

Environmental Challenges Associated with Poorly Planned Industries: A Case of Somaliland

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Abstract

Somaliland's economy predominantly relies on livestock. This sector has been experiencing various environmental, economic and marketing related challenges. As a result, the industry sector which has long been underinvested, is now recognized by the public for its importance on the country's economic growth. The industrialization process in Somaliland has been rising, and various industries that produce diverse goods and services are established. The industry sector has been impacting on environment and ecological integrity in many areas resulting in land, water, and air pollutions. The major pollutants released by industries, and observed in this study include organic wastes, wastewater, toxic substance, plastic, debris and many more. The lack of industrial zones and poor regulatory systems are important factors to growing environmental challenges associated with industrial operation. The study found that the capacity of the industries in managing waste is very limited in Somaliland due to a number of social, economic and political factors prevalent in the industry sector, and in the country at large. These factors include poor recycling and re-use technology, limited human resource/expertise relating to waste management, poor availability of adequate waste collection and disposal facilities, and most importantly economic limitations in investing in clean technology.

Keywords

Industry, Environment, Pollution, Waste Management, Somaliland

1. Introduction

Industrialization for economic development worldwide triggered transboundary global environmental degradation. While the impacts of industrial activity on the

natural environment are a major concern in developed countries little is known about these impacts in developing countries (Ahuti, 2015). The developing countries experience substantial pollution from industrial activities without due regard to environment. The growing environmental problems in the developing countries are prompted by the intensification of human induced activities on environment, and most importantly the increasing demand of various goods and services that outstrips the available resources and carrying capacity of land. Industrial processes play a major role in the degradation of the global environment.

Environmental pollution remains a major global problem in both developed and developing countries. The industrialization and urbanization which have been on an increase as the population is increasing, have a significant role in the environmental pollutions. Many of the pollutants released by industries such as pesticides, oil, hydrocarbons, heavy metals as well as thermal and radioactive substances get into the environment through emission or indirect releases from industries, agricultural farmlands and domestic wastes (Fathi, 2008).

In industrialized countries, environmental regulation and new technologies are reducing the environmental impact per unit produced, but industrial activities and growing demand are still putting pressure on the environment and the natural resource base. In developing countries, a double environmental effect is occurring: old environmental problems, such as deforestation and soil degradation, remain largely unsolved. At the same time, new problems linked to industrialization are emerging, such as rising greenhouse gas emissions, air and water pollution, growing volumes of waste, desertification and chemicals pollution (Ahuti, 2015).

Industrial effluents carry various types of contaminants such as; metals, organic and inorganic matter, Polycyclic Aromatic Hydrocarbons (PAHs), heavy metals, volatile organic compounds, microorganisms, etc. into the environment especially the aquatic systems (Ho et al., 2012). The complexity of industrial effluents as a result of its various contaminants makes it quite impossible to carry out a hazard assessment based on the chemical analysis (El-Shahaby, 2003).

The indiscriminate handling and release of industrial effluents that encompasses various contaminants into surrounding terrestrial or aquatic habitat have been implicated as one of the major sources of environmental pollution. As many countries in both developed and developing countries perpetuate an economic development agenda, unsustainable industrial growth is encouraged which in turn results in a broad array of environmental, social, and health problems if not managed through an environmentally friendly and socially acceptable manner. The effects of industrial effluents are largely seen in developing countries where there is poor management and handling of effluents released by industries.

The industry sector of Somaliland has grown with various industries established across the regions of the country which produce various goods and ser-

vices to the public. However, there have been growing social, economic and environmental implications resulting from industrial operations. The study reinforces the need to integrate sustainable development into expansion of industry sector in Somaliland while mitigating the impact of these industrial operations on environment particularly various environmental receptors such as land, water and ecology in general, the implications of industrial wastes, and possible strategies that can be put in place to counteract pollutions associated with poorly planned industries.

