhanced through a well laid down public open spaces which come as a result of a sustainable planning and improvement of the said public open spaces, which in turn makes the area an attraction for both living and working.

Recommendations Based on Findings:-

- 1 Creation of a well-articulated landscape master plan by the county planning department that shows the existing and proposed public open spaces easy monitoring and development.

- 2 Audit and documentation of all public open spaces in the town by the county government of Machakos for monitoring and management fund allocation.
- 3 Creation of a well planned and linked system of public open spaces that entails walkways, street ways, parking lot landscapes, play fields, urban plant nursery lots, pocket parks and main parks.
- 4 Redevelopment and reorganization of public open space features and spaces to accommodate more activities and also to suit all age groups and people with disabilities.
- 5 The county government of Machakos to acquire more land for creation of more and sufficient public open spaces.
- 6 Creation of a variety of public open spaces within the town to cater for more people, activities and features.
- 7 Involvement of qualified landscape architects in the selection, planning and installation of public open space landscape materials that suit the environment well to ensure user comfort and sustainability.
- 8 Sensitization of the public on the importance of usage of public open spaces through advertisements, hosting of public recreational events like walks, games, dancing completions and comedy shows.
- 9 Proper, strategic and clear signage for general information to the public. The information could be on the usage, safety, dos and don'ts, security, size, distances and general status of the public open spaces.
- 10 Installation of proper, sufficient and appealing lighting fixtures for night lighting. The lights should be well anchored and protected to curb vandalism.
- 11 Introduction of more revenue generating activities within the public open spaces to ensure sustainable maintenance through the money generated.
- 12 Annual appraisal of the public open spaces' performance in an effort to ensure value addition, which could involve addition of landscape features, expansions, advertisements and public sensitization.
- 13 Ensure that all stakeholders are involved during the creation, implementation and maintenance of public open space in the town. In this case, public participation should be emphasized.
- 14 Restructuring of existing public open spaces to make them more usable and efficient. This could include pedestrianization of existing and congested streets, conversion of parking lots into pocket parks and utilization of vertical space for parking.
- 15 Creation and strict adherence to a sustainable maintenance schedule which should include but not limited to; watering of lawns, mowing of lawns, sweeping, litter collection and disposal, pruning and watering of plants, repairs and repainting of worn out landscape features and structures.
- 16 Create an integrated management strategy by stakeholders to ensure sustainable landscaping and maintenance practices like recycling of water for watering plants, use of mulching, solar for lighting, use of local materials for installation of walkways, seats among others.
- 17 Formation of a well-organized maintenance and security team to patrol the open public spaces to ensure order, security and curb vandalism and theft of landscape features and fixtures.
- 18 Proper training of the maintenance team on matters to do with plant care, safety of parks, etiquette, security and aesthetics.
- 19 Establishment of county government owned plant nurseries to ensure availability of cheap plant materials for replacement and addition in the public open spaces
- 20 Policy wise, there should be multi-stakeholder partnership in the creation, implementation and maintenance of the public open spaces. This can be in form of a trust mandated to ensure that the objectives of the partnership are adhered to and curb any political interference.

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