

THE EFFECTS OF NATURAL LANDSCAPE ELEMENTS IN COMBATING
EMERGING DESERTIFICATION IN NORTHERN NIGERIA.

ABDUL AHMED YAHAYA

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DEDICATION

This Ph.D. thesis is dedicated to my late Parents, Abdul-Rahman Bin Mohammad Rabi'u Bin Abdul-Ahad, and my lovely mother Ruqayyat Bint Adam for their constant prayers. To my beloved wife Halima Isa (MAR'ATUSSALIHA), and my children Mohammad Al-Mustapha Bin Ahmed Abdul, Muminah (Aeshat) Bint Ahmed Abdul, and Ahmed-Muzaffar Bin Ahmed Abdul. For their prayers, endurance, sacrifices, and particularly their understanding during the Ph.D. work. It is also devoted to all my relatives for their prayers and tireless support. I sincerely appreciate it.



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ABSTRACT

Desertification or land degradation is a serious environmental problem with tremendous socio-economic consequences. Today's northern Nigeria arid and semi-arid zones are affected by desertification resulting from various factors, from climatic variations to anthropological activities such as bush fire, deforestation, grass-shrub, and tree thickening, degradation, over-cultivation, and overgrazing. Many policies and programs have been formulated and implemented at the national and international levels to address this phenomenon. Programs like afforestation are one of the most effective means of preventing desertification in conjunction with natural landscape elements. Consequently, with the constrained availability of human and ecological resources, there are widespread negative impacts on security. The purpose of this research was to establish the merit and demerit of desertification, to assess the causal factor, and recommend a sustainable method using Natural Landscape Elements (indigenous tree species) in combating drought and desertification, this includes variables of stocking rate, natural mortality, chopping, cutting, grafting and seedling regeneration. The effects of methods of afforestation and reforestation on the promotion of bio-diversity have been investigated. The Stratification Sampling Approach was used for this study. Primary data was compiled using structured interviews. Questionnaires were used to obtain quantitative data from 30 villages in three Local Government Councils of Kano State namely Danbatta, Gabasawa, and Tsanyawa. Secondary data relied on the internet and library research. The major findings of the study include; (i) Anthropological activities are the major determinants of climatic changes; (ii) Climatic changes have notably led to resource scarcities with fundamental effects on various aspects of anthropologic securities in the region of Northern Nigeria; (iii) Climate change served as a key driver of anthropological insecurity. It was also revealed that the government can address the process of desertification using elements for sustainable reforestation projects. It was recommended that while dealing with climate and anthropological changes, global, regional, and national institutions, regimes, and policies be guided by taking into consideration of the broader anthropologic insecurities. Finally, the therapeutic effect using Natural Landscape Elements will serve as the Gap while the Natural Elements is a novelty in the research.

ABSTRAK

Desertification atau kemerosotan tanah adalah masalah alam sekitar yang serius hasil daripada factor sosio-ekonomi yang luar biasa. Zon gersang dan separa gersang di Nigeria utara hari ini terjejas oleh kemerosotan tanah yang terhasil daripada pelbagai faktor, daripada variasi iklim kepada aktiviti antropologi seperti kebakaran belukar, penebangan hutan, pokok renek rumput, dan penebalan pokok, kemerosotan, penanaman berlebihan, dan terlalu banyak aktiviti meragut. Banyak dasar dan program telah digubal dan dilaksanakan di peringkat kebangsaan dan antarabangsa untuk menangani fenomena ini. Program seperti penanaman semula hutan adalah salah satu cara yang paling berkesan untuk mencegah kemerosotan tanah dan mengekalkan unsur-unsur landskap semula jadi. Hasilnya, dengan kekangan sumber manusia dan ekologi yang sedia ada, terdapat kesan negatif yang meluas terhadap keselamatan. Tujuan penyelidikan ini adalah untuk melihat merit dan demerit padang pasir, untuk menilai faktor penyebab, dan mengesyorkan kaedah yang mampan menggunakan unsur-unsur landskap semulajadi (spesies pokok pribumi) dalam memerangi kemarau dan kemerosotan tanah, ini termasuk pembolehkan kadar stok, kematian semula jadi, mencincang, memotong, cantuman dan penjanaan semula jadi. Kesan kaedah penanaman dan penghutanan semula promosi bio-kepelbagaian telah diselidiki. Pendekatan Persampelan Stratification digunakan untuk kajian ini. Data utama telah disusun menggunakan temuduga berstruktur. Borang soal selidik digunakan untuk mendapatkan data kuantitatif daripada 30 kampung di tiga Majlis Kerajaan Tempatan Negeri Kano iaitu Danbatta, Gabasawa, dan Tsanyawa. Data sekunder bergantung kepada penyelidikan internet dan perpustakaan. Penemuan utama kajian ini termasuk; (i) Aktiviti antropologi adalah penentu utama perubahan iklim; (ii) Perubahan iklim telah menyebabkan kekurangan sumber dengan kesan asas ke atas pelbagai aspek sekuriti antropologi di kawasan Nigeria Utara; (iii) Perubahan iklim berfungsi sebagai pemacu utama ketidakselesaian antropologi. Ia juga didedahkan bahawa kerajaan boleh menangani proses kemerosotan tanah menggunakan unsur-unsur untuk projek penghutanan semula yang mampan. Adalah disyorkan bahawa semasa berurusan dengan perubahan iklim dan antropologi, global, serantau, dan institusi kebangsaan, rejim, dan dasar-dasar berpandukan dengan mengambil kira ketidakselesaian antropologi yang lebih luas. Akhirnya, kesan terapeutik menggunakan unsur landskap semulajadi akan berfungsi sebagai jurang manakala Unsur-unsur Semulajadi adalah sesuatu yang baru dalam penyelidikan.