2. Literature Review

Due to industrial pollution, various issues like global warming, ozone depletion, ocean and land pollution, natural resource degradation, rising sea level, poisoned air, and food contaminated with pesticides are serious threats regionally and globally. Due to the advancement of science and technology, the industrial revolution emerged. However, the industrial revolution has also generated industrial pollution. With the advancement in industrial sectors, pollution becomes an ever-growing phenomenon, which needs to be addressed on urgent basis. Industrial pollution not only affects biotic component but also a-biotic component of the environment (Shah, Manzoor, & Asim, 2021).

Environmental pollution by different types of industries occurs in different forms but can usually be thought of as gaseous and particulate pollutants that are discharged from different industries and become part of the earth's atmosphere (Kabir et al., 2020).

Industrial pollution is a serious problem affecting the quality of other environmental resources as well as the human-made structures and services in the given area. Polluted air of industrial area can harm resources in different manners depending on the toxicity of the pollutant, environmental conditions and the nature or depending sensitivity of resources (Kabir et al., 2020).

The gaseous pollutants that contribute air pollution include Sulphur dioxide (SO₂), nitrogen dioxides (NO₂), ozone (O₃), carbon monoxide (CO), hydrogen sulfide (H₂S). These pollutants released from large industries like cement industry, power plant, manufacturing, smelters, and refineries. These are the primary source of environmental damage and cause many respiratory disorders in human (Sunday, 2004).

3. Method and Materials Used

The study focused on four districts in Somaliland of which most light industries are situated. These districts are Borama, Hargeisa, Berbera and Buroa. The study employed mixed approaches in data collection. Key informant interviews are being used with purposely selected respondents focusing on workers in the industry sector, government officials, and members of the community who live in surrounding environment of an operating industries. The data obtained for research purposes, and also review made from secondary data sourced from gov-

ernment reports and published papers.

4. Results and Discussions

4.1. Industry Sector in Somaliland

The industry sector is at embryonic stage in Somaliland, and there is a gap in having substantive statistical data on contribution of industry sector to growth domestic product of the country, however, stakeholders in industry sector confirmed significant contribution of Industry sector to country's economic growth. The industries in Somaliland are predominantly light industries, majorly producing consumer-oriented goods. Most industries are situated in Hargeisa, Borama, and Buroa districts. **Figure 1** shows the percentage distribution of industries situated in the major districts.

Water, milk, beverages, soap, shampoo, detergent powder, and construction materials are major products produced by the industries in Somaliland. There are small light industries that produce crafts, bags, and locally made shoes. The geographical locations situated and the waste management capacity of industries established are important factors with regards to pollutions from manufacturing process. Industries are not situated in a safe industrial zone. Some of them are located in residential areas, others in unsuitable locations including market places. This is due to the lack of effective land use policy at both national and municipal levels.

4.2. Planning and Development of Industrial Zones/Parks

The proper planning and development of industrial zones and parks remains an important aspect for environmental safeguarding, sustainability of natural resources, and better economic function. Industrial parks notably offer opportunities for the sustainable use of lowcarbon energy and for shared infrastructure, energy planning and management are becoming increasingly prominent components of industrial park planning and development (UNIDO, 2019).

The officials interviewed confirmed that there are no industrial zones or parks

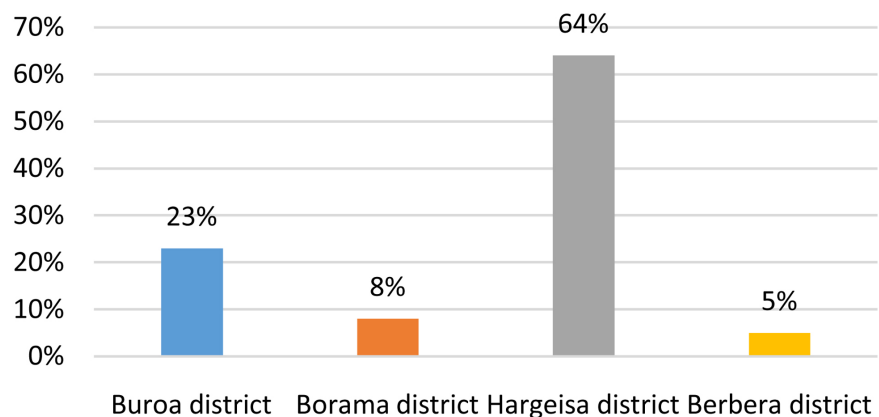


Figure 1. Industrial distribution in major cities in Somaliland. Source: MoII, 2018.

