Republic of The Sudan

The Higher Council for Environment and Natural Resources
Nationally Determined Contributions(NDCs)

NDCs Waste Sector Mitigation Report

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1.Introduction

Sudan's waste sector

Climate change caused by greenhouse gas (GHG) emissions in waste sector is annually increasing in Sudan, mainly from anthropogenic sources. The main sources of emissions come from solid waste disposal, open burning of waste and wastewater treatment systems.

The waste sector in the national inventory of Sudan comprises three sources:

1. Solid waste disposal;
2. Incineration and open burning of waste
3. Wastewater treatment and discharge.

The majority of Sudan's population is rural, with an urban population of just 33.2%. Khartoum state represents about 255% of the total population of Sudan. Municipal waste is a real challenge to the environmental and public health. Recently the issue of municipal waste has become a major issue in the environmental degradation in Sudan, in both urban and rural areas. This has its implication on the composition and amount of waste affected by consumption pattern. It could be obviously seen in huge amount of waste scattering inside the town, out skirts and agricultural areas. The situation has been aggravated by the intensive migration towards urban centers. The increased amount of waste could be attributed to:

1. Increased rate of population.
2. Increased rate of urbanization.
3. Absence of municipal proper waste services in most areas of Sudan especially small towns and big village.
4. Absence of national waste management master plan.
5. Poor infrastructure.
6. Lack of finance.
7. Poor legislations.
8. Poor Awareness programs.

Waste management in Sudan is not is not well managed regardless of whether the waste is solid, liquid, industrial or domestic in nature. This has its environmental, health and social impacts. Currently, Solid waste management n collection, transport and treatment

is not well practiced, waste streams are un -segregated, waste collection is not systematic, and solid waste disposal sites are shallow, poorly designed and mostly unmanaged. Most of this collected waste is dumped in shallow, unmanaged landfills with little engineering integrity, with the rest disposed in open, open burning is a common practice within cities. Khartoum state is seriously suffering a problem of solid waste collection and treatment due to the large amount of generated wastes most of it ends up in open dumps and wetlands, contaminating surface and ground water, posing major health hazards. Land filling has started in Sudan since 2008 but not properly engineered, most amount of the region's waste is disposed in open dumps or semi-controlled unlined landfills with no gas collection system, groundwater protection, leach recovery, or treatment systems. 5,100 tons are generated daily in Khartoum state. (Source: Khartoum Cleaning Company)

2.Overview of shares and trends in emissions

Sudan's Waste sector produces mainly CH_4 (89.5%), with smaller amounts of N_2O (9.4%) and CO_2 (1.1%). In 2015 the Waste sector produced 4,005 Gg CO_2e or 3% of Sudan's total GHG emissions. The largest source category is the Solid waste disposal which contributed 80.9% (3,241 Gg CO_2e) towards the total sector emissions.

Waste sector emissions have increased by 19.2% from the 3,359 Gg CO_2e in 2011 (Table 1). Emissions increased steadily between 2011 and 2015 (Figure 1). Emissions from Solid waste increased by 23% between 2011 (2,635 Gg CO_2e) and 2015 (3,241 Gg CO_2e), while emissions from Incineration and open burning of waste and Wastewater treatment and discharge both increased by 13.1% and 5.1% respectively over this period.

Table 1: GHG emissions from Sudan's Waste sector between 2011 and 2015

Source category	Emissions (Gg CO_2e)		Change 2011-2015	
	2011	2015	Diff	%
4. Waste sector	3,359	4,005	646	19.2
4.A Solid waste disposal	2,635	3,241	606	23
4.C Incineration and open burning of waste	38	43	5	13.1
4.D Wastewater treatment and discharge	686	721	35	5.1

