SITE SELECTION FOR URBAN FORESTRY DEVELOPMENT AS A MITIGANT OF CLIMATE CHANGE IN ILORIN AREA, SOUTHERN GUINEA SAVANNAH OF NIGERIA

BY

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MTECH/SNAS/2013/4210

THESIS SUBMITTED TO THE POSGRADUATE SCHOOL, FEDERALUNIVERSITY OF TECHNOLOGY, MINNA, NIGERIA, IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTER OF TECHNOLOGY (MTECH) DEGREE IN CLIMATE CHANGE AND ADAPTED LANDUSE

JUNE, 2015

DECLARATION

I, hereby declare that this thesis titled: “Site Selection for Urban Forestry Development as a Mitigant of Climate Change in Ilorin Area, Southern Guinea Savannah of Nigeria” is a collection of my original research work and it has not been presented for any other qualification anywhere. Information from other sources (published or unpublished) has been duly acknowledged.

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CERTIFICATION

This thesis titled: Site Selection for Urban Forestry Development as a Mitigant of Climate Change in Ilorin Area, Southern Guinea Savannah of Nigeria. carried out by ASONIBARE, Femi Oluwatosin (MTech/SNAS/2013/4210) meets the regulations governing the award of Degree of Master of Technology of the Federal University of Technology Minna, and it is approved for its contribution to scientific knowledge and literacy presentation.

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Dean Postgraduate School .....
Prof. M. G. M. Kolo Signature & Date

DEDICATION

This study is dedicated to my parents for their love, prayers, support and encouragement; may God continue to keep them.

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ABSTRACT

This study describes a site selection process for urban forestry development as a mitigant of climate change in Ilorin Area, Southern guinea savannah of Nigeria. Based on actual conditions of the study area and other related studies, constrains and factors were considered for the site suitability analysis for afforestation. Slope, elevation, roads, rivers and water bodies, settlements, land price/value and land use were considered. Criteria weights were calculated using the analytical hierarchy process (AHP) using pair-wise Comparism. The consistency ratio for the AHP of this study was 0.07, which was acceptable. A geographic information system (GIS) was used for analysis and presentation of the spatial data. The maps were prepared, reclassified and standardized within the GIS environment. Image classification was used to generate land use, land cover map of the study area for 2015 from Landsat 8 image. The classes generated for the classification are; bare surface 198,350.80 hectares (87.3%), water body 513.41 hectare (0.2%), settlement 7,858.79 hectare (3.6%) and vegetation 18,798.63 (8.9%). Land suitability map for afforestation location was generated using Weight Linear Combination method and the results of the analytical hierarchy process. The resultant map displayed four classes of suitability; high suitability, moderate suitability, low suitability and not suitable. The result of the suitability analysis showed that about 45,654.75 hectares (20.2%) fall under the category of high suitability. Moderate and low suitability covered an area of 74,559.73 hectares (33.1) and 66,869.07 hectares (29.7%) respectively while, not suitable areas accounted for 38.438.05 hectares, about 17.0% of the study area for afforestation. By using the stated criteria, the suitable areas for afforestation site fall majorly on the North western part of the study area. Analyzing the results of the identified afforestation sites for carbon sequestration potentials, local species like *Azadirachta indica,Gmelina arborea, Parkia biglobosa and Anacardium occidentale* were used to estimate the amount of carbon dioxide that can be sequestered for the study area. The average numbers of trees was estimated to be 400 trees per hectare. *Azadirachta indica* and *Gmelina arborea* was estimated to sequester about 1,102.32 and 1,084.04 metric tons of carbon dioxide per hectare respectively The average carbon sequestration potential for a medium sized coniferous tree planted within the identified sites and allowed to grow for 10 years was estimated to be about 15.6 metric ton carbon dioxide. This study shows the ability of GIS, remote sensing and AHP as a veritable tool for analyzing criteria for land suitability. It highlights the potentials of abundance of land available for climate change mitigation by carbon sequestration through afforestation and reforestation.

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LIST OF ABBREVIATION/GLOSSARIES

FAO	Food and Agriculture Organization of the United Nations
GIS	Geographic Information System
GPS	Global Positioning Systems
IPCC	Intergovernmental Panel on Climate Change
LULC	Land Use Land Cover
WASCAL	West Africa Science Service Centre on Climate change and Adapted Land use
RS	Remote Sensing
UN	United Nations
REDD	Reducing Emissions from Deforestation and Forest Degradation
CDM-AR	Clean Development Mechanism-afforestation/reforestation
UNFCCC	United Nations Framework Convention on Climate Change
USGS	Unite State Geological Survey
USEPA	United Nations Environmental Protection Agency
AHP	Analytical Hierarchy Process
MCA	Multi-criteria Analysis
SRTM	Shuttle Radar Topographic Mission

DEM	Digital Elevation Model