allocated and propositioned with clear demarcations and land use options in Somaliland. Factories are established with no clear management guideline at municipal and national levels, and land acquisition is mostly speckled by commercial purposes, with limited consideration of long-term environmental, social and economic implications. The absence of effective land use plan, and land use policy at national and district levels, and limited political commitment are an important factors that impede the process and development of industrial zones.

The planning of an industrial zone should focus on integrated environmental management, utilities and inclusive social infrastructure; flexibility in designing the built environment; synergies of colocation, circularity and industrial symbiosis; mixed land use; enhancing physical connectivity to adjacent communities and regions; use of renewable energy sources and energy conservation; and Phasing of the project (UNIDO, 2019).

4.3. Major Environmental Concerns in Industrial Operation

Environmental degradation is the result of the dynamic interplay of socio-economic, institutional and technological activities. The observable environmental challenges from industry sector in Somaliland include water, land, and air pollutions. These environmental problems are concerned by the community, are they are part and parcel of broader socio-cultural and environmental impacts resulting from the industrial process.

These pollutions are intensified by lack of regulatory frameworks and procedures, and most importantly the absence of pre-studies on the foreseen environmental and social impacts from manufacturing process.

4.3.1. Industry Pollution in Water Resource

Water pollution is very critical since water is relied on by all life forms both human, animal and plants. There are industries situated in water bodies and water ways. This has been widely seen in the areas that have water potential. Industries that consume a large amount of water always prefer to be much closer to the water point, and in turn, they release a large amount of discharge. The more the industries consume a large amount of water, the more the discharge will increase.

Leather processing factory was situated in seasonal watercourse in Laasgeel under Hargiesa district which created pollution.

As mentioned by the community there are cases of illness of both human and animal attributed to pollutions experienced. However, this needs further study to scientifically explore the links between cases of illness reported and pollutions experienced.

There are notable economic and technological circumstances that contribute industries to be situated in water potential areas. Organic wastes, pesticide residues, solvents materials, sludge, and wastewater and other pollutants are among wastes released by industries. The wastewater discharged by industries normally have different temperatures, and this changes natural temperature of receiving

water. The pollutants increase as they move through different food chain, creating magnification of the pollutants in the ecosystem, hence greater impact on ecology, environment and human health.

4.3.2. Impact of Industrial Pollutions on Land

Many industries in Somaliland, indiscriminately release their waste to the surrounding environment. The released waste makes contact with soil, and it causes a change in the natural condition of the soil, affecting the quality and pH of the soil. This will also impede the microbial and plant growth, and ultimately ecosystem at large scale. According to work of *Mura et al. (2013)*, when the effluent or sludge (as the case may be) contains toxic materials and heavy metals, they immediately become part of the soil; when these toxic materials and heavy metals become ionized (i.e. in soluble form), they could be picked by the root of the plant and bioaccumulation in the tissues of the plant.

Figures 2-4 shows different waste materials discharged by industries in the sites visited. These wastes will create detrimental impacts in the environment particularly land and soil if not properly disposed of.



Figure 2. Solid wastes products containing residual of chemical stored in an industry site, Hargeisa.



Figure 3. Sludge, plastic sheet, cartoons and chemical materials released into open land by mattress manufacturing factory, Borama.



Figure 4. Empty barrels from mattress manufacturing factory, Borama.

The disruption of nature system in the land through dumping of both solid and liquid wastes can also have greater impact on land quality in terms of economic efficiency and physical aspects.

