Roles of Peripheral Community Tree Planting as a Sustainable Approach for Urban Environmental Protection in Jiddari Polo Area of Maiduguri

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Abstract: This scholarly research title has identified problems that the communities and public in urban fringes of Maiduguri are not aware of the needs for tree planting and management. These have affected the environment and exposing the entire ecosystem to hazards. Therefore, this research has used GIS technics and PAR model as methods to find data for the research. The major findings are GIS as tool have the capability of enhancing tree planting and its maintenance in the urban peripheral areas and that public participation will instill in the minds of the caregivers the sense of ownership of the plants which reduces the burden of doing same by the government. The authorities that have the roles of creating public awareness and education are not doing much in that direction. Therefore the research designed an objective approach such as to assess the tree planting needs in the study area and to examine the roles of peripheral communities in tree planting in the study area. The major recommendations of the research are that government at all levels should involve the local communities in decision makings concerning tree planting and their maintenance, and to put in place the process of tree planting, it should start with broad based analysis of all the environmental factor that will have effect on the growth of the trees

Key words: Peripheral Community, Tree Planting, Sustainable Approach and Urban Environmental Protection

Introduction

Tree planting or forestation relates to the deliberate intervention by man in planting trees to improve the quality of natural environment. In Sahara and fringes of the savanna areas, tree planting have become a custom and administrative function of government both at the state and local levels. There are also efforts by individuals in planting trees; however these efforts are not sufficient to remediate the challenges posed by global warming. Government

through policies and programmes remains the major stakeholder that controls and manages trees to sustain soil moisture needed to abate desertification in their areas.

The motives of tree planting in those areas are generally to sustain and grow the socio economic wellbeing of the people, protect the environment from excruciating environmental devastation and secure environments from loss of biodiversity. Tree planting induces soil quality to support wide range species of plants. Different trees are used for different purpose in different places; therefore the importance of tree planting cannot be over emphasized (Jared, 2015)

Trees are familiar sight to many people, however only few of us paused to consider how they came to be there, how they are being managed and what benefit they bestow on us. Choosing planting sites, selecting trees and ensuring their survival is critical to the health of the urban dwellers, as without considering these factors haphazard tree planting will hamper on the wellbeing of the people

In the context of urban planning, tree planting is viewed as process not an activity. It is a process because it involves the decision on the goals, identification of problems, site selection, plant selection, data collection and analysis, planting layout design and management process. All these processes are set up and put in place before embarking on the implementation. However, the widely held view of an urban settlement is of an environment which has been heavily modified by man to the extent that some living organisms are eliminated while others will invade, colonize and multiply.

The above scenario does not favor trees in our cities. Therefore to improve the relationship between man and trees around him, Heidi and Jill (2010) developed an environmental planning model call Participatory Action Research (PAR) in which they envisaged a more equal partnership between tree users and government. This model is distinct from the traditional model where trees planted on public land are owned by government. So in contrast, PAR provides the user manager the potential benefit of more appropriate control of the trees. This way the tree owner will have an intimate knowledge of their trees and the ecosystem. The burden placed by this model on the community permits them to acquire broad range of knowledge on the socioeconomic as well as technical information on the trees planted that are entrusted in their care. This research proposal seeks to apply this model (PAR) on selected suburb of Maiduguri Town. This research seeks to deal with the following problems

1. Inadequate awareness, the communities and public in urban fringes of Maiduguri are not aware of the needs for tree planting and management. These have affected the environment and exposing the entire ecosystem to hazards. The authorities that have the roles of creating public awareness and education are not doing much in that direction.
2. Non inclusiveness and neglect of community members in participatory planning and management of tree planting, these neglect have created gap between the communities and government in terms of control and protection of the trees planted.
3. Weak legislation and regulatory institutions criminalizing tree felling have for very long time allowed property developers and commercial loggers to remove an

astonishing number trees (buffers) around urban fringes without appropriate plan of replacing them, thereby exposing the city to devastation of windstorm.

4. Modern techniques such as Geographic Information System (GIS) as a guide for physical development and which also has the central role of providing accurate information of all facilities and utilities including trees and landscaping have been neglected allowing property developers to construct without control and guidance.

The aim of this research is to examine the roles of peripheral community tree planting as a sustainable approach for urban environmental protection in Jiddari Polo, Maiduguri with view to identify problem and propose physical planning solution.