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LIST OF SYMBOLS AND ABBREVIATION**LIST OF SYMBOLS**

ha	Hectare
in	inch
kg	kilogram
km	kilometer
m	Meter
mm	Millimeter
₦	Nigerian Naira (Symbol of Currency)
°C	Degree Celsius
°F	Degree Fahrenheit
°N	Degree North
%	Percentage
R	Roh
\$	United State Dollar



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LIST OF ABBREVIATION

ADB	African Development Bank
ADAP	Adamawa State Development Projects
ADP	Agricultural Development Projects
CFO	Confirmatory Factor Analysis
AP	Afforestation Projects
APCU	Afforestation Programme Coordinating Unit
ATBU	Abubakar Tafawa Balewa University Bauchi
CBO	Community-Based Organisation
CCD	Convention to Combat Desertification
CFA	Communal Forest Area
EA	Environmental Assessment
ECN	Energy Commission of Nigeria
EFA	Exploratory Factor Analysis
ENSO	El Nino/Southern Oscillation
FADE	Fight Against Desert Encroachment
FAO	Food and Agricultural Organisation
FEPA	Federal Environmental Protection Agency
FCT	Federal Capital Territory
FMA	Federal Ministry of Agriculture
FMARD	Federal Ministry of Agriculture and Rural Development
FME	Federal Ministry of Environment
FMWR	Federal Ministry of Water Resources
FORMECU	Federal Management Evaluation and Coordinating Unit
FRMP	Forest Reserved Management Programme
FTF	Forest Trust Fund
GDP	Gross Domestic Product
GEF	Global Environmental Facility

GHG	Green House Gas
GIS	Geographic Information System
GPS	Global Positioning System
IA	Impact Assessment
ICT	Information Communication Technology
IK	Indigenous Knowledge
IPBES	International Science-Policy Platform on Biodiversity and Ecological Services
JICA	Japanese International Cooperation Agency
KNAP	Kano State Afforestation Project
KNARDA	Kano Agricultural and Rural Development Authority
KNMOE	Kano State Ministry of Environment
KSACDP	Katsina State Agricultural and Community Development Project
LEEMP	Local Empowerment and Environmental Management Project
LGA	Local Government Area
LMP	Land Management Practices
LNG	Liquefied Natural Gas
MDG	Millennium Development Goals
MTRMs	Monthly Technology reviewed Meetings
MOU	Memorandum of Understanding
NAEP	National Agricultural Extension Project
NAP	National Action Programme
NAPCD	National Action Programme to Combat Desertification
NARCAP	National Resource Conservation Action Plan
NCCDC	National Coordinating Committee on Desertification Control
NEAZDP	Northeast Arid Zone Development Projects
NEEDS	National Economic Empowerment and Development Strategy
NASA	National Aeronautics and Space Administration