Source: Sudan national greenhouse inventory report 2011-2015

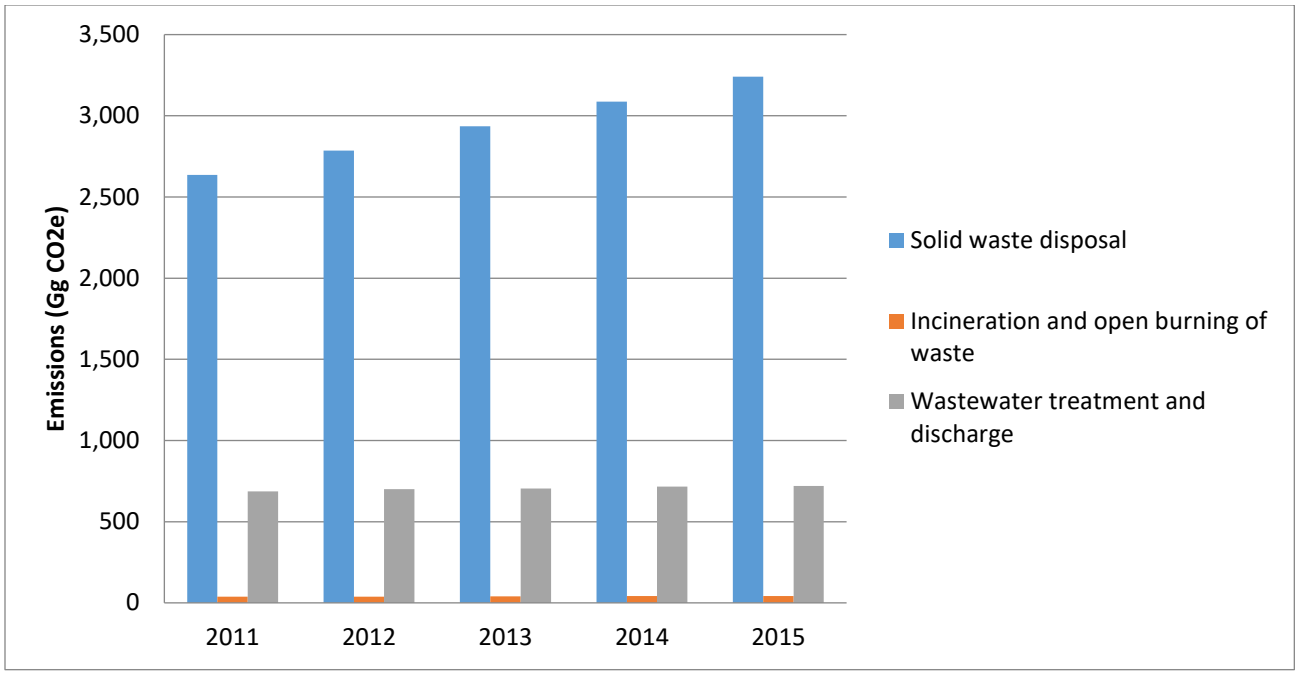

Figure 1: Trend in emissions from Waste sector, 2011–2015

MSW Emission 2020-2025

Year	Waste amount	CH4 Emission	CO2 Emission
2020	12716.2825	157.29382	49.32697
2021	13023.71237	163.75042	50.5195
2022	13337.6858	170.19413	51.73742
2023	13657.61989	176.63514	52.97845
2024	13982.7647	183.08213	54.2397
2025	14312.50891	189.54211	55.5189

3.Legal Framework

Table 2.

4 Law List Related to Waste Management in the Khartoum State

Environmental Protection Act 2001	Environmental Protection Act 2001established environmental interventions to protect the environment at the National level.
The Public Health Act 2008 (PHA)	The Public Health Act 1975 (PHA) created a board in the Ministry of Health which is responsible for proposing plans and general policies regarding environmental health for the country as a whole.
Environmental Health Act 2008 (EHA)	Environmental Health Act 1975(EHA) established district environmental health interventions to protect the environment at the district level. The EHA stresses air, water and soil pollution prevention, and provides for the establishment of an environmental health committee (EHC) at the national level and environmental health committees at provincial level to report on the EHC.
The Industrial Waste Local Order for Khartoum North 1971	This order outlines provisions and conditions for the disposal of industrial waste to central sewerage systems and other wise.
	The order also outlines qualitatively the properties and composition of waste to be disposed to central sewerage and maintenance of industrial waste pretreatment plants, sand and grease interceptors and provides penalties for violation of any of its provisions.
Environmental Protection Law 2008 by Khartoum State Ministry	Environmental Protection Law 2008 by Khartoum State Ministry is enacted to implement the solid waste management at the local level.
Sudanese Standard and Meteorological Organization (SSMO) Standards of pollutants emitted from different industries	In spite of the fact that recently a court for environment was established in Khartoum, nevertheless the current level of the enforcement of the environmental legislation is rather weak, mainly because of the light punishment ensuing from violating laws, lack of supervision, awareness and lack of trained staff.
	It is worth mentioning that according to the adopted regulations waste water irrespective of its quality and treatment it is subjected to should not be disposed into water bodies. This means that waste waters should either be left to evaporate or be treated to a degree that permits its use for irrigation.

From the above attached table we can observe that laws activities governing waste include different levels legislations. Federal laws include Environmental Protection Act 2001, The Public Health Act 2008 (PHA), Environmental Health Act 2008 (EHA), other state leveled legislations including The Industrial Waste Local Order for Khartoum North 1971, Environmental Protection Law 2008 by Khartoum State Ministry and Standards of pollutants emitted from different industries.

Law Enforcement:

Despite the availability of different organizing laws for waste management, still a lot of violations are present in different states of Sudan. This could be attributed to the absence of law enforcement which is very important to achieve clean environment. Moreover waste management needs to have its own specialized laws rather than being included implicitly in other laws.

4.Environmental and Socioeconomic Implications of Waste Sector

5.1 Socio-economic Implications

The increasing amount of waste sector as shown in this report have great implications represented in :

1. Spread of disease vectors.
2. Public health problems.
3. Ugly scenes.
4. Community dissatisfaction.

On the other hand, solid waste may be an effective tool for poverty alleviation, income generation and job creation for poor societies through a systematic plan of recycling. We estimate the revenue of waste recycling at an amount of USD100,000,000 annually. Thus the challenge of solid waste could be changed to an opportunity.

5.2 Environmental Implications

Waste has significant negative impacts on the environment in Sudan which could be summarized as follows:

1. Air, water and soil pollution.
2. Increase of GHG emissions.
3. Threat of biodiversity
4. Deterioration of natural resources.

Solid waste in Sudan is considered as one of the major sectors which has significant contributions in the emission of GHGs. Moreover, solid waste is the major environmental challenge in both urban and rural sectors. It is the major challenge facing both federal and local authorities in Sudan

5. Conclusions and Recommendations:

5.1 Conclusion:

We can conclude that waste in Sudan has significant environmental, health, economic and social impacts. Waste amount is increasing in large amount due to increase of population and changing consumption

pattern and income. This has a direct impact in the increase of GHG emissions which are tremendously increasing according to attached CTU template. Moreover, the weak and improper management of waste in Sudan has aggravated the situation of waste.

5.2 Recommendations

To avoid the negative impacts of waste we recommend an immediate intervention to combat or mitigate GHG emission .Of course waste treatment is a major item using composting, sanitary landfill, wastewater sludge treatment and recycling. These technologies are considered to be applicable and efficient in both GHG mitigation and cost effective. An immediate quick intervention in waste management is highly needed in Sudan.

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