The goal stated above can be achieved through the following objectives:-

1. To identify major streets in the study area using GIS
2. To assess the tree planting needs in the study area
3. To examine the roles of peripheral communities in tree planting in the study area
4. To determine critical factors required in the process of tree planting in the study area
5. To propose physical planning solution.

Conceptual Clarifications

Tree Planting
Over the past decade, a significant and rapid change has taken place in the urban forestry sector. These changes have contributed immensely to the evolution in the concept of tree planting. Urban tree planting is still a nascent development and it appears to be gaining concern. In the context of this research, it refers to an Action Model that has been adopted involving the work of professionals in a variety of sectors ranging from Building Engineering, Architects, Town Planning, Forestry, Health etc. that have served both the needs of natural resource users as well as those of administrative agencies seeking to devolve the responsibility of managing natural resources to users (Mike and Anthony, 2015)

Therefore the concept of urban tree planting should be viewed as the process by which the growth, sitting, planning and control of trees planted are evolved to achieve the purpose within the urban environment. However, Different associations of organisms occupy different intra-urban ecosystems, which fuse together in a network of paved or roofed surface and the vegetated surface.

In tree planting the appearance of a planting arrangement must be imagined at its beginning to its maturity, in winter as well as summer. At planting, trees should be set far enough apart from each other and from structures to prevent interference unless a distorted shape or a solid mass is desired. Large forest tree for example, if meant to come to full size, most be 54 – 60f apart and 20f from building. Trees take time to mature; therefore final effect may not be seen in a short time. What seems to be pleasant at the beginning may later be desperate overcrowding.

For immediate effect, mature specimens may be put in but this is an expensive practice to be reserved for key places. Another solution is to use succession planting, in which quick growing plants and slow growing plants species are planted together, or plants may initially be put in at close spacing.

Trees in Cities

Planting of trees, shrubs and flowers improves the beauty of city. Plants are provided for different needs in different location. Trees provide shade that reduces the need for air conditioning and make travel more pleasant in hot weather.

Susan (2017) believes that in parks, trees provide places for quiet contemplation, trees and shrubs can block some of the city sound, and the complex shape and structures create a sense of shade. Plants also provides habitat for wild life such as birds which many urban residents considers pleasant addition to a city.

The use of trees in cities has expanded since the time of European renaissance. In earlier times trees and shrubs are set apart in gardens where they are viewed as scenery, but not experienced as part of ordinary activities. Street trees were first used in Europe in the eighteenth century, among the first tree – lined streets were the rue-de Ravioli in Paris and Bloomsbury square in London. In many cities trees were now considered as essential element of urban usual scene, and major cities have large planting programs. For example, in New York City 11,000 trees are planted every year, in Vancouver, Canada 4,000 trees are planted per year. Today, there is growing use of trees to soften the effect of climate near houses. In colder climate, rows of conifers planted to the north of the house can protect the house from winter winds. Deciduous trees to the south can provide shade in the summer, reducing requirements for air conditioning and yet allow sunlight to warm the house in the winter. Successful urban tree planting requires:

1. *Landscape Consideration for Tree Planting*

Trees may be planted by land owners (individual) or by community through public participation or by government through special agencies. By whichever means, consideration have to be made to the proximity of buildings and other structures. Trees in close proximity to building or structure may cause structural damages either directly or indirectly. It is also important to note that damages by trees are principally caused by neglect to the factors above. Consideration should also be made to the architecture of the buildings; does the trees form and color complement the surrounding built environment? We therefore seek advice on whether a tree will obscure the features (Susan 2017). In the broader context of landscaping, trees are used in reducing the wider difference between the soft and hard landscaping features. This is used in most landscape urban areas to promote the scenic quality and promotes aesthetics.

Another vital point of consideration in landscape is the possible nuisance a tree might cause in particular situation e.g. ultimate size may cause problems of shade or knock buildings and windows. Therefore planting trees under overhead services like electric cable, planes wire, for as they grew, trees will require constant pruning in order to avert nuisance. The same is applied to underground services and the root system of trees to be planted. Trees planted in urban streets should not obscure any road sight lines or road signs, for instance trees at road junction and bends can prove hazardous to road users and pedestrians.