NFAP	Nigerian Forest Action Programme
NGO	Non-Governmental Organisation
NIMET	Nigerian Meteorological Agency
NPC	National Population Commission
OSU	Ohio State University
PAP	Protection Afforestation Programme
PET	Perceptive Evaluation Theory
PHCN	Power Holdings Company of Nigeria
RBDA	River Basin Development Authority
RET	Renewable Energy Technology
SDDA	South Dakota Dental Association
SEAP	State Environmental Action Plan
SEEDS	State Economic Empowerment Development Strategy
SEPA	State Environmental Protection Agency
SEPP	Sokoto Environmental Protection Programme
SFP	State Forestry Programme
SHP	Small Hydro – Power
SPSS	Statistical Package for Social Sciences
UAES	Unifies Agricultural Extension Services
UDU	Usman Danfodio University Sokoto
UN	United Nation
UNN	United Nation News
UNCCD	United Nation Convention to Combat Desertification
UNS	United Nation Secretariat
MAP	Mean Annual Precipitation
UNCED	United Nation Conference on Environmental and Development
UNCOD	United Nation Conference on Desertification
UNDP	United Nation Development Programme
UNEP	United Nation Environmental Programme
UNESCO	United Nations Educational Scientific and Cultural Organization

UNFCCC	United Nation Framework Convention on Climate Change
UNIDO	United Nation Industrial Development Organization
UNIMAID	University of Maiduguri
USD	United State Dollar
USDA	United State Department of Agriculture
USEPA	United State Environmental Protection Agency
USGS	United State Geological Survey
UTHM	Universiti Tun Hussein Onn Malaysia
VEA	Village Extension Agent
WRI	World Resources Institute
YEDA	Yola Electricity Development Agency



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GLOSSARY OF TERMS

Afforestation	The act or process of establishing a forest especially on land not previously forested.
Agriculturalist	Someone concerned with the science or art or business of cultivating the soil.
Agro-Forestry	Cultivated mixtures of trees, crops and/or livestock. And it is also referred to as the combination of the forest.
Anthropogenic	Factors caused by Human activity.
Arid	Lacking moisture especially, having insufficient rainfall to support trees or woody plants.
Biodiversity	Biological diversity in an environment as indicated by numbers of different species of plants and animals.
Biomass	Plants or animal, such as forestry byproducts or agricultural waste, that is used as a fuel or energy source.
Buffer (trees)	Trees that protects, lessens, absorbs, intercept, or moderate the adverse pressure or influence of air into an environment.
Collinear	Lying on the same line, such as a set of points.
Contact Agriculturalists	Farmers that are involved in afforestation projects and are also provided with incentives.
Deforestation	The removal of forest stands by chopping, cutting and burning to provide land for agricultural purposes, residential or industrial building sites, roads, infrastructures, etc.

Descriptive	Relating to or based upon description or classification rather than explanation or prescription.
Desertification	Land degradation in arid, semi-arid and dry sub-humid regions resulting from various factors, including climate variation and human activity.
Desert	Arid and semi-arid land with usually sparse vegetation; such land having a warm climate and receiving less than 25 centimeters (10 inches) of sporadic rainfall annually and where evaporation greatly exceeds precipitation.
Dryland	An area receiving relatively little rainfall, such as a Savanna or prairie, or almost no rainfall at all, such as a desert.
Drought	A period of dryness especially when prolonged that causes extensive damage to crops or prevents their successful growth.
Elements	These are substances that constitute all physical matter – wind, air, fire, or water, or a natural environment.
Erosion	The group of natural processes, including weathering, dissolution and transportation, by which material is worn away from the earth's surface.
Fadama	The Hausa (Ethnic language) name for irrigable land flood plains and low lying areas underlined by shallow aquifers and found along Nigerian Rivers.
Famine	A severe shortage of food, as through crop failure or overpopulation.
Farm Forestry	Land management practice in which farmers cultivate trees in addition to their productive activities in their farms and is adopted on large scale in order to have the greatest impact on both



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	the amelioration of the environment and wood production.
Firewood	Wood grew or used for fuel.
Fixation	The activity of fastening something firmly in position.
Forester	A person who practices forestry. One who engages in broad forest activities such as timber harvesting, ecological restoration, management and protection of forest zones.
Framework	A structural plan or basis of a project. A set of assumptions, concepts, values, and practices that constitutes a way of viewing reality.
Grassland	Area in which the vegetation is dominated by a nearly continuous cover of grasses.
Hammattan	A dried and dusty West African Northeast trade wind. Blowing Southwest from Sahara into the Gulf of Guinea between mid of November to the middle of March.
Herdsmen	A person who breeds rears, or cares for cattle or (rarely) other livestock in the herd.
Inferential	Presumed to be true, or genuine, especially on the inconclusive ground.
Infrastructure	The basic facilities, services and installations needed for the functioning of a community or society, such as transportation and communication systems, water and power lines and public institutions including schools, post offices and prisons.
Irrigation	To supply land with water by artificial means.
Land Degradation	The process of breaking down of sand particles by erosion or weathering.
Livestock husbandry	The scientific control and management of a branch of farming and especially of domestic animals.



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