

**ASSESSMENT OF MUNICIPAL SOLID WASTE UTILIZATION AND GREENHOUSE  
GAS REDUCTION IN SOUTHWESTERN NIGERIA**

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**A THESIS TO BE PRESENTED TO THE DEPARTMENT OF GEOGRAPHY AND  
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PARTIAL FULFILMENT OF DOCTOR OF PHILOSOPHY (Ph.D.) DEGREE IN  
GEOGRAPHY**

## CERTIFICATION

This is to certify that this research work was carried out by OGUNLEYE, Victor Tola and had been read and approved as meeting the requirements of the Department of Geography and Environmental Management, Faculty of Social Sciences University of Ilorin for the award of Doctorate degree (Ph.D.) in Geography and Environmental Management.

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## **DEDICATION**

This thesis is dedicated to Almighty God for his divine protection, good health and provision, may his name be worthy of praise in my life forever.

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## ACRONYMS

**3Rs** = Reduce, Reuse and Recycle

**MSW** =Municipal Solid Waste

**WHO**= World Health Organization

**UNEP**= United Nations Environmental Programmes

**FAO**= Food and Agricultural Organization

**IFCCC** =International Framework Convention on Climate Change

**GHGs**= Greenhouse Gases

**EIPC**=Environmental International Plastic Council

**MEAs**=Multilateral Environmental Agreements

**MDGs**=Millennium Development Goals

**UNESCAP** =United Nations Economic and Social Commission for Asia and the Pacific

**NIMBY**=Not in My Backyard

**UNCRD**=United Nation Centre for Regional Development

**NGOs**=Non-Governmental Organisations

**BBC**=British Broadcasting Corporation

**NPC**=National Population Commission

**SWUM**=Sustainable Waste Utilization and Management

**USEPA**= United States Environmental Protection Agency

**EPR**=Extended Producer Responsibility

**LCA**=Life Cycle Assessment

**UDBN**=Urban Development Bank of Nigeria

**WM**= Waste Management

**NMVOCs**=Non-Methane Volatile Organic Compounds

**SWDS** =Solid Waste Disposal Sites

**IPCC** = Intergovernmental Panel on Climate Change

**FEPA** = Federal Environmental Protection Agency

**NESREA**= National Environmental Standard Regulatory Environmental Agency

**PSP** = Product Stewardship Programme

**ODS** = Ozone Depleting Substances

**SEPA**s = State Environmental Protection Agencies

**UNIDO** = United Nations Industrial Development Organization

**ELPs** = Environmental Legislations and Policies

**ESM** = Environmentally Sound Management

**NEPAD** =New Partnership for Africa's Development

**CSR** = Corporate Social Responsibility

**FGN** = Federal Government of Nigeria

**FA**= Factor Analysis

**OWMA**= Osun Waste Management Agency

**OYOWMA**= Oyo Waste Management Agency

**LAWMA**= Lagos Waste Management Agency

**OSEPA**=.Ogun State Environmental Protection Agency

## ABSTRACT

Landfills and waste dumpsites are major sources of methane, carbon emission and other greenhouse gases (GHGs) within the ecosystem. However, efforts to convert these wastes to useful resource that could mitigate the emission of these gases are still daunting in developing countries particularly in Nigeria. This study assessed the management of solid waste in selected states of Southwestern Nigeria. The objectives of the study were to: (i) estimate the utilization index of solid waste; (ii) identify factors that affect waste utilization; (iii) examine the temporal pattern of waste utilization; (iv) identify differences in the use of virgin resources and waste on GHGs emission; and (v) estimate greenhouse gas emission saved due to the application of Reduce, Reuse and Recycle (3Rs).

Primary and secondary data were used in this study. The primary data were obtained using a structured questionnaire designed on a five-point Likert Scale. Ten recycling plants were purposively sampled in Osun, Oyo, Ogun and Lagos States at 5% level of significant. A total of four hundred copies of the questionnaire were randomly administered to the staff of the recycling plant at forty copies per recycling plants. The secondary data were obtained from the recycling plants inventories and checklist for a period of six years (2012-2017). Also, data were collected on quantity of waste generated and reused from waste management agencies in the selected states. Interviews were also conducted to understand people's perception on GHGs emission due to waste management concept of 3Rs. Both descriptive and inferential methods of data analyses were used. The descriptive methods used include tabulation, simple percentages, mean and standard deviation, while the inferential methods were relative index, multiple regression, factor analysis, trend analysis, two-way Analysis of Variance (ANOVA) and Waste Reduction Model (WARM).

The study finds that:

- i. waste utilization index between 2012 and 2017 varied from 10-29%;
- ii. environmental education, government policy, and benefits derivable from waste utilization accounted for 70.86% of the factors that promoted waste usage;
- iii. there was a reduction of 50.654tons for plastic, 1.912tons for iron, 0.054tons for copper, 0.115tons for aluminum and 0.099tons for steel in waste utilization;
- iv. reused waste was found to conserve more GHGs compared to virgin resource, while a significant difference exists (at  $F=0.021 < P= 0.05$ ) between the virgin and reused resources on GHGs; and
- v. used iron, aluminum, steel, copper and plastic saved 72.5%, 6.2%, 2.0%, 9.8% and 9.5% of the GHGs respectively in the study area.

The study concluded that utilization of waste through integrated waste management of 3Rs contributed to waste and greenhouse gas emission reduction in Southwestern Nigeria. The study recommended the need to intensify efforts on green policy to facilitate optimum utilization of waste.