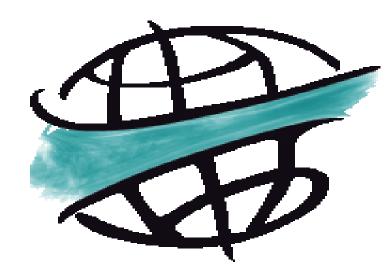
Impact Assessment of Waste-to-Resource Management for Circular Economy and Green Growth Development in Nigeria and Ghana

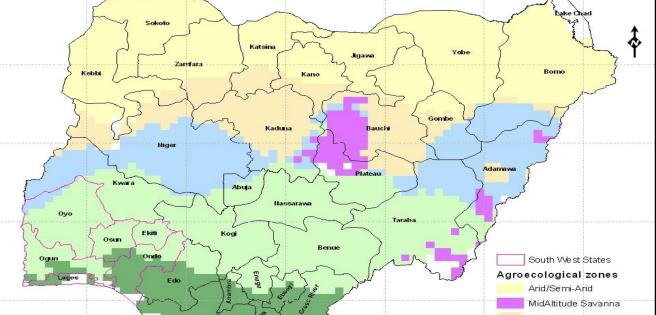


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Introduction and Objective

Poor waste management results in environmental and socioeconomic problems in Nigeria and Ghana. Attempts at managing waste through burning can lead to climate change while landfill leachate reduces soil and ground water quality. Hence, the need to look for better alternative. This research looks at the current challenges in the waste management system in Nigeria and Ghana, as well as proposes a more contemporary system that will move the two Anglophone Countries towards attaining a circular economy. Environmental Kuznets Curve hypothesis provided theoretical framework.



Hewlett Foundation

GIMPA



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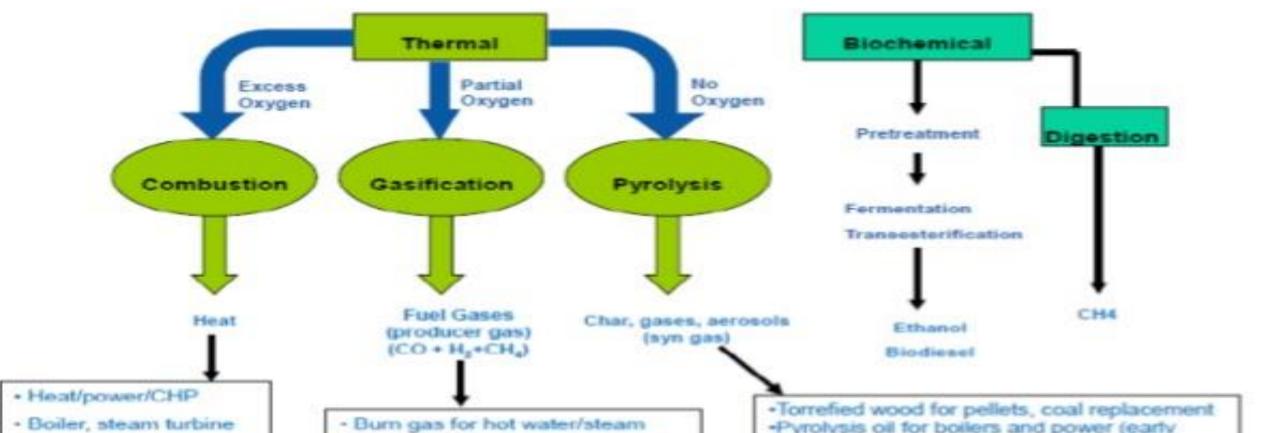
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Figures 3 - 9: Some Landfills & Dumpsites for Waste-to-Resources, Circular Economy+Green Growth>>

Waste-to-Resource Technologies Overview

Figure 10: WTE Technologies Overview

TECHNOLOGIES OVERVIEW



Waste-to-ResourceTOC for Circular Econony+Green Growth & SDGs Realized

THEORY OF CHANGE

DIWA Research Convening

Lack of improved sanitation facilities; poor faecal and organic waste collection, transportation and wisstested; ercergy, iste generation; inadequate organic fertilizer production, lack of treatment of waste water for irrigation; pinaducquate green