The water and land pollutions experienced as result of indiscriminate dumping of wastes into water bodies and land, or improper management of industrial effluents stems from the greater impact on life in water and land. The released effluents will change the quality of water, dissolved oxygen, and pH and this will impact aquatic life. The pollutants will create vicious cycle problems in the ecological system through bioaccumulation and biomagnification processes that take place when the pollutants are transferred through food chains, and through different ecosystems.

4.3.3. Impact on Air Pollution

Due to increase of human population, and the need to provide adequate food supply, this encourages the food producing industries to double the production, resulting in increased the consumption of fossil fuels, and in turn the release of greenhouse gases into the atmosphere. Also the greenhouse gases are emitted by industries pollutes both air and water through both biological and chemical processes.

Effluent especially when it contains high biological oxygen demand and other organic pollutants tends to give off a foul smell. This worsens when the waste is not properly dosed with the required oxygen to effectively digest the complex organic matter to a simpler form. Disgusting gases like hydrogen sulphide (H_2S), cyanide (CN) among others are very notorious in this regard. With the uncontrolled release of effluent/wastewater, the undesirable foul smell could become a threat to the inhabitants of such locality (Ghosh, 2002).

The industries in Somaliland do not generate large amounts of emissions. However, the continuous exposure of the air contaminants including dust particulates for a long period of time may result in serious health problems to both workers and the surrounding community.

4.4. Challenges for Effective Management of Industrial Wastes

The study has found that the capacity of the industries in managing wastes is

very limited due to a number of social, economic and political factors prevalent in the industry sector and the country at large. The major challenges faced by different types of industries in managing wastes include poor recycling and re-use technology, limited human resource/expertise, poor availability of adequate waste collection and disposal facilities, and most importantly economic limitations in investing in clean technology. The clean product technology that minimizes the amount of wastes generated through less input resources (water, energy, raw material) are largely not adopted by industries that operate in Somaliland. The use of technologies that are not resource-friendly demands large amounts of input-resources to produce goods and services. The perpetuations of this will stress the sustainability of vital resources include water which already stressed by the recurrent droughts, climate change, and growing aridity in country and region.

Additionally, the environmental governance and institutional system in place are important factors that determine effectiveness of waste management at industry, municipal and national levels.

5. Conclusion

The industries in Somaliland have several impacts on the environment particularly land, water, air and ecology due to the release of different wastes/chemicals to the environment including wastewater, organic substances, material wastes, solvent, chemicals and other substances.

The waste management capacity of the industries that operate in Somaliland is poor due to economic, social, legislative and technical factors that are existing in the industry sector and country at large. Limited technology in waste management and recycling, absence of technical expertise related to waste management at industrial level, and poor regulatory systems from the government are also important challenges faced.

Wastes released by industries are manageable as the sector is at a developing stage. This needs corrective and pre-emptive measures to be taken stringently and smartly by all operating industries to counteract the environmental and social impact of their operations, and operationalize systems and policies for effective waste management.

6. Recommendations

Regulatory system should be put in place to oversee and administer the industrial operations in order to keep their manufacturing process within the environmental, socially and economically desired outcome.

Industrial communities should adopt and use clean product mechanisms, and use recycling technologies to reduce wastes generated, or at least keep the wastes at an acceptable level.

The government should allocate industrial zones across all districts, and all types of industries have to be located in these zones. The zone should meet en-

vironmental, social and economic aspirations of the community, and there must be a guideline followed.

The existing laws and policies concerning waste management and environment conservation should be improved, enforced and thoroughly disseminated to stakeholders in industry and manufacturing sectors.

The Government should provide incentives and support to the industrial community towards proper management of wastes through tax exemptions and subsidies.

The Government should support the industrial community in engaging with regional and international partners to cooperate on areas of green economy and sustainable development.

The Government should make mandatory to industries to submit waste management plans before licensed.

Local Governments have to enforce the segregation of wastes for efficient management.

7. Further Research

There is a high need to conduct further research on various wastes generated by the industries, and possible technology that can be used to mitigate or manage these wastes at an acceptable level. The analysis has to be made of all chemical and toxic substances from different industries case by case to quantify and measure their impacts and develop technological solutions accordingly.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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