2. Plant Arrangement

Trees of different species can be sited to create a general effect or to contrast with one another. Trees of similar form but dramatically different texture may be juxtaposed, or shapes may be contrasted. For example, an angular and dynamic tree planted beside a rounded space, or upright, recumbent and prostrate trees beside a tall structure. A delicate fern may bring out the character of massive rock out crop. Since it is easier to predict the texture of trees than its particular form and since that texture does not vary from different points of view as much as does the individual shape, it is advisable to dispose plants principally according to their texture and according to the masses that will be produced by large number of plants (Jared, 2015).

In the mixed grouping, only two or three species are made and they are not intermixed evenly, but located in clusters that thin out into clusters of another type. The plant list is consciously limited to a few dominant and subordinate species, all related in their ecology and texture. However, it is unwise to plant only a single species, since a fatal disease may snuff it out e.g. the Elm problem in U.S.A

3. Choice of Species

According to Susan (2017) "once an appropriate site has been selected, the next step is to choose the correct tree species for planting. Mistake in planting a tree are long lasting, expensive to accommodate and difficult to rectify". The prime objectives when considering a suitable tree for a site are to allow adequate space both above and below ground, (i.e. height and spread of canopy and roots) and to provide for its future maintenance requirements (particularly post and after care). Time spent in considering what is required and what the planted area will look like in 20 – 100 years is very important. Frequently one well-placed tree which can grow and break up above the rooftops will provide more visual benefit than several scattered small ones. The idea is to plant a tree that will be able to grow to full maturity with little or no surgery. Remember any pruning cuts made to trees are potentially harmful as they expose the trees living tissue to decay.

To avoid exposing whole populations of trees to epidemics, diseases and pests, plant a variety of unrelated species, obviously there will always be a specific time and place for formal uniform avenues of identical tree.

Planting Framework

If land can be held in reserve (future development) it might be possible to pre plant lines and masses of trees in a pattern suitable for future development. The initial investment would be small and when development occurred, it would benefit from a mature plant setting. Where this has happen accidentally, as in the resumption of development in abandoned land, the effect has often been quite and handsome.

In any case, tree planting is not a frill to be left to the future. The main framework should be completed before the area is occupied. Tree planting and landscaping are green stuffing to be packed between buildings, or a series of small settings for individual structures. It must be conceived as a total pattern, continued throughout the site. Lines of tall trees, visible from distance, may mark major axis in the plan, masses may define major spaces and species texture may be used for important areas (Jonathan, 2017).

It has been customary, in housing developments, to plant on the public areas, leaving private plots to be landscaped by the tenant. Along the streets, we use a single solution

with monotonous regularity. The double line of street trees is mostly regarded to the single line. Planted avenue can be handsome, particularly when it leads to some important destination. The following factors are crucial in planting framework

1. *Access to Land and Tree Usufruct*

Wide range of possibilities exists in urban areas of many developing countries with regard to people access to land and usufruct of trees growing on it. Situations vary from open access and poor control over usufruct to privately own and strong control over usufruct. Many trees in urban areas are effectively open access resources, used by all owned by few. This is particularly true of those on public land such as roadsides and derelict plots. Vandalism or excessive harvesting may be a particular problem in such circumstances. Trees planted through community initiatives may be managed as a common property or resources, particularly if it is located on land strongly associated with community ownership such as around a school or mosque or church. In some circumstances, specific usufruct right may be defined and allocated, e.g. the right to harvest fruit from trees grown in parks (Sofie, 2012)

2. *Spatial Model of Planting*

A simple model of tree planting zones in urban areas of developing countries was provided by McPherson and Peper (2012) although they used it to describe urban farming systems. The model categorized urban settlements into three (3) broad spatial categories as follows:

1) Core – the city centre
2) Sub-core – areas outside the core zone
3) Periphery – urban fringe and suburb

The categorization is used for indicating where trees may be found growing in towns and cities and where there may be unexploited potential for their cultivation. It remains a fact that in most urban environments, space is precious and subject to many competing land pressures. Much of the challenges of urban forestry lie in making optimal use of the limited area available for urban trees.