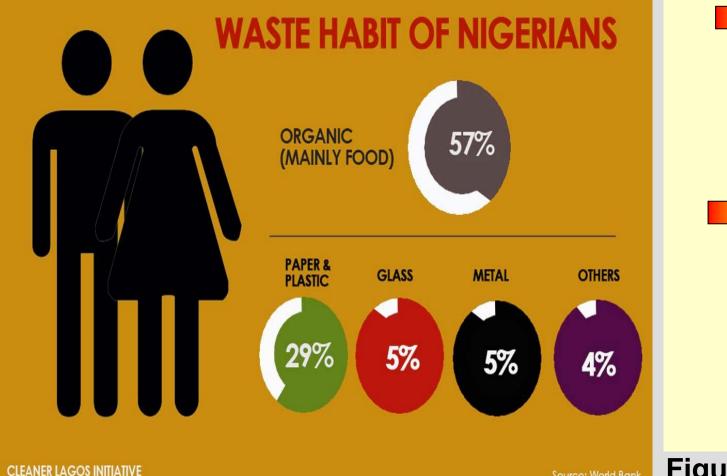
N	Activity	Output	Results	Outcome	Impact
		Improved Sanitary Conditions of	Lowincome Urban	Reduction in disease prevalence due to access to Sanitation facilities	
	Implementation	Markets and SlaughteHouses	Communities benefitting from	Improved hygiene conditions of local population cleaner environment	Health
	of a Waste to	Production of	the Operations an Services of SSG	Quality and adequacy of food enhance through the use of	Food Security
	Energy Factory	for Urban		Improve productivity and income by living&rcheaalthy environment	Increase Income
	Ghana (Ashaima Municipality)		Customers	Reduction in CO2 emissions by generating clean electr biogas instead of fossil fuel	i Environment
		Energy	patronize, bu	Reduction in CO2 emissions by using organic fertilizer synthetic fertilizer	
		Cultivation of	and recycle products	Transportation to collect waste and distribute products decreases	r
		Green Vegetables		Improved soil by the use of organic fertilizer a	Soil Pollution



Results

(commercial)
Use in IC engine for CHP (precommercial)
Catalytic conversion to alcohols, chemicals, synthetic diesel (development) commercial) • Specialty chemicals (commercial) • Further refining for transportation fuels (development)

Waste Challenges & Habits in Nigeria and Ghana (Figure 12)



- Only 28.1% & 41.8% separated waste at source, 46.2% & 58.5% used private collection services in Nigeria and Ghana respectively.
- Major waste management challenges were pollution & health risks (69.1%), limited resources (44.8%), lack of technical skill (23.8%) and inadequate management skill(18.1%).

Figure 6: Waste Challenges & Habit in NG+GH

WTR Model for Circular Economy+Green Growth Dev. (Figure 14)





Figure 11: WTR Theory of Change & Sustainable Development Goals Realized

Source: Figures 1 - 20 : DIWA-Safisana Partners / Own Computation; IITA Nigeria; Internet Impact Assessment of WTR for CE+GG Development: Keynotes & Highlights

- □Anaerobic Digestion => Biogas
 for Renewable Energy
- **Composting => Fertilizer**
- □ Wastewater Treatment (Wetland) => Agri-Business



Figure 15-19: WTR Site & Tech. Process

As part of waste management practices;

- **95.2% & 97.6%** were willing to participate in circular economy,
- **94.3% & 98.1%** supported polluter pays principle,
- 96.2% & 98.5% supported dissemination of public information on Wasteto-Resources in Nigeria and Ghana respectively.
- Waste management challenges significantly influenced health issues and pollution in both Countries (p=0.05).

Materials and Methods

EKC, Energy STAT, Socioeconomic Survey, Sampling & Analyses:

- *k* Environmental Kuznets Curve (EKC) hypothesis provided theoretical framework.
- Purposive sampling of major landfills in Nigeria and Ghana with their waste generation patterns using structured questionnaires (250) on spatial-variation, challenges and prospect of waste management practices were done.
- // The results were validated at expert workshop for key officials within the waste management industry.
- // Data were analysed using descriptive and inferential statistics.

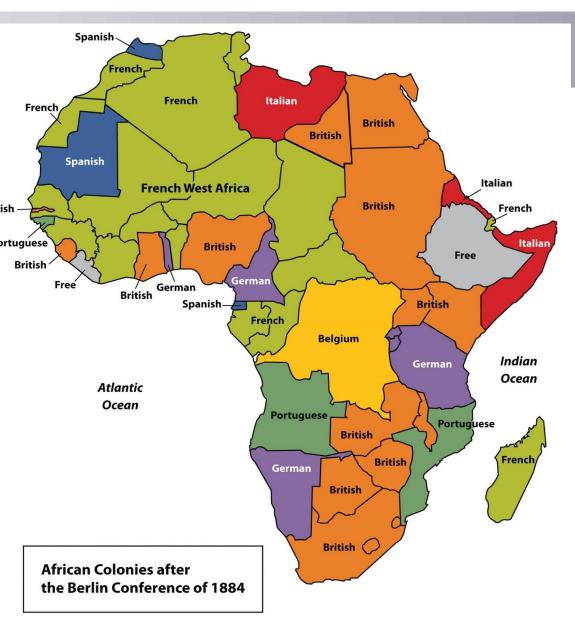


Figure 20: Map of Africa indicating the European Colonial Masters

Conclusions

- A theory of change (TOC) was established to capture the activity, outputs, results, outcomes, impact and the sustainable development goals realised.
- With the implementation of waste-to-resource (WTR) projects in Nigeria and Ghana, some of the outputs are; production of clean energy, improved sanitary conditions of markets and slaughter-houses, production of compost fertilizer for urban agriculture, and cultivation of green vegetables.
- Both Countries are now benefitting from the operations and services of the Pioneers, customers also patronize, buy and recycle products. The impact cut across clean environment, health, food security, increased income and 8 Sustainable Development Goals (SDGs) realization.
- M The government has a role in creating an enabling environment and stimulating demand to sustainably transits from current linear to circular economy (CE) for green growth (GG) development in the West African Countries.