Use of GIS in Tree Planting

It has been proven that GIS is one of the veritable tools that can be used in tree planting and management. This can be done mainly by using ArcGIS 9.2 software. GIS put together common database operation such as query and analysis with the unique visualization and geographic analysis benefits from maps. These abilities make GIS chosen from other information system and make it also valuable in estimating the cost of maintenance, determining the location precisely and planning strategic for the landscape tree management of the study area. It is clear that GIS can be used as an application in landscape architecture for monitoring the management system. According to Masbiha and Noriah (2012) GIS integrate most common database operation such as query and analysis with visualization and geographic analysis. These abilities distinguished GIS from other information system and make it valuable for explaining event, predicting outcomes, and planning the management system of park area. The data acquisition for this research can be more detail in future works to provide more accurate information for the analysis. The use of more detailed method such as the Spatial Multi-Criteria Decision Analysis (MCDA) can help in decision making and evaluation. By using this method, the different classifications of the site area can be rank in the order of the preference. It was preferred

that every local authority would apply this system for the ease of use to manage their park efficiently. This suggestion would impact up on overall trees management system of the park and can be extended to manage all elements that need to be maintained in the park. This system can give evidence to the maintenance work that have been done on the site by updating it in the system and of course, the site inspections still need to be done. Local authority and private garden managers should be aware of this finding and use this opportunity in enhancing their management system from the use of advanced technology.

Participatory Action Research Approach in Tree Planting

Participatory Action Research (PAR) is considered a subset of Action Research, which is the "systematic collection and analysis of data for the purpose of taking action and making change" by generating practical knowledge. Action research discourse includes myriad of terms, such as: participatory action research, participatory research, community-based participatory research, and other forms of participative inquiry, which may seem ambiguous for novice researchers intending to conduct action research, the purpose of all action research is to impart social change, with a specific action (or actions) as the ultimate goal.

Heidi and Jill (2010) believes that acquiring new knowledge and understanding in this regard would assist in the promotion of greater equity in accessing respectful and effective tree planting while promoting overall improvements in urban area development.

Action research in urban tree planting is regarded as the systematic and orientated around analysis of data; requiring gathering of data, analysis and the generation of interpretations directly tested in the field of action. Therefore, action research is concerned with an agenda for social change that embodies the belief of pooling knowledge to define a problem in order for it to be resolved.

Materials and Method

This research has used the GIS (Geographic Information System) to identify the areas where the trees were planted. The tool also identified the household heads in whose house frontages the trees were planted. The streets were named and owners of each of the house were recorded as the plant caregivers. Another tool used in this research is the advocacies and community sensitization to obtain a result on how the community members were involved as the stakeholders of the tree planting and maintenance. This is justified by the fact 458 community members were motivated to participate in a Participatory Action Research (PAR) model.

Research Findings

1. GIS as tool have the capability of enhancing tree planting and maintenance in the urban peripheral areas
2. GIS can assist in keeping records of all the household heads that are identified as the caregivers to the plants
3. It is very easy to identify with use of the GIS the plants existence and traces the history of the tree for its security and well-being, including those that are affected by encroachment

4. Public participation in tree planting can guarantee the security and healthy growth of the plants
5. That public participation will instill in the minds of the caregivers the sense of ownership of the plants which reduces the burden of doing same by the government
6. PAR had made it possible for involving the all the stakeholders at the critical junctions, keeping them a braced with all the needed information about tree planting
7. That tree planting is knowledge-based activity, not an annual event as misconstrued before
8. The public are willing to adjust to new development but there are insufficient awareness creation on the side of the government

Conclusion

Urban Tree Planting has become one of the major urban issues since the emergence of the global warming and its many challenges to urban inhabitant. Urban tree planting approach represents an opportunity as well as management challenge for the city. The city remains an underutilize resource, playing parasite on the host environment. Therefore it is critical to understand how the city can better serve the environment through public participation and inclusiveness as well as involving GIS technology in tree planting and management to curb the menace associated with lack of it. Therefore, conclusively one may conveniently say that, to promote more sustainable environmental protection, much more attention must be spent on unblocking the community inclusiveness and public participation in natural resource management to enhance the well fare of the city and the wellbeing of its inhabitants.

Recommendations
1. Government at all levels should involve the local communities in decision makings concerning tree planting and their maintenance
2. The process of tree planting should start with broad based analysis of all the environmental factor that will have effect on the growth of the trees
3. Pre planting studies of the programme needs to be undertaken to avoid chaotic and haphazard implementations
4. Modern technology such as the use of GIS must be made an integral parts of tree planting to secure the growth and protection of the trees
5. Awareness on the need for tree planting must be created amongst the populace to stimulate a harmony between people and trees around them
6. Public participation should encouraged and made as one the necessary process of tree planting
7. More fund should be allocated to the sections, units and government department to facilitate and foster maintenance

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